TITLE 13. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE CLEAN FUELS OUTLET REGULATION

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adoption of amendments to the Clean Fuels Outlet Regulation.

DATE: January 26, 2012

TIME: 9:00 a.m.

PLACE: Metropolitan Water District Offices
700 North Alameda Street
Los Angeles, California 90012-2944

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., January 26, 2012, and will continue at 8:30 a.m., on January 27, 2012. This item may not be considered until January 27, 2012. Please consult the agenda for the hearing, which will be available at least 10 days before January 26, 2012, to determine the day on which this item will be considered.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendments to California Code of Regulations, title 13, sections 2300, 2302, 2303, 2303.5, 2304, 2307, 2308, 2309, 2311, 2311.5, 2312, 2313, 2314, 2315 and 2318; repeal of sections 2306, 2310, 2316 and 2317; and proposed adoption of section 2306.1., and the incorporated "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles," adopted August 5, 1999, as last amended September 27, 2010, which are undergoing amendments pursuant to the LEV III regulatory amendments being considered at the January 26, 2012 hearing.

Background:

The existing Clean Fuels Outlet (CFO) regulation requires that certain owner/lessors of retail gasoline stations equip an appropriate number of their stations with clean alternative fuels. The regulation does not require retail CFOs until the number of alternative fuel vehicles projected to be certified on that fuel reaches 20,000 statewide in a given year.

Proposed Regulatory Action: Amendments to the CFO regulation are being proposed to address the gap in hydrogen fueling infrastructure that may occur when the number of government-funded and other hydrogen stations are not adequate to meet fuel demands of growing numbers of fuel cell vehicles (FCV) that automakers are producing to comply with the Zero Emission Vehicle mandate. The proposed amendments to the CFO Regulation include:

- Changing the types of alternative fuel vehicles (AFV) captured under the regulation from those certified as low emission AFVs to only those certified as zero emission vehicles. At first the regulation as amended would only pertain to hydrogen and FCVs. Plug-in electric vehicles are addressed in the proposed changes by adding a regulatory review followed by recommendations for further actions.

- Changing the regulated party from owner/lessors of retail gasoline outlets to major refiner/importers of gasoline, and modifying how new CFOs are allocated among the regulated parties.

- Increasing from two to three years the FCV reporting requirements and compliance timeframe to provide regulated parties with more time to plan for and build hydrogen stations.

- Adding a 10,000 vehicle activation trigger that would apply to an air basin before the statewide trigger of 20,000 is reached to complement auto manufacturers' early commercialization plans to market FCVs in regional clusters.

- Streamlining the compliance requirements so that they are less prescriptive and more like performance standards, giving regulated parties the flexibility to determine how best to meet the minimum requirements.

- Adding a penalty provision for auto manufacturers if they deliver less than 80 percent of their projected number of FCVs.

- Sunsetting the regulation when the number of CFOs equals 5 percent of the total number of retail gasoline outlets (the existing regulation sunsets at 10 percent).

The proposed changes would have the effect of requiring the construction of public hydrogen stations in geographic areas where automakers are marketing their FCVs.

ARB is currently engaging with energy companies, fuel providers and auto manufacturers in the development of a memorandum of agreement (MOA) to secure the resources needed to ensure that hydrogen fueling stations are built and operated when and where they are needed to support early fuel cell vehicle deployments. If the resources are committed in a timely manner, implementation of the provisions of the proposed regulation may not be necessary.

These amendments, part of the Advanced Clean Cars regulatory proposals to be heard as a package on the same day, thus address multiple pollutant types in the context of California's passenger motor vehicle program as a whole.

COMPARABLE FEDERAL REGULATIONS

There are no comparable federal regulations.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action, which includes a summary of the economic and environmental impacts of the proposal. The report is entitled: 2012 Proposed Amendments to the Clean Fuels Outlet Regulation.

Copies of the ISOR and the full text of the proposed regulatory language, in underline and strikeout format to allow for comparison with the existing regulations, may be accessed on ARB's website listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990, on **December 7, 2012.**

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on ARB's website listed below.

Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Ms. Leslie Goodbody, Air Pollution Specialist, ZEV Infrastructure Section, (916) 323-2961 and Mr. Gerhard Achtelik, Manager, ZEV Infrastructure Section, (916) 323-8973.

Further, the agency representative and designated back-up contact persons, to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Ms. Lori Andreoni, Manager, Board Administration and Regulatory Coordination Unit, (916) 322-4011, or Ms. Amy Whiting, Regulations Coordinator, (916) 322-6533. The Board staff has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the ISOR and all subsequent regulatory documents, including the FSOR, when completed, are available on ARB's website for this rulemaking at http://www.arb.ca.gov/regact/2012/cfo2012/cfo2012.htm

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulations are presented below.

Pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed regulatory action would not create costs or savings to any State agency or in federal funding to the State, costs or mandate to any local agency or school district, whether or not reimbursable by the State pursuant to Government Code, title 2, division 4, part 7 (commencing with section 17500), or other nondiscretionary cost or savings to State or local agencies.

In developing this regulatory proposal, ARB staff evaluated the potential economic impacts on representative private persons or businesses. As detailed in the ISOR and Form 399, ARB staff believes businesses required to comply with this regulation would incur costs associated with installing and operating hydrogen fueling stations but would likely recoup any costs through the sale of fuel to drivers of hydrogen fuel cell vehicles. Additionally, a private person who owns or leases a FCV and purchases hydrogen fuel may be impacted positively or negatively depending on hydrogen price. If hydrogen is priced higher on a miles-per-gallon gasoline-equivalent basis, private persons would pay more for fuel compared to gasoline. Alternatively, if hydrogen is priced lower, private persons would pay less compared to gasoline.

The Executive Officer has made an initial determination that the proposed regulatory action would not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons. Staff expects the proposed amendments to increase jobs associated with station construction, hydrogen production, hydrogen delivery, station operation and maintenance. However, job losses may include those associated with the production, delivery and retail sale of gasoline.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action would affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California. An assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

The Executive Officer has also determined, pursuant to California Code of Regulations, title 1, section 4, that the proposed regulatory action would not affect small businesses because the regulated parties, major refiner/importers of gasoline, and major automobile manufacturers do not fall under the category of "small business." However, small businesses engaged in station construction, operation and maintenance, and fuel delivery would benefit from this regulation as discussed above.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements of the regulation which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the Board, or that has otherwise been identified and brought to the attention of the Board, would be more effective in carrying out the purpose for which the action is proposed, or would be as effective and less burdensome to affected private persons than the proposed action.

ENVIRONMENTAL ANALYSIS

In accordance with ARB's certified regulatory program, California Code of Regulations, title 17, sections 60006 through 60007, and the California Environmental Quality Act, Public Resources Code section 21080.5, ARB has conducted an analysis of the potential for significant adverse and beneficial environmental impacts associated with the proposed regulatory action. The environmental analysis of the proposed regulatory action can be found in Appendix B of the ISOR.

SUBMITTAL OF COMMENTS

Interested members of the public may also present comments orally or in writing at the meeting, and comments may be submitted by postal mail or by electronic submittal before the meeting. The public comment period for this regulatory action will begin on **December 12, 2011**. To be considered by the Board, written comments, not physically submitted at the meeting, must be submitted on or after **December 12, 2011**, and received no later than **12:00 noon on January 25, 2012**, and must be addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

You can sign up online in advance to speak at the Board meeting when you submit an electronic board item comment. For more information go to: http://www.arb.ca.gov/board/online-signup.htm.

Please note that under the California Public Records Act (Gov. Code, § 6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request.

ARB requests that written and email statements on this item be filed at least 10 days prior to the hearing so that ARB staff and Board members have additional time to consider each comment. The Board encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

Additionally, the Board requests but does not require that persons who submit written comments to the Board reference the title of the proposal in their comments to facilitate review.

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under the authority granted in Health and Safety Code, sections 39600, 39601, 39667, 43013, 43018 and 43101; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). This action is proposed to implement, interpret, and make specific sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Government Code, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340).

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non-substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice and that the regulatory language as modified could result from the proposed regulatory action; in such event, the full regulatory text, with the modifications clearly indicated, will be made available to the public, for written comment, at least 15-days before it is adopted.

The public may request a copy of the modified regulatory text from ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990.

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format or another language; or
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at 916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia.
- Documentos disponibles en un formato alterno u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date: November 29, 2011

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.arb.ca.gov.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS

ADVANCED CLEAN CARS

2012 PROPOSED AMENDMENTS TO THE

CLEAN FUELS OUTLET REGULATION

This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

Date of Release: December 8, 2011

Scheduled for Consideration: January 26-27, 2012

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Executive Summary

Continuing its leadership role in the development of innovative and ground breaking emission control programs and to achieve California's goals of meeting ambient air quality standards and reducing climate changing greenhouse gas emissions, ARB has developed the Advanced Clean Cars (ACC) program. The ACC program combines the control of smog-causing pollutants and greenhouse gas emissions into a single coordinated package of requirements for model years 2015 through 2025 and assures the development of environmentally superior cars that will continue to deliver the performance, utility and safety car owners have come to expect. The Zero Emission Vehicle (ZEV) regulation will act as the technology forcing piece of the ACC program, pushing manufacturers to produce ZEVs and plug-in hybrid electric vehicles (PHEVs) in the 2018 through 2025 model years. In addition, the ACC program also includes amendments to Clean Fuels Outlet (CFO) requirements (with amendments proposed herein) that will assure that ultra-clean fuels such as hydrogen are available to meet vehicle demands brought on by amendments to the ZEV regulation.

Beyond 2025, the driving force for lower emissions will be primarily climate change. In order to meet our 2050 GHG goal, the new vehicle fleet will need to be primarily composed of advanced technology vehicles such as electric and fuel cell vehicles by 2035 in order to assure sufficient fleet turnover. Accordingly, the ACC program coordinates the goals of the Low emission Vehicle (LEV), ZEV, and CFO programs in order to lay the foundation for commercialization and support of ultra-clean vehicles. A more complete description of the impacts and benefits of the ACC can be found in the LEV staff report, including in its Executive Summary.

The current CFO regulation requires the construction and operation of alternative fuel outlets for a particular fuel when there are 20,000 alternative fuel vehicles (AFVs) using that fuel. Coordinating the development of alternative fuel infrastructure with AFV deployment is critically important to the successful commercialization of both. This is especially true for ZEVs, specifically hydrogen fuel cell vehicles, where customers rely solely on publically available fuel to use their vehicles. Without fueling stations, hydrogen fuel cell vehicles cannot be sold.

With the proposed changes, to the CFO regulation would:

- Apply only to zero emission vehicles (ZEVs) and ZEV fuels. Staff is proposing to change the types of AFVs subject to the regulation from all AFVs certified as low emission vehicles to only those certified as ZEVs when operating on the designated clean fuel.

- Add a regulatory review for plug-in electric vehicles. Electricity is currently excluded from the definition of a designated clean fuel in the regulation. Staff is proposing to add regulatory language that requires ARB to evaluate the development and usage of workplace and public charging infrastructure, and make recommendations for further actions two years following adoption of the regulation.

- Change the regulated party to be the major producer/importers of gasoline. California's seven major petroleum companies supply 93 percent of the gasoline consumed in California, while owning only 13% of the retail gasoline outlets. Changing the regulated party from owner/lessors of retail gasoline outlets to "major refiner/importers of gasoline," evenly spreads the requirement to build CFOs among the parties that continue to benefit financially from California's use of gasoline.

- Modify calculations for determining the number of new CFOs and allocating responsibility among the regulated parties. Staff is proposing to modify how the number of required CFOs is calculated to account for the fuel requirements of hydrogen and FCVs. When determining how many CFOs each regulated party is responsible for, the proposed changes include allocating stations among each regulated party based on their share of the gasoline market, rather than the number of gasoline outlets each owns.

- Add a year to both fuel cell vehicle reporting requirements and the compliance timeframe. Staff is proposing to modify the AFV reporting requirements to make auto manufacturers report FCV production plans three model years into the future (the current requirement is two) and provide FCV placement numbers by air basin. This provides the regulated party with an additional year to locate, permit, and build CFOs.

- Add a lower regional activation trigger. Staff is proposing to add a 10,000 vehicle activation trigger that would apply to an air basin before the statewide trigger of 20,000 is reached. The lower trigger complements auto manufacturers' early commercialization plans to market FCVs in regional clusters.

- Streamline the compliance requirements. The proposed amendments include modifying the compliance requirements to be less prescriptive and more like performance standards, giving the regulated party the flexibility to determine how best to meet the minimum requirements. Hydrogen infrastructure can be placed at an existing gasoline station or at a freestanding site.

- Add a penalty provision for auto manufacturers. Since the number of required CFOs is driven by auto manufacturer projections of sales and leases, staff is proposing to add a penalty that could be assessed to automakers that deliver less than 80 percent of their projected number of FCVs.

- Lower the regulation sunset provision. Under the current regulation, the requirement to build CFOs ceases when the total number outlets offering a particular clean fuel equals ten percent of the total number of retail gasoline outlets. Staff is proposing to reduce this provision to five percent based on findings that hydrogen fueling infrastructure can achieve commercial viability at five percent saturation and, therefore, a mandate would no longer be necessary.

Projected environmental impacts associated with this regulation will be minimal if any. The fueling stations will be located close to where the vehicles are operated, and the lower emissions of the vehicles will dominate any increased emissions associated with providing the fuel to the station.

The anticipated economic impacts of the regulation will mainly be felt during the onset, when hydrogen stations are not anticipated to be fully utilized. As station utilization improves due to increased consumer acceptance of FCV technology and confidence in fuel availability, the cost to dispense hydrogen will decrease. Staff projects that, with high station utilization, fuel providers will be able to sell hydrogen at an affordable price and realize a return on their investment within three to four years.

Offering hydrogen fuel in convenient commercial settings is critical to the successful launch of zero emission vehicles, which will contribute to achieving clean air and be the cornerstone of achieving climate change emission reduction goals.

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I. Introduction and Background

The Clean Fuels Outlet (CFO) regulation, contained in Title 13, California Code of Regulations (CCR) sections 2300-2318, was originally adopted in a 1990-1991 rulemaking and became effective in September 1991. The CFO Rulemaking was an integral part of the 1990 Low Emission Vehicle (LEV) regulation because of the expectation that clean alternative fuels would play a key role in enabling automobile manufacturers to certify vehicles to LEV standards, which were considered challenging at the time. The CFO requires the development of alternative fuel outlets that coincide with the market launch of alternative fuel vehicles (AFVs), ensuring the viability of selling AFVs in the marketplace.

The CFO regulation was amended in 2000 primarily to: 1) account for fleet vehicles and the availability of private fleet fueling infrastructure; 2) allow for more existing public and private alternative fueling facilities to qualify for compliance with the regulation; and 3) add a sunset provision.

To date, the CFO regulation has not been used to require the building of alternative fueling infrastructure. With the advancement of vehicle emission control technologies and cleaner burning gasoline formulations, vehicles have been able to meet emission requirements far lower than LEV standards without using alternative fuels. However, conventional fuels and vehicles are not sufficient to meet California's zero emission vehicle (ZEV) standards, which today can only be achieved through electric drive vehicles fueled with either electricity or hydrogen. While the lack of abundant public changing infrastructure does not currently appear to be hindering auto manufacturers deployment of battery electric vehicles (BEVs), well-placed and accessible public hydrogen fueling infrastructure is a necessary prerequisite to the success and commercialization of fuel cell vehicles (FCVs) that operate on compressed hydrogen gas.

Today, the larger auto manufacturers are focusing on both BEVs and FCVs to meet their future ZEV requirements, while counting on hydrogen fueling infrastructure advancing with (or ahead of) their deployment of FCVs. While early demonstration programs and government funding are helping advance hydrogen fueling technology development and station commercialization, public funding in its current form[1] alone is insufficient to meet increasing demand for hydrogen, bring hydrogen infrastructure to the point of commercial viability, and create a business case that encourages private investment. Public hydrogen fueling infrastructure available to today's FCV drivers is

[1] To date, government funding has provided grants to cover the majority of capital equipment and installation costs for hydrogen stations (see Section I B 1).

minimal, causing automakers to limit the number of FCVs they release.[2] In the near future, ARB estimates that government funding allocated for hydrogen infrastructure could meet the fueling needs of up to 7000 to 9000 FCVs but, after that, there is no guarantee of continued government funding for infrastructure or that infrastructure will grow on its own. This uncertainty has left auto manufacturers in limbo as they try to plan ahead how they will meet their ZEV requirements. Acknowledging how this uncertainty affects the ZEV regulation as a whole, the board directed staff to explore options to spur hydrogen infrastructure with one option being "mandating hydrogen through modifications to existing regulations or through a new regulation."[3]

Staff is responding to this directive by recommending modifications to the existing CFO regulation. To support development of the Clean Fuels Outlet Regulation, beginning in April 2010, ARB staff held three public workshops to engage stakeholders and to get input on the proposed regulations. These stakeholders primarily included representatives from the petroleum industry, trade associations for the petroleum industry, automobile manufacturers, alternative fuel station developers and fuel providers, and environmental and clean transportation advocacy groups.

These workshops were held at the Cal EPA Building in Sacramento. The announcements and materials for these workshops were posted on the ARB website and distributed through a list serve that included over 740 recipients. Each workshop attracted just over 50 attendees in person. Almost all of the meetings were either telecast, webcasted or available by teleconference. The dates and materials presented at the workshops are available on the ARB website http://www.arb.ca.gov/fuels/altfuels/cf-outlets/cf-outlets.htm.[4] The ARB staff has also participated in 30 individual meetings with various stakeholders, supported by numerous individual telephone calls.

The following sections include a summary of the existing regulation and an update on the status of alternative fuel vehicles and infrastructure, including policies, regulations, and incentives affecting alternative fuels and vehicles in California. Proposed changes to the CFO regulation are included in Section II, and other alternatives are discussed, followed by analyses of the environmental and economic impacts of the proposed regulatory changes.

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[2] NYT, 2011. New York Times article. Motavalli, Jim. "In U.S., Hydrogen Cars May Line Up With Few Places to Fill Up." Dec. 6, 2011.
[3] ARB, 2009a. California Air Resources Board. Resolution 09-66, December 9, 2009.
[4] The dates and materials from the ARB workshops are presented at: http://www.arb.ca.gov/fuels/altfuels/cf-outlets/cf-outlets.htm

A. Existing Regulation

The CFO program, adopted in the early 1990s, is unique in its structure and requirements. The following section briefly describes the main elements of the current regulation in order to provide context for the proposed changes.

The current regulation requires that certain owner/lessors of retail gasoline stations equip an appropriate number of their stations with clean alternative fuels. The regulation does not require establishing retail outlets for a designated clean fuel until the number of designated clean fuel vehicles projected to be sold using that fuel reaches 20,000 in a given year. If, after applying the fleet discount per section 2303.5(a)(2), the projected number of vehicles for a given year is 20,000 or greater, the regulations specify a formula for determining the number of new clean fuel outlets required (section 2304).

1. The Regulated Party

The regulation applies to the larger owner/lessors of operating retail gasoline outlets (i.e., those who own a minimum number of retail gasoline outlets), and that minimum number is calculated each year pursuant to Section 2306 of the regulation. The franchisor, refiner or distributor is considered the "owner/lessor" if it owns, leases or controls the retail outlet. Otherwise the actual retail outlet owner is the "owner/lessor."

2. Designated Clean Fuels and Designated Clean Fuel Vehicles

The regulation pertains to designated clean fuels used in low emission vehicles. This includes dedicated clean fuel vehicles that are designed to be operated solely on the designated clean fuel, as well as flex-fuel and dual-fuel vehicles that are capable of operating on gasoline and the designated clean fuel. Only those vehicles certified to LEV standards when operating on the designated clean fuel are considered to be designated clean fuel vehicles. Alternative fuels in use today and captured under the regulation include compressed natural gas (CNG), E85 (a blend of 85% ethanol, 15% gasoline) and hydrogen.

The current regulation includes both liquid and gaseous fuels; it excludes electricity from the definition of designated clean fuel (section 2300). In the 1991 Final Statement of Reasons for the original regulation (pg. 137), staff justified removing electricity from the regulation based on its belief that charging infrastructure needs would be readily met without the regulation within the timeframe of the introduction of BEVs.

3. Vehicle Trigger and Regulation Activation

Each year, auto manufacturers must submit to ARB their alternative fueled vehicle production plans per requirements set forth in California's vehicle exhaust emission test procedures.[5,6] With this submittal, auto manufacturers must provide sales projections for alternative fuel vehicles (including dedicated, flex-fueled and dual-fueled vehicles) for the current model year, and production estimates for two subsequent model years. ARB then uses automaker projections, Department of Motor Vehicle registration data, and formulas set forth in Section 2303(b) to estimate how many designated clean fuel vehicles certified on a particular designated clean fuel are projected to be on the road and available for sale in California within the next two years.

Triggering the regulation for the first time involves notification and information sharing, as described in sections 2311.5, 2313 and 2305, to give owner/lessors and other affected parties advance notice of the possibility that they may be required to build stations. Station requirements are based on the vehicle projections, trigger calculations detailed in section 2303(b), and the fleet adjustments in section 2303.5.

4. Calculating Fuel Demand and Required New Clean Fuel Outlets

Once the determination to activate the regulation is made, the required number of new clean fuel outlets is calculated pursuant to section 2304, which is based on fuel demand volume calculations made pursuant to section 2303(c). The *total projected maximum volume* (TPMV) is the sum of the annual fuel demands for each model year and vehicle class reported. Before calculating the number of outlets, the TPMV is adjusted to reflect: (a) the dual and flex fuel vehicles that will not fuel solely on the designated clean fuel (section 2304(a)(2)(A)); and (b) fleet vehicles that will fuel at both private and public fueling stations.

The adjusted TPMV is then divided by an annual per station throughput volume of 300,000 gallons gasoline equivalent (based on BTUs per gallon)[7] for liquid fuels and 400,000 therms per year for gaseous fuels, and the result, rounded to the nearest integer, is the total number of clean fuel outlets required for a particular fuel. The

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[5] "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1960.1. Amended Aug. 5, 1999.

[6] "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1961. Amended Sept. 27, 2010.

[7] ARB, 1991. "Final Statement of Reasons: Proposed Regulations for Low-Emission Vehicles and Clean Fuels," July 1991. The regulation assumes that a gallon gasoline equivalent of any clean fuel will allow one to travel the same distance as a gallon of gasoline. (Pg. 132).

number of *new* clean fuel outlets required to be added in the compliance year[8] is adjusted to reflect certain pre-existing outlets pursuant to section 2304(a)(2)(C).

5. Identifying Affected Owner/lessors and Allocating Outlets

Owner/lessors must own a minimum number of retail gasoline stations before they are required to comply with the retail requirements of section 2302. This *minimum ownership level* (MOL) is the total number of retail gasoline stations (that do not offer clean fuel) divided by the number of new clean fuel outlets required for a given year. For example, if 25 new outlets were needed and there are 9,700 retail gasoline stations in the state that do not offer clean fuel, the MOL would be 388.

If a person or company is the owner/lessor of a number of retail gasoline outlets equal to or greater than the MOL, ARB will notify them of their compliance obligation for the year (i.e., how many new clean fuel outlets they must install). Compliance obligation for an affected owner/lessor is determined by multiplying the clean fuel fraction (calculated pursuant to Section 2307(c)) by the number of non-clean fuel retail gas stations owned by the affected owner/lessor. The intent is to ensure that the required number of new clean fuel outlets is equitably distributed among the owner/lessors with the most retail gasoline stations. A constructive allocation clause in the regulation (Section 2308) allows an owner/lessor of a stand-alone retail clean fuel outlet to allocate its outlet toward the compliance obligation of an affected owner/lessor through mutual agreement among the two parties.

To help ensure that the clean fuel outlets are placed in locations that are near the vehicles requiring the particular clean fuel, affected owner/lessors must submit proposed locations for each required outlet and optional locations equal to 20 percent of the proposed locations pursuant to section 2309(a). Locations are finalized after consultation with ARB.

6. Responsibilities for Maintaining Fuel Supply and Outlet Operation

The regulation details specific requirements for the different entities involved with the fuel supply chain. Section 2309(b) sets facility requirements that must be met by owner/lessors for clean fuel outlets located at retail gasoline outlets. These requirements ensure that customers seeking clean fuel have the same experience in terms of fuel supply, access, payment and other amenities as those seeking gasoline. Similarly, section 2309(c) establishes fuel supply, directional and amenity requirements that owner/lessors must meet at outlets that do not offer gasoline. Section 2309(d)

[8] "Compliance year" is defined in section 2300 as "the 12 month period running from May 1 through April 30."

establishes who is responsible (i.e., the owner/lessor or the station operator) for maintaining the supply of clean fuel to the station. Section 2310 details requirements that must be met by the station operator, which pertain mostly to signage and day-to-day station operation.

7. Timing

The timing of activities (i.e., reporting, notices, and other actions) required in the regulation is stated in terms of the *year* in which new clean fuel outlets would be required should the regulation be activated. "Year" in this sense means calendar year whereas "compliance year" means the 12 month period starting on April 1 of the year that the owner/lessor is required to have operating clean fuel outlets. Figure I-1 provides a simplified illustration of the timing of key activities associated with activating the regulation in "Year A."

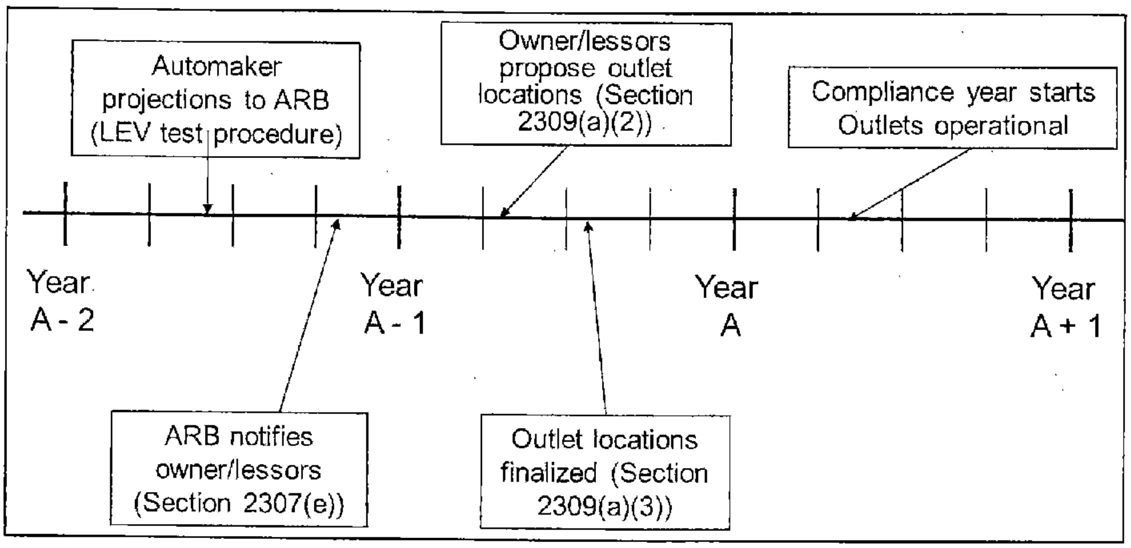

Figure I-1. Timeline of activities for current regulation

In order to give advanced notice to potentially affected parties, the regulation also contains notice and reporting requirements that precede activation of the regulation (section 2311.5). This section requires that owner/lessors, fleet operators and fuel providers be notified when the "Executive Officer determines that there is a substantial possibility that the 20,000 vehicle trigger level for the first time will be reached" for a given clean fuel vehicle and fuel type.

8. Violations

If an owner/lessor fails to equip its required number of outlets with clean fuel per section 2302, or fails to meet the fuel supply and station amenity requirements at their clean fuel outlets per section 2309(b), it will be subject to financial penalties that are based on the number of conventional vehicles they sell gasoline to. The penalty fee is $500 per violation and can amount to daily fines of up to: $5,000 per noncompliant station for violating section 2302, and $2,500 per station for noncompliance with sections 2309(b) and 2310.

9. Sunset provisions

The current regulation will sunset for a particular clean fuel when the number of outlets offering that fuel represents at least 10 percent of all retail gasoline outlets in the state (section 2318). This provision was added to the regulation in 2000 to provide an end point that represents when fueling infrastructure would be sufficient to no longer require siting of new outlets. Studies at the time indicated that consumers would be relatively unconcerned about the availability of an alternative fuel if the fuel were available at 10 to 20 percent of the retail service outlets.[9] Today, there are approximately 9,700 retail gasoline outlets in California meaning the regulation would sunset for a particular fuel when that fuel is offered at 970 outlets.

B. Status of Zero Emission Infrastructure and Vehicles

California's current ZEV regulation, as well as the proposed changes, requires auto manufacturers to develop and produce zero emission vehicles for sale in ever increasing volumes. This section discusses the current status of FCV and BEV production and deployment, and the efforts underway to develop infrastructure to support increasing numbers of these vehicles.

1. Hydrogen Fueling Infrastructure and Vehicles

FCV and hydrogen infrastructure development efforts were initiated in California in early 2000 with the assistance of the U.S. Department of Energy's (DOE) Hydrogen Program,[10] the California Hydrogen Highway Network (CaH2Net) initiative[11] and the

[9]ORNL, 1997. Oak Ridge National Laboratory. Green, David L. "Survey Evidence on the Importance of Fuel Availability to Choice of Alternative Fuels and Vehicles." Nov. 11 1997.

[10] The DOE Hydrogen Program works in partnership with industry, academia, national laboratories, federal and international agencies to: 1) overcome technical barriers through research and development of hydrogen production, delivery, and storage technologies, and fuel cell technologies for transportation; 2) address safety concerns and develop model codes and standards; 3) Validate and demonstrate hydrogen and fuel cell technologies in real-world conditions; and 4) educate key stakeholders whose acceptance of these technologies will determine their success in the marketplace. <http://www.hydrogen.energy.gov/>

[11] CaH2Net, a public-private partnership directed by ARB, was initiated in 2004 by Executive Order S-07-04 to support and catalyze the transition to a clean, hydrogen transportation economy in California in

California Fuel Cell Partnership (CaFCP).[12] From 2006 to 2009, ARB provided $15.2 million dollars to begin the expansion of a hydrogen fueling network. Starting in 2010, additional funding for hydrogen fueling infrastructure has been allocated through the Alternative and Renewable Fuel and Vehicle Technology Program (AB 118).[13] AB 118 funding is administered by the California Energy Commission (CEC) according to investment plans that are updated annually. Also assisting in the development of hydrogen infrastructure is a federal tax credit of $200,000 for those who build hydrogen stations by the end of 2015.[14] Following is a summary of initiated hydrogen infrastructure and vehicle demonstration programs, and an assessment of future hydrogen supply and demand.

a) *Early Hydrogen Infrastructure*

The US DOE's Hydrogen Program provided cost sharing for most of the hydrogen stations built in the early 2000's. These were research/demonstration stations, usually built to supply fuel for small private automaker fleets of three to five vehicles, and often sited on local government or local utility property. They were operated by energy companies such as Shell, British Petroleum and Chevron and served prototype FCV fleets from auto manufacturers such as Ford, GM, Daimler Chrysler, Honda, Hyundai and Toyota. Most of the stations were located in the greater Los Angeles area with a few in the San Francisco, Sacramento and San Diego areas. These early stations had limited capacity and were able to dispense only 12 to 25 kilograms per day (kg/day). While a kilogram of hydrogen has the same energy content as a gallon of gasoline, a FCV can travel more than twice the distance on one kilogram of hydrogen when compared to a gallon of gasoline in similar sized gasoline vehicle. All of these early stations dispensed hydrogen at 5000 pounds per square inch (psi) (350 bar).[15] Most of these stations operated through 2006 as part of the DOE's Technical Validation Program. The CaFCP also built a station in early 2000 to serve all CaFCP member auto manufacturers' FCV development programs in West Sacramento, and this station is still in operation.

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order to reduce dependence on foreign oil, reduce greenhouse gas emissions, improve air quality and grow the California economy. http://www.hydrogenhighway.ca.gov/.

[12] CaFCP is a consortium of federal, state and local government agencies, energy companies, automakers and industrial gas companies, created in 1999 to demonstrate and promote the potential for fuel cell vehicles as a clean, safe, and practical alternative to vehicles powered by internal combustion engines. http://www.fuelcellpartnership.org/.

[13] AB 118, 2007. California Assembly Bill. Nuñez, Fabian (Assemblymen). "The Alternative and Renewable Fuel and Vehicle Technology Program," Chapter 750, Statutes of 2007, Oct. 14, 2007.

[14] U.S.DOE, 2005. United States Department of Energy. Website. "Alternative Fuel Infrastructure Tax Credit," Aug. 5, 2005, http://www.afdc.energy.gov/afdc/laws/law/US/351.

[15] Most of today's FCVs require fueling at 10,000 psi (700 bar) to get a full tank and meet their maximum target driving ranges.

Most of the stations build in early 2000 were built behind fences, providing limited access through security gates. Persons refueling vehicles were required to attend training on hydrogen properties and fueling, as well as wear eye protection and fire resistant personal protection equipment while fueling. While private fueling enabled the development of FCV technology and infrastructure, auto manufacturers acknowledged that public fueling, mimicking the customer experience of gasoline would be critical to FCV commercialization.

The first publicly accessible hydrogen fueling stations began appearing around 2004. The South Coast Air Quality Management District's "Five Cities Program" funded the building of five stations – one each in: Burbank, Ontario, Riverside, Santa Monica and Santa Ana. These stations dispensed gaseous hydrogen that was trucked in from industrial suppliers or produced on-site via electrolysis. These stations provided up to 25 kg/day to a fleet of 25 Toyota Prius hybrids converted to run on hydrogen and approximately 30 additional hydrogen fuel cell vehicles produced by various automakers. The University of California at Irvine and Davis also built limited public access stations. Shell Hydrogen built California's first retail hydrogen station in Santa Monica, and though it is only 350 BAR, it is still in operation today.

b) *State Funding for Hydrogen Infrastructure to Date*

In 2004, Governor Arnold Schwarzenegger signed an Executive Order calling for the development of a California Hydrogen Blueprint Plan. This order resulted in a 2005 plan that called for the State to provide co-funding for the phased construction of public hydrogen infrastructure. This infrastructure provided fuel for hydrogen fuel cell vehicles being built in response to the state's ZEV regulation. From 2006 through 2009, ARB awarded $15.2 million in state co-funding for eight public access hydrogen stations. In 2010, the CEC provided an additional $15.7 million to co-fund an additional eight stations, and upgrade three existing stations. Further hydrogen infrastructure funding will be made available in early 2012 as discussed in the next subsection.

As of November 2011, there are six operational hydrogen stations that are open to the public, four undergoing final commissioning, and nine in the final permitting process. The aforementioned five cities AQMD stations are still open on a limited access basis. Table I-1 below provides the locations, capacity, and status of each of these stations.

Table I-1: Public Hydrogen Fueling Stations in California (open and pending)

Station Operator	City/ Location	Community/City Served	State Funded	Capacity (kg/day)	Status	Funding Ends
Northern California						
A.C. Transit	Emeryville	East Bay area, Oakland, Berkeley	Yes	60	Testing	2014
San Francisco International Airport	Millbrae	San Francisco/San Mateo/San Bruno	Yes	240	Permit	2014
Linde LLC	West Sacramento	West Sacramento	Yes	240	Permit	2015
Southern California						
City of Burbank	Burbank	Burbank, Glendale, I-5 commuters	Yes	100	Open	2014
Cal State University Los Angeles	Los Angeles	Los Angeles, I-5 & I-10 commuters	Yes	60	Testing	2014
Shell Hydrogen	Santa Monica	Santa Monica, West L.A. I-405 & I-10 commuters	No	25	Open	2011
South Coast Air Quality Management District	Diamond Bar	Diamond Bar, highway 55 commuters	No	25 (180)	Open	2014
Shell Hydrogen	Torrance	Torrance, Redondo Beach, I-405 commuters	No	50	Open	unknown
Air Products/University California of Irvine	Fountain Valley	Huntington Beach, Fountain Valley, I-405 commuters	Yes	100	Open	2014
University of California Irvine	Irvine	Irvine, I-405 commuters	No	25 (180)	Open	2014
Mebtahi-Chevron	Harbor City	Palos Verdes, Lomita, Harbor City, Pacific Coast Hwy	Yes	100	Testing	2014
Shell Hydrogen	Newport Beach	Newport Beach, Costa Mesa	Yes	100	Testing	2014
University of California	Los Angeles	Santa Monica, Westwood, Beverly Hills	Yes	100	Permit	2015
City of Ontario	Ontario	Ontario	No	25	Open	2012
City of Santa Ana	Santa Ana	Santa Ana	No	25	Open	2012
City of Riverside	Riverside	Riverside	No	25	Open	2012
City of Santa Monica	Santa Monica	Santa Monica	No	25	Open	2012
Air Products and Chemicals Inc. (APCI)	Santa Monica	Santa Monica	Yes	180	Permit	2015
APCI	Beverly Hills	Los Angeles, Beverly Hills	Yes	180	Permit	2015
APCI	Los Angeles	Los Angeles	Yes	180	Permit	2015
APCI	Hermosa Beach	Hermosa Beach	Yes	180	Permit	2015
APCI	Irvine	Irvine	Yes	180	Permit	2015
APCI	Hawthorne	Hawthorne	Yes	180	Permit	2015
Linde LLC	Laguna Nigel	Laguna Nigel	Yes	240	Permit	2015

c) *Factors Considered when Administering State Funding*

In order to ensure that state funds for hydrogen infrastructure are allocated to the most worthwhile projects, grants are awarded on a methodical, competitive basis in response to solicitations. Before releasing each solicitation, meetings with auto manufacturers are held and confidential surveys are conducted (discussed below) to help pin-point, as much as possible, in what communities and in what numbers, FCVs are most likely to be placed with customers. Based on this information, teams of experienced and qualified individuals[16] (i.e., bidders) seek out sites and or retail stations that would best serve the FCV customers of the auto manufacturers. Station proposals are awarded only if auto manufacturers clearly commit to vehicle numbers and placement locations. The results of these confidential surveys are also included in one vehicle ramp-up scenario used in the environmental and economic analyses presented later in this report.

Studies supporting the strategic rollout of hydrogen infrastructure are also factored into station funding deliberations. CEC, ARB, CaFCP, auto manufacturers, and the University of California's Transportation Studies Programs at Irvine and Davis are collaborating in the modeling of different scenarios to help ensure the most effective rollout of hydrogen infrastructure. The annual confidential auto manufacturer vehicle surveys are also be taken into account when planning future infrastructure and how best to allocate government resources.

d) *Future Hydrogen Infrastructure*

The next round of hydrogen infrastructure funding will include \$18.7 million administered through CEC by way of a Program Opportunity Notice (PON) to be released in late 2011. At this time, it is not possible to know the exact locations, numbers or sizes of stations that will be awarded as a result of the upcoming PON. However, one can estimate from prior station awards and from industrial gas suppliers' statements that same-size stations will cost less in future funding cycles due to economies of scale and existing production and delivery system investments. Therefore, one could conclude that these new funds will result in anywhere from 10 to 14 new stations, and add 2400 to 4600 kg/day of new hydrogen capacity.

Estimates of the number of stations and total capacity into the near future must account for the fact that hydrogen stations co-funded by the state are obliged to operate for a minimum of three years. After three years, the stations can close. Ideally, increasing vehicle numbers and fuel demand will generate enough revenue to make a business case for keeping the stations open. Unfortunately, it is difficult to predict whether or not stations will remain open after the obligatory three years.[17]

To establish a baseline for hydrogen infrastructure in 2015, staff assumed that the estimated 10 to 14 new stations added via the \$18.7 million PON discussed above, plus

[16] Teams bidding on the most recent Program Opportunity Notice typically included industrial gas suppliers, station builders, and property owners.
[17] Stations more likely to stay open are those located at retail gasoline fueling stations, easily accessible from major thoroughfares with safe and convenient public access.

many of the existing and previously funded stations operating in 2014 will continue to operate beyond the requisite three years and well into the future. Together, these 25 to 30 stations could supply 4800 to 7000 kg/day, which could support 6000 to 9000 fuel cell vehicles.

e) *Hydrogen Vehicle Deployments and Plans*

As mentioned above, ARB and CEC jointly conduct an annual confidential auto manufacturer FCV rollout survey to ascertain, as close as possible, the timing, numbers and locations of planned FCV placements. The survey requests manufacturer name, model and class of vehicle, and preferred fueling pressure. In completing the survey, each auto manufacturer is requested to identify how many FCVs they plan to place in each county, city and community listed in the survey, as well as the year that the vehicles will be placed. The individual auto manufacturer's survey numbers are combined to form a summary. This data helps guide the development of infrastructure in those select communities. The 2010 survey drew responses from seven auto manufacturers. The combined statewide results of the survey, as well as the portion of FCVs planned to be placed within the south coast air basin are summarized in Table I-2.

Table I-2: Summary of ARB/CEC Auto Manufacturer Survey Results (2010)

2010 Survey	2012	2013	2014	2015-17
Cumulative FCVs Statewide	312	430	1,389	53,000
FCVs in South Coast Air Basin	240	347	1,161	34,230

It is important to note that while completing the surveys, auto manufacturers make two key assumptions: 1) that adequate hydrogen fueling infrastructure will indeed be in place in the communities ahead of their vehicle deployments; and 2) customers will lease or buy these vehicles.

California and the federal government currently offer incentives for buying or leasing a fuel cell vehicle, such as high occupancy vehicle (HOV) lane access, federal tax credits, state rebate and, in some communities, free parking. While all of these incentives will likely end eventually, they offer positive motivation for customers contemplating the purchase or lease of a FCV in the early years.

f) *Evaluating Hydrogen Supply and Demand*

The 2010 auto manufacturer survey numbers indicate that the majority of FCVs will likely be placed in five major areas, referred to as clusters. These clusters include: 1) San Francisco Bay Area; 2) Sacramento area; 3) Santa Monica/Westwood/Beverly Hills; 4) Torrance/South Bay area; and 5) Irvine/Newport Beach area. Although some auto manufacturers are planning placements in the two northern California clusters, all of them are planning vehicle rollouts in the three southern California clusters. Therefore, to support the FCV placements discussed above during the timeframe shown in Table I-2, most of the fueling infrastructure is being built in southern California, which is apparent in Table I-1. Additionally, if auto manufacturer's survey data continues to indicate that the majority of their FCVs will be placed in communities within the south coast air basin, it is likely that the next round of CEC station co-funding will also focus on placing stations in these areas.

In evaluating both the FCV and hydrogen station projections, it appears that fueling infrastructure would be more than sufficient to support the projected number of FCVs through 2014. However, the hydrogen infrastructure as estimated above will become insufficient at some point in 2015 or 2016. This date is dependent upon how quickly FCV placements meet the auto manufacturer's projections of 53,000 vehicles.

California's requirements for auto manufacturers to introduce ever increasing numbers of zero emission vehicles into the California light duty vehicle market will likely result in FCVs comprising a significant percentage of the state's zero emission vehicle fleet. Early hydrogen infrastructure co-funding, vehicle rebates and other incentives illustrate the state's commitment to bringing FCV technology to commercialization. Unfortunately, there's no guarantee of future government funding for infrastructure.

2. Battery Electric Vehicles and Charging Infrastructure

Auto manufacturers introduced roughly 4,400 full function BEVs into the fleet from 1997 through 2003 as part of California's early ZEV program. In 2008, auto manufacturers started deploying BEVs in response to ARBs revised ZEV regulation, and now are developing product lines that include full-function BEVs as well as plug-in hybrid electric vehicles (PHEVs).[18] Unlike FCVs, a significant portion of the potential BEV and PHEV market is not dependent on public fueling infrastructure. BEVs and PHEVs are sold with home Electric Vehicle Supply Equipment (EVSE), while home fueling is currently not an option to FCVs. In addition, some public charging will be available at retail locations where charging is currently free and some workplace charging is available.

[18] Plug-in hybrid electric vehicles are hybrid vehicles with larger batteries that can be charged by plugging in to Electric Vehicle Supply Equipment or standard 110V or 220V outlet.

Most BEVs and PHEVs are expected to be primarily charged at home. Home charging will facilitate off-peak charging, which will reduce the need for grid expansion and allow better optimization of power generation equipment. While public charging is not needed for the early market deployment of BEVs and PHEVs, it may make these vehicles more attractive to a potentially broader market. The following paragraphs discuss the current status of EV charging infrastructure and vehicle development.

In addition, EVSE operate fundamentally differently than today's retail petroleum fueling or hydrogen fueling. Conventional vehicles are currently refueled in well under ten minutes, and state-of-the-art hydrogen stations also refuel FCVs in less than ten minutes. Refueling of PHEVs and BEVs typically takes from four to eight hours, when using a 110 or 220 volt outlet. While limited fast charging is available, it will take well over ten minutes and it is not certain that all battery types will be suitable for fast charging. The success of retail fueling outlets relies on quick customer turnaround.

a) *Existing EV Charging Infrastructure*

It is estimated that over 1,200 "legacy" Electric Vehicle Supply Equipment (EVSE) units also referred to as charging stations, remain in public locations throughout California. The EVSEs were installed in the late 1990s and early 2000s to facilitate BEV demonstration programs as well as support initial consumers. These older EVSEs utilize connectors that are not compatible with the current Society of Automotive Engineers (SAE) J1772 plug standard in use by new BEVs and PHEV. A few hundred older BEVs continue to use the legacy EVSEs. Plug adaptors are available for these BEVs to connect to new and upgraded public charging stations, as well as for new BEVs and PHEVs to connect to the legacy systems.

b) *Future Charging Infrastructure Developments*

An interest in expanding public charging infrastructure has resulted from current and anticipated BEV and PHEV deployments in California. The CEC provided funding through AB 118 to update legacy EVSEs to install J1772 compliant connectors to allow charging for older BEVs as well as BEVs and PHEVs being currently deployed. Up to 900 legacy systems will up upgraded. In addition, CEC with funding from a variety of partners including the Unites States Department of Energy, Association of Bay Area Governments, Bay Area Air Quality Management District, South Coast Air Quality Management District, Sacramento Municipal District, and EV Sacramento Coalition will co-fund the installation of over 5,000 level two home chargers and public EVSEs and almost 100 fast charge EVSEs. These projects, along with additional EVSE supplier installations, will result in several thousand public charging stations in California within the next few years.

Consumer demand for and use of public EVSEs is poorly understood. The EV Project, funded by DOE, state, and local entities, will place 8,300 Plug-in Electric Vehicles (PEVs) and more than 5,300 public EVSEs in six regions of the United States, and collect data on vehicle and EVSE use. ECOtality North America, Nissan North America, and General Motors are partners for this ambitious vehicle and infrastructure deployment project. San Diego, Los Angeles, and the San Francisco Bay Area are the three California sites participating in The EV Project. Over 2,000 BEVs and PHEVs, along with close to 1,000 new public charging stations will be monitored in California. The collected data will be analyzed to characterize vehicle use, effectiveness of charging station infrastructure, and impact of variable pricing on public EVSE use. Results from this work as well as other studies conducted are anticipated to identify the amount of public charging infrastructure needed for the increasing number of BEVs and PHEVs in California.

Auto manufacturer's projections for sales and leases in California include 69,600 BEVs and 21,500 PHEVs in the 2011 to 2014 timeframe.[19] Some auto manufacturers believe that public chargers are needed to expand the BEV market significantly beyond the early adopters or people who purchase BEVs as a second or third vehicle.

Similar to FCVs, California and the federal government offer incentives for buying or leasing BEVs and PHEVs, such as high occupancy vehicle (HOV) lane access, federal tax credits, and a state rebate. The major utilities offer low time-of-use rates to households to encourage off-peak charging. Some offer rebates and permitting assistance to offset the cost of installing home chargers. Several cities are also offering rebates for BEVs and PHEVs while funds last, as well as free parking with free charging.[20] These incentives are an important factor in customers' decisions to purchase BEVs.

Because electric vehicle technologies are an important component of emission reduction strategies for light duty vehicles, the state and federal government will continue to support the commercialization BEVs and PHEVs through the efforts and incentives discussed above, and will continue to gain information on how to increase the sale and utilization of electric vehicles.

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[19] Earlier BEVs are not included in this number because their connectors are not compatible with the current J1772 plug standard. Projections past 2014 were requested but not required. In 2011, automakers were only required to project through model year 2013 as required in test procedure AFV reporting requirements (see Section I A 3).
[20] ARB's DriveClean website provides a complete list of incentives offered to BEV and PHEV owners. http://www.dirveclean.ca.gov.

C. Status of Non-ZEV Alternative Vehicles and Fuel Infrastructure

Currently, the light and medium duty AFV population in California is comprised primarily of flex fuel vehicles (FFVs) that can operate on E85 and gasoline, and vehicles that operate solely on CNG. Approximately 224 outlets offer CNG and 118 offer E85; most of these outlets are not associated with a retail gasoline outlet, and roughly 55 percent offer alternative fuel to the public. Sales and leases of CNG and E85 alternative fuel vehicles in California have increased substantially since the late 1990s. By 2010, approximately 760,000 E85 FFVs and 25,000 CNG vehicles had been sold or leased in California.

Recently, federal stimulus funding and state funding through AB 118 have been allocated for alternative fuel infrastructure and vehicle rebates. To date, $27 million has either been invested or allocated towards CNG and E85 infrastructure, $19 million towards development and production of advanced ethanol, and another $12 million for vehicle rebates. See Appendix C for a more detailed discussion on the current status of California's alternative fuel vehicles, infrastructure, and government funding allocated for both.

1. CNG Vehicles Relative to CFO

There were approximately 25,000 CNG vehicles operating in California in 2010 and, by 2013, auto manufacturer's project that the numbers will increase to 30,000. The CFO has never been triggered for CNG because the majority of vehicles are in fleet use and, therefore, subject to the regulation's fleet discount provision. With 126 public and 98 private CNG stations in place, and funding for roughly 30 new public stations allocated or pending, CNG infrastructure will continue to be sufficient to support vehicles into the near future.

2. E85 FFVs Relative to CFO

Numbers of E85 FFVs have steadily increased during the past decade to over 700,000 vehicles. However, since utilization of E85 is not essential to the operation of FFVs, customers do not always choose E85. Plus, E85 provides 23 to 28 percent less energy than a gallon of gasoline. Of the 63 public retail stations that offer E85, some station operators are finding that they must price E85 proportionately lower on an energy equivalent basis to get customers to choose E85 over gasoline, making it difficult to justify their investment.

3. Future of Non-ZEV Fuels and Vehicles

While use of E85 and CNG help reduce GHG emissions, they do not play a significant role in meeting California's long-term air quality goals for light and medium duty vehicles. Rather than supporting all alternative fuels, infrastructure regulations should to be linked to near-term and future requirements pertaining to vehicle fleet emission reduction needs.

II. Recommended Actions and Alternatives

Staff is proposing a substantial number of modifications to the CFO regulation so that it aligns with proposed changes to both the LEV and ZEV regulations and supports commercialization of zero emission vehicles. These proposed modifications are detailed below, followed by an analysis of alternatives to the proposed changes.

A. Proposed Regulatory Amendments

This section provides a description of the proposed changes to the CFO regulation and the rationale behind those changes.

1. Regulation Title

Staff is proposing to change the title of the regulation from "Clean Fuels Program" to "Clean Fuels Outlets" because the current title too broad and implies that the regulation also pertains to fuel quality. Clean Fuels Outlets is a more succinct title.

2. The Regulated Party

The proposed amendments would shift the requirements to equip retail outlets with designated clean fuel from "owner/lessors" to "major refiner/importers of gasoline." Owner/lessors would be removed from the regulation language and a new definition added to section 2300 for "refiner/importers," which includes companies that produce in or import into California 500 million gallons or more of gasoline per calendar year.

This modification recognizes the refiner/importers as the intended regulated party in the original CFO regulation since, at the time; they were the owner/lessors of most of California's retail gasoline stations, either as the *franchisor* or the *refiner or distributor.* When the regulation was modified in 2000, about 15 percent of the retail stations were directly owned and operated by refiners. The majority of the state's retail gasoline outlets, approximately 70 percent, were "lessee dealer stations" where the refiner or wholesale distributor (also known as a branded jobber) owns, or controls by a lease, the land, buildings, and equipment then leases them to the dealer-operator. Such lease agreements were predicated on supply agreements requiring the lessee dealers to purchase the refiner's gasoline exclusively and, in turn, the refiner bore the responsibilities customarily applied to an owner/lessor. The remaining 15 percent of the stations in 2000 were owned and operated by independent wholesale dealers, or unbranded jobbers." [21]

[21] AG, 2000. California Attorney General. Lockyer, Bill (Attorney General), "Report on Gasoline Pricing in California." May 2000.

Today, the ownership profile for retail gasoline outlets has shifted heavily toward small business as illustrated in Figure II-1, 58 percent of California's approximate 9,700 retail gasoline outlets are owned by people who own fewer than 10 stations. Figure II-1 also shows the companies that own more than 200 retail stations (with the number of stations each owns in parentheses), as well as a breakdown of numbers of entities that own more than 10 stations.

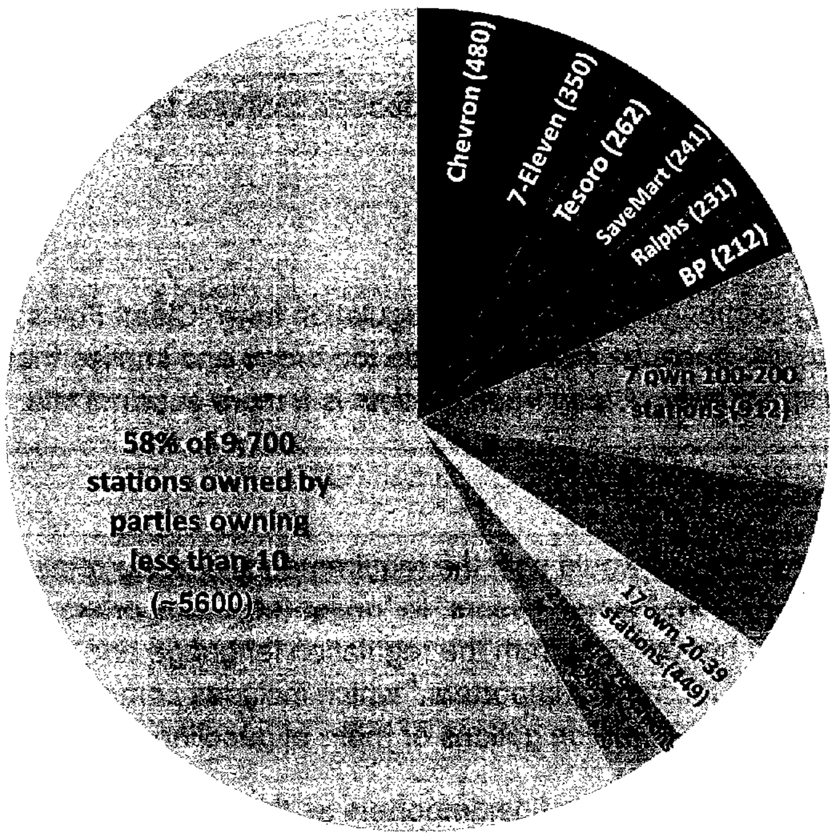

Figure II-1: Owner/Lessors of Retail Gasoline Outlets, January 2011[22]

Approximately 13 percent of the state's stations (1260 stations) are owned and operated by 6 out of 7 of the major refiner/importers; and only three, Chevron, Tesoro and BP, own enough outlets to be subject to the retail requirements of the regulation in the early years. While the majority of stations today are independently owned by small business owners, those independent stations carrying a major refiner's brand are only linked to the supplier via contractual agreements.

[22] BOE, 2011a. California State Board of Equalization. Sales and Use Tax account registration information for businesses operating under NAICS Code 4471. Jan. 14, 2011.

Table II-1 provides a breakdown of refiner/importer-owned and operated stations and independently owned stations identified as selling that company's fuel brand as of January 2011.

Table II-1. Gasoline station ownership including major refiner/importers and Independents selling branded fuel[23]

Major Refiner/Importer	Company-owned stations	Brands sold by independents	Independents selling major's brand	Total branded Stations	% of all CA stations
Chevron USA, Inc. and Chevron Stations, Inc.	480	Chevron and Chevron with Techron	470	950	9.8%
BP West Coast Products LLC	212	BP, Arco, AM/PM	458	670	6.9%
Equilon Enterprises LLC.	126	Shell	414	540	5.5%
ConocoPhillips Co.	0	76 and Union 76	330	330	3.4%
ExxonMobil Oil Corp.	96	Exxon and Mobil	210	306	3.1%
Tesoro Refining and Marketing Co.	262	Tesoro	3	265	2.7%
Valero Marketing and Supply Co.	84	Valero	155	239	2.5%
Totals	1,260		2,040	3,300	34%

In addition to the few refiner/importers who still own relatively large numbers of retail gasoline outlets, the current CFO regulation, if applied today, would also target other owner/lessors of retail gasoline outlets that are not in the business of producing gasoline – 7-Eleven, SaveMart Supermarkets and Ralphs Grocery Company. Petroleum companies that have divested most or all of their retail outlets would likely not be affected by the requirements of the current regulation.

As such, the proposed modification recognizes that, while most refiner/importers have significantly divested their interests in the retail aspect of the gasoline supply chain, they continue to play an active role in the upstream aspects of the supply chain (oil exploration and production, and refining). Of the 14.86 billion gallons of gasoline

[23] Ibid.

produced in or imported into California in 2010, California's seven major oil companies were responsible for 13.77 billion gallons. Figure II-2 illustrates the percent of gasoline production and imports by company in calendar year 2010.

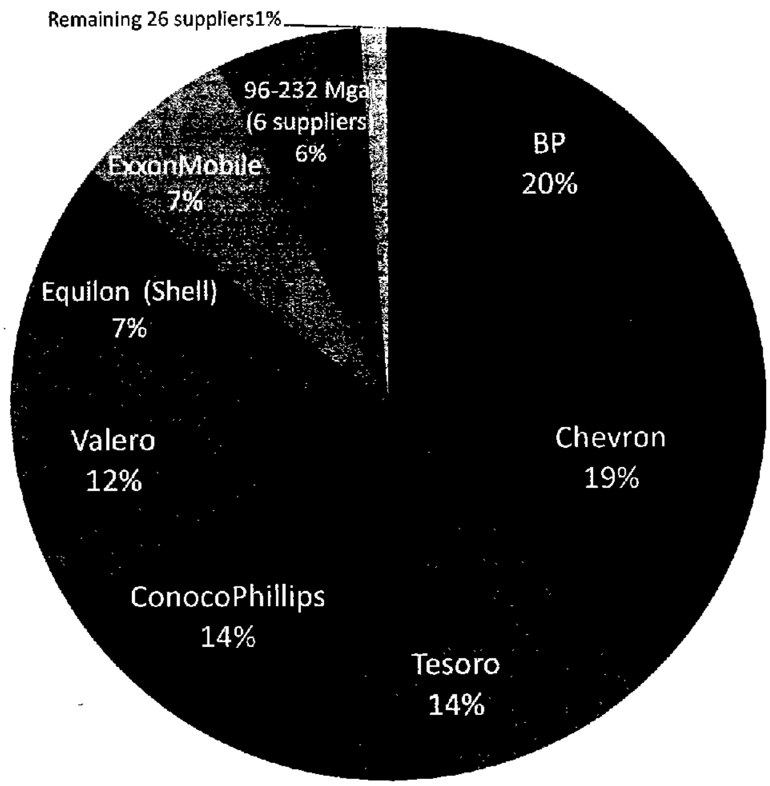

Figure II-2: California gasoline production and imports by company (2010)[24]

From the above, it is clear that refiner/importers continue to benefit financially from California's use of gasoline while relying on small business owners to deliver their product to the end user. For example, refinery profit margins for branded fuel in 2010 ranged from 24 to 62 cents per gallon.[25] The profit associated with the distribution and marketing of branded gasoline, on the other hand, ranges from 12 to 27 cents per gallon,[26] which is split between the distributor and the retailer.

[24] BOE, 2011b. California State Board of Equalization. Monthly Motor Vehicle Fuel Distribution Reports for calendar year 2010. January 2010 through December 2010. www.boe.ca.gov/sptaxprog/spftrpts.htm. Accessed June 2011.
[25] CEC, 2011a. California Energy Commission. Energy Almanac: Estimated 2011 Gasoline Price Breakdown & Margins Details webpage. http://energyalmanac.ca.gov/gasoline/margins/index.php. Accessed Sept. 22, 2011.
[26] Ibid.

3. Vehicles included in designated clean fuel vehicle count

Proposed amendments would modify the regulation to apply only to dedicated clean fuel vehicles that operate on ZEV fuels, with a placeholder for electricity as discussed in the next subsection. Once implemented, the regulation would pertain only to hydrogen and fuel cell vehicles; however, in the future it could be applied to electricity for plug-in hybrids and BEVs depending on the outcome of a BEV needs assessment discussed in the next subsection.

Focusing on ZEV fuels aligns the CFO regulation with the ZEV and LEV III GHG regulations, which conclude that, by 2025, new cars and trucks will on average have to reduce their GHG emissions by about 51 percent from 2008 levels. Plug-in electric vehicles and FCVs will continue to offer the lowest CO_2 emissions of all. For conventionally fueled vehicles, CO_2 emission reductions in the overall fleet will largely be attributed to a variety of powertrain and efficiency improvements, and an increase in the availability of hybrid vehicle platforms.[27]

Regarding alternative fuels other than electricity and hydrogen, the LEV III staff analysis does not project that CNG vehicles will be a significant strategy for LEVIII GHG regulatory compliance. Similarly, utilization of E85 fuel by FFVs was not assumed in the projected analysis of LEVIII GHG compliance; however, the LEV III staff report includes a proposal for allowing automakers to petition to use E85-capable FFVs for LEV III compliance. To petition, an automaker must submit verifiable data of E85 usage by their vehicles in California. In evaluating this petition, ARB would apply the average Low Carbon Fuel Standard (LCFS) rating of the E85 ethanol consumed that year to determine the GHG rating of the E85 vehicles.

The LEV III staff report also notes that there are many uncertainties about the amount of E85 fuel that will be used, E85 refueling availability, whether E85 owners know their vehicles are E85-capable, and reliable data-tracking about actual real-world E85 usage. As discussed in Appendix C of this staff report, the price of E85 will also affect the amount of E85 dispensed such that it must be priced proportionately lower than gasoline to persuade FFV drivers to choose E85 over gasoline.

Staff's proposal to make CFO ZEV-only is in line with the ZEV and LEV III regulations: LEV, being primarily focused on technology and efficiency improvements in conventional vehicles, does not rely on additional alternative fuels for compliance; and

[27] Section III of "Staff Report: Initial Statement of Reasons for proposed rulemaking, public hearing to consider the "LEV III" amendments to the California Greenhouse Gas and Criteria Pollutant Exhaust and Evaporative Emissions Standards and Test Procedures, and to the On-Board Diagnostic System Requirements for Passenger Cars, Light-duty Trucks, and Medium-duty Vehicles, and to the Evaporative Emission Requirements for Heavy-duty Vehicles." Dec. 8, 2011.

the ZEV regulation, which is focused on commercializing plug-in and fuel cell electric vehicles, will rely in the successful build out of retail hydrogen stations and, possibly, public charging stations, for compliance.

4. Charging Infrastructure Needs Assessment

The proposed changes would add a placeholder for electricity in the definition of designated clean fuel, and add section 2302(c) which details the components and timeframe of an electric vehicle charging infrastructure needs assessment. The assessment will involve evaluating the development and usage of workplace and public charging infrastructure to determine if additional public charging is needed, what types of public charging would have the highest likelihood of increasing zero-emission vehicle miles traveled by full function battery electric vehicles and plug-in hybrids, and the associated environmental and economic impacts. The assessment would also include further recommendations on whether a charging infrastructure mandate is warranted and, if so, a timeline for a regulatory proposal.

5. Estimating the number of Clean Fuel Vehicles

Staff is proposing several changes to the methodology for estimating the number of clean fuel vehicles that would trigger activation of the regulation. Proposed changes include the following:

a) *Modifying the test procedure reporting requirement*

The California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles is the authority cited in Section 2303(a) of the CFO regulation that requires automakers to provide ARB with alternative fuel vehicle production plans. To provide ARB with the additional information needed to plan for hydrogen infrastructure, staff is proposing to modify the alternative fuel vehicle reporting requirements to include additional reporting for ZEVs certified on hydrogen fuel.

These changes for FCVs will require automakers to submit FCV projections for three model years into the future instead of two, include FCV placement numbers by air basin, and submit this data by March 1 every year (instead of June 1). FCV projections by air basin will be used by ARB to determine if the regulation should be activated within an air basin as discussed below. The automaker projections required under this modification will eliminate the need to conduct the annual automaker FCV surveys detailed in Section I B 1.

b) *Modify the calculations in section 2303(b)(1)*

To estimate the number of ZEVs certified on hydrogen three model years into the future, staff is proposing to use the data submitted by the automakers discussed above and modify the procedure in section 2303(b)(1) to include:

The sum of:

[i] The projections for ZEVs certified on hydrogen for the year for which the estimates are being made plus ~~one~~two prior model years. For example, calculations done in 2012 to estimate the number of vehicles in 2015 would include total projected numbers of model year 2015, 2014 and 2013 vehicles.

[ii] One ~~sixth~~third of the number of ZEVs certified on hydrogen projected for the model year that is ~~two~~three years prior to the year for which the estimates are being made. Following the example above, this would be one third of the model year 2012 projections.

[iii] The number of ZEVs certified on hydrogen that are registered with the DMV through ~~July 30~~May 31 of the year three years prior the year for which the estimates are being made. This would include all vehicles registered through May 31, 2012, following the above example.

As a result, the change to [i] adds one more model year to the estimate. Changing registered vehicles included in the sum in [iii] to include those registered through May 31 instead of July 31 accounts for staff's proposal to move the compliance timeframe up. By doing this, it becomes necessary to increase the fraction of projected vehicles in [ii] to account for the fact that fewer of the projected vehicles will be sold or leased and therefore, not reflected in the DMV records.

6. Lower Regional Activation Trigger

The proposed changes include adding a lower vehicle trigger of 10,000 to section 2303.5(a) that would be applied within an air basin in the early years, before the statewide trigger of 20,000 vehicles is reached. The lower regional trigger captures automakers' desire to deploy fuel cell vehicles in regional clusters, as discussed in Section I B 1. Based on what we know today about automaker deployment plans for fuel cell vehicles, the South Coast air basin would very likely be where the regional trigger would be first applied.

The notion of a 10,000 vehicle regional trigger is not new. When the CFO regulation was first being developed, staff proposed a 10,000 vehicle trigger for the South Coast air basin that would have applied from 1994 to 1996, and a 20,000 vehicle statewide trigger that would apply from 1997 on.[28] The 10,000 vehicle trigger was removed from the final regulation and both triggers were set at 20,000, primarily to address concerns raised by the regulated party about being able to adequately recover their costs. Automakers expressed an opposing concern – that a 10,000 South Coast trigger was too *high*. They reasoned that most customers would not be willing to take the risk of buying an alternative fuel vehicle unless they are assured clean fuel. They also reasoned that automakers would not want to risk developing and producing cars for which there is no fuel. ARB countered automakers concerns with the conclusion that "the widespread availability of clean fuel will not be a prerequisite for consumers to purchase these vehicles" because ARB "expects that most of the clean fuel vehicles, particularly in the early years, will be FFVs."[29]

However, the rationale for using the higher 20,000 vehicle trigger presented during the original CFO development cannot be applied to dedicated clean fuel vehicles (i.e., those that operate solely on clean fuel). The argument made by automakers for the lower trigger back in 1990 can be made today; validating the important role that fueling infrastructure plays when customers are considering purchasing an alternative fuel vehicle. If government and private commitment to invest in hydrogen infrastructure were sufficient to support the first 20,000 vehicles, there would be no reason to create a lower regional trigger (or activate the regulation if the lower trigger were in place). State funded stations are sufficient to establish an early network to support the first commercial vehicle placements. However, they will not be able to keep pace with the vehicle deployments projected to exceed the 10,000 threshold in the South Coast Basin in 2015.

7. Determining Required Number of Clean Fuel Outlets

As discussed in Section I A, the process for determining the required number of CFOs involves first estimating the total projected maximum volume (TPMV) for the year, then dividing that number by a per station clean fuel throughput volume. Staff is proposing the following three changes to this process.

a) *TPMV calculations*

Staff is proposing minimal changes to the TPMV calculations in section 2303(c). TPMV is the estimated demand of clean fuel required during the year for which the calculations are being made. It includes the sum of estimated maximum demand volumes for each

[28] ARB, 1990. "Staff Report: Proposed Regulations for Low-Emission Vehicles and Clean Fuels." August 13, 1990.
[29] ARB, 1991. "Final Statement of Reasons: Proposed Regulations for Low-Emission Vehicles and Clean Fuels." July 1991. Pg. 113.

vehicle class and model year. Staff is only proposing to change the oldest model year vehicles included in the calculation from 1994 to 2000. Since the regulation is being modified to include ZEVs, primarily FCVs,[30] this change is justified by the fact that there is no pre-2000 FCVs in operation.

b) *Conversions*

The current regulation includes estimated fuel demand from vehicle conversions in the formula in section 2304(a)(1) for determining the required number of CFOs.

Staff is proposing to exclude conversions from the formula because, unlike natural gas conversions, there are no companies currently involved in the aftermarket conversion of conventional vehicles to ZEVs that use hydrogen. All hydrogen powered FCVs will be created by automakers in response to our ZEV regulation requirements, and fuel demand from these cars will be included in the TPMV calculation above. Conversions for FCVs, if any, would play a very minimal role in the future fleet – it does not make sense economically to convert and certify an existing vehicle into an FCV when compared to buying or leasing a new FCV from an automaker.

c) *Per station throughput volume*

The proposed changes include reducing the per station clean fuel throughput volume used in the formula in section 2304(a)(1) for calculating the required number of CFOs for gaseous fuels (in terms of hydrogen gas, the existing volume of 400,000 therms/year is the same as 351,600 kilograms/year [kg/y]).[31]

Staff is proposing to reduce this value to 146,000 kg/y to account for the reduced per mile fuel consumption of hydrogen based on the following rationale. As mentioned earlier, there is an underlying assumption in the existing regulation that one gallon equivalent of an alternative fuel will allow one to travel the same distance as a gallon of gasoline on an energy equivalent basis. However, the LCFS recognizes that certain vehicle technologies and alternative fuels offer significant fuel consumption benefits that are not reflected when comparing fuels solely by their energy content.[32] For this reason, LCFS uses an energy economy ratio (EER)[33] when calculating carbon intensity values of alternative fuels. The EER is also a ratio of the per mile fuel consumption of an alternative fuel vehicle compared to that of a conventional gasoline or diesel vehicle,

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[30] In the future, this regulation could be modified to include charging and battery electric vehicles.
[31] The accepted way of measuring hydrogen gas used for transportation is kilograms, which represents hydrogen's energy density of 120 mega joules per kilogram on a lower heating value basis.
[32] ARB, 2009b. "Staff Report: Initial Statement of Reasons for Proposed Regulation to Implement the Low Carbon Fuel Standard." March 5, 2009.
[33] EER is also known as a Fuel Displacement Factor in the LCFS to account for the amount of gasoline or diesel that is displaced by the use of an alternative fuel.

and provides a more accurate way to compare fuels and fuel pricing than energy content alone.

Proposed modifications include changing the EER for hydrogen to 2.5 based on most recent available fuel consumption data for FCVs.[34] Using 2.5 to adjust the throughput volume for gaseous hydrogen would reduce it to 140,640 kg/y. Staff's proposal to reduce the throughput volume for hydrogen to 146,000 kg/y, which represents a 400 kg/day station, reflects the fuel consumption benefits of hydrogen.

Staff is also proposing to eliminate from this calculation the provision to double the clean fuel throughput volume when more than five percent of all retail gasoline outlets are required to dispense a particular liquid clean fuel. This change recognizes that the decision to increase a station's capacity should be based on fuel demand and a business case, which ensures that the station owner sees a return on their investment. As such, staff is proposing to sunset the regulation at five percent as discussed later in this report.

8. Change how requirements are distributed based on market share

Staff is proposing the following changes to how the retail outlet requirements are distributed among regulated parties:

a) *Market share vs. minimum ownership level*

The proposed amendments include replacing section 2306, which establishes regulated party responsibility based on the number of retail gasoline outlets each owns, with the new section 2306.5. This new section requires the Executive Officer to annually calculate each refiner/importer's market share by dividing their total gasoline production and imports for the two consecutive calendar years by the sum of gasoline production and imports for the same calendar years. The data source for these calculations will be State Board of Equalization's Motor Vehicle Fuel Distribution reports[35] and will include the most recent data for which two consecutive calendar years is available.

This amendment will ensure that those refiner/importers that have the largest stake in supplying gasoline to the California market have a commensurate role in developing the state's hydrogen infrastructure.

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[34] ARB, 2011a. Proposed Regulation Order "Subchapter 10. Climate Change, Article 4. Regulations to Achieve Greenhouse Gas Emission Reductions, Subarticle 7. Low Carbon Fuel Standard." http://www.arb.ca.gov/fuels/lcfs/regamend/101411regorder.pdf. Oct. 14, 2011.
[35] State Board of Equalization Monthly Motor Vehicle Fuel Distribution Reports, http://www.boe.ca.gov/sptaxprog/spftrpts.htm.

b) *Allocating retail station requirement by market share*

The proposed amendments include minor modifications to section 2307 to reflect the above change. Section 2307(a) determines the number of new retail outlets each refiner/importer must install in the year by multiplying their market share by the required number of new outlets calculated per section 2304(b), rounding to the nearest integer. If the product is less than 0.5, that refiner/importer is not required to install a CFO in the year for which the calculations are being made.

9. Tools for Evaluating Proposed Outlet Locations

The proposed amendments include updating the types of existing stations deemed to satisfy the station location criteria in section 2309(a) to include any retail clean fuel outlet that was equipped to dispense a designated clean fuel and received funding from the State to do so prior to January 1, 2015.

The proposed changes also include adding the option to use modeling tools to section 2309(a)(2) to help identify geographic areas where additional outlets are needed as well as evaluate the locations proposed by the regulated parities. The purpose of this addition is to help identify outlet locations that would best meet drivers' fueling needs and, in turn, result in greater outlet usage and faster return on investment for the owner. An example of such as model is the Spatially & Temporally Resolved Energy & Environmentally Tool (STREET) model developed by the Advanced Power and Energy Program at the University of California at Irvine (UCI).[36] This model is capable of evaluating possible station locations based on vehicle densities and travel times, and identifying areas where stations could be best placed for customer convenience and high utilization. Also of potential use is the near-term analysis of hydrogen vehicle roll-out scenarios developed by the Institute of Transportation Studies at the University of California at Davis.[37]

The proposed modifications also include a slight change in how existing clean fuel outlets that are owned or leased by someone other than a regulated party are considered when determining the required number of new outlets. The current section 2304(a)(2)(C) requires that, for existing outlets to be counted toward the total, they must be operating for 15 months before the start of the year. Staff is proposing that, for existing outlets to count, they must certify that they will operate throughout the

[36] UCI, 2011. University of California, Irvine. UCI Advanced Power and Energy Program. "STREET: Determining Hydrogen Fueling Station Needs in Targeted Communities." July 13, 2011.
[37] UCD, 2010. University of California, Davis. Nicholas, Mike, and Joan Ogden. UCD Institute of Transportation Studies. "An Analysis of Near-Term Hydrogen Vehicle Rollout Scenarios for Southern California." Jan. 29, 2010.

compliance year. Staff is also proposing to change the definition of compliance year to mean the calendar year – January 1 through December 31.

10. Extending the Timeline for Compliance

The proposed changes include adding approximately 14 months to the compliance timeline from the point when the regulated parties are notified of their compliance obligation to when they must have operating stations. The main reason for adding 14 months to the timeline is to account for the extra time required to site, permit, secure equipment and construct early hydrogen fueling stations when compared to other types of alternative fueling stations. Table II-2 illustrates how this change will affect the various reporting and compliance aspects of the regulation.

Table II-2: Proposed Timeline for Notifications and Compliance Requirements

Section	Requirement: Existing and Proposed	Due date and months prior to January 1 of Year A	
		Existing	**Proposed**
2311.5	Existing: On or before this date, Executive Officer (EO) shall identify if the trigger has a *substantial possibility* of being reached in Year A. If so, EO notifies regulated parties and ZEV fleet operators that the trigger may be reached in Year A and what their reporting requirements would be. Proposed: Move initial notification timeframe up 12 months to give regulated parties additional lead time to prepare for compliance.	Mar. 1, A-2 22 months	Mar. 1, A-3 34 months
LEV Test Procedure	Existing: Automakers submit reports of sales to date and projected AFV sales 19 months prior to January 1 of Year A. Proposed: Modify LEV test procedure to require projected sales and leases of vehicles that use hydrogen 33 months prior to January 1 of Year A. Add requirement to include the air basins where manufacturers plan to deliver their hydrogen vehicles for sale or lease.	June 1, A-2 19 months	April 1, A-3 33 months
2313 2304(a)(2)(B)	Existing: If EO determines that reaching the trigger for first time is likely in Year A, fleet operators respond to Section 2311.5 and supply EO with AFV fleet and fueling information. Existing: EO revises fleet discount factor, if necessary, based on input provided per Section 2313 or other relevant info. Proposed: Move fleet reporting timeframe up 14 months and EO revision time up 13 months to provide adequate opportunity and analysis for adjusting fleet discount factors.	June 30, A-2 18 months (same for both)	May 1, A-3 32 months June 1, A-3 31 months

Table II-2 (Continued)

2303.5(b)	Existing: EO identifies fuel for vehicles that are projected to reach trigger for the first time. OEM projections through model year A plus DMV registration data through July 31, A-2 used in this calculation Proposed: Add 14 months to include DMV registration data through May 31, Year A-3 and an additional year to automaker projections.	Sept. 1, A-2 16 months	July 1, A-3 30 months
2303.5(c) 2304	Existing: EO issues final trigger determination and fleet discount factor. Existing: EO calculates maximum demand volume (Section 2303(c)), determines total number of required CFOs, and required new CFOs. Proposed: Move the review and decision-making process up 15 months.	Nov. 1, A-2 14 months (same for both)	Aug. 1, A-3 29 months (same for both)
2312	Existing: By this date following the EO notification made pursuant to 2311.5 and July 31 thereafter, owner/lessors must report total number of retail gasoline stations in the state of which they are the owner/lessor. Proposed: Move requirement to respond up 12 months, similar to section 2311.5, to give EO sufficient time to quantify station ownership by refiner/importers.	July 31, A-2 17 months	Aug. 1, A-3 29 months
2306 Repeal 2306.5 Add	Existing: EO calculates a minimum ownership level determining which regulated parties are required to equip outlets to dispense clean fuel based on the number of gasoline stations they own. Proposed: EO calculates market share, expressed in percentage, that will be used (in Section 2307) to determine the number of new CFOs required by each major refiner/importer	Nov. 1, A-2 14 months	Aug. 1, A-3 29 months
2304(a)(2)(D) 2307(e)	Existing: EO issues notice of adjustments to the number of outlets made pursuant to Section 2304(a)(2)(C)2. Existing: EO notifies each affected regulated party in writing of their required minimum number of CFOs. Proposed: Move adjustment and notification timeframe up 14 months.	Nov. 1, A-2 14 months	Sept. 1, A-3 28 months
2304(a)(2)(E)	Existing: EO considers requests, if any, to revise adjustments made pursuant to Section 2304(a)(2)(C)2, and makes final determination on those adjustments. Proposed: Move adjustment determination up 14 months.	Jan.1, A-1 12 months	Nov.1, A-3 26 months

Table II-2 (Continued)

2309(a)(2) 2309(a)(2) (A) & (B) Added	<u>Existing</u>: Regulated party submits to the EO its proposed CFO locations and optional locations (representing 20% of their total requirement). Proposal may include constructively allocated stations per Section 2308. Following the submittal, regulated parties shall consult with ARB on optimal locations for new outlets. <u>Proposed</u>: Move submittal time up 14 months; change the amount of required optional locations to 40% of their total requirement. Add the option for ARB to employ modeling tools to evaluate fuel infrastructure scenarios and proposed locations.	Apr. 30, A-1 8 months	Mar. 1, A-2 22 months
2309(a)(3)	<u>Existing</u>: Regulated party notifies EO of their final locations for all new outlets for Year A. <u>Proposed</u>: Move notification up 14 months.	July 1, A-1 5 months	June 1, A-2 19 months
2302(a)	<u>Existing</u>: Each regulated party equips its required number of retail CFOs for the entire compliance year (defined as the 12 month period running from May 1, Year A through April 30, Year A+1). Regulated parties have nine months from finalizing their locations to when their outlets need to be operational. <u>Proposed</u>: Change compliance year to represent calendar year A, giving the regulated party 19 months from finalizing their locations to when their outlets need to be operational.	May 1, Year A -4 months	Jan. 1, Year A 0 months

In the future, when the process can be accelerated due to shared learning experiences, permit streamlining and economy of scale benefits, the extra 12 months may not be necessary.

11. Compliance Requirements

The proposed amendments to the compliance requirements include modifying the minimum dispensing requirements of section 2302(b) for gaseous fuels to include fueling at two pressures (5000 and 10,000 psi) to meet the needs of FCVs projected for deployment. The proposed amendments refer to the Society of Automotive Engineers standard J2601, "Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles,"[38] as the required fueling protocol.

The proposed amendments to section 2309 include consolidating the responsibilities that are currently allocated among owner/lessors and suppliers (section 2309(b) and

[38] SAE, 2010. Society of Automobile Engineers. "Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles." SAE standard J2601. March 16, 2010. Accessed November 8, 2011.

(c)), and operators (section 2310) into one set of requirements assigned to the affected refiner/importers.

Modifying the compliance requirements to be more like performance standards recognizes the refiner/importers as the responsible party for ensuring that stations are built, maintained, and operated to meet the minimum requirements of sections 2302(b) and 2309(b). Some have expressed concern that refiner/importers are not in a good position to develop and operate retail hydrogen fueling infrastructure because they have divested most or all of their retail assets. However, three major refiner/importers, through their participation in the DOE Hydrogen Program, have demonstrated competence in developing and maintaining hydrogen fueling stations.[39] One refiner/importer is currently operating two hydrogen fueling stations in Southern California. Also, the constructive allocation provision (section 2308) allows station operators who are not refiner/importers to allocate their outlet toward the compliance requirements of a regulated party through constructive allocation agreements.

12. Violations

The proposed amendments to section 2315 account for shifting the outlet compliance requirements to refiner/importers as proposed above. The proposal includes eliminating one of the mechanisms for assessing penalties in sections 2315(a) and (b) – the one based on the first five or ten conventional vehicles fueled with gasoline each day by the regulated party - and simply assesses daily fines. The proposed changes also include citing Health and Safety Code sections 43027 and 43028 as the appropriate penalty statutes for non-compliance. With these changes, violating the regulation by willfully failing to install the required number of CFOs could result in penalties that may not exceed $250,000 per station per day. Violations due to negligence could result in penalties that may not exceed $50,000 per station per day.

The proposed amendments add a penalty (section 2315(d)) that could be assessed on automakers. The penalty would apply to automakers that knowingly provide false information in their vehicle projections submitted pursuant to the test procedure reporting requirements discussed earlier in this section. In addition, each automaker that fails to deliver for sale or lease at least 80 percent of their projected number of vehicles by the end of the calendar year for which the projections are being made would be fined $35,000 according to Health and Safety Code section 42402.5. The reason for adding this provision is to address concerns raised by refiner/importers that stations

[39] USDOE, 2006. United States Department of Energy. US DOE Hydrogen and Fuel Cells Program. "2006 Annual Merit Review and Peer Evaluation Report, Technology Validation." http://www.hydrogen.energy.gov/annual_review06_report.html. Accessed Nov. 10, 2011.

may be underutilized if automakers do not actually deliver the approximate number of vehicles they projected.

13. Breakdown of Dispensing Equipment-Release from Liability

The proposed amendments to section 2311 regarding major breakdowns of dispensing equipment include requiring that the equipment be prepared within one month instead of six months. With the limited amount of infrastructure available to fuel cell vehicle drivers, six months of station downtime would be too disruptive. Additionally, fuel and technology providers possess the necessary capabilities to repair stations, and have the ability to provide temporary fueling, such as mobile refuelers, in the event of equipment breakdown.

14. Sunset provision

The proposed amendments would include reducing the threshold for sunsetting the requirements. No new outlets would be required when the number of outlets offering a particular clean fuel reaches five percent of the total number of retail gasoline stations in the state. Staff applied the following rationale for changing the sunset threshold from ten to five percent.

The rationale for the 10 percent sunset threshold, discussed in Section I A 9, may still be valid today but may not be necessary for hydrogen infrastructure. Comments submitted at a March 2011 AB 118 advisory committee meeting[40] suggest that increasing vehicle deployments and major technological improvements to the processing and delivery of transportation hydrogen will make hydrogen cost competitive with traditional fuels. As the five percent station threshold is approached, the number of new vehicles sold or leased is expected to increase more rapidly in terms of absolute numbers. More FCVs create greater demand for hydrogen. In addition, the development of light weight, high pressure delivery vehicles allow for the consolidation of several steps of the supply chain into a central production location, thereby increasing cost effectiveness, potentially reducing the initial cost of a station from over $2 million to less than $1 million. With nearer term and potentially higher ROI, it is anticipated that more station operators will be attracted to the retail hydrogen market independent of the CFO regulation.

[40] CEC, 2011b. California Energy Commission. Transcript: "Advisory Committee Meeting before the California Energy Resources Conservation and Development Commission in the matter of: Alternative and Renewable Fuel and Vehicle Technology Program," Sacramento, California, March 7, 2011, http://www.energy.ca.gov/2010-ALT-1/documents/2011-03-07_meeting/2011-03-07_Transcript.pdf.

15. Substitute Fuels

The proposed amendments include removing section 2317, which allows one to petition ARB to designate a substitute fuel that could be used instead of the primary designated clean fuel on which a ZEV was certified. The primary reason for removing this is section is that it cannot be applied to hydrogen fuel cell vehicles, which are designed to operate only on high purity hydrogen gas. If another type of FCV is introduced that can operate on something other than hydrogen, that vehicle would be considered a different type of designated clean fuel vehicle.

B. Alternatives Considered

Several options were considered while developing this CFO regulatory proposal including keeping the CFO regulation as-is (no action) and non-regulatory options such as incentives and binding agreements. Each alternative is presented below and evaluated in the context of the primary objective to ensure that adequate hydrogen infrastructure is developed to support fuel cell vehicle commercialization.

1. No Action

With the "no action" alternative, the CFO regulation would remain as-is requiring the larger owner/lessors of retail gasoline outlets to equip their outlets with designated clean fuels once the designated clean fuel vehicles reach 20,000 after applying the fleet vehicle discount. Required fuels may include CNG, hydrogen, and potentially, E85.

There are several limitations with the no action alternative. First, as discussed in Section II A, the regulation originally targeted the fuel providers who, at the time, also owned or otherwise controlled most of the state's retail gasoline outlets. Now, fuel providers have divested most of their retail outlets. Three major refiner/importers of gasoline would share the compliance burden with three convenience store and super market chains in the early years, and the other four major refiner/importers would not be brought into the regulation until later, if at all. This would likely result in even more entities divesting from the retail gasoline market thereby thinning the pool of regulated parties and stations. With the growing trend of retail gasoline stations shifting to independent small business owners, the number of entities capable of financing the development of alternative fueling stations will continue to shrink.

Second, for dedicated clean fuel vehicles that can only operate on the designated clean fuel, a 20,000 vehicle trigger is unattainable if existing and planned infrastructure is insufficient to support vehicle population growth to 20,000.

Third, much has changed since the adoption of the CFO regulation. Namely, conventional fuels and vehicle technologies have advanced such that alternative fuels are not needed to achieve LEV standards. All of the major automakers are supplying conventional vehicles that achieve the most stringent LEV emission standard today. Therefore, by keeping the regulation as-is and requiring CFOs for all alternative fuels would result in additional costs for compliance without air quality benefits.

2. Low Carbon Fuel Standard Credit Multiplier for Hydrogen

Staff considered an alternative to the CFO regulation to incentivize hydrogen station development by using a credit-multiplier approach within the Low Carbon Fuel Standard (LCFS). Regulated parties can earn credits in the LCFS program by providing transportation fuels that have lower carbon intensities (CIs) than the gasoline or diesel standard currently in effect. CI takes into account the greenhouse gas (GHG) emissions from the production, transport, and use of a transportation fuel. If used as a transportation fuel, hydrogen would receive LCFS credits because its CI is well below the annual CI requirements of the LCFS. A credit-multiplier would give hydrogen additional credits, thereby increasing its value as a low-CI transportation fuel and incenting its use.

Potential drawbacks of a multiplier incentive include: a reduction in the benefits of the LCFS program; setting a precedent for other fuels to request a multiplier, further reducing LCFS benefits; and possible conflicts with AB 118 funding. Although analysis shows that a multiplier could potentially cover some portion of the cost to build a hydrogen station, stakeholders cite the uncertainty in future credit value as a significant drawback to this approach. Refiner/importers also commented that their need to rely on credits derived from ZEV fuels will not likely occur until 2015 or later, which may not result in the increase in operating stations needed by 2015. Staff will continue to analyze the potential of a credit multiplier incentive; however, at this time staff believes the LCFS multiplier would not be an effective incentive approach for the reasons listed above. Since the automakers need certainty that hydrogen fueling stations will be available to commercially launch FCVs, an incentive that does not have considerable interest from LCFS-regulated parties was deemed insufficient to ensure station deployment.

3. Market Protection Licenses

Staff also considered an alternative that would involve issuing "licenses" to hydrogen providers who installed stations early, before there is sufficient demand to justify a business case. Under this alternative, a provider who installs the first station in a defined geographic area would be the only provider for that area for a defined period of time. Competitors could not build hydrogen stations in that area until the license holder is able to gain a return on their investment. Protection against competition by licensing would reward the license holder for taking the early risk by installing and maintaining hydrogen stations when demand is low and a positive cash flow is uncertain. This concept is similar to licenses that are issued private taxicab companies in New York by the New York City Taxi and Limousine Commission. Licensed taxicab companies must abide by the requirements of the commission, and only licensed cabs can operate in New York City.[41] The licenses would have been of limited duration to allow free market growth once a sufficient number of FCVs were on the road.

While some hydrogen providers viewed this proposal positively, it did not generate adequate interest to justify further pursuit.

4. Memorandum of Agreement

Staff and stakeholders have been exploring an alternative to the CFO regulation involving a multiparty agreement to supply hydrogen stations to meet fuel cell vehicle fueling needs. Such an agreement, possibly executed through a Memorandum of Agreement (MOA) could lay out a framework for interactions between the regulated parties, retail gasoline stations, hydrogen fuel providers, automakers and government to establish hydrogen stations during the crucial early market ramp up period. The advantage of such an agreement would be shared understanding and purpose among the participants regarding timing, location and functionality of hydrogen stations. Ideally, an MOA would include specific, enforceable commitments for meeting hydrogen demand needs within a specified timeframe. ARB staff continues to work on development of an MOA with stakeholders, in parallel to the regulatory effort. All parties recognize that a mutually agreed upon process for ensuring hydrogen infrastructure is preferable to a regulatory mandate; however, if an agreement cannot be reached or if it cannot be developed in time to meet vehicle fueling needs, the proposed regulatory amendments will remain necessary.

C. Comparable Regulations

State and federal regulations pertaining to the advancement of alternative transportation fuels, both prescriptive and performance-based, are in affect today. California's Low Carbon Fuel Standard and the federal Renewable Fuels Standard are summarized below and compared to the Clean Fuels Outlet regulation and proposed amendments.

[41] NYC Taxi, 2011. New York City Taxi & Limousine Commission. Website. http://www.nyc.gov/html/tlc/html/licenses/medallion_main.shtml. Accessed Nov. 10, 2011.

1. Low Carbon Fuel Standard

The 2009 LCFS regulation requires producers and importers of transportation fuels to ensure that the mix of fuel they sell into the California market meets, on average, a declining standard for lifecycle GHG emissions measured in grams CO2-equivalent per unit of fuel energy sold. The LCFS is a performance standard that allows fuel providers to choose how they reduce GHG emissions while responding to consumer demand. By 2020, the LCFS requires a 10 percent reduction in the carbon intensity of all passenger vehicle fuels sold in California relative to the gasoline baseline.

Today, most parties regulated under LCFS are complying by blending biofuels, primarily ethanol, with conventional fuels for use in conventional vehicles. Even though ethanol producers are finding it challenging to reduce the lifecycle carbon emissions of ethanol over time, regulated parties have viewed E85 as the light-duty vehicle fuel substitute with the most potential to achieve the greatest carbon reductions at the least cost.

While, hydrogen on a unit energy basis, has a significantly lower carbon intensity compared to gasoline, parties regulated under LCFS are not currently choosing hydrogen as a compliance path due in part to high cost of infrastructure and low number of vehicles. LCFS only provides compliance credits through actual fuel sales. In the early vehicle deployment years, hydrogen infrastructure needs to lead FCV placements to provide confidence that fuel will be available. Early hydrogen infrastructure will likely be underutilized, therefore making it difficult for a regulated party to earn sufficient compliance credits.

2. Federal Renewable Fuels Standard

The Renewable Fuels Standard, which was updated in 2007 (see discussion in Appendix C), requires the use of biofuels in transportation fuels.[42] By 2022, a minimum of 36 billion gallons of biofuels must be used annually for transportation in the United States. Because the Renewable Fuels Standards applies specifically to liquid fuels, regulated parties today do not have an option to use renewable ZEV fuels, such as electricity or hydrogen, for compliance."

[42] Federal Register, National Archives and Records Administration, March 26, 2010, pages 14669-15320 http://edocket.access.gpo.gov/2010/pdf/2010-3851.pdf

III. Emissions and Health Impacts

This section presents the environmental analysis of the benefits and impacts associated with the implementing of the CFO regulation. Included within is a summary of the Environmental Impact Analysis completed for the Advanced Clean Cars program with the complete environmental analysis in Appendix B. Next is a summary of the Emissions Impacts Analysis, which focuses on estimating how Greenhouse Gas (GHG) emissions and local criteria pollutant emissions would change due to the displacement of petroleum-based fuels by hydrogen used in fuel cell vehicles. The detailed emissions analysis presented in Appendix D.

A. Environmental Impact Analysis

ARB is the lead agency for the proposed regulation and has prepared an environmental analysis pursuant to its certified regulatory program. The California Environmental Quality Act (CEQA) at Public Resources Code section 21080.5 allows public agencies with regulatory programs to prepare a plan or other written document in lieu of an environmental impact report or negative declaration once the Secretary of the Resources Agency has certified the regulatory program. ARB's regulatory program has been certified by the Secretary of the Resources Agency.[43] As required by ARB's certified regulatory program for the proposed regulations, the environmental analysis is included in the Staff Report: Initial Statement of Reasons (ISOR) for the rulemaking. [44]

Appendix B to the Staff Report is an Environmental Analysis (EA) that provides an evaluation of the potential for environmental impacts associated with the proposed Advanced Clean Cars (ACC) Program. The proposed ACC Program consists of amendments to The Clean Fuels Outlet (CFO) regulation as well as amendments to the Low-Emission Vehicle (LEV III), the E-10 Fuels Certification, Environmental Performance Label (EPL), and the Zero Emission Vehicle (ZEV) regulations. Three separate Regulatory Notices and Staff Reports have been prepared for these proposed amendments. A single coordinated analysis of the potential environmental impacts is analyzed in Appendix B. The EA assesses the potential for significant long or short term adverse environmental impacts associated with the proposed actions and an analysis of those impacts.[45] In accordance with ARB's regulations, the EA also describes any beneficial impacts.[46] The resource areas from the state CEQA

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[43] State CEQA Guidelines section 15251 (d); California Code of Regulations (CCR), title 17, sections 60005-60008.)
[44] CCR section 60005.
[45] CCR section 60005, subd (b).
[46] CCR 60005, subd. (d).

Guidelines environmental checklist were used as a framework for assessing potentially significant impacts.[47]

If comments that are received during the public review period raise significant environmental issues, staff will summarize and respond to the comments in writing. The written responses will be included in the Final Statement of Reasons (FSOR) for the regulation. In accordance with ARB certified regulatory program, prior to taking final action on the proposed regulation, the decision maker will approve the written responses.[48] If the regulation is adopted, a Notice of Decision will be posted on ARB's website and filed with the Secretary of the Natural Resources Agency for public inspection.[49]

B. Environmental Justice Outreach

The ARB has made the achievement of environmental justice an integral part of its activities. State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.

The Board approved Environmental Justice Policies and Actions (Policies) on December 13, 2001. These Policies establish a framework for incorporating environmental justice into the ARB's programs consistent with the directives of State law. The Policies apply to all communities in California, but recognize that environmental justice issues have been raised more in the context of low-income and minority communities.

1. Outreach to Minority and Low Income Communities

Staff conducted workshops in communities with environmental justice concerns. The dates of all the workshops were as follows:

Date	Location
July 12, 2011	Fresno
July 19, 2011	Pacoima
July 26, 2011	Oakland

47 State CEQA Guidelines, Appendix G.
48 CCR 60007, subd (a).
49 CCR 60007, subd. (b).

Each of the three workshops included an expert panel with opening remarks from a local community leader. The panels included one expert that focused on background information and environmental impacts of air pollution, one expert in the medical field that focused on the health impacts of air pollution, one expert from the American Lung Association of California that discussed its report titled "The Road to Clean Air," and in some workshops also had an expert speak about local concerns. For instance, in Fresno, one speaker addressed agriculture impacts of climate change. Having local community members and leaders participate in the workshops was greatly appreciated and added value and a local context to ARB's presence in these communities. After community members heard from the panel members, staff presented information about the advanced clean cars regulations and the CEQA scoping process.

There were a number of different comments and concerns expressed at each workshop and staff was able to engage in a constructive dialogue with attendees about many air quality and climate change related issues.

In general, community leaders and community members were very supportive of the work ARB is doing to take steps to reduce emissions from passenger cars and light-duty trucks.

C. Emissions Impact Analysis

The following describes the assumptions and modeling protocol used to estimate emissions associated with supplying compressed hydrogen gas to increasing numbers of fuel cell vehicles, followed by a summary of the analysis results.

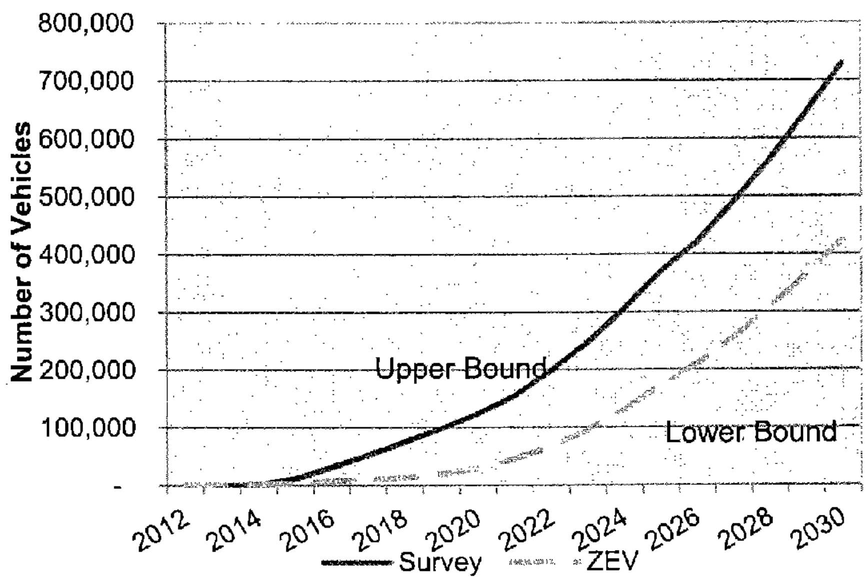
1. Assumptions

Emissions estimates are affected by the numbers and timing of fuel cell vehicle placements, fuel consumption and miles traveled, as well as how the hydrogen is produced and delivered to the station. The following assumptions were used in performing the GHG and criteria pollutant emissions analysis.

a) *Numbers and timing of FCV placements*

In order to create lower and upper bounds for the analysis, staff used two vehicle roll-out scenarios to estimate the anticipated number of FCVs to be deployed in California from present until the regulation sunsets. The Lower Bound is the FCV portion of the ZEV ramp-up scenario referred to as the "most likely compliance scenario," which is used in the ZEV staff report.[50] The Upper Bound includes FCV numbers through 2017 as reported by the automakers in the survey discussed in Section I B 1 of this staff report. To expand the survey data beyond 2017, a ZEV compliance scenario using only FCVs was applied.[51] In both vehicle population data sets, staff utilized graphical best-fit algorithms to fill in data gaps (i.e., between 2014 and 2017 in the survey data) as well as extend the data beyond what is provided in the projections. Figure III-1 shows graphically the cumulative number of FCVs anticipated under each scenario from 2012 through 2030. The vehicle ramp up scenarios shown below were developed for the purpose of analyzing potential impacts of the regulation; however, the actual CFO regulation would be triggered based on automaker projections as discussed in Section II A.

Figure III-1: Estimated Number of FCVs 2012 to 2030



b) *Timing of Regulation Triggering and Sunset*

As discussed in Section II A 6, the regulation would be triggered within an air basin when the projected number of vehicles reaches 10,000 and statewide when the projected number reaches 20,000. In Section II A 13, the proposed modifications include sun setting the regulation when the number of CFOs equals five percent (currently 485) of the total retail gasoline outlets in California. Today, this would mean

[50] Section 3, Table 3.6 of the "Staff Report: Initial Statement of Reasons for 2012 proposed amendments to the California Zero Emission Vehicle Program regulations." Dec. 8, 2011.
[51] Staff applied the ZEV calculator to estimate what compliance to the ZEV regulation would look like if automakers chose to comply strictly with FCVs in lieu of a mix of FCVs, BEVs and PHEVs.

that once the number of hydrogen stations statewide reaches 485, regulated parties would no longer be required build new hydrogen stations.

For both FCV ramp-up scenarios, staff assumed that a large percentage of FCVs will be placed in southern California in the early years where hydrogen infrastructure development is currently underway. For the Upper Bound scenario, staff assumed that, by the end of 2015, 85 percent of the FCVs in California – just over 10,000 – would be deployed within the south coast air basin thereby activating the regional trigger. In 2016, the statewide trigger would be activated and, by 2024, there would be a sufficient number of vehicles – just over 306,000 – to have required 485 hydrogen stations and, therefore, sunset the regulation.

For the Lower Bound scenario, staff assumed that the regional trigger would be activated in 2018, the statewide trigger in 2020, and the sunset in 2028.

c) *Fuel consumption and VMT*

Use of hydrogen each year is dependent on number of FCVs, vehicle miles traveled (VMT), and fuel consumption. Staff referred to EMFAC 2011[52] for average VMT and the LEV staff report[53] for average fuel consumption values for FCVs by model year. For VMT, staff assumed that, due to the full-functionality of fuel cell vehicles,[54] drivers would use FCVs for all of their driving. To calculate emissions for a specific year, staff used a fleet average fuel consumption representing the population of different model year vehicles and a total FCV fleet VMT for that year.

The analyses involved comparing the FCV fleet to the same number of conventional gasoline vehicles in a given year. For the gasoline baseline, staff assumed that the fleet average fuel consumption would decrease over time due to light-duty GHG emission reduction requirements pursuant to Pavely and LEV III.[55]

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[52] ARB, 2011b. California Air Resources Board. EMFAC2011 Technical Documentation, September 19, 2011.

[53] Section III of "Staff Report: Initial Statement of Reasons for proposed rulemaking, public hearing to consider the "LEV III" amendments to the California Greenhouse Gas and Criteria Pollutant Exhaust and Evaporative Emissions Standards and Test Procedures, and to the On-Board Diagnostic System Requirements for Passenger Cars, Light-duty Trucks, and Medium-duty Vehicles, and to the Evaporative Emission Requirements for Heavy-duty Vehicles." Dec. 8, 2011.

[54] FCVs produced today can travel 350 miles on one full tank of hydrogen making their functionality comparable to conventional vehicles, provided there is adequate fueling infrastructure.

[55] AB 1493, 2002. California Assembly Bill. Pavley, Fran (Assemblyman). "Vehicular emissions: greenhouse gases," Chapter 200, Statutes of 2007. July, 2, 2002.

d) *Fuel cycle and vehicle emissions*

Since FCVs are zero emission vehicles, there are only fuel cycle emissions (i.e., from the collection and transport of feedstock's, and production, transport and dispensing of hydrogen) contributing to the well-to-wheel emissions. GHG emissions were evaluated for six hydrogen production pathways including: 1) central plant steam methane reformation (SMR) with liquid hydrogen delivery; 2) central plant SMR with gaseous hydrogen delivery; 3) onsite SMR; 4) onsite SMR using 33 percent renewable resources; and 5) two different pathway combinations containing central plant and onsite production technologies. Hydrogen GHG emissions were compared to well-to-wheel gasoline baseline GHG emissions, which include emissions reductions over time due to the existing California Low Carbon Fuel Standard (LCFS) regulation.[56]

Well-to-wheel criteria pollutant emissions were calculated for four distinct hydrogen pathways – central SMR with liquid delivery, central SMR with gaseous delivery, on-site SMR and on-site electrolysis – and were compared, on a tons per day basis, to the same size fleet of conventional vehicles using California Reformulated Gasoline (CaRFG) with 10 percent ethanol content by volume.

2. Modeling Protocol

The models employed to estimate both GHG and criteria pollutant emission reductions that would result from the proposed regulations are discussed below.

a) *GHGs*

GHG emissions were analyzed using version 1.8b of a life cycle analysis model called Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) that was modified for California conditions (CA-GREET). GHG emissions per mile and total annual GHG reductions were evaluated for the six hydrogen production options listed above.

The GHG emissions analysis takes into consideration SB1505, the Environmental and Energy Standard for Hydrogen Production (SB 1505, Statutes of 2006, Chapter 877),[57] which is anticipated to be in effect shortly after the CFO is triggered. SB 1505 sets GHG and criteria pollutant standards for transportation hydrogen and requires the use of renewable resources in hydrogen production once a specific fuel throughput is reached. For the gasoline baseline, it was assumed that the LCFS regulation would result in lowering the gasoline carbon intensity 10 percent by 2020.

[56] ARB, 2011a.
[57] SB 1505, 2006. California Senate Bill. Lowenthal, Alan (Senator). Chapter 877, Statutes of 2006, September 20, 2006.

For the Upper Bound scenario, four years were evaluated: 2015 and 2016 (regional and statewide triggers); 2020 (Upper Bound scenario midpoint); and 2024 (sunset). In the early years prior to 2016, it is assumed that some of the hydrogen produced is SB1505 compliant. As the number of commercial-scale stations increases around 2016 and beyond, it is assumed that all hydrogen produced will be SB1505 compliant.

For the Lower Bound scenario, the years modeled include: 2018 and 2020 (regional and statewide triggers); 2023 (midpoint); and 2028 (sunset). By 2018, some of the hydrogen produced will be SB1505 compliant, and by 2020, all transportation hydrogen will meet SB 1505 requirements.

b) *Criteria Pollutants*

Staff performed well-to-wheel lifecycle analyses of the criteria pollutants using GREET. Following the requirements established in SB1505 to mitigate local criteria pollutant emissions associated with hydrogen, this well-to-wheel evaluation includes those emissions occurring on a local level. Local criteria pollutant emissions were modeled for four hydrogen production pathways using year 2020 fuel demand associated with the midpoint of the Upper Bound FCV scenario.

3. Results

Both GHG and criteria pollutant emissions were compared to the gasoline well-to-wheel baseline with emissions consistently lower regardless of the hydrogen pathway modeled. The results from the emissions modeling are summarized below with greater detail provided in Appendix D. The emission reductions discussed below are well-to-wheel reductions. The U.S. EPA-proposed fleet average GHG emission standard for 2025 is 163 grams per mile is in terms of tank-to-wheel. The equivalent well-to-wheel value for the average gasoline car in 2025 would be 314.9 grams per mile. FCV have zero tank-to-wheel GHG and criteria emissions. Baseline years were based on the CFO trigger years determined in the example scenarios.

a) *GHG Modeling Results*

The total GHG emissions reductions for the Upper Bound scenario ranged from approximately 0.03 to 0.8 million metric tons of carbon dioxide equivalent per year (MMTCO2e/year), depending on the hydrogen production method and year modeled. While gaseous hydrogen delivery will be used significantly in the early years with smaller stations, hydrogen produced by central SMR with liquid delivery, which is more efficient at larger volumes, is anticipated to largely contribute to the commercialization effort of hydrogen.[58] The central SMR with liquid delivery pathway showed a per-mile well-to-wheel GHG reduction in of 25 to 38 percent compared to the average gasoline vehicle, with values ranging from 244.73 grams carbon dioxide equivalents per mile (gCO2e/mi) at CFO onset to 239.74 gCO2e/mi at sunset.

For the Lower Bound scenario, GHG emission reductions ranged from 0.02 to 0.7 MMTCO2e/year. For the central SMR liquid delivery pathway, per mile GHG reductions were lower compared to the other scenario with reductions ranging from 21 to 32 percent.

Well-to-wheel emissions in both FCV scenarios were also compared to the 30 percent GHG reduction requirement in SB1505. Meeting this reduction requirement becomes increasingly challenging because the GHG emissions of the gasoline baseline continue to improve over time. Only pathways that include a lower percentage of SMR with liquid delivery satisfy the SB1505 GHG reduction targets over the life of the regulation.

b) *Criteria Pollutant Modeling Results*

Local criteria pollutants are expected to be reduced, on average, by more than 50 percent when compared to gasoline for the hydrogen production pathways mentioned above. Based on lifecycle results, the proposed CFO regulation is expected to result in no additional adverse impacts to California's air quality due to emissions of criteria pollutants. There may be additional reductions as the technology matures.

4. Future Hydrogen Production

As demand for transportation hydrogen increases, new hydrogen production facilities will eventually be needed, and will likely be built in California. New facilities may be needed before the regulation sunset if existing hydrogen production in California is insufficient.[59] Hydrogen production on a commercial scale will require development of new technologies as well as the continued use of conventional technology used today. New technology could include hydrogen produced from renewable sources and novel fuel transportation and delivery technologies such as pipeline transport of hydrogen. On

[58] In the early years before the CFO regulation is triggered, central SMR with gaseous delivery is expected to be the predominant hydrogen pathway; however, once demand requires 400 kg/day stations, central SMR with liquid delivery will play an increasing role as it is expected to be more efficient.

[59] US DOE, 2011a. US DOE Hydrogen Analysis Resource Center. "Merchant Liquid and Compressed Gas Hydrogen Production Capacity in the U.S. and Canada by Company and Location." Sept. 6 2005. Last modified June 21, 2011. http://hydrogen.pnl.gov/cocoon/morf/hydrogen/article//706. Accessed October 19, 2011Staff utilized this information from this source to estimates that annual transportation hydrogen demand upon regulation sunset will about 9% of California's merchant hydrogen production capacity.

a statewide basis, GHG and criteria pollutants emissions will likely be offset by reductions in motor vehicle emissions. ARB is committed to making the achievement of emissions reduction an integral part of the CFO. Staff will continue to develop tools to ensure that the proposed regulation does not disproportionately impact low-income and minority communities, does not interfere with the attainment and maintenance of ambient air quality standards, and considers overall societal benefits (such as diversification of energy resources).

IV. Economic Impacts

This section presents a summary of staff's evaluation of initial costs, and operation and maintenance costs associated with hydrogen stations developed pursuant to this regulatory proposal. This economic analysis evaluates hydrogen station deployment scenarios associated with both the Upper Bound and Lower Bound FCV rollout scenarios. The complete economic analysis is included in Appendix E.

A. Assumptions and Modeling Parameters

The following summarizes the assumptions and calculations used to estimate the number and timing of CFO development, and the costs of compliance to the regulated parties. The same assumptions for quantities and timing of FCV placements, VMT, and other factors (shown in Table IV-1) that were used in the Emissions Impact analysis discussed in Section III B were applied in this economic analysis.

Table IV-1. Number of FCVs for Upper and Lower Bound FCV Scenarios

Year	FCV Fuel Economy[60] (miles/kg)	Lower Bound Scenario		Upper Bound Scenario	
		FCVs/year[61][62]	Cumulative FCVs	FCVs/year[63]	Cumulative FCVs
2014	62.2	600	1,900	970	1,400
2015	68.0	2,700	4,600	10,600	12,000
2016	73.9	2,900	7,500	20,000	32,000
2017	72.6	3,000	10,500	21,000	53,000
2018	68.4	2,900	13,400	22,000	75,000
2019	68.1	6,200	19,600	23,000	98,000
2020	68.1	10,600	30,200	26,000	124,000
2021	68.1	15,400	45,600	31,000	155,000
2022	68.1	21,600	67,200	44,000	199,000
2023	68.1	27,800	95,000	49,000	248,000
2024	68.1	35,200	130,200	58,000	306,000
2025	68.1	43,600	173,800		
2026	68.1	36,000	209,800		
2027	68.1	46,300	256,100		
2028	68.1	51,000	307,100		

Numbers rounded to the nearest 100. Shaded cells indicate CFO regulation sunset for each scenario.

1. Estimating the Number of Required CFOs

Determining the number of required clean fuel outlets for a given year first involves calculating annual maximum demand volume (MXDV), which is based on the number of vehicles by model year and the average fuel consumption and VMT for each model year vehicle. In addition, to analyze how a regional vehicle trigger could initiate the development of hydrogen stations within an air basin, staff assumed that a large majority of the first FCVs, and hence, fuel demand, would be in the South Coast air

[60] See "ACC Compliance Scenarios Summary" Worksheet posted on the following website for fuel economy assumptions, developed for the Advanced Clean Cars rulemaking: http://www.arb.ca.gov/msprog/clean_cars/clean_cars_ab1085/clean_cars_ab1085.htm

[61] Source for 2014-2017 Lower Bound FCV numbers. "Zero-Emission Vehicle Standards for 2005 through 2008 Model year Passenger cars, Light-Duty trucks, and Medium-Duty vehicles." California Code of Regulations, title 13, section 1962. Adopted Dec. 17, 2008.

[62] Source for 2018-2025 Lower Bound FCV numbers: Section 3, Table 3.6 of the "Staff Report: Initial Statement of Reasons for 2012 proposed amendments to the California Zero Emission Vehicle Program regulations." Dec. 8, 2011. Graphical best used for 2026-2028 FCV numbers.

[63] Source of Upper Bound FCV numbers: OEM surveys for 2014-2017. For 2018 and beyond, staff assumed FCV growth based on automaker compliance with the ZEV regulation using FCVs only. For both FCV scenarios, see "StationCostCalculator.xlsx" worksheet posted on the following website developed for the Advanced Clean Cars rulemaking: http://www.arb.ca.gov/msprog/clean_cars/clean_cars_ab1085/clean_cars_ab1085.htm.

basin. When the CFO is first triggered, some of the fuel demand will be met by existing and funded hydrogen stations discussed in Section I B 1. Additionally, stations added pursuant to the CFO regulation in a given year will be considered "existing supply" in later years. Each year, the estimated existing hydrogen supply is subtracted from the MXDV to determine a hydrogen supply deficit, and ultimately the required number of new stations for that year. Tables IV-2a and IV-2b present a summary of estimated vehicle numbers, annual MXDVs and hydrogen supply deficit for the Lower and Upper Bound FCV ramp-up scenarios.

The number of required new stations is calculated by dividing the hydrogen supply deficit by a per-station throughput volume of 146,000 kilograms per year (or 400 kg/day). Recognizing that new CFOs will not all be the same, staff assumed that the new stations in the early years would receive delivered hydrogen from a central SMR facility, with 25 percent gaseous delivery and 75 percent liquid delivery. It is important to note that, before the CFO regulation is triggered, central SMR with gaseous delivery is expected to be the predominant hydrogen pathway; however, once demand requires 400 kg/day stations, central SMR with liquid delivery will play an increasing role as reflected in staff's assumptions used in the cost analyses. When there are roughly 300 hydrogen stations in California (representing three percent of the total number of gasoline stations), staff assumed that the new stations would be 85 percent delivered liquid and 15 percent on-site SMR. Tables IV-1a and IV-1b also show the number and types of new stations added each year for both FCV scenarios from when the regulation is triggered to its sunset. It should be noted that each table represents a *scenario* of the types of stations that could be constructed to comply with the CFO regulation and not a requirement to build certain types of stations.

Table IV-2a. Hydrogen Demand and Station Deployments Using the Lower Bound FCV Scenario

Year	FCV Population Cumulative Statewide	FCVs in SCAQMD Region	Annual H2 Demand (1000 kg/year)	Existing H2 Supply (1000 kg/year)	H2 Shortage (1000 kg/year)	Total Stations	New Stations Installed per CFO: Total	Delivered Gaseous	Delivered Liquid	On-site SMR	Notes
2017	10,500	7,861	2,578	1,668	910	29	0	0	0	0	
2018	13,400	10,100	3,198	1,668	1,530	33	5	1	4	0	Regional trigger
2019	19,600	14,700	4,756	2,398	2,358	42	9	2	7	0	
2020	30,200		7,461	3,712	3,749	67	26	7	19	0	State trigger
2021	45,600		11,290	7,508	3,782	93	26	6	20	0	SB1505 threshold
2022	67,200		16,574	11,304	5,270	131	38	9	29	0	
2023	95,000		23,170	16,560	6,610	177	46	11	35	0	
2024	130,200		31,374	23,276	8,098	231	54	13	41	0	
2025	173,800		41,375	31,160	10,215	300	68	0	58	10	3% Saturation
2026	209,800		48,279	41,234	7,045	348	48	0	41	7	
2027	256,100		57,981	48,242	9,739	415	67	0	57	10	
2028	307,100		68,494	58,024	10,470	487	72	0	61	11	5% - Sunset

Table IV-2b. Hydrogen Demand and Station Deployments Using the Upper Bound FCV Scenario

Year	FCV Population Cumulative Statewide	FCVs in SCAQMD Region	Annual H2 Demand (1000 kg/year)	Existing H2 Supply (1000 kg/year)	H2 Shortage (1000 kg/year)	Total Stations	New Stations Installed per CFO: Total	Delivered Gaseous	Delivered Liquid	On-site SMR	Notes
2014	1,400	1,200	437	1,726	0	31	0	0	0	0	
2015	12,000	10,200	3,528	1,668	1,860	38	9	2	7	0	Regional trigger
2016	32,000		8,529	2,982	5,547	77	39	10	29	0	State trigger
2017	53,000		13,302	8,676	4,626	109	32	8	24	0	SB1505 threshold
2018	75,000		18,304	13,326	4,978	142	34	8	26	0	
2019	98,000		23,289	18,290	4,999	176	34	8	26	0	
2020	124,000		28,855	23,188	5,667	215	40	10	30	0	
2021	155,000		35,543	29,028	6,515	261	46	0	39	7	3% Saturation
2022	199,000		45,590	35,744	9,846	328	67	0	57	10	
2023	248,000		56,239	43,946	12,293	402	74	0	63	11	
2024	306,000		68,713	56,502	12,211	488	86	0	732	13	5% - Sunset

2. Cost Assumptions

Following is a summary of the cost data, assumptions, and information sources used in the CFO economic analysis.

a) *Initial Costs*

The costs to construct hydrogen fueling stations have come down in recent years. Cost estimates provided by station developers who have successfully competed for State funding (discussed in Section I B 1) show a 40 percent decrease in costs from 2008 to 2010, even though the average capacity of the 2010 stations is greater.[64] It is important to recognize, however, that the 2010 bids reflect stations with capacities of 180 to 240 kg/day, and not 400 kg/day, which is the basis of the throughput volume used in the station calculations discussed above.

UC Davis' Institute of Transportation Studies and the US Department of Energy's Hydrogen Program have conducted in-depth analyses and consulted with several hydrogen providers and station developers to estimate future initial and O&M costs associated with the development, operation and maintenance of hydrogen fueling infrastructure. Table IV-3 presents initial costs associated with 400 kg/day hydrogen fueling stations in both the early years, 2012 to 2015, and the later years (2017 and beyond). The studies predict that costs would come down even with a moderate amount of learning, approximately five to ten stations per year, and costs will come down more quickly when stations are deployed at a faster rate. Initial costs include site preparation, permitting, engineering, utility installation, structures, and hydrogen storage, compression and dispensing equipment (including 5000 and 10,000 psi dispensing equipment).

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[64] CEC, 2010. California Energy Commission. "Revised Notice of Proposed Award, Alternative and Renewable Fuel and Vehicle Technology Program Grant Solicitation PON-09-608, Hydrogen Ruel Infrastructure." Nov. 17, 2010. http://www.energy.ca.gov/contracts/PON-09-608_Revised_NOPA.pdf. Percent reduction based on four of the stations awarded funding from ARB in 2008 (average per station cost of $3.27 million) and eight stations awarded funding from CEC in 2010 (average per station cost of $2 million).

Table IV-3. Initial Costs for 400 kg/day Hydrogen Fueling Stations (2009 dollars)

Type of 400 kg/day station	Early years	Later years
Central SMR with delivered gaseous hydrogen[65]	$2 million	$1.5 million
Central SMR with delivered liquid hydrogen[66]	$1.8 million	$1.4 million
On-Site SMR[67]	$3.8 million	$2.4 million

Note: Shaded cells represent initial costs used in the economic impact analysis.

For the economic impact analysis, staff used the lower value for the delivered gas pathway based on the likelihood that the cost of this technology will come down due to economy of scale before the regulation is triggered. For delivered liquid, staff used the higher initial cost in the early years until approximately 30 of these stations have been installed in California. This would occur in 2017 in the Upper Bound Scenario and 2021 in the Lower Bound Scenario. After that, staff assumed that initial costs would drop to the lower value due to technology advancements. For hydrogen produced on-site using SMR, staff used the lower costs because, as shown on Tables IV-2a and IV-2b, this technology is not included in the station mix until 2021 in the Upper Bound Scenario, and 2025 in the Lower Bound Scenario. While stations using delivered hydrogen have lower initial costs compared to on-site SMR, staff believes that some stations that can produce hydrogen on site may be necessary to service areas where hydrogen delivery may not be economically viable.

b) *Operation and Maintenance*

Operation and maintenance (O&M) costs consist of two components – fixed and variable. Fixed O&M costs cover hydrogen station upkeep, regular maintenance, repair and replacement of station equipment due to normal wear and tear, and rental of retail space. Variable O&M covers costs that are dependent on hydrogen throughput such as the purchase of hydrogen (or the on-site production of hydrogen) and the electricity required to chill and dispense the hydrogen at 5000 and 10,000 psi. Additionally, SB 1505, which includes requirements for using 33 percent renewable resources for hydrogen production, will come into effect in 2017 in the Upper Bound Scenario and 2021 in the Lower Bound Scenario. For the cost analysis, staff assumed that hydrogen providers would pay a premium to supplement 33 percent of their electricity usage with renewable electricity credits and 33 percent of their natural gas feedstock with biogas

[65] UCD, 2011. University of California, Davis. Ogden, Joan et al. UCD Institute of Transportation Studies. "Analysis of a "Cluster" Strategy for Introducing Hydrogen Fuel Cell Vehicles and Infrastructure in Southern California." Sept. 16, 2011. Revised Oct. 5, 2011.Note: Range provided for 2015 and beyond.
[66] US DOE, 2010a. United States Department of Energy. Nguyen, Tien et al, DOE Hydrogen Program Record (Draft), Sept. 22, 2010.
[67] Ibid.

credits, resulting in an additional cost of \$0.70 per kilogram. Table IV-4 summarizes these assumptions and information sources used.

Table IV-4. Fixed and Variable Operation and Maintenance Costs (2009 dollars)

Fixed Costs	\$100,000 per year (all pathways)[68]			
Variable costs	**Dollars per kilogram of hydrogen produced/dispensed**			
Hydrogen Pathway	**Delivered H2 Cost[69]**	**On-site Electricity**	**On-site Natural Gas**	**SB 1505 Premium[70]**
Delivered Gaseous	\$2.85	\$0.15[71] (1 kwh/kg)[72]	N/A	\$0.70
Delivered Liquid	\$2.70	\$0.15 (1 kwh/kg)	N/A	\$0.70
On-site SMR	N/A	\$0.45 (3 kwh/kg)	\$1.00[73][74]	\$0.70

3. Station Utilization and Payback Assumptions

Critical to this cost analysis is evaluating payback and return on investment, which are dependent on station utilization and hydrogen price, as well as station financing and interest rates. For the cost analysis, staff assumed that the initial costs for each required station will be paid over a seven year period with a six percent interest rate.[75]

Since the CFO regulation uses a 400 kg/day throughput to calculate the number of required stations, this same throughput is used in the cost model as a daily capacity even though station operators may provide greater throughput if needed to meet demand. The model assumes that stations will operate 365 days per year and recognizes that stations will not be fully utilized when they first open, especially those

[68] UCD, 2011.
[69] US DOE, 2011b. United States Department of Energy. Satyapal, Sunita. US DOE Fuel Cell Technologies Program. "Overview of Hydrogen and Fuel Cells." March 3, 2011.
[70] Staff assumed that a kilowatt-hour of renewable electricity would cost almost three times that of commercial grid electricity, and biogas inputs would cost 2.5 times that of conventional natural gas.
[71] Based on average commercial electricity for California's three investor-owned utilities.
[72] UCD, 2011.
[73] US DOE, 2001. United States Department of Energy, National Renewable Energy Laboratory. Spath, Pamala, L. and Margaret K. Mann. "Life Cycle Assessment of Hydrogen Production via Natural Gas." Document No. NREL/TP-570-27637. Revised February 2001. Provided following data to support \$1.00 cost: 158 scf of natural gas is needed to produce one kg of hydrogen via SMR.
[74] EIA, 2011. United States Energy Information Administration. US Natural Gas Price. November 29, 2011 Website. http://www.eia.gov/dnav/ng/hist/n3035us3m.htm. Accessed Dec. 1, 2011. Supports average price for natural gas of \$6.00/1000 standard cubic feet used to determine \$1.00 cost.
[75] FRS, 2011. Board of Governors of the Federal Reserve System. Selected Interest Rates Historical Data website. Last updated 13 April 2011. http://www.federalreserve.gov/releases/h15/data.htm Accessed 1 Nov. 2011. Note: A 6% annual interest rate represents annual corporate AAA bond interest rates averaged from 2000 to 2010.

opening in the early years after the regulation is first triggered. Later, as numbers of FCVs grow and become increasingly commercially viable, station utilization upon opening is expected to be greater compared to the earlier stations. Table IV-5 shows estimated station utilization rates based on the year in which a station was installed and operational for both the Upper and Lower Bound FCV ramp-up scenarios.

Table IV-5. Station Utilization Rates by Year of Operation

	Year Station Opened (Lower Bound/Upper Bound Scenarios)		
Year of Operation	**2018 / 2015**	**2019 / 2016**	**2020+ / 2017+**
First	25%	50%	75%
Second	50%	75%	100%
Third	75%	100%	100%
Fourth and later	100%	100%	100%

4. Price for Hydrogen

It is difficult to project the price of hydrogen for transportation, particularly in the next few years when a network of distribution stations is first being formed. A supporting factor that will contain costs for early networks is that hydrogen production will predominantly come from existing centralized industrial facilities. In the early years, when station utilization is anticipated to be lower, hydrogen may be sold at a loss or it may be priced high to account for low utilization. In the later years when utilization is higher, station operators may be able to sell hydrogen at a profit and recoup their earlier losses. In order to perform the economic analyses for both the ZEV the CFO regulations, staff assumed a linear decreasing price scenario as shown as "Price A" in Table IV-6.

From a different perspective, consumers may accept hydrogen if it is priced at twice the cost of premium gasoline to reflect the per mile fuel consumption benefits and achieve roughly equal dollars per mile cost. Over time, however, the cost to produce hydrogen could drop below that of gasoline (on an energy and mileage equivalent basis) and, therefore, price would likely be set by natural market forces. As such, staff also included a flat pricing scenario "Price B" in the economic analysis that assumes hydrogen is priced at $8 per kilogram, roughly twice the cost of premium gasoline today. For both price scenarios, staff assumed that the credit card fees are captured in the price. Although the information in Table IV-6 was developed for the economic analyses, it is by no means intended to serve as a pricing schedule for retail hydrogen.

Table IV-6. Example Hydrogen per Kilogram Price Scenario by Year - Upper and Lower Bound (2009 dollars)

Upper/Lower Bound Year	2015/2018	2016/2019	2017/2020	2018/2021	2019/2022	2020/2023	2021/2024	2022/2025 and beyond
Price A	$13	$12	$11	$10	$9	$8	$7	$6
Price B	$8	$8	$8	$8	$8	$8	$8	$8

B. Economic Analysis Results

Initial costs, fixed and variable O&M costs, pricing and utilization assumptions presented above were used to calculate total annual costs to all regulated parties as well as annual costs associated with a single station installed during various years of the regulation lifespan. All cost estimates are in 2009 dollars. Results are detailed in Appendix E and summarized below.

1. Cost of Regulation - Lower Bound FCV Ramp-up Scenario

Table IV-7 below shows total annual cost to comply with the CFO regulation assuming a Lower Bound FCV ramp-up scenario. Costs include the total annual payments associated with seven annual loan payments for each station, fixed O&M costs, and variable O&M costs associated with station throughput (as discussed earlier). The total annual costs were then divided by the annual hydrogen throughput, which is based on the station utilization assumptions in Table IV-5, resulting in an average annual cost per kilogram of hydrogen. Hydrogen production costs were then compared to hydrogen sales using the two different pricing scenarios shown in Table IV-6.

Table IV-7. Annual Cost to Comply and Estimated Cumulative Profits Assuming Lower Bound FCV Ramp-up Scenario

Year	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Price A			Price B		
				Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)
2018	$2,584	183	$14.16	$13	($212)	($212)	$8	($1,124)	($1,124)
2019	$8,699	1,022	$8.51	$12	$3,565	$3,354	$8	($523)	($1,647)
2020	$29,008	4,380	$6.62	$11	$19,172	$22,526	$8	$6,032	$4,386
2021	$56,745	8,687	$6.53	$10	$30,125	$52,652	$8	$12,751	$17,137
2022	$87,078	13,797	$6.42	$9	$ 35,616	$ 88,268	$8	$ 21,819	$ 35,956
2023	$126,187	20,221	$6.33	$8	$ 33,842	$ 122,110	$8	$ 33,842	$ 72,798
2024	$172,588	27,813	$6.27	$7	$ 20,365	$ 142,475	$8	$ 48,178	$ 120,976
2025	$229,383	37,230	$6.19	$6	($ 7,001)	$ 135,473	$8	$ 67,459	$ 188,435
2026	$270,695	44,968	$6.04	$6	($ 1,757)	$ 133,716	$8	$ 88,179	$ 276,614
2027	$318,356	54,057	$5.91	$6	$ 5,114	$ 138,831	$8	$ 113,227	$ 389,841
2028	$373,428	64,386	$5.81	$6	$ 12,019	$ 150,850	$8	$ 140,791	$ 530,632
2029	$373,005	67,014	$5.57	$6	$ 28,711	$ 179,561	$8	$ 162,739	$ 693,372
2030	$361,272	67,014	$5.40	$6	$ 40,445	$ 220,006	$8	$ 174,473	$ 867,844

Note: Shaded cells represent regulation sunset where no new stations are required after 2028.

As expected, the cost of production in the first year (2018) is high due to the assumption that the stations will only operate at 25 percent capacity. As more stations are added each year and utilization steadily increases, the average cost of production declines quickly. Using the Price A scenario, the average amount of time it will take for a regulated party to see a return on their investment could be less than two years. A decrease in the average annual profit is apparent from 2025 through 2028 when the price of hydrogen drops to $6. The addition of the more costly on-site SMR stations starting in 2025 also factors into this decrease; however, with increasing fuel demand, it is expected that the SMR stations will realize a return on their investment within 5 years. In every year except 2018, however, the cumulative profits remain positive and continue to grow under the Price A scenario.

Using the Price B scenario implies that hydrogen would be priced below cost in 2018 and 2019, resulting annual losses totaling $1.2 and $0.95 million. Starting in 2020, the average cost of production drops below $8 per kilogram, resulting in net profits in 2020 and beyond. With high station utilization, production costs would continue to decrease indicating that market forces would soon factor into hydrogen price.

2. Cost of Regulation – Upper Bound FCV Ramp-up Scenario

The total annual cost of compliance assuming the Upper Bound FCV ramp up scenario is shown in Table IV-8. In 2015 and 2016 when the regional and statewide triggers are reached, average cost of production is comparable but slightly lower than the first two years of the Lower Bound Scenario. Under the Price A scenario, cumulative profits over time grow more quickly which is consistent with the faster introduction rate for vehicles and stations. When the hydrogen price drops to $6 per kilogram in 2022, the cost of production is slightly higher than $6 affecting the average annual profitability for that year only. Cumulative profits continue to grow after the first year under the Price A scenario.

The cost analysis results using the Price B scenario are similar to the Lower Bound Scenario results in that the cost to produce hydrogen is greater than the price for only the first two years. Annual losses during 2015 and 2016 are greater ($2 and $1.7 million) due to greater numbers of stations with low utilization. Early station operators could start to recoup their investments in 2017.

Table IV-8 Annual Cost to Comply and Estimated Cumulative Profits Assuming Upper Bound FCV Ramp-up Scenario

				Price A			Price B		
Year	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)
2015	$4,642	328.5	$14.13	$13	($371)	($371)	$8	($2,014)	($2,014)
2016	$29,750	3,504	$8.49	$12	$12,298	$11,927	$8	($1,718)	($3,732)
2017	$62,427	8,760	$7.13	$11	$33,933	$45,859	$8	$7,653	$3,921
2018	$98,321	15,403	$6.38	$10	$55,709	$101,568	$8	$24,903	$28,824
2019	$128,863	20,477	$6.29	$9	$55,426	$156,994	$8	$34,949	$63,773
2020	$163,371	26,134	$6.25	$8	$45,701	$202,695	$8	$45,701	$109,474
2021	$202,807	32,631	$6.22	$7	$25,610	$228,305	$8	$58,241	$167,715
2022	$255,421	41,647	$6.13	$6	($5,542)	$222,763	$8	$77,751	$245,466
2023	$ 306,562	52,195	$5.87	$6	$ 6,608	$ 229,371	$8	$ 110,998	$ 356,464
2024	$ 371,354	64,313	$5.77	$6	$14,740	$ 243,895	$8	$ 143,150	$ 449,614

Note: Shaded cells represent regulation sunset where no new stations are required after 2028.

3. Cost and Payback Period for One Station

While the above tables provide a comprehensive example of the overall cost of the regulation, it is valuable to examine cost and payback on a single station basis. Staff evaluated the cost and payback associated with the three different types of stations installed during different periods of the regulation.

a) *Station Installed at Onset of CFO Regulation*

Examples of annual costs and payback associated with a single station installed when the CFO regulation is first triggered are presented in Table IV-9 for delivered gaseous hydrogen and Table IV-10 for delivered liquid hydrogen. The same cost and gradual utilization ramp-up assumptions were applied, and it was assumed that SB 1505 renewable premium would apply starting in the third year of station operation.

Table IV-9. Cost of One Delivered Gaseous Station Installed First Year of CFO

				Price A			Price B		
Year of Operation	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)
1	$478	36.5	$13.10	$13	($3.7)	($3.7)	$8	($186)	($186)
2	$588	73	$8.05	$12	$288	$285	$8	($4)	($190)
3	$774	109.5	$7.07	$11	$431	$715	$8	$102	($88)
4	$909	146	$6.23	$10	$551	$1,266	$8	$259	$171
5	$909	146	$6.23	$9	$405	$1,671	$8	$259	$430
6	$909	146	$6.23	$8	$259	$1,931	$8	$259	$690
7	$909	146	$6.23	$7	$113	$2,044	$8	$259	$949
8	$640	146	$4.38	$6	$236	$2,279	$8	$528	$1,476
9	$640	146	$4.38	$6	$236	$2,515	$8	$528	$2,004
10	$640	146	$4.38	$6	$236	$2,751	$8	$528	$2,532

Depending on how hydrogen is priced, the operator of a delivered gaseous hydrogen station could start becoming profitable by their fourth year of operation – sooner if the station were used more during the first three years. Applying the same utilization and pricing assumptions to a delivered liquid hydrogen station, which has greater initial costs during the early years, shows that it will take slightly longer for the operator to become profitable in the first few years following CFO onset (Table IV-10).

Table IV-10. Cost of One Delivered Liquid Station Installed First Year of CFO

				Price A			Price B		
Year of Operation	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)
1	$526	36.5	$14.42	$13	($52)	($52)	$8	($234)	($234)
2	$630	73	$8.64	$12	$246	$194	$8	($46)	($281)
3	$811	109.5	$7.41	$11	$393	$587	$8	$65	($216)
4	$941	146	$6.44	$10	$519	$1,106	$8	$227	$11
5	$941	146	$6.44	$9	$373	$1,479	$8	$227	$238
6	$941	146	$6.44	$8	$227	$1,707	$8	$227	$466
7	$941	146	$6.44	$7	$81	$1,788	$8	$227	$693
8	$618	146	$4.23	$6	$258	$2,046	$8	$550	$1,243
9	$618	146	$4.23	$6	$258	$2,303	$8	$550	$1,792
10	$618	146	$4.23	$6	$258	$2,561	$8	$550	$2,342

b) *Station Installed Five Years Following CFO Onset*

For hydrogen stations installed five years after the first CFO stations are installed, staff assumed that they would have greater utilization during the first year of operation (75 percent) and complete utilization after that. Also, at this point, the initial cost of a delivered liquid station will have decreased due to technology advancements as discussed above in Section IV A 2, and all stations would be required to meet the SB 1505 renewable hydrogen requirements. Tables IV-11 and IV-12 provide examples of annual costs and payback associated with gaseous and liquid stations installed five years after the CFO regulation is first triggered.

If hydrogen stations are highly utilized as expected starting the fifth year after the CFO regulation is triggered, the analysis shows that total cost to produce hydrogen at both liquid and gaseous delivered hydrogen stations is less than both price scenarios evaluated with one exception. In the Price A scenario when the price drops to $6 per kilogram in year four, both gaseous and liquid hydrogen stations show a decrease in annual profits when the cost to produce hydrogen is greater than or equal to $6. Stations become more profitable in year eight once the seven year loan is paid off.

Table IV-11. Cost of One Delivered Gaseous Station Installed Fifth Year of CFO

				Price A			Price B		
Year of Operation	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)
1	$774	110	$7.07	$9	$212	$212	$8	$102	$102
2	$909	146	$6.23	$8	$259	$471	$8	$259	$361
3	$909	146	$6.23	$7	$113	$584	$8	$259	$620
4	$909	146	$6.23	$6	($33)	$551	$8	$259	$879
5	$909	146	$6.23	$6	($33)	$518	$8	$259	$1,139
6	$909	146	$6.23	$6	($33)	$485	$8	$259	$1,398
7	$909	146	$6.23	$6	($33)	$452	$8	$259	$1,657
8	$640	146	$4.38	$6	$236	$688	$8	$528	$2,185
9	$640	146	$4.38	$6	$236	$924	$8	$528	$2,712
10	$640	146	$4.38	$6	$236	$1,160	$8	$528	$3,240

Table IV-12. Cost of One Delivered Liquid Station Installed Fifth Year of CFO

				Price A			Price B		
Year of Operation	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)
1	$740	110	$6.75	$9	$246	$246	$8	$136	$136
2	$869	146	$5.95	$8	$299	$545	$8	$299	$435
3	$869	146	$5.95	$7	$153	$698	$8	$299	$734
4	$869	146	$5.95	$6	$7	$705	$8	$299	$1,033
5	$869	146	$5.95	$6	$7	$712	$8	$299	$1,332
6	$869	146	$5.95	$6	$7	$719	$8	$299	$1,631
7	$869	146	$5.95	$6	$7	$725	$8	$299	$1,930
8	$618	146	$4.23	$6	$258	$983	$8	$550	$2,480
9	$618	146	$4.23	$6	$258	$1,241	$8	$550	$3,029
10	$618	146	$4.23	$6	$258	$1,499	$8	$550	$3,579

c) *Station Installed Eight Years Following CFO Onset*

Staff also evaluated single station costs for CFOs built eight years following the first required CFO stations to assess the economic impacts of a station installed after the market has developed substantially. Staff assumed the same utilization ramp-up, initial and O&M costs, and renewable hydrogen requirements as above. In both the Lower and Upper Bound FCV ramp-up scenarios, staff assumed that the new stations installed in year eight would consist of mostly delivered liquid with some on-site SMR (see Tables IV-2a and IV-2b for station mix). Starting in year 8, the price for hydrogen using the Price A scenario would be $6 per kilogram. Tables IV-13 and IV-14 provide examples of annual costs and payback associated with delivered liquid stations and on-site SMR stations installed eight years after the CFO regulation is first triggered.

Table IV-13. Cost of One Delivered Liquid Station Installed in Eighth Year of CFO

				Price A			Price B		
Year of Operation	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)	Retail Price ($/kg)	Annual Profit ($1000/ year)	Cumulative Profit ($1000/ year)
1	$740	110	$6.75	$6	($83)	($83)	$8	$136	$136
2	$869	146	$5.95	$6	$7	($76)	$8	$299	$435
3	$869	146	$5.95	$6	$7	($69)	$8	$299	$734
4	$869	146	$5.95	$6	$7	($62)	$8	$299	$1,033
5	$869	146	$5.95	$6	$7	($55)	$8	$299	$1,332
6	$869	146	$5.95	$6	$7	($48)	$8	$299	$1,631
7	$869	146	$5.95	$6	$7	($41)	$8	$299	$1,930
8	$618	146	$4.23	$6	$258	$217	$8	$550	$2,480
9	$618	146	$4.23	$6	$258	$474	$8	$550	$3,029
10	$618	146	$4.23	$6	$258	$732	$8	$550	$3,579

Table IV-14. Cost of One On-Site SMR Station Installed in Eighth Year of CFO

Year of Operation	Total costs ($1000/ year)	Total H2 Demand (1000 kg/year)	Cost of Hydrogen ($/kg)	Price A: Retail Price ($/kg)	Price A: Annual Profit ($1000/ year)	Price A: Cumulative Profit ($1000/ year)	Price B: Retail Price ($/kg)	Price B: Annual Profit ($1000/ year)	Price B: Cumulative Profit ($1000/ year)
1	$765	110	$6.99	$6	($108)	($108)	$8	$111	$111
2	$844	146	$5.78	$6	$32	($76)	$8	$324	$435
3	$844	146	$5.78	$6	$32	($44)	$8	$324	$759
4	$844	146	$5.78	$6	$32	($12)	$8	$324	$1,083
5	$844	146	$5.78	$6	$32	$20	$8	$324	$1,407
6	$844	146	$5.78	$6	$32	$53	$8	$324	$1,732
7	$844	146	$5.78	$6	$32	$85	$8	$324	$2,056
8	$414	146	$2.83	$6	$462	$547	$8	$754	$2,810
9	$414	146	$2.83	$6	$462	$1,009	$8	$754	$3,564
10	$414	146	$2.83	$6	$462	$1,471	$8	$754	$4,318

Except for the first year, when the stations are assumed to be utilized at 75 percent, hydrogen production costs are over $6 per kilogram, which results in loss during the first year using the Price A scenario. In both hydrogen station types, these losses are difficult to make up in the following years with the per kilogram cost just below $6. This is not the case with the Price B scenario. It is important to note that, under either vehicle ramp-up scenario, there would be significant numbers of vehicles (174,000 to 199,000 FCVs) requiring fuel during the eighth year following the onset of the CFO regulation. At this time, new stations will likely be built with the ability to supply more than 400 kilograms per day with a nominal increase in cost.[76] With greater throughput, station operators will be able to pay down their fixed annual costs with greater ease and realize a return on their investment sooner than illustrated above.

4. Cost to Regulated Parties if Stations are Not Utilized

The economic analyses presented above rely on the assumption that fuel cell vehicles will be deployed at the rates presented in the Upper and Lower Bound ramp-up scenarios. But it is important to evaluate the cost to the regulated parties if the FCVs are not deployed as illustrated in the Lower and Upper Bound Scenarios. The regulation will require the first round of mandated stations to be operational at the beginning of the calendar year for which the regulation was triggered.

[76] US DOE, 2010a. DOE estimates that the capital cost of a liquid delivery station with a 1000 kg/day capacity will cost the same or slightly more than the same station with 400 kg/day capacity.

For the following analysis, staff created absolute worst-case scenarios for both FCV ramp up scenarios. Staff assumed that regulated parties were notified during three consecutive years of their CFO obligations in compliance years 2018, 2019 and 2020 in the Lower Bound Scenario and 2015, 2016 and 2017 in Upper Bound Scenario. Then during the first year of CFO onset, staff assumed that OEMs introduced no new FCVs and abandoned all future FCV production plans. Even though there would be some FCVs in the statewide fleet, staff assumed that the required CFO stations were not utilized. For estimating the cost to the regulated party, staff assumed that they incurred 100 percent of the initial and decommissioning[77] costs plus one year of fixed O&M costs for the stations required in the first year; 75 percent of the initial and decommissioning costs for the stations required in the second year; and 10 percent of the initial costs for the stations required in the third year. Under this worst case example, staff assumed that by the third quarter of the first year following the onset of the CFO it would be clear to all parties that no additional effort or financial commitment to hydrogen infrastructure would be required. Table IV-15 illustrates the estimated total costs incurred by all regulated parties by the end of the first year of CFO onset.

Table IV-15. Estimated Total Cost to Regulated Parties at End of 2018 Lower Bound FCV Scenario and 2015

Year	Required New Stations	Total Cost ($million)
2018	5 (regional trigger)	$11.91
2019	9	$14.18
2020	26 (statewide trigger)	$4.47
Total cost incurred under Lower Bound Scenario		**$30.56**
2015	9 (regional trigger)	$21.36
2016	39 (statewide trigger)	$61.10
2017	32	$5.52
Total cost incurred under Upper Bound Scenario		**$87.98**

To give these numbers perspective, staff compared both totals to the amount of gasoline that the regulated parties, the seven major refiner/importers of gasoline, supply

[77] Decommissioning cost is estimated to be $50,000 to $10,000. Sources: bids received by CaFCP to decommission their liquid delivery hydrogen fueling station in West Sacramento, and information provided by sources to be quoted later. $100,000 was used in the above estimates.

to the California market (which was approximately 13.77 billion gallons in calendar year 2010). However, it is anticipated that existing policies guiding the reduction in gasoline consumption through 2016, as well as the gasoline consumption reductions anticipated to occur as a result of this Advanced Clean Cars program, could result in a 17 percent reduction in gasoline consumption from 2010 to 2020.[78] A 17 percent reduction in gasoline produced or imported by the regulated party amounts to 11.43 billion gallons per year. If the worst case scenario discussed above occurred, the regulated parties may desire to pass the cost they incurred as a result of the CFO regulation on to their customers through gasoline sales. If this were to occur in a single year, it would amount to $0.003 per gallon in the Lower Bound Scenario and $0.008 per gallon in the Upper Bound Scenario.

5. Summary of Economic Analysis Results

This economic analysis illustrates that, under the two example hydrogen price scenarios considered, the owner of a hydrogen station will be able to recoup their initial investment and start making a profit within three years. The analysis supports the notion that hydrogen could be priced competitively with gasoline when compared on a gallon-gasoline-equivalent per mile basis, and that with high station utilization, hydrogen could be priced comparatively lower than gasoline.

Station utilization is the key factor in how quickly a profit can be derived at a station. This analysis uses equations from the CFO regulation to determine how many stations are needed based on FVC projections and fuel demand, and the assumption that, after a period of adjustment, FCV owners will use their FCVs for all of their driving (see Table IV-5 for assumptions on station utilization rates). The CFO is intended to match supply with demand thereby facilitating high utilization. The results presented in this section indicate that a lower utilization, for example 90 instead of 100 percent, does not have a significant effect on the timing for recoupling investment and turning a profit.

Under the worst case scenario, if the projected vehicles do not materialize and required stations are underutilized or not utilized at all, the regulated parties will not be able to recoup their investment through hydrogen sales. If the amounts in Table IV-15 were distributed equally among the seven regulated parties, total losses could amount to $4.4 to 12.6 million each. It is important to note, however, that the losses under the worst case scenario would be limited to this amount since no additional stations would be required. If vehicle deployments materialize later or in smaller quantities than projected,

[78] Table V-D-1 of "Staff Report: Initial Statement of Reasons for proposed rulemaking, public hearing to consider the "LEV III" amendments to the California Greenhouse Gas and Criteria Pollutant Exhaust and Evaporative Emissions Standards and Test Procedures, and to the On-Board Diagnostic System Requirements for Passenger Cars, Light-duty Trucks, and Medium-duty Vehicles, and to the Evaporative Emission Requirements for Heavy-duty Vehicles." Dec. 8, 2011.

regulated parties could start selling fuel; however, it would take more time to recoup their investments.

6. Other Economic Impacts

As more hydrogen stations are constructed in the state, local authorities will be required to permit and inspect these stations, potentially adding to their workload. Staff anticipates that local permitting agencies will pass the cost through permitting fees onto the station developer and, as such, these costs are included in this economic analysis.

Additionally, hydrogen dispensing equipment will require routine testing to ensure that it conforms to requirements set forth by the California Department of Food and Agriculture, Division of Measurement Standards (DMS). DMS will develop a protocol for certifying hydrogen dispensers with funding through CEC. Once developed, the cost of certifying individual dispensers will be passed on to the station owner.

Finally, staff expects that the increase in station construction and operation activity will result in new jobs associated with station construction, hydrogen production, hydrogen delivery, station operation and maintenance. Job losses may include those associated with the production, delivery and retail sale of gasoline.

V. Legal Authority

When the Clean Fuels Outlet Regulation was first proposed by ARB staff in 1990, some stakeholders questioned whether ARB had the authority to adopt the regulation. In response, ARB General Counsel Michael P. Kenny issued a legal opinion dated July 31, 1990, entitled "*Authority of Air Resources Board to Adopt Requirements for the Distribution and Retail Availability of Clean Motor Vehicle Fuels.*" The opinion concluded that the Board had the legal authority to adopt the proposed regulation, upon making appropriate findings of necessity, cost-effectiveness, and technological feasibility. This legal opinion can be found in Appendix F.

The reasoning set forth in July 31, 1990 legal opinion applies with equal force to staff's current proposed amendments to the Clean Fuel Outlet Regulation. To briefly summarize, Health and Safety Code section 43018 is the primary source of ARB's legal authority to adopt the proposed regulation. This section was enacted as part of the California Clean Air Act of 1988 (CCAA; Stats. 1988, Chapter 1568), which expanded ARB's previous authority to regulate and control the sale of motor vehicle fuels. Section 43018 does not limit the Board's regulatory options to adopting "specifications" of fuels. Rather, it authorizes the Board to adopt whatever control measures pertaining to fuels that are technologically feasible, cost-effective, and necessary to attain the state ambient air quality standards by the earliest practicable date. A more detailed discussion of the ARB's legal authority and the CCAA can be found in the July 31, 1990 legal opinion.

Some commenters have argued that even if Health and Safety Code section 43018 provided ARB with such authority in 1990, it no longer provides such authority now. These commentators base their argument on language in Health & Safety Code section 43018(b), which directs the Board "not later than January 1, 1992" to "take whatever actions are necessary, cost-effective, and technologically feasible" in order to achieve specified amounts of emission reductions by December 31, 2000. It is argued that these provisions of section 43018 are all concerned with actions to be taken in order to achieve emissions reductions by December 31, 2000. Because this date has now passed, the contention is that section 43018 no longer provides any authority for ARB to adopt the proposed regulation.

We do not agree with this argument. Aside from the fact that section 43018 simply requires ARB to meet an ambitious time schedule and does not actually say that the Board's authority would lapse in 2000, this argument is inconsistent with the Legislature's intent in enacting the California Clean Air Act (CCAA). "Statutory time limits ordinarily are considered directory rather than mandatory and jurisdictional unless the Legislature clearly expresses a contrary intent." (*Plastic Pipe and Fittings Ass'n v.*

California Building Standards Commission, 124 Cal.App.4th 1390, 1411 (2004).) "If depriving an agency of the power to act after a deadline has passed would defeat the purpose of the statute, a court should reject such a construction." (*Ibid.*) One of the overarching purposes of the CCAA was to attain the state and federal ambient air quality standards by the earliest practicable date, and to give ARB the necessary additional authority to accomplish this (see Health and Safety Code sections 40910, 43000.5, and 43018(a), and uncodified section 1(b) of Stats. 1988, Chapter 1568). Most of California has still not attained the state and federal ambient air quality standards, and attainment is many years away for some nonattainment areas. It is not credible to believe that the Legislature intended to give ARB a deadline of December 31, 2000, to adopt regulations to attain the state and federal air quality standards and protect public health, and then take away this authority on that date even if these standards had yet not been attained and public health was still jeopardized. We therefore believe that section 43018 continues to provide ARB with the authority to adopt the proposed regulation.

VI. Summary of Proposed Regulatory Changes

This section provides explanation or rationale for each proposed change included in the proposed regulation order in Appendix A. to the Clean Fuels Outlet Regulation

Amendments to Title 13, CCR, Chapter 8.

The name of the chapter is being changed to "Clean Fuel Outlets." This change identifies the purpose of the chapter to be clean fuel distribution outlets.

Amendments to Title 13, CCR, Section 2300. Definitions.

Modifications to this section include deletion of definitions that no longer apply, modification to definitions that are needed to address the unique qualities of zero emission fuels, and the additions of terms needed to incorporate fuels needed for zero emission technologies.

The following definitions are being removed:

(1) The definition of "affiliate" is being removed because the word is no longer used in the regulation.

(4) The definition of "CNG" is being removed because CNG is not used in ZEVs and, therefore, is no longer covered by this regulation.

(8) The definition of "dual fuel vehicle" is being removed because the definition states that the vehicle also operates on gasoline, which is not a zero emission vehicle (ZEV) fuel. Only ZEVs are included in this regulation. Dual fueled ZEVs are inherently captured in this regulation.

(11) The definition of "flexible fuel vehicle" is being removed because the definition states that the vehicle also operates on gasoline, which is not a zero emission vehicle fuel. Only ZEVs are included in this regulation.

(13) The definition of "gasoline supplier" is being removed because the term is no longer used in the regulation.

(15) The definition of "liquid designated clean fuel" is being removed because it is no longer used in the regulation, and staff believes that the definitions of "designated clean fuel" and "designated clean fuel vehicle" capture all ZEV fuels, regardless of state of matter.

(16) The "low emission vehicle" definition is being removed. This regulation is being modified to only apply to fuels for ZEVs.

(21) The definition of "owner/lessor" is being removed. The definition was used to determine the responsible party based on gasoline station ownership. The determination of the responsible party is being modified so that it is based on the amount of gasoline provided to the California market. A new definition for the responsible party, "major refiner/importers of gasoline," has been added, therefore, the owner/lessor definition is no longer needed.

(22) The "primary designated clean fuel" definition is being removed to reflect the modification of the regulation to only include fuels used to certify ZEVs.

(23) The "produce" definition is being removed because it is no longer used in the regulation.

(26) The "refinery" definition is being removed because it is no longer used in the regulation.

(31) The definition for "vehicle conversion" is being removed. The regulation is being modified to include only original equipment manufacturer vehicles. Staff believes that vehicle conversions will not be in a significant quantity due to cost and production issues.

The following definitions are being modified:

(3) The definitions of "clean alternative fuel" and "clean fuel" are being modified to include only fuel for ZEVs. ZEVs, ZEV-enabling technologies, and technological improvements to gasoline-powered low emission vehicles (as proposed in the amendments to the Low Emission Vehicle regulation) together have the greatest potential for achieve long-term reductions in emissions of criteria pollutants and greenhouse gasses in the light duty vehicle sector. ZEVs, especially hydrogen fuel cell vehicles that require hydrogen fueling stations, face the greatest infrastructure challenge.

(4.1) The definition of "compliance year" is being changed from the original equipment manufacturers' production cycle to the calendar year to address the need for hydrogen infrastructure to be in place before full scale fuel cell vehicle deployments so that potential customers are more likely to have confidence of hydrogen fuel availability before they purchase or lease a fuel cell vehicle.

(4.2) The "dedicated clean fuel vehicle" definition is being modified to remove low emission vehicles and only include ZEVs operated solely on clean alternative fuels. This definition is used to determine the amount of clean fuel needed.

(5) The "designated clean fuel" definition is being modified to reflect which fuels are included in the regulation. Addition, references to low emission vehicles are being removed as only ZEVs are being included in the regulation. Also, the definition adds the reference for the process for including electricity as a designated clean fuel, if deemed necessary.

(10) The "fleet operator" definition is being modified to limit the category to only ZEVs to be consistent with the other proposed changes.

(10.1) The "fleet vehicle" definition is being modified to limit the category to only ZEVs.

(14) "Import" means to bring motor vehicle fuel into California for the first time for use in motor vehicles in California.

(17) "Major breakdown" is being modified to apply to all fuels used for ZEVs.

(19) "Minor breakdown" is being modified to apply to all fuels used for ZEVs.

The following definitions are being modified for minor edits, updating numbering, or for clarification purposes:

(2) "CEC," (9) "Executive Officer"

The following definitions are being added.

(12.1) The definition of "Gasoline" is being added and is used in the determination of the responsible parties, and in the calculation of clean fuel outlets.

(14.1) The definition of "Importer" is being added and is used in the determination of the responsible parties.

(17.1) The definition of "Major refiner/importer of gasoline" and "refiner/importer" are being added and are used in the determination of the responsible parties.

(18) The calculation to determine number of outlets required by each responsible party has changed and is determined by market share. A definition of "Market share" was added to address this change.

(21.1) The responsible party and the determination of outlets has changed. The definition of "Position holder" is needed in the determination of the responsible party.

(23.1) The responsible party and the determination of outlets has changed. The definition of "Producer" is needed in the determination of the responsible party.

(24.1) The responsible party and the determination of outlets has changed. The definition of "rack" is needed in the determination of the responsible party.

(30) The responsible party and the determination of outlets has changed. The definition of "Terminal" is needed in the determination of the responsible party.

(32) The regulation has changed to only include fuels for ZEVs. A definition of "Zero emission vehicle" and "ZEV" is being added to the regulation.

Amendments to Title 13, CCR, Section 2302. Equipping Retail Gasoline Outlets or Other Outlets to Dispense Designated Clean Fuels.

This section addresses the requirements necessary for the outlets to dispense clean fuels.

(a) The modifications to this section are being made to address the changes to the way the industry handles fuel and thus the changes to the responsible party.

(b) The modifications to this section are being made to address the changes needed for clean fuels used in ZEVs.

(1) This new subsection provides information on the pressures required to fill the ZEVs.

(2) This new subsection identifies that the Society of Automotive Engineers standard J2601 must be adhered to for fueling zero emission hydrogen fuel cell vehicles.

(3) This new subsection identifies that the requirements in section 2309(b) for clean fuel outlets must be met.

(c) This section is being added to require staff to (1) evaluate electric vehicle charging infrastructure; (2) determine the need for a charging infrastructure mandate; and (3) develop a time line for a regulatory proposal if the need for a mandate is determined. The requirements of this added section must be met within two years following the adoption of the regulation.

Amendments to Title 13, CCR, Section 2303. Determination of Total Projected Maximum Volumes of Designated Clean Fuels.

This section identifies how to determine the annual amount of fuel necessary for clean vehicles. The section was modified to remove low emission vehicles and only include ZEVs. Modifications are being made to the timeline for notification from 14 months to

28 months. This modification is necessary to accommodate for the additional time required to permit and construct hydrogen fueling stations.

(a) Identification of designated clean fuels.

The proposed modifications to this section reflect the changes necessary for ZEVs and the test procedures for those vehicles. In addition, a sentence was added to clarify that the Executive Officer has the ability to determine if fuels should be designated as a clean fuel.

(b) Estimation of number of designated clean fuel vehicles.

(1) Modifications to this section include clarification corrections and typographical corrections. In addition, language was changed to reflect the proposed modification to include only fuel for ZEVs. Staff also proposes to extend the notification timeline for the responsible party. Following are rationale for the proposed modifications for estimating the number of ZEVs certified on hydrogen:

[i] The cited Low Emission Vehicle test procedure includes revisions that require vehicle manufacturers to provide projections of ZEVs that operate on hydrogen for an additional year into the future.

[ii] Because the compliance year was modified to start in January, this paragraph was modified to increase the fraction of projected vehicles included in the equation to account for the fact that fewer vehicles will have been sold and registered with DMV when the calculations are being made.

[iii] The modification to use DMV records for ZEVs certified on hydrogen through May 31 instead of July 31 accounts for staff's proposal to change the start of the compliance year to January 1.

(2) Vehicle manufacturers reporting will be modified to require vehicle projections and sales data by air basin. This paragraph was added to provide regulated parties with information on where fueling infrastructure is needed.

(c) Determination of total projected maximum volumes of designated clean fuel.

This section identifies how the volume of clean fuel for ZEVs will be calculated. The existing language provides calculations for determining the volume of fuel needed statewide. The modifications being proposed provide the calculation procedures for determining the volume of fuel needed by air basin. Some modifications are also made for clarification purposes. The units used for measurement for gaseous fuel are being changed to kilograms as that unit of measurement is used with gaseous zero emission fuels. Therefore, the model year included for vehicle tracking is being changed. The number of remaining model year 2000 and earlier ZEVs is limited and not significant enough to affect vehicle numbers counting toward the trigger calculation. Also, fueling protocol for the early electric vehicles is not consistent with what is being required and standardized today.

(d) Characterization of certain dual-fuel or flexible-fuel vehicles.

This section was removed as dual fuel vehicles, as previously defined, and flex fuel vehicles are not ZEVs and are therefore not part of the regulation.

Amendments to Title 13, CCR, Section 2303.5. Identification of Designated Clean Fuels Projected to Reach the Trigger Level In a Particular Year.

(a) The trigger level requirement.

This section sets the number of clean fuel vehicles that are necessary to trigger the regulation. Modifications are being proposed to provide an additional determination for vehicles within an air basin. Other modifications clarify that only ZEVs are clean fuel vehicles.

(1) Number of designated clean fuel vehicles necessary to trigger a retail clean fuel outlet requirement.

Modifications are being proposed to provide an additional determination for vehicles within an air basin. Other modifications clarify that only ZEVs are clean fuel vehicles.

(2) Reducing the discount factor for fleet vehicles.

Modifications to this section are to correct typographical errors.

(b) Yearly projections regarding the trigger level.

References to vehicles are being changed to ZEVs as low emission vehicles are no longer covered under this regulation. As previously mentioned, the notification timeframe for required clean fuel outlets is being increased. The Executive Officer will notify interested parties thirty months prior to the start of the year instead of sixteen. Other proposed modifications to this section are to correct typographical errors.

(c) Requests to revise trigger level projections.

As previously mentioned, the notification timeframe for required clean fuel outlets is being increased. Therefore, the timeline for the Executive Officer to issue a final determination is being changed to twenty–nine months before the start of the year from fourteen months. Other modifications to this section are to correct typographical errors or for clarification purposes.

Amendments to Title 13, CCR, Section 2304. Determination of Total and Additional Number of Retail Clean Fuel Outlets Required for Each Designated Clean Fuel in Each Year.

This section describes the process for determining the number of stations required under the regulation and evaluates the current status of stations to determine the need for additional stations. Modifications to this section include those to incorporate the determination the station need by air basin. As previously mentioned, the notification timeframe for required clean fuel outlets is being increased. The Executive Officer will notify interested parties twenty-nine months prior to the start of the year instead of fourteen. Other proposed modifications to this section are to correct typographical errors.

(a) Determination of total number of retail clean fuel outlets required for each designated clean fuel in each year.

This section describes how to determine the total of clean fuel stations needed. Modifications to this section are for clarification purposes or are the correction of typographical errors.

(1) Formula for calculating required number of clean fuel outlets.

This section provides the formula for determining the total number of clean fuel stations needed. The proposed modifications include the deletion of the volume of fuel needed from vehicle conversions because vehicle conversions are no longer included in the regulation.

(2) Executive Officer adjustments to the number of required retail clean fuel outlets.

This section provides information regarding potential adjustments to the number of clean fuel outlets based on types of vehicles, fleets of vehicles, and existing outlets. Other modifications include typographical errors.

(A) Reducing projected clean fuel volume to reflect the volume of gasoline used in dual-fuel or flexible-fuel vehicles.

This section, which provided adjustments from dual fuel vehicles and flexible fuel vehicles, was removed because these vehicles are no longer included in the regulation.

(B) Change to the discount for fleet vehicles.

This section described the adjustments that are made if ZEVs are fleet vehicles. As previously mentioned, the notification timeframe for required clean fuel outlets is being increased. Dates were changed to thirty-one months prior to the start of the year instead of eighteen. Other modifications include typographical errors or addition of information for clarification purposes.

(C) Reducing the number of required retail clean fuel outlets to reflect certain preexisting outlets.

This section identifies how to reduce the number of additional clean fuel outlets required based on the existing clean fuel stations. Modifications to this section represent the change to the responsible party. Modifications also include requiring operators of existing clean fuel stations who are not considered "regulated parties" to certify that they will operate their station throughout the compliance year before their station can be used to reduce the number of required clean fuel outlets per this subsection. Other modifications correct typographical errors or for clarification purposes.

(D) Notification regarding any adjustments.

This section describes the process for notification of adjustments. As previously mentioned, the notification timeframe for required clean fuel outlets is being increased. Dates were changed to twenty-eight months prior to the start of the year instead of fourteen. Other modifications made are to correct typographical errors or for clarification purposes.

(E) Requests to revise the Executive Officer's adjustments.

This section describes the process requests from industry to revise Executive Officer's adjustments. As previously mentioned, the notification timeframe for required clean fuel outlets is being increased. Dates were changed to twenty-six months prior to the start of the year instead of twelve. Other modifications made are to correct typographical errors or for clarification purposes.

(b) Determination of total number of additional clean fuel outlets required each year for each designated clean fuel.

This section describes the means to determine the number of additional clean fuel stations needed. A clause in the second sentence of this paragraph was removed because it was previously repeated in error. Other modifications made are to correct typographical errors or for clarification purposes.

Amendments to Title 13, CCR, Section 2306. Identification of Affected Owner/Lessors Required to Equip Additional Retail Clean Fuel Outlets Each Year.

This section provides the means to determine for who is responsible for installing stations. The responsible party is being changed to refiners/importers and is no longer based on station ownership. Therefore, this section is being removed and replaced by section 2306.1.

Amendments to Title 13, CCR, Section 2306.1. Determination of Market Share for Each Major Refiner/Importer of Gasoline

This new section provides the means to determinate market share for refiners and importers of gasoline. It also identifies that the calculations will begin twenty-nine month prior to the start of the year.

Amendments to Title 13, CCR, Section 2307. Allocation Among Major Refiner/Importers of Gasoline of the Total Number of Retail Clean Fuel Outlets.

This section provides the means to determine who is responsible for installing stations and the how many stations each major refiner or importer is responsible for. Modifications proposed include correction of typographical errors.

(a) Allocation among affected major refiner/importer of gasoline of the number of additional retail clean fuel outlets for each year.

Modifications include changing the responsible party from Owner/Lessor to major refiners and importers of gasoline and references to sections that apply to the new regulated party. Additional modifications proposed include correction of typographical errors and changes for clarity.

(b) Determination of an owner/lessor's number of non-clean fuel retail gasoline outlets.

Gasoline stations are now primarily owned by private parties who own relatively small numbers of stations. The number of clean fuel stations required to be installed by a regulated party is no longer determined by the number of their existing gasoline stations. As such, this section was removed.

(c) Determination of clean fuel fraction.

Gasoline stations are now primarily owned by private parties who own relatively small numbers of stations. The number of clean fuel stations required to be installed by a regulated party is no longer determined by the existing gasoline stations owned. This section was removed.

(d) Determination of each major refiner/importer of gasoline's total required minimum number of retail clean fuel outlets for each clean fuel for each year.

This section determines the number of stations for each major refiner and importer of gasoline. Modifications include changing the responsible party from Owner/Lessor to major refiners and importers. Modifications also include the additional requirements to determine the number of stations by air basins. Additional modifications proposed include correction of typographical errors and modifications for clarification purposes.

(e) Notification of refiner/importers.

This section describes how the refiners and importers will be notified and when they will be notified. Modifications include changing the responsible party from Owner/Lessor to major refiners and importers. Modifications also include the additional time for notification. Notification is proposed to be twenty-eight month prior to the start of the year instead of fourteen months.

Amendments to Title 13, CCR, Section 2308. Constructive Allocation of Retail Clean Fuel Outlets

This section addresses the requirements of the fueling stations.

(a) Modifications include changing the responsible party from Owner/Lessor to major refiners and importers.

(b) No modifications are proposed.

(c) No modifications are proposed.

(d) This section only applied to existing retail gasoline stations. Proposed modifications to this section change this to apply to all proposed constructive allocations of clean fuel outlets. Additional modifications proposed include correction of typographical errors and modifications for clarification purposes.

(e) Modifications place the responsibility of complying with the station requirements on the owner of the constructively allocated clean fuel outlet to reflect changing the responsible party from Owner/Lessor to major refiners and importers.

(f) Additional modifications proposed include correction of typographical errors and modifications for clarification purposes.

(g) Modifications include changing the responsible party from Owner/Lessor to major refiners and importers. Additional modifications proposed include correction of typographical errors and modifications for clarification purposes.

Amendments to Title 13, CCR, Section 2309. Responsibilities of Refiner/Importers of Selected Retail Clean Fuel Outlets.

This section describes the responsibilities of the refiners/importers of clean fuel outlets. Modifications provide requirements for previously installed stations to be included as a clean fuel outlet. These requirements must be met with the requirements prior to January 1, 2015.

(a) Locations of required clean fuel outlets.

Modifications include changing the responsible party from Owner/Lessor to major refiners and importers. Obsolete text regarding the CEC methanol program has been removed. Modifications also include additional time for installation of stations. The timeline for the responsible party to provide proposed locations for clean fuel outlets to the Executive Officer is extended to twenty-two months from eight months In addition to the proposed locations, the amount of optional locations shall be in excess of the required locations by 40 percent. This proposed modification of optional locations was changed from an excess of twenty percent. Proposed modifications include the addition of modeling tools to establish and evaluate clean fueling infrastructure scenarios. Notification of the final determination of the station location has been modified from five to nineteen months. Additional modifications proposed include correction of typographical errors and modifications for clarification purposes. .

(b) Requirements for selected retail clean fuel outlets.

This section outlines the requirements for clean fuel outlets and identifies that the refiner/importer be responsible for ensuring the requirements are met. Non-duplicative requirements of sections 2309(c) have been added to this section. This section was also modified to remove obsolete terms and requirements. Additions include identification of requirements necessary for zero emission fuels.

(c) Requirements regarding facilities at selected clean fuel outlets at which gasoline is not offered to the public.

This section is being removed and non-duplicative requirements are being added to section 2309(b).

(d) Requirements regarding supply of designated clean fuels to selected retail clean fuel outlets.

(1) This subsection is being removed because the requirements to ensure the supply of reasonable quantities of clean fuel to each outlet are encompassed in the compliance requirements of the responsible party set forth in sections 2302 and 2309(b).

(2) Modifications include changing the responsible party from Owner/Lessor to major refiners and importers. Added to the notification requirements of this subsection is the requirement that the regulated party identify contractors hired for the operation and maintenance of the clean fuel outlet. Additional modifications proposed include correction of typographical errors and modifications for clarification purposes.

(e) Annual reports regarding compliance with section 2302.

This section describes what is required in the annual reports from refiners and importers. Modifications include changing the responsible party from Owner/Lessor to major refiners and importers. Additional modifications proposed include correction of typographical errors and modifications for clarification purposes.

Amendments to Title 13, CCR, Section 2310. Responsibilities of Operators of Selected Retail Clean Fuel Outlets.

This section described the responsibilities of operators for clean fuel outlets. This section is proposed for removal and non-duplicative requirements are being added to 2309(b).

Amendments to Title 13, CCR, Section 2311. Relief from Liability Caused by Breakdowns of Clean Fuel Dispensing Equipment.

This section establishes the conditions of liability related to breakdown of dispensing equipment. Modifications include: changing the type of equipment from CNG equipment to clean fuel equipment thereby including hydrogen and potentially electricity, and changing responsibility from owner/lessor or operator to refiner/importer.

Provisions for a major equipment breakdown were modified to reduce the amount of time required for a responsible party to repair a major equipment breakdown from six months to one month. Allowing a station to be nonoperational for six months without being in violation would be too disruptive to fuel cell vehicle drivers depending fueling stations. Additionally, if the responsible party is unable to make the necessary repairs within a month, temporary fueling equipment can be used to provide fuel to customers while equipment is being repaired.

Amendments to Title 13, CCR, Section 2311.5. Notification of Executive Officer Reporting Obligations

This section establishes when the Executive Officer shall notify identified parties that there is a possibility that the vehicle based trigger may be reached. Modifications include changing the vehicle threshold to include a 10,000 vehicle air basin based trigger (only a 20,000 vehicle statewide trigger was in place previously). Modifications also include changing the notification period from 22 months to 34 months prior and including zero emission fleet operators and major refiner/importers of gasoline in the notifications.

Amendments to Title 13, CCR, Section 2312. Reporting Requirements for Major Refiner/Importers of Gasoline

This section requires responsible parties to report the number of retail gasoline outlets that they own or are affiliated with. Modifications include changing the responsible party from Owner/Lessor to major refiners and importers, and including information about the refiner/importers affiliation with the stations, whether it be as an owner, distributor, franchisor, or affiliated with the brand of fuel supplied at the station.

Amendments to Title 13, CCR, Section 2313. Reporting Requirements for Fleet Operators

This section establishes reporting requirements for fleet operators. Modifications include changing the reporting period from 18 months to 32 months prior to the start of the year and modifying the vehicle requirement from low-emission vehicles to ZEVs.

Amendments to Title 13, CCR, Section 2314. Reporting Requirements for Producers and Distributers

This section addresses reporting requirements for distributors on clean fuel. It was modified to include requiring producers of the designated fuel to report the required data, when previously, only distributors had to report. Modifications include the additional requirement that persons who produce or distribute the clean fuel report the volume of fuel distributed to each outlet on a quarterly basis. This provision was added to assist staff in quantifying the amounts of clean fuel being distributed by geographic area.

Amendments to Title 13, CCR, Section 2315. Determination of Violations

This section describes determination of violations of the regulation and related penalties.

(a) Violation of section 2302.

This part addresses the failure of the primary regulated party to provide the required number of outlets. It was modified to reflect that the regulated party is now the refiner/importer and removed the provision that the penalty be assessed based on the first ten vehicles fueled. This provision was removed because some refiner/importers do not own a single outlet, thereby providing no metric to assess a penalty for non-compliance. Modifications to this section include assessing a fixed daily penalty for non-compliance with section 2302. The relevant penalties are described in Health and Safety Code sections 43027 and 43028. These modifications seek to ensure that penalties equitably capture non-compliant regulated parties regardless of the number of retail gasoline outlets they own.

(b) Violation of section 2309 (b)

This part addresses the failure to operate the stations according to the specifications in section 2309(b). The modifications reflect the regulated party is now the refiner/importer versus the owner/lessor previously and removes the provision that penalties be assessed based on the first five vehicles fueled. As stated above, this provision was removed because some refiner/importers do not own a single outlet, thereby providing no metric to assess a penalty for non-compliance. Modifications include assessing a fixed daily penalty for failure to comply with section 2309(b). The relevant penalties are described in Health and Safety Code sections 43027 and 43028. These modifications seek to ensure that penalties equitably capture non-compliant regulated parties regardless of the number of retail gasoline outlets they own.

(c) Violation of section 2310

This part addresses requirements of the operator of a station. The requirements of section 2310 were combined with section 2309. This subsection is no longer needed.

(d) Violations of Section 2303 (b)(2)

This section was added to include penalties for motor vehicle manufactures that fail to deliver for sale or lease at least 80 percent of the projected number of designated clean fuel vehicles. The relevant penalties are described in Health and Safety Code 42402.4. This addition establishes a penalty to motor vehicle manufacturers for over reporting that did not exist before. Over reporting could result in undue burden on refiner/importers requiring them to build more clean fuel outlets than necessary.

Amendments to Title 13, CCR, Section 2316. Determination of Energy Equivalency of Fuels

This section provides information on energy equivalency values for clean fuels compared to gasoline. Modifications include: revising the volumetric energy content for gasoline to 109,600 BTUs per gallon to reflect the new standards and ethanol content of California reformulated gasoline specified in the Low Carbon Fuel Standard regulation; removing all fuels that are not zero emission fuels; and adding the energy equivalency value for gaseous hydrogen in BTUs per gallon gasoline equivalent based. This modification reflects changes in gasoline standards and that the regulation only pertains to ZEVs and ZEV fuels.

Amendments to Title 13, CCR, Section 2317. Section Provided for the Designation of a Substitute Fuel

This section was removed. This section previously established the procedure that allowed a substitute fuel to be used instead of a primary designated fuel, for example requesting the use of a CNG fuel with a slightly different energy content then the certification CNG fuel. Since the regulation will now exclusively focus on zero emission fuels, hydrogen in the near term and potentially electricity at a later time this section is no longer applicable. They fuel quality of hydrogen is set by the Department of Food and Agriculture through the Division of Measurement and Standards.

Amendments to Title 13, CCR, Section 2318. Sunset for Particular Designated Clean Fuels.

This section identifies when the regulation ceases to require the construction of clean fuel outlets. The modifications reduced the ratio of clean fuel outlets to gasoline outlets from ten percent to five percent as ratio is a likely signal of adequate consumer acceptance of the technology to support the necessary expansion of hydrogen infrastructure absent a mandate.

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APPENDIX A

PROPOSED REGULATION ORDER

Amend section sections 2300, 2302, 2303, 2303.5, 2304, 2307 2308, 2309, 2311, 2311.5, 2312, 2313, 2314, 2315 and 2318; repeal of sections 2306, 2310, 2316 and 2317; and proposed adoption of section 2306.1., title 13, California Code of Regulation (CCR), to read as follows:

[Note: Set forth below are the 2012 amendments to the Clean Fuels Program regulation. The text of the amendments is shown in underline to indicate additions and ~~strikeout~~ to indicate deletions, compared to the preexisting regulatory language.]

Chapter 8. Clean Fuels Outlets ~~Program~~

§ 2300. Definitions.

(a) The following definitions apply to Chapter 8.

~~(1) "Affiliate" means any person who owns or controls, is owned or controlled by, or is under common ownership and control with, another person.~~

~~(2)~~(1) "CEC" means the State Energy Resources, Conservation and Development-Commission.

~~(3)~~(2) "Clean alternative fuel" and "clean fuel" means any fuel used as the certification fuel in a ~~low~~zero-emission vehicle~~, other than the primary gasoline or diesel fuel used in exhaust emission certification testing pursuant to the ARB's "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1960.1, or "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1961~~.

~~(4) "CNG" means compressed natural gas.~~

~~(4.13)~~ (3)"Compliance year" means the 12 month period running from ~~May 1 through April 30.~~January 1 through December 31.

(4.~~7~~) "Dedicated clean fuel vehicle" means a ~~low~~zero-emission vehicle designed and engineered to be operated solely on a clean alternative fuel.~~, and not on gasoline or any mixture of gasoline and the clean alternative fuel.~~

(5) "Designated clean fuel" means a~~ny~~ clean alternative fuel as determined by the Executive Officer pursuant to section 2303(a). ~~other than electricity.~~ Designated clean fuel does not include electricity unless the Board concludes, based on the analysis conducted pursuant to section 2302(c), that public charging infrastructure for electric vehicles should be incorporated into this regulation.

(6) "Distribute" means to physically transfer from a production or importation facility and irrevocably release into commerce for use as a motor vehicle fuel in California.

(7) "Distributor" has the same meaning as defined in section 20999 of the Business and Professions Code.

~~(8) "Dual-fuel vehicle" means any motor vehicle that is engineered and designed to be capable of operating on gasoline, and on liquified petroleum gas, CNG or liquiefied natural gas.~~

~~(9)~~(8) "Executive ~~o~~Officer" means the ~~e~~Executive ~~o~~Officer of the Air Resources Board, or his or her designee.

~~(10)~~(9) "Fleet operator" means, for any given calendar year, the operator in that year of fifteen or more ~~low~~zero-emission vehicles that are certified on a particular designated clean fuel and that are under common ownership or operation in California.

(10~~.3~~) "Fleet vehicle" means one of fifteen or more ~~low~~zero-emission vehicles that are certified on a particular designated clean fuel and that are under common ownership or operation in California.

~~(11) "Flexible-fuel vehicle" means any alcohol-fueled motor vehicle that is engineered and designed to be operated using any gasoline-alcohol mixture or blend.~~

~~(12)~~(11) "Franchise," "franchisor," and "franchisee" have the same meaning as defined in section 20999 of the Business and Professions Code.

(12~~.1~~) "Gasoline" means finished gasoline and gasoline blendstocks.

~~(13) "Gasoline supplier" means any person, including affiliates of such person, who produces gasoline for use in California or imports gasoline into California.~~

~~(14)~~(13) "Import" means to bring motor vehicle-fuel into California for the first time for use in motor vehicles in California.

(14) "Importer" means the person who owns an imported product when it is received at the import facility in California.

~~(15) "Liquid designated clean fuel" means any designated clean fuel that is dispensed into motor vehicles in liquid form.~~

~~(16) "Low-emission vehicle" means any vehicle certified to the transitional low-emission vehicle, low-emission vehicle, ultra low-emission vehicle, super ultra-low-emission vehicle, or zero-emission vehicle standards established in Title 13, California Code of Regulations, sections 1960.1 or 1961.~~

~~(17)~~(15) "Major breakdown" means an unforeseeable mechanical or electrical failure ~~off CNG~~ of clean fuel dispensing equipment which cannot in the exercise of reasonable diligence be repaired in 72 hours or less.

(16) "Major refiner/importer of gasoline" and "refiner/importer" mean a position holder who is also a producer of gasoline in California or importer of gasoline into California, and their total gasoline production and imports amounts to 500 million gallons or more for the calendar year, as determined from State Board of Equalization Motor Vehicle Fuel Distribution Reports used by the Board of Equalization to assess motor vehicle fuel taxes at the terminal rack.

(17) "Market share" is the value that represents the percent of gasoline production and imports made by a major refiner/importer of gasoline as determined pursuant to section 2306.5.

~~(19)~~(18) "Minor breakdown" means an unforeseeable mechanical or electrical failure of clean fuel~~CNG~~ dispensing equipment which can in the exercise of reasonable diligence be repaired in 72 hours or less.

~~(20)~~(19) "Non-retail facility" means any establishment at which a designated clean fuel is supplied or offered for supply to motor vehicles, but is not supplied or offered to the general public.

~~(21) "Owner/lessor" means:~~
~~(A) In the case of a retail gasoline outlet which is owned, leased or controlled by a franchisor, and which the franchisee is authorized or permitted, under the franchise, to employ in connection with the sale of gasoline, the franchisor.~~

~~(B) In the case of a retail gasoline outlet which is owned, leased or controlled by a refiner or a distributor, and is operated by the refiner or distributor or his agent, the refiner or distributor.~~

~~(C) In the case of all other retail gasoline outlets, the owner of the retail gasoline outlet.~~

(20) "Position holder" (per section 7332 of the Revenue and Taxation Code) includes any person that holds the inventory position in the motor vehicle fuel, as reflected on the records of the terminal operator. A person holds the inventory position in motor vehicle fuel when that person has a contractual agreement with the terminal operator for the use of storage facilities and terminaling services at a terminal with respect to the motor vehicle fuel. "Position holder" includes a terminal operator that owns motor vehicle fuel in its terminal.

~~(22) "Primary designated clean fuel" means a designated clean fuel for which a substitute fuel has been proposed or designated pursuant to section 2317.~~

~~(23) "Produce" means, in the case of any liquid motor vehicle fuel, to convert in California liquid compounds which do not constitute the fuel into the fuel.~~

(21) "Producer" means the person who owns the fuel when it is supplied from the facility at which it was produced.

~~(24)~~(22) "Quarter" means the three month calendar quarters January-March, April-June, July-September, and October-December.

(23) "Rack" means a mechanism for delivering motor vehicle fuel from a refinery or terminal into a truck, trailer, railroad car, or other means of nonbulk transfer.

~~(25)~~(24) "Refiner" has the same meaning as defined in section 20999 of the Business and Professions Code.

~~(26) "Refinery" means a facility that produces gasoline by means that include distilling petroleum.~~

~~(27)~~(25) "Selected retail clean fuel outlet" means a specific retail clean fuel outlet which is equipped to store and dispense a designated clean fuel in order to comply with section 2302.

~~(28)~~(26) "Retail clean fuel outlet" means an establishment which is equipped to dispense a designated clean fuel to motor vehicles and at which the designated clean fuel is sold or offered for sale to the general public for use in motor vehicles without the use of a key or card key and without the need to establish an account.

~~(29)~~(27)"Retail gasoline outlet" means any establishment at which gasoline is sold or offered for sale to the general public for use in motor vehicles.

(28) "Terminal" means a motor vehicle fuel storage and distribution facility that is supplied by pipeline or vessel, and from which motor vehicle fuel may be removed at a rack. "Terminal" includes a fuel production facility where motor vehicle fuel is produced and stored and from which motor vehicle fuel may be removed at a rack.

~~(31) "Vehicle conversion" means a modification of a gasoline or diesel fueled vehicle, not certified to a low emission vehicle standard, to a vehicle which uses a designated clean fuel and which is capable of meeting low-emission vehicle exhaust emissions standards as demonstrated either by installation of an ARB-approved conversion system that achieves such low-emission standards or by individual vehicle testing~~

(29) "Zero emission vehicle" and "ZEV" mean a vehicle that produces zero exhaust emissions of any criteria pollutant (or precursor pollutant) under any and all possible operational modes and conditions.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2302. Equipping Retail Gasoline Outlets or Other Outlets to Dispense Designated Clean Fuels.

(a) ~~Any~~ Each major refiner/importer of gasoline ~~person who is the owner/lessor of an operating retail gasoline outlet~~ shall, for each designated clean fuel, establish ~~equip~~ at least the required minimum number for each year, as determined in accordance with section 2307(d), of ~~his or her retail gasoline outlets in the state, or of other outlets in the state, so that the outlets are~~ retail clean fuel outlets for the designated clean fuel. The required minimum number of retail clean fuel outlets for each compliance year shall apply to the entire compliance year. The requirements of this section shall apply at all times during which a refiner/importer meets the definition of a "major refiner/importer of gasoline" in section 2300(a). ~~person is an owner/lessor of an operating retail gasoline outlet. The requirements of this section shall in any case be deemed satisfied with regard to a designated clean fuel if all of the owner/lessor's operating retail gasoline outlets are equipped as retail outlets for the designated clean fuel.~~

(b) In the case of any designated clean fuel which is in gaseous form, the dispensing equipment required by this section shall be designed ~~for a minimum of four hours of high volume operation per day.~~ to satisfy the following minimum criteria:

(1) Dispense gaseous fuel upon request to bring to a full state of charge vehicles designed with 5000 pounds per square inch (350 bar) and 10,000 pounds per square inch (700 bar) storage tanks;

(2) For gaseous hydrogen, satisfy the fueling protocols specified in the Society of Automotive Engineers standard J2601,"Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles"; and

(3) Satisfy the requirements for selected retail clean fuel outlets set forth in section 2309(b).

~~For all retail gasoline outlets or other that are claimed by the owner/lessor to be equipped in order to satisfy the requirements of this section, the owner/lessor shall notify the operator in writing that the outlet is so equipped.~~

(c) In the case of electricity used for transportation, the Board shall, within two calendar years following the adoption of these regulatory amendments, determine if requirements for electricity used for transportation and vehicle charging infrastructure for full-function battery electric vehicles and plug-in hybrid electric vehicles should be incorporated into this regulation based on the following:

(1) An evaluation of the development and usage of workplace and public charging infrastructure to determine:

(A) how pricing affects customer charging preferences in terms of frequency of use of home, workplace and public chargers;

(B) how incentives, such as free charging, free parking, preferential parking, and other factors, affect the use of workplace and public chargers;

(C) the level of current and future private market investment in public charging infrastructure;

(D) whether additional public charging infrastructure will increase [i] electric vehicle miles traveled by electric vehicles and plug-in hybrids, or [ii] the sale of battery electric vehicles and plug-in hybrid vehicles, and to what extent; and

(E) the potential environmental impact of increased daytime charging at public charging stations especially during peak electricity demand periods.

(2) If the evaluation conducted pursuant to section 2302(c)(1) concludes that additional public charging infrastructure is needed, public charging locations and types of chargers will be assessed to determine which combinations of locations and charger types (i.e., Level 2 or DC fast chargers) have the highest likelihood of use by plug-in electric vehicles drivers. This assessment will include detailed discussion of environmental and economic impacts and benefits associated with the different public charging scenarios.

(3) A report summarizing the results of the assessment and assessment conducted pursuant to 2302(c)(1) and (2) will be completed and include:

(A) recommendations for locations and types of additional public chargers;

(B) environmental and economic impacts associated with the installation, operation, maintenance and use of recommended public chargers;

(C) interaction with other ARB regulations pertaining to emissions of greenhouse gases, criteria pollutants, and toxic air contaminants; and

(D) next steps including but not limited to recommendations for whether a charging infrastructure mandate is warranted, and if so, timeline for a regulatory proposal.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2303. Determination of Total Projected Maximum Volumes of Designated Clean Fuels.

The ~~e~~Executive ~~o~~Officer shall determine the total projected maximum volume of each designated clean fuel for each year, at least ~~fourteen~~ twenty-eight months before the start of the year, in accordance with this section.

(a) *Identification of designated clean fuels.*
The Executive Officer shall determine which clean alternative fuels are designated as clean fuels. The ~~e~~Executive ~~o~~Officer shall determine ~~what~~which designated clean fuels are expected to be used as the certification fuel in zero~~low~~- emission vehicles in the year. This determination shall be based on registration records of the Department of Motor Vehicles and projected production estimates submitted by motor vehicle manufacturers to the ~~e~~Executive ~~o~~Officer pursuant to ~~the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1960.1, and~~the "California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures ~~for 2001~~ and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1961.2.

(b) *Estimation of number of designated clean fuel vehicles.*

(1) For each designated clean fuel identified pursuant to section 2303(a), the ~~e~~Executive ~~o~~Officer shall make an estimate of the number of ~~low~~zero-emission vehicles certified on the fuel for each calendar year. The estimate shall be the sum of:

[i] the number of ~~low~~zero-emission vehicles certified on the fuel that vehicle manufacturers have projected to be produced in the corresponding model year for which calculations are being made and the two prior model years for sale in California;

[ii] one-~~sixth~~ third of the number of ~~low~~zero-emission vehicles certified on the fuel that vehicle manufacturers project to produce for the model year that is three~~two~~ years prior to the year for which the calculations are being made; and

[iii] the number of ~~low~~zero-emission vehicles certified on the fuel that are registered with the Department of Motor Vehicles through May 31~~July 30~~ of the year ~~two~~ three years prior to the year for which the estimates are being made.

(2) The vehicle manufacturers' projections used for the estimates made under this section 2303(b) shall be the reports of projected production data air basin-specific vehicle deployment plans submitted by motor vehicle manufacturers to the ~~e~~Executive ~~o~~Officer pursuant to the ~~"California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1960.1, or~~ "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in Title 13, California Code of Regulations, section 1961.

(c) *Determination of total projected maximum volumes of designated clean fuel.* Total projected maximum volume (TPMV) calculations detailed in this section shall be performed for designated clean fuel vehicles projected to be placed within the boundaries of an air basin when the trigger level requirement for that air basin is met pursuant to 2305.5(a). TPMV calculations shall be performed considering designated clean fuel vehicles projected to be placed anywhere in California when the statewide trigger level requirement is met pursuant to 2305(a). ~~For each designated clean fuel identified pursuant to section 2303(a), the executive officer shall estimate the total projected maximum volume (TPMV) of the designated clean fuel for the year.~~ The ~~total projected maximum volume~~TPMV for each designated clean fuel shall be the sum of the maximum demand volumes (MXDV) calculated by model-year and vehicle class (passenger car, light-duty truck, or medium-duty vehicle). The following equation shall be used to calculate total projected maximum volumes for an air basin and statewide:

$$TPMV = \sum_{\substack{\text{Model-}\\ \text{year (y)}}} \Big[\sum_{\substack{\text{vehicle}\\ \text{class (i)}}} MXDV\ (\textit{vehicle class i, model-year y}) \Big]$$

Where:

TPMV is the total projected maximum volume (gasoline equivalent gallons per year for a liquid fuel and ~~therms~~kilograms per year for a gaseous fuel) for a particular clean fuel.

MXDV is the maximum demand volume for a particular clean fuel within vehicle class *i* and model-year *y* as calculated below.~~in the next paragraph of text.~~

Model-year y is, in turn, each vehicle model-year since and including ~~1994~~2000.

Vehicle class i is, in turn, each of three classes of vehicles: passenger cars (PC), light-duty trucks (LDT) or medium-duty vehicles (MDV).

Maximum demand volume for a designated clean fuel (for a given model-year and vehicle class within an air basin or statewide) shall equal the number of vehicles (as determined in section 2303(b)) in a particular vehicle class certified on a particular fuel, multiplied by the average miles travelled per year per vehicle by those vehicles, divided by the average fuel economy of those vehicles.

The following equation shall be used to calculate ~~maximum demand volumes~~MXDVs:

$$\text{MXDV (vehicle class i, model-year y)} = \frac{\textit{(number of vehicles certified on fuel) x (AMT per vehicle)}}{\textit{(average fuel economy)}}$$

Where:

MXDV is the maximum demand volume (gasoline equivalent gallons per year for a liquid fuel and ~~therms~~kilograms per year for a gaseous fuel) for a particular clean fuel within vehicle class *i* and model-year *y*.

Vehicle class i is one of three possible classes of vehicles--passenger cars (PC), light-duty trucks (LDT) or medium-duty vehicles (MDV).

Model-year y is, in turn, each vehicle model-year since and including ~~1994~~2000.

Number of vehicles certified on fuel shall be determined pursuant to section 2303(b), and shall be calculated separately for vehicles of the same model year and vehicle class (PC, LDT, MDV).

AMT per vehicle is the average vehicle miles traveled per year per ~~low~~zero-emission vehicle, based on annual mileage accrual rates for motor vehicles for a specific model year and vehicle class derived from the current version of the ARB's EMFAC emission inventory model and other reasonably available relevant information.

Average fuel economy represents the estimated fuel economy in miles per gasoline equivalent gallon (mpg) (or miles per ~~therm~~kilogram in the case of gaseous fuels) of ~~low~~zero-emission vehicles of the same model year and vehicle class. The average fuel economy estimates shall be determined by the ~~e~~Executive ~~o~~Officer based on the fuel economy estimates provided by the vehicle manufacturers pursuant to the ~~"California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" and the~~ "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty

Trucks and Medium-Duty Vehicles," which are incorporated by reference in Title 13, California Code of Regulations, sections 1960.1 and 1961, and on other reasonably available relevant information.

(d) [RESERVED] ~~*Characterization of certain dual-fuel or flexible-fuel vehicles.* Any dual-fuel or flexible-fuel vehicle which is certified to meet, while operated on gasoline or diesel fuel, low-emission vehicle standards at least as stringent as the most stringent low-emission vehicle standards to which the vehicle is certified while operated on a fuel other than gasoline shall not be included in the determination pursuant to section 2303(b) of the number of low-emission vehicles certified on a designated clean fuel.~~

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2303.5. Identification of Designated Clean Fuels Projected to Reach the Trigger Level In a Particular Year.

(a) *The trigger level requirement.*

(1) *Number of designated clean fuel vehicles necessary to trigger a retail clean fuel outlet requirement.* There shall be no retail clean fuel outlets for a designated clean fuel required in a year unless the ~~statewide~~ number of ~~low~~zero-emission vehicles projected by the ~~e~~Executive ~~o~~Officer for that fuel in accordance with section 2303(b) is 10,000 or greater within the boundaries of an air basin and 20,000 or greater statewide, after discounting the number of fleet vehicles by 75 percent or a smaller discount factor determined in accordance with section 2303.5(a)(2).

(2) *Reducing the discount factor for fleet vehicles.* The discount factor for fleet vehicles is intended to reflect the approximate percentage of clean fuel that will be dispensed to the fleet vehicles from facilities other than retail clean fuel outlets in the year for which the trigger determination is being made. If the ~~e~~Executive ~~o~~Officer determines, based on the reports filed pursuant to section 2313 and on any other relevant reasonably available information, that a specified lower percentage of the clean fuel dispensed to the fleet vehicles will likely be dispensed from facilities other than retail clean fuel outlets, the ~~e~~Executive ~~o~~Officer shall discount the number of fleet vehicles by that specified lower percentage.

(b) *Yearly projections regarding the trigger level.*
For each year, the ~~e~~Executive ~~o~~Officer shall identify any designated clean fuel(s) he or she projects will for the first time be the fuel for a sufficient number of ~~low~~zero-emission vehicles to reach the trigger level set forth in section 2303.5(a). At least ~~sixteen~~ thirty months before the start of the year, the ~~e~~Executive ~~o~~Officer

shall notify interested parties of the fuel or fuels identified, and shall make available a summary of the information and analysis relied upon, including the fleet discount factor applied. The notification shall also identify any other designated clean fuel that the ~~e~~Executive ~~o~~Officer projects will miss the trigger level by no more than 30 percent, with the information and analysis relied upon being made available. The notice shall be provided to trade associations representing gasoline refiners, distributors and retailers, representative environmental groups, and any person who has requested in writing to receive such notices.

(c) *Requests to revise trigger level projections.*
Any interested party may request in writing that the ~~e~~Executive ~~o~~Officer revise the trigger determination or fleet discount factor for any designated clean fuel, and may submit any relevant information supporting a revised determination. In order to be considered by the ~~e~~Executive ~~o~~Officer, the written request and supporting information must be received no more than 30 days after issuance of the notice. The ~~e~~Executive ~~o~~Officer shall consider any requests that are ~~timely~~ submitted in a timely manner, and shall issue his or her final trigger determination and fleet discount factor no less than ~~fourteen~~ twenty-nine months before the start of the year in question.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2304. Determination of Total and Additional Number of Retail Clean Fuel Outlets Required for Each Designated Clean Fuel in Each Year.

The ~~e~~Executive ~~o~~Officer shall, for each designated clean fuel, determine the total number of retail clean fuel outlets required for each year, and the total number of additional retail clean fuel outlets required for the first time in the year, in accordance with this section. The Executive Officer shall make these determinations for an air basin when the trigger level requirement for that air basin is met pursuant to 2303.5(a), and for the state when the statewide trigger level requirement is met pursuant to 2303.5(a). The ~~e~~Executive ~~o~~Officer shall make the determinations at least ~~fourteen~~ twenty-nine months before the start of the year.

(a) *Determination of total number of retail clean fuel outlets required for each designated clean fuel in each year.*
The ~~e~~Executive ~~o~~Officer shall determine for each designated clean fuel the total number of retail clean fuel outlets that shall be required for that designated fuel in each year, ~~calculated as follows~~using the following formula:

(1) *Formula for calculating required number of clean fuel outlets.*
Except as otherwise provided in this section 2304(a), the total number of clean fuel outlets that shall be required for each designated clean fuel for each year shall be calculated as follows:

$$\textit{Required Clean Fuel Outlets} = \frac{\textit{Total Projected Maximum Clean Fuel Volume} - \textit{Discounted Clean Fuel Volume for Fleet Vehicles} \cancel{+ \textit{Total Clean Fuel Volume From Vehicle Conversions}}}{\textit{Clean Fuel Throughput Volume per Station}}$$

Where:

Total Projected Maximum Clean Fuel Volume shall be determined in accordance with the procedures set forth in section 2303(c).

Discounted Clean Fuel Volume for Fleet Vehicles means the total volume of the designated clean fuel (adjusted to gasoline volumes on an energy equivalent basis for liquid fuels) estimated to be used in fleet vehicles during the year, multiplied by the discount factor determined pursuant to section 2303.5(a) for the designated clean fuel for the year in which the retail clean fuel outlet trigger was reached. This figure shall be determined by the ~~e~~Executive ~~o~~Officer using the methodology in section 2303(c), the reports filed pursuant to section 2313 and any other relevant reasonably available information.

~~*Total Clean Fuel Volume from Vehicle Conversions* means the total amount of the designated clean fuel (adjusted to gasoline volumes on an energy equivalent basis) for each vehicle class from conversions. This figure shall be determined by the executive officer based on information provided by the Department of Motor Vehicles and on any other relevant reasonably available information.~~

Clean Fuel Throughput Volume Per Station ~~for liquid fuel~~ shall be 300,000 gasoline equivalent gallons per year for ~~each~~ liquid designated clean fuel and 146,000 kilograms per year for hydrogen. ~~, except that once more than five percent of all retail gasoline outlets are required to be equipped to dispense a particular liquid clean fuel, the clean fuel throughput volume per station shall be 600,000 gasoline equivalent gallons for purposes of calculating the number of required retail clean fuel outlets in excess of five percent of all retail gasoline outlets. For gaseous fuel, the clean fuel throughput volume per station shall be 400,000 therms per year.~~

(2) *~~e~~Executive ~~o~~Officer adjustments to the number of required retail clean fuel outlets.*

(A) [RESERVED] ~~*Reducing projected clean fuel volume to reflect the volume of gasoline used in dual-fuel or flexible fuel vehicles.* For each year, the executive officer shall determine for each designated clean fuel the percentage of the low-emission vehicles identified for the year pursuant to section 2303(b) that will be dual-fuel or flexible-fuel vehicles. The executive officer shall further determine the approximate percentage of the fuel used during the year in these dual-fuel or flexible-fuel vehicles that will be gasoline rather than the designated clean fuel and multiply that percentage by 0.85. The executive officer shall then discount the "Total Projected Maximum Clean Fuel Volume" attributed to these vehicles in the section 2304(a)(1) equation by the adjusted percentage. The determinations are to be based on the information sources identified in section 2303(a) and on any other relevant reasonably available information.~~

(B) *Change to the discount for fleet vehicles.* If the ~~e~~Executive ~~o~~Officer determines pursuant to section 2303.5(a)(2) that the discount factor applied to the calculation of the Clean Fuel Volume for Fleet Vehicles in the equation in section 2304(a)(1) does not accurately reflect the approximate percentage of clean fuel that will be dispensed to the fleet vehicles from facilities other than retail clean fuel outlets projected ~~18~~thirty-one months from the start of the year for which the number of required clean fuel outlets is being determined, he or she shall revise the discount factor so that it is an accurate reflection of that percentage. The determination shall be based on reports filed pursuant to section 2313 and on any other relevant reasonably available information.

(C) *Reducing the number of required retail clean fuel outlets to reflect certain preexisting outlets.*

1. For each year, the ~~e~~Executive ~~o~~Officer shall determine for each designated clean fuel the number of retail clean fuel outlets that [i] are owned or leased by persons who are not ~~owners/lessors of any retail gasoline outlets~~major refiner/importers of gasoline, [ii] have a design capacity as set forth in section 2302(b) where applicable, [iii] satisfy the provisions of section 2309(b), and [iv] certify that they will~~are~~ operate~~ing~~ throughout the compliance year ~~as of fifteen months before the start of the year~~ for which the determination is being made.

2. For each year, the ~~e~~Executive ~~o~~Officer shall reduce the total number of required clean fuel outlets required for each designated clean fuel, as determined pursuant to sections 2304(a)(1)~~, (a)(2)(A)~~ and (a)(2)(B) by the number of retail clean fuel outlets determined in accordance with section 2304(a)(2)(C)1.~~,~~ The ~~e~~Executive ~~o~~Officer shall notify the ~~owner/lessor~~refiner/importer responsible for ~~of~~ each retail clean fuel outlet included in the determinations made pursuant to this section 2304(a)(2), and no such outlet may be constructively allocated pursuant to section 2308.

(D) *Notification regarding any adjustments.* If the ~~e~~Executive ~~o~~Officer makes an adjustment pursuant to section 2304(a)(2)~~(A),~~ (B) or (C) for a given year, he or she shall notify interested parties of the adjustment and the underlying basis for the adjustment, at least twenty-eight~~fourteen~~ months before the start of the year.

The notice shall be provided to trade associations representing gasoline refiners, distributors and retailers, representative environmental groups, and any person who has requested in writing to receive such notices.

(E) *Requests to revise the ~~e~~Executive ~~o~~Officer 's adjustments.* Any interested party may request in writing that the ~~e~~Executive ~~o~~Officer revise the adjustments, and may submit any relevant information supporting revised determinations. In order to be considered by the ~~e~~Executive ~~o~~Officer, the written request and supporting information must be received no more than ~~30~~thirty days after issuance of the notice. The ~~e~~Executive ~~o~~Officer shall consider any requests that are timely submitted, and shall issue his or her final determinations no less than twenty-six~~twelve~~ months before the start of the year in question. At the same time, the ~~e~~Executive ~~o~~Officer shall make any resulting modifications to the determinations and notifications made pursuant to sections 2304(b), 2306 and 2307.

(b) *Determination of total number of additional clean fuel outlets required each year for each designated clean fuel.*
For each year, the ~~e~~Executive ~~o~~Officer shall determine, for each designated clean fuel, the total number of additional retail clean fuel outlets required for the first time to be in place in that year. This figure shall be determined by subtracting the total number of required retail clean fuel outlets determined in accordance with section 2304(a) for the previous year~~, from the total number of required clean fuel outlets determined in accordance with 2304(a) for the previous year~~, from the total number of required clean fuel outlets determined in accordance with 2304(a) for the year for which the calculations are being made.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2306. ~~Identification of Affected Owner/Lessors Required to Equip Additional Retail Clean Fuel Outlets Each Year.~~

~~For each year, at least fourteen months before the start of the year, the executive officer shall identify for each designated clean fuel the affected retail gasoline outlet owner/lessors who will be required to equip retail gasoline outlets or other retail outlets to dispense that fuel. An affected station owner/lessor is any person who is the owner/lessor of a number of retail gasoline outlets equal to or greater than the minimum ownership level (MOL) for the year, calculated as follows:~~

~~MinimumOwnership Level (MOL) =~~
~~Number of Non-Clean Fuel Retail Outlets~~
~~Sum of the Numbers of Additional Retail Clean Fuel Outlets for All Designated Clean Fuels~~

~~Where:~~

~~*Number of Non-Clean Fuel Retail Outlets* is calculated by subtracting the sum of the required retail clean fuel outlets determined in accordance with section 2304(a) for all designated clean fuels for the previous year, from the total number of retail gasoline outlets statewide estimated by the executive officer based on the reports submitted pursuant to section 2312 and other reasonably available relevant information.~~

~~*Sum of the Numbers of Additional Retail Clean Fuel Outlets for All Designated Clean Fuels* is the sum of the total additional number of clean fuel outlets calculated for the year for each designated clean fuel in accordance with section 2304(b).~~

~~The executive officer shall round the result of the calculation for minimum ownership level to the nearest integer.~~

~~NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).~~

§ 2306.1. Determination of Market Share for Each Major Refiner/Importer of Gasoline

For each year, at least twenty-nine months before the start of the year, the Executive Officer shall calculate each refiner/importer of gasoline's market share expressed in percent as follows:

$$\text{Market share}_i = \frac{\textit{Production and imports of major refiner/importer of gasoline}_i}{\textit{Sum of gasoline production and imports}}$$

Where: *Production and imports of major refiner/importer of gasoline$_i$* equals the total gallons of gasoline recorded in the State Board of Equalization's Motor Vehicle Fuel Distribution reports for refiner/importer *i* for the two most recent consecutive calendar years for which complete reports are available.

Sum of gasoline production and imports equals the total gallons of gasoline recorded in the State Board of Equalization's Motor Vehicle Fuel Distribution reports for all of the major refiner/importers of gasoline for the two most recent consecutive calendar years for which complete reports are available.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2307. Allocation Among ~~Affected Owner/Lessors~~ Major Refiner/Importers of Gasoline of the Total Number of Retail Clean Fuel Outlets.

For each year, the ~~e~~Executive ~~o~~Officer shall, for each designated clean fuel, make the determinations set forth in this section.

(a) *Allocation among affected ~~owner/lessors~~major refiner/importer of gasoline of the number of additional retail clean fuel outlets for each year.*
For each year, the ~~e~~Executive ~~o~~Officer shall determine the number of additional retail clean fuel outlets that each major refiner/importer of gasoline ~~affected owner/lessor of retail gasoline outlets~~ is required for the first time to have in place ~~in the state~~. This number shall be calculated, for each designated clean fuel, by multiplying the ~~owner/lessor's~~refiner/importer's market share ~~number of non-clean fuel retail gasoline outlets~~ (determined in accordance with section 2306.5~~2307(b)~~) by the ~~clean fuel fraction~~number of new clean fuel outlets (determined in accordance with section 230~~7(c)~~4(b)), rounded to the nearest integer using conventional rounding. If the resulting number is less than 0.5~~zero~~, the number shall be adjusted to zero.

(b) [RESERVED] ~~*Determination of an owner/lessor's number of non-clean fuel retail gasoline outlets.*~~
~~The executive officer shall determine an owner/lessor's number of non-clean fuel retail gasoline outlets by subtracting the sum of the owner/lessor' s total required minimum number of retail clean fuel outlets for all designated clean fuels in the preceding year as determined pursuant to section 2307(d), from the owner/lessor' s total number of retail gasoline outlets (based on reports submitted pursuant to section 2312 and other reasonably available relevant information).~~

(c) [RESERVED] ~~*Determination of clean fuel fraction.*~~
~~For each designated clean fuel, the executive officer shall calculate the clean fuel fraction for each designated clean fuel as follows:~~

~~Clean Fuel Fraction =~~
~~Total Number of Retail Clean Fuel Retail Outlets~~
~~Number of Non-Clean Fuel Outlets Owned by All Affected Owner/Lessors~~

~~Where:~~

~~*Total Additional Number of Retail Clean Fuel Outlets* is the total number of additional retail clean fuel outlets required for the year for the particular clean fuel in accordance with section2304(b).~~

~~*Number of Non-Clean Fuel Outlets Owned by All Affected Owner/Lessors* is calculated by subtracting the sum of the required retail outlets determined in accordance with section 2304(a) for all clean fuels from the sum of the number of retail gasoline outlets owned or leased by all of the~~

~~affected owners and lessors estimated by the executive officer based on the reports submitted pursuant to section 2312 and other reasonably available relevant information.~~

(d) *Determination of each ~~owner/lessor~~major refiner/importer of gasoline's total required minimum number of retail clean fuel outlets for each clean fuel for each year.*
For each year, each ~~owner/lessor~~refiner/importer's required minimum number of retail clean fuel outlets for each designated clean fuel ~~in the state~~ shall consist of the number of additional retail clean fuel outlets that the refiner/importer ~~owner/lessor~~ is required for the first time to have in place in the year as determined in accordance with section 2307(a), added to the sum of the numbers of additional retail clean fuel outlets required of the refiner/importer ~~owner/lessor~~ for the first time in each of the previous years as determined in accordance with section 2307(a). The required minimum number of a~~n~~ ~~owner/lessor~~refiner/importer's retail clean fuel outlets for each designated clean fuel in a year shall not be less than the required minimum number of such outlets for the previous year, except that there shall be no required minimum number of outlets for a designated clean fuel in any year for which the number of vehicles estimated by the ~~e~~Executive ~~o~~Officer pursuant to section 2303(b) is less than 10,000 within an air basin and 20,000 statewide. For example, if a refiner/importer is not required to equip new outlets in the year for which the calculations are being made, but has previously been required to equip a total of fifteen retail clean fuel outlets, that refiner/importer is required to maintain a minimum of fifteen retail clean fuel outlets during the year for which the calculations are being made.

(e) *Notification of ~~owner/lessors~~refiner/importers.*
At least twenty-eight~~fourteen~~ months before the start of each year, the ~~e~~Executive ~~o~~Officer shall notify each affected refiner/importer~~owner/lessor~~ in writing of the ~~owner/lessor~~refiner/importer's required minimum number of clean fuel outlets for each designated clean fuel for the year. The written notification shall include a detailed analysis of how the number was derived.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2308. Constructive Allocation of Retail Clean Fuel Outlets

(a) Any ~~owner/lessor of a retail gasoline outlet, and any~~ person who is the owner or ~~/~~lessor of a retail clean fuel outlet which is not a retail gasoline outlet, may constructively allocate one or more retail clean fuel outlets to ~~the owner/lessor of a retail gasoline outlet~~ a major refiner/importer of gasoline, for purposes of demonstrating compliance with the requirements in section 2302, as long as the requirements of this section are met.

(b) Any agreement to constructively allocate a retail clean fuel outlet pursuant to this section shall be in writing. The constructive allocation shall be in calendar year increments, and shall not cover less than one calendar year. The agreement shall be executed before the start of the first year of constructive allocation covered by the agreement.

(c) A retail clean fuel outlet may not be constructively allocated unless it meets any applicable dispensing capacity requirements set forth in section 2302(b).

(d)~~ If the retail clean fuel outlet being constructively allocated is not a retail gasoline outlet, t~~The person making the constructive allocation shall obtain prior approval from the ~~e~~Executive ~~o~~Officer. The ~~e~~Executive ~~o~~Officer shall approve the constructive allocation if s/he determines that the facility is adequately accessible for fueling motor vehicles by the general public with the designated clean fuel.

(e) Any person who constructively allocates a retail clean fuel outlet for a designated clean fuel shall ~~be deemed to be the owner/lessor of that retail clean fuel outlet and shall~~ be subject to the requirements of sections 2309(b)~~ and (c)(1)~~ during the period covered by the constructive allocation agreement.

(f) The owner or ~~/~~lessor of any retail clean fuel outlet which is constructively allocated shall notify the operator in writing that it is claimed to be equipped in order to satisfy the requirements of section 2302, as applicable.

(g) Any person who constructively allocates a retail clean fuel outlet to a~~n~~ ~~owner/lessor~~a major refiner/importer of gasoline shall submit a report to the ~~e~~Executive ~~o~~Officer by January 10 of each year covered by the constructive allocation agreement. The report shall be executed in California under penalty of perjury and shall contain the following information:~~.~~

(1) The name, address and telephone number of the person making the constructive allocation.

(2) The street address of each retail clean fuel outlet constructively allocated, the type of designated clean fuel dispensed at the outlet, the business interest in the outlet of the person making the constructive allocation, and the brand, trade, or other name under which the business at the outlet is conducted.

(3) For each constructively allocated retail clean fuel outlet, the name and address of the ~~owner/lessor~~refiner/importer to whom the outlet was constructively allocated, and the starting and ending dates of the constructive allocation.

(4) The name of the operator of the retail clean fuel outlet.

(h) Any ~~owner/lessor~~refiner/importer who receives a constructive allocation of a retail clean fuel outlet shall submit a report to the ~~e~~Executive ~~o~~Officer by January 10 of each year covered by the constructive allocation agreement. The report shall be executed in California under penalty of perjury and shall contain the following information:~~.~~

(1) The name, address and telephone number of the ~~owner/lessor~~ refiner/importer.

(2) The street address of each retail clean fuel outlet constructively allocated, the type of designated clean fuel dispensed at the outlet, and the brand, trade, or other name under which the business at the outlet is conducted.

(3) For each constructively allocated retail clean fuel outlet, the name and address of the person constructively allocating the outlet, and the starting and ending dates of the constructive allocation.

(4) A copy of the executed constructive allocation agreement.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2309. Responsibilities of ~~Owner/Lessors~~Refiner/Importers of Selected Retail Clean Fuel Outlets.

Any retail clean fuel outlet that was equipped to dispense a designated clean fuel and received funding from the State to do so prior to January 1, 2015, shall be deemed to satisfy the criteria detailed below.

(a) *Locations of required clean fuel outlets.*

(1) For each designated clean fuel, in determining the locations of required retail clean fuel outlets, ~~an~~ a refiner/importer~~owner/lessor~~ shall provide a reasonable geographical dispersion of the outlets and place the outlets in locations that are reasonably near the existing and anticipated areas of operation of ~~low~~zero-emission vehicles that operate on the designated clean fuel, and are convenient to drivers of such vehicles. ~~Any retail clean fuel outlet that was equipped to dispense a designated clean fuel as part of the CEC's California Methanol Fuel Demonstration Program shall be deemed to satisfy these criteria.~~

(2) At least twenty-two~~eight~~ months before the start of each year (by March 1~~April 30~~ of the previous year), each ~~owner/lessor~~major refiner/importer of gasoline who has received a notification pursuant to section 2307(e) indicating that ~~s/he~~ he or she will be required to have in place additional retail clean fuel outlets for that year shall submit to the ~~e~~Executive ~~o~~Officer proposed locations for such outlets

and optional locations equal to at least ~~20~~40 percent of ~~off~~ the proposed locations, identified by street address, ZIP code, and Universal Transverse Mercator (UTM) coordinates. The submittal shall include any outlets that are or may be constructively allocated to the ~~owner/lessor~~refiner/importer pursuant to section 2308.

Following submittal, the ~~owner/lessor~~refiner/importer shall consult with designees of the ~~e~~Executive ~~o~~Officer ~~, and with the CEC's executive officer or his or her designees,~~ on the optimal locations for new retail clean fuel outlets. Designees of the Executive Officer may employ modeling tools to establish and evaluate fuel infrastructure scenarios.

(3) The ~~owner/lessor~~refiner/importer shall notify the ~~e~~Executive ~~o~~Officer of the final locations of all new retail clean fuel outlets for the year, no later than nineteen~~five~~ months before the start of the year (by ~~July 31~~June 1).

(b) *Requirements ~~regarding facilities at~~for selected retail clean fuel outlets ~~at retail gasoline outlets~~.*

For each selected clean fuel outlet equipped to satisfy the requirements of section 2302, the refiner/importer shall ensure that the requirements of this section are met.

(1) Locate the designated clean fuel dispensers in a location that is readily accessible and visible to customers upon entering the station. Any active dispenser equipped prior to January 1, 2015 to dispense a designated clean fuel as part of the Board's Hydrogen Highway program funding and the CEC's Renewable Fuel and Vehicle Technology Program shall be deemed to satisfy this criterion.

(2) Store a commercially reasonable quantity of the designated clean fuel at the outlet and offer the fuel for sale to the public. However, a refiner/importer shall not be liable for failure to comply with this requirement if the operator demonstrates he or she was unable to comply because of unforeseeable occurances such as an earthquake or flood, and act of war or an act by a public enemy, a civil disorder or riot, the expropriation or confiscation of facilities or property, or the operation of law.

(3) Provide that hydrogen fuel dispensers satisfy all requirements of the Society of Automotive Engineers Standard J2601 "Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles."

(4) Ensure that the designated clean fuel dispensers are well marked and clearly identified with regard to the type of fuel.

(5) Display on the premises a sign which discloses that the clean fuel outlet offers the designated clean fuel for sale, and which is clearly visible from the

street or highway adjacent to the outlet, provided that the signage is displayed in a manner consistent with applicable local ordinances.

(6) Ensure that the designated clean fuel dispensers are available for public use during normal business hours without the use of a key or cardkey.

(7) Ensure that a customer is able to pay for his or her fuel purchase without establishment of an account with the outlet owner or operator.

(8) Maintain lighting which keeps the designated clean fuel dispenser area reasonably well-illuminated when the outlet operates at night.

(9) Prominently display directions on use of the clean fuel dispensing equipment.

(10) Maintain the designated clean fuel dispensing equipment in good operating condition.

~~Each owner/lessor of a selected retail clean fuel outlet at a retail gasoline outlet shall, with respect to each such outlet:~~

~~(1) Locate the designated clean fuel dispenser(s) in a location substantially as accessible and visible to a customer entering the station as are the gasoline dispensers, and providing substantially the same convenience of ingress and egress as exists for the gasoline dispensers at the outlet; provided that any dispenser equipped prior to January 1, 1993 to dispense a designated clean fuel as part of the CEC's California Methanol Fuel Demonstration Program shall be deemed to satisfy this criterion.~~

~~(2) Ensure that the designated clean fuel dispensers are substantially as well marked and as clearly identified as the gasoline dispensers with regard to the type of fuel.~~

~~(3) Maintain lighting which keeps the designated clean fuel dispenser area substantially as well-illuminated as the gasoline dispensing area when the outlet operates at night.~~

~~(4) Ensure that customers using designated clean fuel dispensers will have, within the same service mode (e.g. self serve or full serve), substantially the same access to services and facilities such as canopy coverage, air and water, vending, and restrooms as do customers purchasing gasoline, unless the owner/lessor has, in the preceding 12 months, demonstrated to the satisfaction of the executive officer that providing such a service or facility is prohibited by local ordinance or applicable safety codes.~~

~~(5) Prominently display directions on use of the clean fuel dispensing equipment.~~

~~(6) Maintain the designated clean fuel dispensing equipment in good operating condition.~~

(c) [RESERVED] ~~*Requirements regarding facilities at selected clean fuel outlets at which gasoline is not offered to the public.*~~
~~Each owner/lessor of a selected retail clean fuel outlet at which gasoline is not offered to the public shall, with respect to each such outlet:~~

~~(1) Locate the designated clean fuel dispenser(s) in a location that is readily accessible from main streets and highways.~~

~~(2) Ensure that the designated clean fuel dispensers are available for public use during normal business hours without the use of a key or cardkey.~~

~~(3) Ensure that a customer is able to pay for his or her fuel purchase without establishment of an account with the outlet owner or operator.~~

~~(4) If the outlet is operated after dark, maintain commercially reasonable lighting levels to provide user safety.~~

~~(5) Prominently display directions on use of the clean fuel dispensing equipment.~~

(d) *Requirements regarding supply of designated clean fuels to selected retail clean fuel outlets.*

(1) [RESERVED]~~Whenever the operator of a selected retail clean fuel outlet requests that the owner/lessor of the outlet provide for the delivery, within a specified time not less than 72 hours from the request, of specified commercially reasonable quantities of the designated clean fuel to the outlet on commercially reasonable terms, the owner/lessor shall be jointly liable with the operator for any violations at the outlet of section 2310(a)(1) starting with the requested time of delivery and ending with the next delivery of commercially reasonable quantities of the clean fuel to the outlet, unless the owner/lessor does one of the following:~~
~~[i] supplies the specified quantity of designated clean fuel to the outlet, within the specified time, on commercially reasonable terms, or~~
~~[ii] identifies a third party willing to supply, within the specified time, the specified quantity of designated clean fuel to the outlet on commercially reasonable terms.~~

~~However, an owner/lessor's failure to satisfy the conditions set forth in [i] and [ii] shall not result in liability under this section if the owner/lessor demonstrates that s/he was prevented from satisfying the conditions by a natural disaster such as an earthquake or flood, an act of war or an act by a public enemy, a civil disorder or riot, the expropriation or confiscation of facilities or property, or the operation of law.~~

(2) Whenever ~~an owner/lessor~~a refiner/importer is required to submit a notification regarding final outlet locations to the ~~e~~Executive ~~o~~Officer pursuant to section 2309(a)(3), the notification shall include a description of the means by which the ~~owner/lessor~~refiner/importer intends to comply with section 2309~~(c)(1)~~(b). The description shall include, but need not be limited to, [i] a description of any facility that is or will be owned or leased by the ~~owner/lessor~~refiner/importer for the production or importation of the designated clean fuel, including the throughput capacity of such facility; [ii] the identities of any third parties with whom the ~~owner/lessor~~refiner importer has or plans to have contracts to supply the designated clean fuel, and the minimum volumes of the designated clean fuel subject to such contracts; [iii] if the ~~owner/lessor~~refiner/importer will not have a designated clean fuel production or import facility, or a contract for supply of the fuel, a description of the manner in which ~~supply of~~ the designated clean fuel will be supplied ~~arranged~~; [iv] a description, including location and capacity, of any facilities that are or will be owned or leased by the ~~owner/lessor~~refiner/importer for the loading of the designated clean fuel into tank cars, vessels, or tank trucks; ~~and~~ [v] the identities of any parties with whom the ~~owner/lessor~~refiner/importer has, or plans to have, contracts for the delivery of the designated clean fuel to the retail clean fuel outlets, and the facilities from which such parties will make such deliveries; and [vi] the identities of any parties with whom the refiner/importer has, or plans to have, contracts for the operation and maintenance of the retail clean fuel outlet.

(e) *Annual reports regarding compliance with section 2302.*

(1) For each calendar year, each ~~owner/lessor~~refiner/importer who is required to equip one or more ~~retail gasoline~~ outlets as~~-a~~ retail clean fuel outlets shall submit to the ~~e~~Executive ~~o~~Officer by January 10 of the year a report containing the information set forth below regarding compliance with section 2302. The information shall be categorized by each designated clean fuel. The reports shall be executed in California under penalty of perjury~~.~~, and shall include the following:

(A) The street address of each ~~of the owner/lessor' s~~ retail ~~gasoline~~ outlets claimed by the refiner/importer to be equipped as a retail clean fuel outlet to satisfy the requirements of section 2302.

(B) For each such outlet, the type of designated clean fuel dispensed at the outlet, the brand, trade, or other name under which the business at the outlet is conducted, and the name of the operator of the outlet.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2310. [RESERVED] ~~Responsibilities of Operators of Selected Retail Clean Fuel Outlets.~~

~~(a) The operator of a selected retail clean fuel outlet equipped to dispense gasoline shall, whenever gasoline is offered for sale at the outlet, do all of the following with respect to the designated clean fuel(s) that the outlet is equipped to dispense:~~

~~(1) Store a commercially reasonable quantity of the designated clean fuel at the outlet and offer the fuel for sale to the public, during the same hours that gasoline is offered for sale. However, an operator shall not be liable for failure to comply with this section 23l0(a)(1) if the operator demonstrates s/he was unable to comply because of a natural disaster such as an earthquake or flood, and act of war or an act by a public enemy, a civil disorder or riot, the expropriation or confiscation of facilities or property, or the operation of law.~~

~~(2) Maintain the designated clean fuel dispensing equipment in good operation conditions.~~

~~(3) Keep the designated clean fuel dispenser area substantially as well-illuminated as the gasoline dispensing area during nighttime operation.~~

~~(4) Keep the designated clean fuel dispenser area and pad substantially as clean as the gasoline dispenser area and pad.~~

~~(b) The operator of a selected retail clean fuel outlet not equipped to dispense gasoline to the general public shall do all of the following with respect to the designated clean fuel(s) that the outlet is equipped to dispense:~~
~~(1) Maintain reasonable access to the clean fuel dispensing equipment.~~

~~(2) Maintain the designated clean fuel dispensing equipment in good operating condition.~~

~~(3) Provide a payment option that does not require the purchaser to establish an account with the operator.~~

~~(c) The operator of any selected retail clean fuel outlet shall do all of the following with respect to the designated clean fuel(s) that the outlet is equipped to dispense:~~

~~(1) If the designated clean fuel dispensers are at any time in a consumer self-service mode, post at all times in a conspicuous and convenient location directions illustrating the use of the dispensing equipment.~~

~~(2) Display on the premises a sign which discloses that the clean fuel outlet offers the designated clean fuel for sale, and which is clearly visible from the~~

~~street or highway adjacent to the outlet, provided that the operator shall not be required to display a sign in a manner inconsistent with applicable local ordinances.~~

~~(3) Conspicuously post, on the designated clean fuel dispenser, the price of the clean fuel volume that provides the energy provided by a gallon of gasoline. This price shall be calculated for liquid fuels by multiplying the price of a volumetric gallon of the fuel by the values in the table below. In the case of CNG, the price shall be posted as 1.18 multiplied by the price of one therm of compressed natural gas.~~

~~Fuel~~	~~Price Multiplier~~
~~Gasoline~~	~~1.00~~
~~LPG~~	~~1.27~~
~~Methanol (MI00)~~	~~2.08~~
~~M85~~	~~1.79~~
~~Ethanol (EI00)~~	~~1.54~~
~~E85~~	~~1.43~~

~~NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).~~

§ 2311. Relief from Liability Caused by Breakdowns of Clean Fuel~~CNG~~ Dispensing Equipment.

(a) A~~n owner/lessor or operator~~ refiner/importer or their contractor responsible for ~~of~~ a selected clean fuel outlet equipped to dispense gaseous hydrogen ~~CNG~~ shall not be liable for violations of sections 2302~~,~~ or 2309(b) ~~or 2310(a)~~ resulting from a minor breakdown if:

(1) The refiner/importer or their contractor designated pursuant to section 2309(d)(2)~~owner/lessor or operator~~ reports the breakdown to the ~~e~~Executive ~~o~~Officer within 4 hours of the time the person knows or reasonably should know of the breakdown, including the time, location, and nature of the breakdown;

(2) The equipment is repaired as quickly as possible in the exercise of reasonable diligence, in no case in more than 72 hours;

(3) Within 12 hours of repair of the equipment, the refiner/importer or their contractor~~owner/lessor or operator~~ reports to the ~~e~~Executive ~~o~~Officer that the repairs have been completed, and describes the corrective measures, if any, taken to avoid breakdowns in the future; and

(4) The refiner/importer or their contractor ~~owner/lessor or operator~~ is able to demonstrate that the breakdown did not result from inadequate or improper

maintenance, operator error, or other reasons within the control of the refiner/importer or their contractor ~~owner/lessor or operator~~.

(b) A~~n~~ refiner/importer or their contractor responsible for ~~owner/lessor or operator of~~ a selected clean fuel outlet equipped to dispense gaseous hydrogen~~CNG~~ shall not be liable for violations of sections 2302~~,~~ or 2309(b) ~~or 2310(a)~~ resulting from a major breakdown if the refiner/importer or their contractor~~owner/lessor or operator~~:

(1) Reports the breakdown to the ~~e~~Executive ~~o~~Officer within 4 hours of the time the person knows or reasonably should know of the breakdown, including the time, location, and nature of the breakdown;

(2) Within 7 days of the breakdown, submits to the ~~e~~Executive ~~o~~Officer ~~is~~in writing a report that:

(A) Demonstrates to the reasonable satisfaction of the ~~e~~Executive ~~o~~Officer that the breakdown did not result from inadequate or improper maintenance, operator error, or other reasons within the reasonable control of the refiner/importer or their contractor~~ownerl/lessor or operator~~; and

(B) Identifies a plan reasonably detailing how the hydrogen~~CNG~~ dispensing equipment will be repaired or replaced as soon as possible with the exercise of reasonable diligence, including a final completion date no later than one~~six~~ months following the date of the breakdown; and

(3) Completes the repair or replacement [i] by the final completion date identified in the submitted plan, or [ii] by such earlier completion date designated by the ~~e~~Executive ~~o~~Officer, within 14 days of receipt of the plan, as reasonably feasible based on review of the plan.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2311.5. Notification by Executive Officer of Reporting Obligations.

For each year starting with 201~~3~~0~~2~~, the ~~e~~Executive ~~o~~Officer shall determine whether there is a substantial possibility that the 10,000 vehicle trigger within an air basin or the 20,000 statewide vehicle trigger level in section ~~2304~~2303.5(a)(1) will for the first time be reached for one or more designated clean fuels. The ~~e~~Executive ~~o~~Officer shall identify any such designated clean fuel at least thirty-four~~22~~ months before the start of the year. The ~~e~~Executive ~~o~~Officer shall then take prompt and reasonable steps to provide notice of the identified fuel and applicable reporting obligations to: (1) all owners and ~~/~~lessors of retail gasoline outlets, (2) all zero emission vehicle fleet operators, ~~and~~ (3) all persons engaged in the business of distributing the identified fuel for use in motor vehicles, and (4) all major refiner/importers of gasoline.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2312. Reports by Major Refiner/Importers of Gasoline~~Owner/Lessors of Retail Gasoline Outlets~~.

(a) Once the ~~e~~Executive ~~o~~Officer has identified a designated clean fuel under section 2311.5, by July 31 of the year the identification was made and by July 31 of every year thereafter, each refiner/importer ~~owner/lessor of a retail gasoline outlet~~ shall report to the ~~e~~Executive ~~o~~Officer the total number of retail gasoline outlets in the state of which the person is affiliated, either as the owner, distributor, franchisor, or as the refiner/importer affiliated by name with the branded fuel ~~the owner/lessor~~, the street addresses of the retail gasoline outlets, and the refiner/importer's~~owner/lessor's~~ business interest in each~~the~~ outlets.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2313. Reports by Fleet Operators.

Once the ~~e~~Executive ~~o~~Officer has identified a particular designated clean fuel under section 2311.5, every fleet operator shall, for any year in which the fleet operator reasonably expects to operate fleet vehicles certified on a designated clean fuel, supply the following information to the ~~e~~Executive ~~o~~Officer, at least thirty-two~~eighteen~~ months (by ~~June~~ April 30) before the start of the year:

(1) The expected number of ~~low~~zero-emission vehicles in the fleet to be operated in the year that will be certified on a designated clean fuel, categorized by designated clean fuel.

(2) The total volume of each designated clean fuel expected to be used by the vehicles in the year.

(3) The total volume of designated clean fuel expected to be supplied to the fleet operator's ~~low~~zero-emission vehicles during the year from the fleet operator's own dispensing facilities and from facilities that are not retail clean fuel outlets.

(4) The actual vehicle miles traveled for the prior 12 month period and the estimated vehicle miles travelled for the year in question.

(5) The extent to which operations using the designated clean fuel would be expanded due to increased availability of the designated clean fuel at retail clean fuel outlets.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2314. Reporting Requirements for Persons Who Produce and Distribute Designated Clean Fuels for Use in Motor Vehicles.

Starting the with the beginning of the year after the Executive Officer ~~the executive officer~~ identifies a particular designated clean fuel under section 2311.5, each person who in a quarter produces and/or distributes a designated clean fuel for use in motor vehicles shall within 45 days after the end of the quarter, submit to the ~~e~~Executive ~~o~~Officer a report containing the following information for each designated clean fuel:

(1) The volume of the designated clean fuel that was produced by the person and that was distributed in the quarter for use in motor vehicles.

(2) The volume of the designated clean fuel that was imported by the person and that was distributed in the quarter for use in motor vehicles.

(3) The volume of designated clean fuel distributed to each retail facility that the producer or distributor supplies designated clean fuel to.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2315. Determination of Violations.

(a) *Violations of section 2302.*
At any time that a~~n~~ refiner/importer~~owner/lessor~~ fails to have equipped the number of clean fuel ~~retail gasoline~~ outlets required to be equipped ~~by section 2302 to be equipped to be a retail clean fuel outlet~~ for a designated clean fuel, the refiner/importer will be deemed to be in violation of section 2302 and subject to the penalty described in Health and Safety Code sections 43027 and 43028. ~~owner/lessor shall be deemed to have sold or supplied gasoline to motor vehicles in violation of these regulations. For each day that the owner/lessor violates section 2302, the first ten motor vehicles fueled at one of the owner/lessor's retail gasoline outlets shall be deemed to have been unlawfully fueled for each retail gasoline~~ Each day, or portion of a day, that the refiner/importer violates section 2302 for each outlet not equipped as required will be deemed a separate violation when assessing the penalties described in Health and Safety Code

sections 43027 and 43028. If a~~n~~ refiner/importer~~owner/lessor~~ claims to comply with the requirements of section 2302 on the basis of retail clean fuel outlets constructively allocated pursuant to section 2308, such facilities shall not satisfy the refiner/importer's~~owner/lessor's~~ obligations if the requirements in section 2308 for constructive allocation are not met.

(b) *Violations of section 2309(b).*
~~Whenever the owner/lessor of a selected retail clean fuel outlet violates section 2309(b) with respect to the outlet, the gasoline sold or supplied by the owner/lessor~~ Whenever the refiner/importer fails to satisfy the requirements of section 2309(b) at a clean fuel outlet required to be equipped to satisfy the requirements of section 2302, the refiner/importer is in violation of these regulations and subject to the penalties described in Health and Safety Code sections 43027 or 43028 as applicable. Each day, or portion of a day, that the refiner/importer violates section 2309(b) at a specific outlet shall be deemed a separate violation when assessing the penalties described in Health and Safety Code sections 43027 and 43028. ~~For each day that the owner/lessor violates section 2309(b) with respect to a selected retail clean fuel outlet, the first five motor vehicles fueled that day at the outlet with gasoline shall be deemed to have been unlawfully fueled by the owner/lessor.~~

(c) [RESERVED] ~~*Violations of section 2310.*~~
~~Whenever the operator of a selected retail clean fuel outlet violates section 2310 with respect to the outlet, the gasoline sold or supplied at the outlet shall be deemed to have been sold or supplied by the operator violates section 2310, the first five motor vehicles fueled that day with gasoline at the outlet shall be deemed to have been unlawfully fueled by the operator.~~

(d) *Violations of section 2303(b)(2).*
Whenever a motor vehicle manufacturer fails to deliver for sale or lease the projected number of designated clean fuel vehicles it submitted to the Executive Officer pursuant to the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles " as incorporated by reference in Title 13, California Code of Regulations, section 1961, that motor vehicle manufacturer will be deemed to have knowingly submitted falsified documentation within the meaning of Health and Safety Code section 42402.4. The penalty as described in Health and Safety Code section 42402.4 will be assessed during the first quarter of the calendar year following the year for which the Executive Officer made the determination pursuant to sections 2304 and 2307 and motor vehicle manufacturer projections, that additional retail clean fuel outlets were required. No penalty will be assessed under Health and Safety Code section 42402.4 if the motor vehicle manufacturer delivers for sale or lease at least 80 percent of their projected number of vehicles during the calendar year the following year for which the Executive Officer made the determination pursuant to sections 2304 and 2307 that additional retail clean fuel outlets were required.

NOTE: Authority cited: Sections 39600, 39601, 39667, 42402.4, 43013, 43018, 43027, 43028 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 42402.4, 43000, 43013, ~~43016,~~ 43018, 43027, 43028 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

2. Amendment of section and NOTE filed 12-8-2000; operative 1-7-2001 (Register 2000, No. 49).

§ 2316. Determinations of Energy Equivalency of Fuels.

Whenever implementation of this chapter requires values for the energy contents of fuels, the lower heating values in the following table shall be used.

Volumetric Energy Contents

Fuel	BTUs per gallon equivalent
Gasoline	109,600~~116,500~~
~~LPG~~	~~91,500~~
~~Methanol (M1OO)~~	~~56,500~~
~~M85~~	~~65,000~~
~~Ethanol (E1OO)~~	~~75,700~~
~~E85~~	~~81,800~~
~~CNG~~	~~1000 BTU/scf~~
Hydrogen gas	113,000

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2317. [RESERVED]~~Satisfaction of Designated Clean Fuel Requirements with a Substitute Fuel.~~

~~(a) Any person may petition the state board to designate by regulation a substitute fuel which may be used instead of a primary designated clean fuel to satisfy any requirements in this chapter pertaining to a designated clean fuel. The state board shall designate such a substitute fuel if it is satisfied that the petitioner has demonstrated all of the following:~~

~~(1) That use of the fuel in low-emission vehicles certified on the primary designated clean fuel will result in emissions of NMOG (on a reactivity-adjusted basis), NOx. and CO no greater than the corresponding emissions from such vehicles fueled with the primary designated clean fuel; as determined pursuant to the procedures set forth in the "California Test Procedure for Evaluating Substitute Fuels and New Clean Fuels," as adopted November 2, 1993, which is incorporated herein by reference.~~

~~(2) That use of the fuel in low-emission vehicles certified on the primary designated clean fuel will result in potential health risks from exposure to benzene, 1,3-butadiene, formaldehyde, and acetadehyde in the aggregate no greater than the corresponding potential health risks for such vehicles fueled with the primary designated clean fuel, as determined pursuant to the procedures set forth in the "California Test Procedure for Evaluating Substitute Fuels and New Clean Fuels," as adopted November 2, 1993, which is incorporated herein by reference.~~

~~(3) That if the proposed substitute fuel may be used to fuel any motor vehicle other than low-emission vehicles certified on the primary designated clean fuel:~~

~~(A) Use of the substitute fuel in such other motor vehicles would not increase emissions of NMOG (on a reactivity adjusted basis), NOx, and CO as determined pursuant to the procedures set forth in the "California Test Procedure for Evaluating the Emission Impacts of Substitute Fuels or New Clean Fuels," as adopted November 2, 1993, which is incorporated herein by reference; and~~

~~(B) Use of the substitute fuel in such other motor vehicles would result in potential health risks from exposure to benzene, 1,3-butadiene, formaldehyde, and acetadehyde in the aggregate no greater than the corresponding potential health risk from the emissions from such vehicles when operating on their customary fuel, as determined pursuant to the procedures set forth in the "California Test Procedure for Evaluating the Emission Impacts of Substitute Fuels or New Clean Fuels," as adopted November 2, 1993, which is incorporated herein by reference; and~~

~~(C) Use of the substitute fuel in such other motor vehicles would not result in increased deterioration of the emission control system on the vehicle and would not void the warranties of any such vehicles.~~

~~(b) Whenever the state board designates a substitute fuel pursuant to this section, the state board shall also establish by regulation required specifications for the substitute fuel.~~

~~(c) Commencing with the effective date of a regulatory action of the state board designating a substitute fuel pursuant to this section, any person may satisfy his or her obligations under this chapter pertaining to a primary designated clean fuel, in whole or in part. by substituting the substitute fuel in place of the primary designated clean fuel.~~

~~NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).~~

§ 2318. Sunset for Particular Designated Clean Fuels.

This Chapter 8, shall cease to apply to a particular designated clean fuel once the number of retail clean fuel outlets offering the designated clean fuel represent at least ~~ten~~five percent of all retail gasoline outlets.

NOTE: Authority cited: Sections 39600, 39601, 39667, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39667, 43000, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

APPENDIX C

STATUS OF ALTERNATIVE FUEL INFRASTRUCTURE

FOR NON-ZEV ALTERNATIVE FUEL VEHICLES

APPENDIX B

DRAFT ENVIRONMENTAL ANALYSIS FOR THE ADVANCED CLEAN CARS PROGRAM

APPENDIX B

Draft Environmental Analysis

prepared for the

Advanced Clean Cars Program

Analyzing Amendments to California's Low-Emission Vehicle Criteria Pollutant and Greenhouse Gas (LEV III), Zero Emission Vehicle (ZEV), and Clean Fuels Outlet (CFO) Regulations

California Air Resources Board
1001 I Street
Sacramento, California, 95812

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ES. EXECUTIVE SUMMARY

This document is an Environmental Analysis (EA) that evaluates the environmental impacts of the proposed Advanced Clean Cars (ACC) Program. The proposed ACC Program represents a new approach to controlling emissions from passenger vehicles, i.e., passenger cars (PCs), light-duty trucks (LDTs), and medium-duty vehicles (MDVs), by combining the control of smog and soot "criteria" air pollutants and their precursors, toxic air contaminants, and greenhouse gases (GHGs) into a coordinated regulatory package. Thus, the EA structure and analysis recognize the interdependent technologies that manufacturers would apply to passenger motor vehicles to respond to the coordinated regulatory program as a whole, along with the resultant environmental impacts.

A. OVERVIEW OF ADVANCED CLEAN CARS PROGRAM

Despite significant progress in reducing smog-forming and particulate matter emissions from the passenger vehicle fleet, California needs further reductions to meet health-based, State and federal ambient air quality standards. In addition, climate change continues to pose a serious threat to the economic well-being, public health, natural resources, and the environment of California.

To address the challenge presented by climate change and to meet the State's goal of an 80 percent reduction in GHG emissions by 2050, as expressed in Executive Order S-3-05, vehicular GHG emissions must be drastically reduced. This 40-year outlook is a far longer time horizon than those employed by the federal agencies under the Clean Air Act (CAA), or federal agency requirements to develop corporate average fuel economy (CAFE) standards. Policies developed under this longer timeframe deliver a continuous message to both the manufacturers and consumers that California is committed to significant changes to clean up the cars and lights trucks we drive.

Over the past three years California has worked with federal agencies to ensure that stringent criteria pollutant and GHG standards for light- and medium-duty vehicles, if adopted, will help achieve the dramatic reductions that meet California's needs. Together, these standards will provide consumers with the next generation of vehicles, designed to reduce multiple pollutants, while preserving vehicle choice and saving money.

1. California's Advanced Clean Cars Program and Its Economic Benefits

Continuing its leadership role in developing innovative and ground-breaking emission control programs, Air Resources Board (ARB) staff has developed the ACC Program. It is a pioneering approach consisting of a "package" of regulations that, although separately constructed, reflect prior practice and achieve synergy by addressing both ambient air quality needs and climate change in a coordinated manner.

The ACC Program combines three programs to control smog-forming, particulate matter, TAC, and GHG emissions in a single coordinated package of requirements for model years 2015 through 2025. One goal is to promote the development of environmentally superior cars that will continue to deliver the performance, utility, and safety vehicle owners have come to expect. The three programs involve amendments to existing regulations for Low-Emission Vehicles (LEV III), Zero Emission Vehicles (ZEV), and Clean Fuels Outlets (CFO). To achieve further criteria emission reductions from the passenger vehicle fleet, staff is proposing several amendments representing a significant strengthening of the existing LEV program. The LEV amendments include improvements to consumer labeling, patterned on California's revolutionary environmental performance label (EPL), to provide important emissions information in a graphical, easy-to-understand format. The ZEV program will act to focus vehicle technology development by requiring manufacturers to produce increasing numbers of ZEVs and plug-in hybrid electric vehicles in the 2018-2025 model years. Proposed amendments to the CFO regulation that will assure ultra-clean fuels, such as hydrogen, are available to meet vehicle demands resulting from the projected increase in number of ZEVs operating in the State.

The proposed ACC Program is intended to generate economic benefits for California. The State is a clear leader in innovation and venture capital investment, which will benefit from the ACC package. California received over half of all clean-tech venture capital investments in the U.S. in the last quarter and is well poised to continue to serve as an economic hub for technology and job creation related to clean vehicles in the coming years. These regulations, especially the ZEV rules, are creating the jobs of the 21st century now in California.

Three innovative automakers have opened businesses in California, and are pushing the market forward, creating jobs in the process. Tesla Motors has resurrected auto manufacturing in California by purchasing and retooling the former NUMMI plant in Fremont, California to produce its Model S sedan. Operation of the Tesla facility is expected to create about 1,000 manufacturing jobs. CODA Automotive opened its new global headquarters in Los Angeles, which will allow the company to grow significantly in coming years. The company also has an assembly plant in Benicia, California, where final assembly of its sedan occurs. Southern California is also home to the global headquarters of ZEV producer, Fisker Automotive, as well as engineering and design facilities for many larger automakers and their clean cars programs.

In addition to job-forming benefits through the automakers, additional economic benefit can be derived from other employment generation and from the effects of the ACC Program on reduced fuel and vehicle operating costs for consumers. The job and economic center of the plug-in electric vehicle charging sector is in California, which is expected to produce additional jobs in the State. In the tradition of California's innovation-driven economy, these companies are helping to develop the early market for ZEVs with novel financing and charging options. Fuel cost savings and other vehicle operating cost savings will materialize for the California consumer as a result of the ACC Program. Cost savings increase consumer purchasing power over time by returning funds to them for other economic purposes. The resulting effect can be an overall increase in economic output and job creation in the State. As the vehicle fleet and fuels industry respond to the new standards, economic modeling suggests an increasingly positive economic impact to the State, leading to thousands of additional jobs this decade, and tens of thousands in the next.

2. Greenhouse Gas Emissions Goals

Recognizing the increasing threat of climate change to the well-being of Californians and the environment, in 2002 the Legislature adopted and the Governor signed AB 1493 (Chapter 200, Statutes 2002, Pavley). AB 1493 directed ARB to adopt the maximum feasible and cost-effective reductions in GHG emissions from light-duty vehicles. Vehicle GHG emissions included carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) that are emitted from the tailpipe, as well as emissions of HFC134a, the refrigerant then used in most vehicle air conditioning systems.

As directed by AB 1493, ARB adopted what is commonly called the Pavley regulations, the first in the nation to require significant reductions of GHGs from motor vehicles. These regulations, covering the 2009 - 2016 and later model years, call for a 17 percent overall reduction in GHG emissions from the light-duty fleet by 2020 and a 25 percent overall reduction by 2030. They also formed the foundation for the federal GHG and fuel economy programs for light-duty vehicles for 2012-2016 model years.

After the Board adopted the Pavley regulations, the Legislature adopted and the Governor signed AB 32, the California Global Warming Solutions Act (Chapter 488, Statutes 2006, Nuñez/Pavley.) AB 32 charges ARB with the responsibility of monitoring and regulating GHG emissions in the State. AB 32 also directed ARB to prepare a Scoping Plan outlining the State's strategy to achieve the maximum feasible and cost-effective reductions in furtherance of reducing GHG emissions to 1990 levels by 2020. Measure T1 of the Scoping Plan anticipates an additional 3.8 million metric tons of carbon dioxide equivalent (MMT CO_2e) reduction from the passenger vehicle fleet by 2020 beyond the reductions from the 2009 - 2016 AB 1493 standards.

Although originally part of the LEV program, ARB established the ZEV program as a stand-alone regulation in 1999, in recognition of the increasing maturity of zero emission technologies and the critical role they can play in achieving California's air quality standards and GHG reduction goals. Since then, the program has been modified several times to address the pace of development of zero emission technologies. At its March 2008 hearing, the Board directed staff to redesign the 2015 and later model year ZEV program by strengthening the requirement and focusing primarily on zero emission technologies, i.e., battery electric vehicles (BEV), hydrogen fuel cell vehicles (HFCV), and plug-in hybrid electric vehicles, to ensure that these low GHG technology vehicles transition from the demonstration phase to full commercialization in a reasonable timeframe to meet long-term emission reduction goals.

Beyond 2025, the driving force for lowering GHG emissions in California will be climate change. To meet the State's 80 percent GHG reduction goal by 2050, the new vehicle feet will need to be primarily composed of advanced technology vehicles by 2035 to have nearly an entire advanced technology fleet by 2050, including both new and used vehicles. Accordingly, the ACC Program coordinates the goals of the LEV, ZEV, and CFO programs to lay the foundation for the commercialization and support of these ultra-clean vehicles.

3. Criteria Emission Standards

To achieve further criteria emission reductions from the passenger vehicle fleet, ARB staff is proposing several amendments representing a significant strengthening of the LEV program. The major elements of the proposed LEV III program are:

- A reduction of fleet average emissions of new PCs, LDTs, and medium-duty passenger vehicles (MDPVs) to super ultra-low-emission vehicle (SULEV) levels by 2025.
- The replacement of separate NMOG and oxides of nitrogen (NO_x) standards with combined NMOG plus NO_x standards. The combined ROG and NOx standard will decline (e.g., from 0.100 for passenger cars and light-duty trucks and 0.119 for light-duty trucks and medium-duty passenger vehicles in 2015 to 0.030 for all vehicle categories by 2030).
- More stringent particulate matter (PM) standards for light- and medium-duty vehicles.
- An increase of full useful life durability requirements from 120,000 miles to 150,000 miles, which guarantees vehicles operate longer at these extremely low emission particulate levels.
- A backstop to assure continued production of super ultra-low-emission vehicles after PZEVs as a category is moved from the ZEV to the LEV program in 2018.
- Zero fuel evaporative emission standards for PCs and LDTs, and more stringent evaporative standards for MDVs.

4. Greenhouse Gas Emission Standards

For the 2017 - 2025 model year standards, ARB proposes to use the U. S. Environmental Protection Agency (U.S. EPA) approach and adopt separate standards for CO_2, CH_4, and N_2O. The proposed GHG emission standards would reduce new passenger vehicles carbon dioxide (CO_2) emissions from their model year 2016 levels by approximately 34 percent by model year 2025, from about 251 to about 166 grams of CO_2 per mile (gCO_2/mile), based on the projected mix of vehicles sold in California. The basic structure of the standards includes two categories, passenger cars and light-duty trucks that are consistent with federal categories for light-duty vehicles. The standard targets would reduce car CO_2 emissions by about 36 percent and truck CO_2 emissions by about 32 percent from model year 2016 through 2025.

The CH_4 and N_2O standards will reflect the same stringency as the original GHG standards. The net result is, like the current 2009 - 2016 California GHG standards, the proposed 2017 - 2025 standards account for all major sources of vehicle GHG emissions, including upstream emissions associated with vehicle fuels. In addition, California is proposing to align its vehicle air conditioning system requirements with federal requirements.

5. Phasing In Maximum Feasible and Cost-Effective Technologies

Vehicle manufacturers need sufficient lead time to implement new technologies across their vehicle lines both from a feasibility and cost-effectiveness standpoint. Manufacturers will be resource challenged over the next 15 years as they strive to develop and implement technologies ranging from advanced gasoline and diesel engines to electric and fuel cell vehicles, while at the same time lowering criteria emissions of their combustion engines. The phase-in of the ACC Program requirements recognizes this by providing manufacturers with significant lead time and considerable compliance flexibility.

The technology for controlling vehicle emissions is well understood and manufacturers have a wide range of emission control technologies available to achieve "near-zero-at-the-tailpipe" (SULEV) emissions. Many of these technologies are already being used today on vehicles meeting LEV II requirements, and staff anticipates that with ongoing improvements to the effectiveness of these technologies, particularly catalyst technology, manufacturers will be able to meet the proposed requirements for smog forming emissions under the LEV III element of the ACC package. For some vehicles, specifically the heavier vehicles with larger displacement engines, additional emission control componentry, such as secondary air and hydrocarbon absorbers may be required to achieve the proposed emission levels.

The proposed GHG standards are also predicated on many existing and emerging technologies that increase engine and transmission efficiency, reduce vehicle energy loads, improve auxiliary and accessory efficiency, and recognize increasingly electrified vehicle subsystems with hybrid and electric drivetrains. Many technologies reduce both criteria emissions and GHGs, with this synergy enhancing technologies, cost effectiveness and demonstrating the importance of California analyzing the passenger vehicle fleet program as a whole.

Previous rulemakings (i.e., California's 2009 - 2016 and federal 2012 - 2016 standards) established an original technical basis for the proposed GHG standards. This rulemaking builds on this existing technical foundation with new technical data and the understanding of evolving state-of-the-art engine, transmission, hybrid, and electric-drive technologies. As part of this effort, and without conceding any of California's separate authority, staff has been working with the U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) since early last year to develop a unified national GHG program for motor vehicles beyond 2016. Importantly, while California proposes accepting national program compliance at manufacturers' option, California is doing so because it believes the proposed standards are stringent enough to meet State GHG emission reduction goals.

B. Environmental Impacts

The EA presents a programmatic evaluation of a full range of environmental impact topics related to implementation the proposed ACC Program. The EA discusses both beneficial and adverse effects on the environment as a result of the projected compliance responses to the proposed regulatory amendments, such as changes in State's vehicle fleet mix, uses of different technologies, construction of fuel outlets and relevant manufacturing facilities, and resulting reductions of pollutant emissions. A summary of key findings is presented below.

1. Criteria Emissions Reductions

Reduction of criteria air pollutant emissions is a substantial, beneficial, environmental impact of implementing the ACC Program. Table ES-1 provides the emission benefits for calendar years 2023, 2025, 2035, and 2040 for the criteria pollutants, reactive organic gas (ROG), oxides of nitrogen (NO_X), and particulate matter ($PM_{2.5}$) respectively. Emission benefits are fully realized in the 2035 - 2040 timeframe when nearly all vehicles operating in the fleet are expected to be compliant with the proposed ACC standards. By 2035, statewide ROG emissions would be reduced by an additional 34 percent, NOx emissions by an additional 37 percent, and $PM_{2.5}$ emissions by 10 percent from the baseline.

Table ES-1 Statewide Emission Benefits of the ACC Program: Reactive Organic Gas (ROG), Oxides of Nitrogen (NO_X) and Particulate Matter ($PM_{2.5}$)

Calendar Year	Adjusted Baseline	Proposed Regulation	Benefits	Percent Reduction
Statewide ROG (tons/day)				
2023	189.6	182.9	6.6	3%
2025	175.5	164.44	11.1	6%
2035	141.1	93.6	47.4	34%
Statewide NO_X (tons/day)				
2023	201.3	185.6	15.7	8%
2025	183.6	161.2	22.4	12%
2035	136.8	86.4	50.4	37%
Statewide $PM_{2.5}$ (tons/day)				
2023	26.7	26.0	0.6	2%

Table ES-1 Statewide Emission Benefits of the ACC Program: Reactive Organic Gas (ROG), Oxides of Nitrogen (NO_X) and Particulate Matter ($PM_{2.5}$)				
Calendar Year	Adjusted Baseline	Proposed Regulation	Benefits	Percent Reduction
2025	27.2	26.3	0.9	3%
2035	29.7	26.8	2.9	10%

2. GHG Emission Reductions

Reduction of GHG emissions is another substantial, beneficial, environmental impact of implementing the proposed ACC Program, including reductions in CAPs, GHG, and TACs. Table ES-2 provides the emission benefits for calendar years 2020, 2025, 2035, and 2050 for GHG. By 2025, CO_2 equivalent emissions would be reduced by almost 14 Million Metric Tons (MMT) per year, which is 12 percent from baseline levels. Carbon dioxide equivalent is a standardized measurement unit used to compare the emissions from various GHGs based upon their global warming potential. The reduction increases in 2035 to 32 MMT/Year, a 27 percent reduction from baseline levels. By 2050, the proposed regulation will reduce emissions by more than 42 MMT/Year, a reduction of 33 percent from baseline levels. Viewed cumulatively over the life of the regulation (2017-2050), the proposed ACC program would reduce emissions by more than 870 MMT CO_2e.

Table ES-2 Statewide GHG Emission Benefits of the ACC Program (with Rebound)				
Calendar Year	Adjusted Baseline	Proposed Regulation	Benefits	Percent Reduction
Statewide GHG Emissions (tons/day)				
2020	111.2	108.1	3.1	3%
2025	109.9	96.3	13.7	12%
2035	114.8	83.2	31.5	27%
2050	131.0	88.3	42.7	33%

3. Other Environmental Impacts

In addition to the analysis of changes in air pollutant emissions, the EA evaluates the potential direct and indirect environmental effects of implementation of the proposed ACC Program in relation to a full spectrum of other environmental resources topics. The primary sources of these impacts are the compliance responses to the proposed regulatory amendments that cause changes in the physical environment. Potential changes to the physical environment would result primarily from landscape disturbance occurring from constructing and operating fueling facilities required for compliance with the proposed CFO regulation amendments or battery manufacturing facilities expected to be needed to achieve compliance with the proposed ZEV regulation amendments.

The EA examined all the environmental topics presented in the environmental checklist contained in Appendix G of the CEQA Guidelines. When potentially significant environmental impacts are identified, feasible mitigation measures have been presented to substantially reduce the effects. ARB does not, however, possess the authority to require project-specific mitigation measures for facilities approved by other land use or permitting agencies. Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate impacts) and, for CEQA compliance purposes, discloses that potentially significant impacts related to the development of fueling stations and new or modified manufacturing facilities may be significant and unavoidable. ARB expects, however, that as the proposed ACC Program is carried out, these significant impacts can and should be resolved and reduced to insignificance by other government agencies, in accordance with their authorities and project review procedures.

Among the range of environmental issues addressed in the EA, the following topics contained potentially significant environmental effects that may be unavoidable: aesthetics, biology, cultural resources, geology and soils, hazards (accidental releases), hydrology and water quality, noise, traffic (construction), and utilities. Only less-than-significant environmental effects would occur related to the following topics: agriculture and forest resources, land use and planning, mineral resources, population and housing, and recreation. As noted previously, substantial beneficial environmental effects would result from implementation of the proposed ACC Program related to air quality and GHG emissions.

1.0 INTRODUCTION AND BACKGROUND

This document is an Environmental Analysis (EA) that provides an evaluation of the environmental impacts of the proposed Advanced Clean Cars (ACC) Program. The proposed ACC Program represents a new approach to controlling emissions from passenger vehicles (i.e., passenger cars [PC], light-duty trucks [LDT1 and LDT2], and medium-duty vehicles [MDV]) by combining the control of smog-causing, toxic air contaminants (TACs), criteria air pollutants and precursors (CAPs) and greenhouse gas (GHGs) into a single coordinated regulatory package.

The proposed ACC Program consists of amendments to the following regulations:

- Low-Emission Vehicle Criteria Pollutant and Greenhouse Gas (LEV III),
- Zero Emission Vehicle (ZEV), and
- Clean Fuels Outlet (CFO).

The proposed California Evaporative Emission Regulations; Manufacturer Size Definition Changes; Environmental Performance Label (EPL); On-Board Diagnostic System Requirement for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines; and the E10 Certification Fuel are part of LEV III.

Additional details about the proposed amendments to these regulations are provided in Chapter III (Project Description). Three separate Regulatory Notices and Staff Reports (Initial Statement of Reasons) have been prepared for these proposed LEV III, ZEV, and CFO amendments and will be presented to the Board with a single coordinated analysis of emissions and the associated environmental impacts and benefits as presented in this EA.

If adopted, the proposed regulatory amendments would integrate the requirements for reducing CAPs and GHGs from cars and light-duty trucks for model years 2015- 2025 in California. These requirements would apply to the vehicle types listed in Table 1-1. For the purposes of this environmental impact analysis, these vehicle classes are collectively referred to as "light- and medium-duty vehicles."

A description of the background, standards, and requirements of the existing LEV I and II, ZEV, and CFO regulations, along with detailed information about the proposed amendments, is also provided in the respective Staff Reports.

Table 1-1. Vehicle Types Subject to the Advanced Clean Cars Program

Vehicle Type	Example Models
Passenger Cars (all weights)	Honda Fit, Ford Fusion, Chrysler 300, Chrysler Sebring, Chevrolet Malibu, Toyota Camry, Dodge Avenger
Light-Duty Trucks	
Light-Duty Truck 1 (0-3,750 lb LVW)	Ford Ranger, Ford Escape, Toyota RAV4, Jeep Compass, Hyundai Tucson, Mitsubishi Outlander, Nissan Rogue
Light-Duty Truck 2 (3,751 lb LVW – 8,500 lb GVWR)	Ford F150, Chevrolet Tahoe, Dodge Caravan
Medium-Duty Vehicles (8,501 – 14,000 lb GVWR)	Ford F250 and F350 Ford Club Wagon, Chevrolet 2500 and 3500 Silverado, GMC 2500 and 3500 Sierra, and Savana and Express Vans, Chrysler 2500 and 3500 Ram Trucks

Notes: There are several classifications for vehicles based on weight. Different measures of weight are considered. Curb weight is defined as the actual weight of the vehicle without carrying any load. Loaded vehicle weight (LVW) is defined as the curb weight plus 300 pounds (lb). Gross vehicle weight rating (GVWR) is the maximum, designed loaded weight of the vehicle. This means the curb weight of the vehicle plus a full payload.

A. ARB's Certified Regulatory Program and Environmentally Mandated Projects under the California Environmental Quality Act

1. CEQA Requirements Under ARB's Certified Regulatory Program

The California Air Resources Board (ARB or the Board) is the lead agency for the proposed ACC Program and has prepared this EA pursuant to its California Environmental Quality Act (CEQA) Certified Regulatory Program. Public Resources Code (PRC) Section 21080.5 allows public agencies with regulatory programs to prepare a plan or other written document in lieu of an environmental impact report or negative declaration once the Secretary of the Resources Agency has certified the regulatory program. ARB's regulatory program was certified by the Secretary of the Resources Agency (California Code of Regulation [CCR], Title 14, hereafter "CEQA Guidelines" Section 15251[d]). As required by ARB's Certified Regulatory Program, and the policy and substantive requirements of CEQA, ARB has prepared this EA to assess the potential for significant adverse and beneficial environmental impacts associated with the proposed action and to provide a succinct analysis of those impacts (CCR, Title 17, Section 60005[a] and [b]). The resource areas from the CEQA Guidelines Environmental Checklist (Appendix G) were used as a framework for assessing potentially significant impacts. In accordance with ARB's Certified Regulatory Program, for proposed regulations this EA is included in the package prepared for the rulemaking (CCR, Title 17, Section 60005).

ARB has determined that adoption and implementation of the proposed ACC Program is a "project" as defined by CEQA. CEQA Guidelines (CCR, Title 14, Section 15378[a]) defines a project as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is ... an activity directly undertaken by any public agency." Although the policy aspects and regulation amendments of the proposed ACC Program do not directly change the physical environment, the proposed ACC Program qualifies as a project under CEQA because it has the potential to result in a reasonably foreseeable indirect physical change in the environment from compliance responses to the regulations.

Furthermore, the requirements of PRC Section 21159 apply when ARB adopts a rule or regulation requiring the installation of pollution control equipment, or a performance standard or treatment requirement. For such projects, the CEQA Guidelines (CCR, Title 14, Section 15187) require ARB to conduct "an environmental analysis of the reasonably foreseeable methods by which compliance with that rule or regulation will be achieved." The analysis shall include reasonably foreseeable environmental impacts of the methods of compliance, reasonably foreseeable feasible mitigation measures related to significant impacts, and reasonably foreseeable alternative means of compliance that would avoid or eliminate significant impacts. The analysis should not engage in speculation and the detail of a project-level analysis is not required.

2. Public Review Process for the EA

In accordance with CCR, Title 17, Sections 60005 and 60007 and consistent with ARB's commitment to public review and input on regulatory actions, this EA is subject to a public review process through the posting of a Staff Report. The Staff Report, including this EA, is being posted for a public review period that begins on December 12, 2011 and ends at the close of the hearing on this item at the Board's regularly scheduled hearing set for January 26, 2012. This period complies with regulatory requirements for a minimum 45-day public review.

To conclude the public review period, the Board will hold a hearing on the proposed regulations. At the hearing, the Board will consider the Staff Report, including the EA and public comments received during the review period. The Board may accept, modify, or reject the staff recommendation for the proposed ACC Program. If modifications are requested, staff will address the changes and release the revised package, or relevant parts thereof, for one or more additional 15-day review and comment periods. At the conclusion of review(s), staff will compile all comments and responses, including any comments on the EA. The comments and written responses to comments, including environmental comments, will be incorporated into the Final Statement of Reasons (FSOR) for the regulation.

When the FSOR and full regulatory package are completed, including all public comments and responses to comments, they will be reviewed for final consideration and action at a subsequent Board meeting prior to transmittal to the Executive Officer and forwarding to the Office of Administrative Law for processing. However, because the U. S. Environmental Protection Agency (U.S. EPA) is concurrently working on a National Program and this program may influence ARB's decision, the conclusion of

ARB's consideration of the proposed ACC Program in California may be affected by the progress and outcome of relevant federal rulemakings announced for completion in 2012. Consequently, the Board may reserve its final action on this proposed regulation, including consideration of the EA and written responses to environmental comments, until after the federal rulemakings are substantially complete.

If the regulations are adopted, a Notice of Decision will be posted on ARB's website and filed with the Secretary of the Natural Resources Agency for public inspection.

B. Project Background

1. Previous Rulemakings

Light- and medium-duty vehicles are major contributors to emissions of CAPs and GHGs in California, and further reductions are needed for California to achieve mandated national and State ambient air quality standards for CAPs. GHG emission reductions are also needed from these vehicles to help meet the mandate established by Assembly Bill (AB) 32, Statutes of 2006. AB 32 calls for the reduction in statewide GHG emissions to 1990 levels by 2020. Additionally, former Governor Schwarzenegger's Executive Order S-3-05 requires further reductions of statewide GHG emissions to 80 percent below 1990 levels by 2050. Finally, AB 1493 (Chap. 200, Statutes of 2002) requires GHG emission reductions from California's passenger fleet.

Traditionally, CAPs from these vehicles have been controlled by two regulatory programs: 1) the LEV regulations designed to maximize emission reductions from light- and medium-duty vehicles and 2) ZEV regulations designed to encourage the development of very clean, advanced vehicle technologies. While operating essentially as separate regulations, significant synergies exist between the LEV and ZEV regulations, as well as between these vehicle programs and the CFO fuels program.

The previous LEV, ZEV, and CFO rulemakings are discussed in greater detail below.

a. Low-Emission Vehicle Criteria Pollutant and Greenhouse Gas (LEV III)

i. Criteria Pollutants

The LEV regulation was first adopted in 1990 and is now commonly referred to as LEV I. LEV I phased in a set of fleet-average emission standards for CAPs emitted by light-duty vehicles for model years 1994-2003, including PCs, LDTs, and MDVs. In 1999, ARB adopted a set of amendments to the LEV I regulation, known as LEV II. LEV II established a set of emission standards for model years 2004-2010 that were generally more stringent than the standards under LEV I and required the then increasingly popular class of sport utility vehicles (SUVs) to meet the same emission standards as passenger cars. The standards established by LEV II are in effect today. The requirements of LEV I and LEV II are included in CCR, Title 13, Sections

1960 - 1962, respectively. LEV-certified vehicles must also meet the evaporative standards in CCR, Title 13, Section 1976(b).

The CAPs regulated under LEV II include non-methane organic gas (NMOG), carbon monoxide (CO), oxides of nitrogen (NO_X), particulate matter, and non-methane hydrocarbons (NMHC). Formaldehyde, which is a TAC, is also regulated. LEV II addresses both exhaust emissions from vehicle tailpipes and evaporative emissions, which occur when fuel contained in the vehicle's fuel system evaporates and escapes into the surrounding air. LEV II also includes tailpipe emission standards for particulate matter generated by motor vehicles. LEV II also amended the test procedures required for manufacturers to demonstrate compliance. The California Supplemental Federal Test Procedure (SFTP) that addressed emissions resulting from aggressive operation, typified by high speeds and hard accelerations, and from air conditioner (AC) use was also adopted.

LEV II contains two major elements. One element consists of emission standard tiers to which various vehicle classes must certify. The other element consists of fleet-average emission standards. Fleet-average emission standards apply to the average emission rates of the various vehicle models marketed by a manufacturer, weighted by the number of vehicles sold or leased by the manufacturer in each vehicle class. Both the vehicle emission standards and fleet-average emission standards of LEV II became increasingly stringent for later model years from 2004 to 2010.

In meeting the fleet-average standards, manufacturers may certify their vehicles to any of the applicable emission standards as long as the fleet-average emissions of their new vehicles meet the fleet-average emission requirements for that model year. This flexibility enables a manufacturer to sell some higher-emitting vehicle models as long as enough lower-emitting vehicle models are sold to achieve the applicable fleet-average emission standards for the particular vehicle type and model year. Generally, the fleet-average emission standards differ according to the vehicle type (e.g., PC, LDT1, LDT2) and weight class (e.g., 0-3,750 lb LVW, 3,750 lb LVW-8,500 lb GVWR) and are more stringent for each newer model year vehicle. MDVs are also provided a tier of emission standards, but instead of a fleet-average requirement, they must certify an increasing percentage of their MDVs to more stringent emission tiers. The different types of vehicles subject to LEV II include PC and LDT1, and LDT2 and the fleet-average emission standards are expressed in units of grams per mile (g/mi).

The emission standards under LEV II also account for the "durability basis" of each vehicle type to address the fact that vehicles tend to generate higher emissions as they age. For instance, a fleet of light-duty vehicles with a GVWR less than 8,501 lb was required to meet an intermediate full useful life standard during the first 50,000 miles of the vehicle's life and slightly less stringent full useful life standard before it reaches 120,000 miles. Manufacturers are also subject to in-use emission verification of their vehicles; those vehicles failing to meet the certified emission standards are subject to recall by the manufacturer for corrective action. Manufacturers are also required to warrant the performance of all emission control systems.

The emission standards of LEV II are sophisticated in a number of ways to meet two basic objectives. One objective is to establish standards that achieve the maximally feasible emission reductions based on the state of motor vehicle technologies at the time. The other objective is to maintain competitive parity among the different vehicle manufacturers while allowing them to be responsive to market demands. For this reason, some of the requirements under LEV II are different for small-, intermediate- and large-volume manufacturers. Compliance with LEV II also involves different tiers of vehicle emissions performance, including LEVs, Ultra-Low-Emission Vehicles (ULEVs), and Super-Ultra-Low-Emission Vehicles (SULEVs). In complying with LEV II, each manufacturer earns emission credits if it over-complies with the fleet-average standards and emission debits if it fails to meet the fleet-average standard. Any credits accrued by the manufacturer can be banked for future use, used to offset any debits accrued by the manufacturer, or sold to another manufacturer. If a manufacturer has not earned sufficient credits to offset any accrued debits, it may purchase credits, if available from another willing manufacturer, or be subject to fiscal penalties.

The emission standards that apply to model year 2010 also apply to all subsequent newer model years, and therefore, are in effect at the time of writing this EA. All emission standards were and are equivalent to, or more stringent than, comparable emission standards established by U.S. EPA.

ii. Greenhouse Gases

In 2005, requirements to reduce GHG emissions from all PCs, LDTs, and medium-duty passenger vehicles (MDPVs) were incorporated into the LEV II regulation. These additional requirements, generally known as the Pavley regulations (AB 1493), apply to model years 2009-2016 and, thus, continue to be phased in at the time of writing this EA. These are also fleet-average standards and are expressed in units of g/mi of carbon dioxide equivalent (CO_2e). Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent, recognizing the varying global warming potential (GWP) of different GHGs. . The specific GHG emission standards incorporated into LEV II are found in CCR, Title 13, Section 1961.1.

The Pavley regulations takes into consideration that AC refrigerant leakage (i.e., direct emissions) and fuel use to power AC system usage (i.e., indirect emissions) increase GHG emissions. The rule provides credits as incentives to improve the leak-tightness and efficiency of AC systems.

Direct emissions of refrigerant contribute substantially to GHG emissions because of the high GWP of the refrigerant. The predominant refrigerant currently in use, hydrofluorocarbon-134a (HFC-134a, also referred to as R-134a, 1,1,1,2-tetrafluoroethane), is a potent GHG with a GWP of 1,430 (IPCC 2007b) (i.e., 1430 times as heat-trapping by weight as CO_2). It can slowly leak out of the AC system in a manner that may occur in any closed high-pressure system, such as permeation through hoses and seepage through fittings, connections, and seals. Larger loss may occur during accidents, maintenance and servicing, and vehicle disposal at the end of useful life. The Pavley regulations grant direct AC credit of up to 6 g/mi of CO_2e, if the manufacturer can demonstrate that the AC system meets a suite of low-leak requirements. These requirements include use of fitting technologies less prone to leakage and misassembling, low permeability hoses, and multiple lips to seal the shaft for a belt-driven compressor. A greater credit of up to 9 g/mi of CO_2e can be granted, if the AC is manufactured to use an alternative refrigerant with a low GWP.

Indirect emissions occur because use of an AC system in a vehicle adds a load to the engine, resulting in increased tailpipe emissions or, in the case of plug-in electric vehicles, decreased all-electric range. The Pavley regulations grant indirect AC credits of up to 9 g/mi of CO_2e for systems with single-evaporator configuration and up to 11 g/mi of CO_2e for systems with a dual-evaporator configuration, if the manufacturer can demonstrate that the AC system meets specific efficiency requirements. To receive credits the AC system must have management of outside and recirculated air; be optimized for efficiency by utilizing state-of-the-art, high efficiency evaporators, condensers, and other components; and have an externally controlled compressor that adjusts evaporative temperature to minimize the necessity of reheating cold air to satisfy occupant comfort. If all of these criteria are met, manufacturers are awarded credits that are prorated based on the size of the compressor.

The Pavley regulations also provides credits for the sale of alternatively fueled (e.g., E85) vehicles to the extent shown to be running on that fuel.

The GHG requirements under the LEV regulation also form the basis for federal GHG requirements for model years 2012-2016, which were finalized by U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) in April, 2010 (75 Fed. Reg. 25324 [May 7, 2010]).

U.S. EPA similarly provides indirect AC credits in its rule for model years 2012-2016, although the maximum number of credits is 5.7 g/mi due to a different methodology used to calculate indirect emissions. Because federal GHG requirements are substantially equivalent to the GHG reductions beyond those expected from the original Pavley regulations, California has agreed to allow compliance with the federal regulation for model years 2012-2016 to be deemed compliance with the Pavley regulations (CCR, Title 13, Section 1961.1[a]). This, in turn, allows vehicle manufacturers to meet a single set of national GHG standards while achieving the reductions envisioned by the Pavley regulations. A broader discussion about the nexus between ARB's efforts and those of federal agencies is discussed later in this chapter.

iii. California Evaporative Emission Regulations

Evaporative emissions consist of fuel hydrocarbon vapors from a motor vehicle that are released into the atmosphere. Evaporative emissions are classified into three types: running loss, hot soak, and diurnal. Running loss emissions occur during vehicle operation, originating from various sources within the fuel system and from fuel vapor overflow of the on-board carbon canister. Hot soak emissions occur immediately after the termination of engine operation, when latent engine heat vaporizes residual fuel in the engine system. Diurnal emissions are caused by daily cycling of ambient temperatures when a vehicle is parked, where ambient temperature increases result in fuel tank vapor generation. Another type of emissions, refueling emissions, occurs during refueling of the vehicle when the entering liquid fuel volumetrically displaces the fuel vapors in the fuel tank.

One main source of vehicular evaporative emissions is the carbon canister, where excess vapors in the fuel tank are routed for storage instead of being released into the atmosphere. In many evaporative emission systems, the canister also captures fuel tank vapor emissions during refueling as part of onboard refueling vapor recovery (ORVR.) The carbon canister is regenerated during vehicle operation when the fuel vapors stored in the canister are purged into the engine's intake system and subsequently burned in the combustion process. Substantial evaporative emission losses from the canister occur when the generated fuel tank vapors routed to the canister are greater than its storage capacity, and thus, breakthrough of vapors from the canister occurs. In addition, small evaporative losses from the canister, called bleed emissions, result when hydrocarbon emissions escape the canister because of diffusion of adsorbed hydrocarbons as the vehicle rests over a period of time. Another main source of evaporative emissions is through permeation of fuel in elastomeric hoses, joints, and valves, as well as plastic fuel tanks.

Compliance with the current evaporative emission regulations, adopted as part of the LEV II Program, is based on meeting three separate certifications related to whole-vehicle emission standards. Specifically, these include the running loss emission standard, the three-day diurnal plus high-temperature hot soak (three-day) emission standard, and the two-day diurnal plus moderate-temperature hot soak (two-day) emission standard. The running loss emission standard ensures evaporative emission control during vehicle driving. The three-day emission standard ensures that the evaporative system can control evaporative emissions for three consecutive hot summer days. The two-day emission standard ensures an effective purging strategy of the vehicle carbon canister.

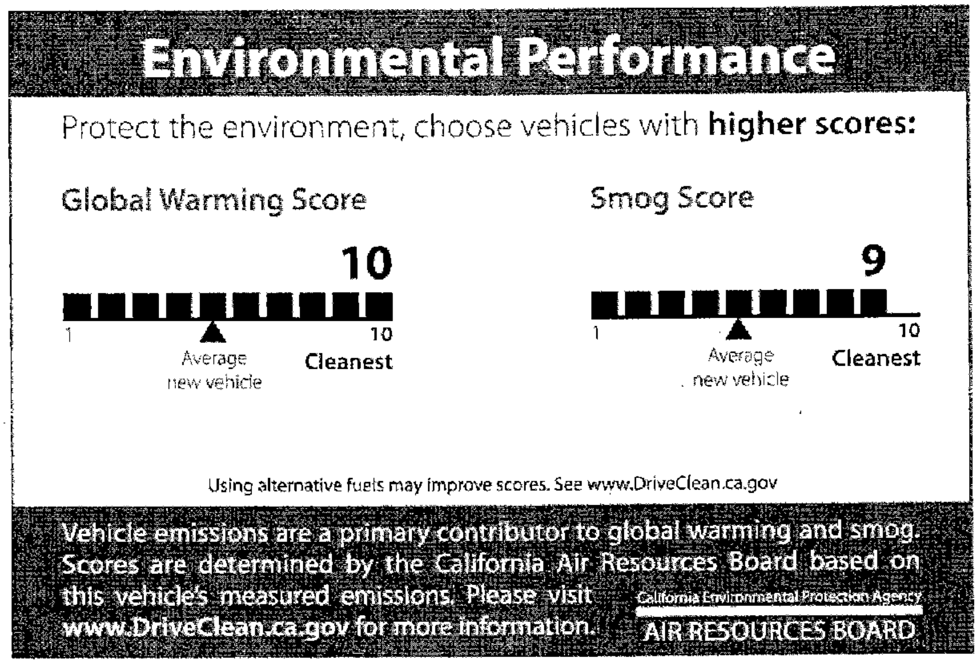
iv. Manufacturer Size Definition Changes

A manufacturer's California sales volume plays an important role in determining a manufacturer's treatment under various light-duty vehicle regulations. Size is based on a manufacturer's average PC, LDT, and MDV sales in California, and on the percentage amount that one manufacturer owns of another manufacturer. Two changes that affect the size definitions of manufacturers include: 1) staff proposes to decrease the intermediate volume manufacturer (IVM) (i.e., large volume manufacturer [LVM] threshold from 60,000 PCs, LDTs, and MDVs on average in California to 20,000 on average), and 2) staff proposes that two manufacturers' sales will be aggregated for determination of size if one manufacturer owns greater than 33.4 percent of another manufacturer. The effect of these changes is all current IVMs, except Volvo, Subaru, Jaguar/Land Rover and Mitsubishi, would be expected to become LVMs in 2018, and meet the full ZEV requirements starting that year. This proposed change is needed to assure that major manufacturers compete on a level playing field.

v. Environmental Performance Label Regulation

The EPL is a vehicle label showing the model's rating for GHG emissions (Global Warming Score) and CAP emissions (Smog Score). It is currently required on all new vehicles manufactured after January 1, 2009 and sold in California. The EPL is the result of AB 1229 (Nation), Statutes of 2005, and EPL requirements are found in CCR, Title 13, Section 1965. The EPL's appearance is shown in Figure 1-1.

Figure 1-1. Environmental Performance Label

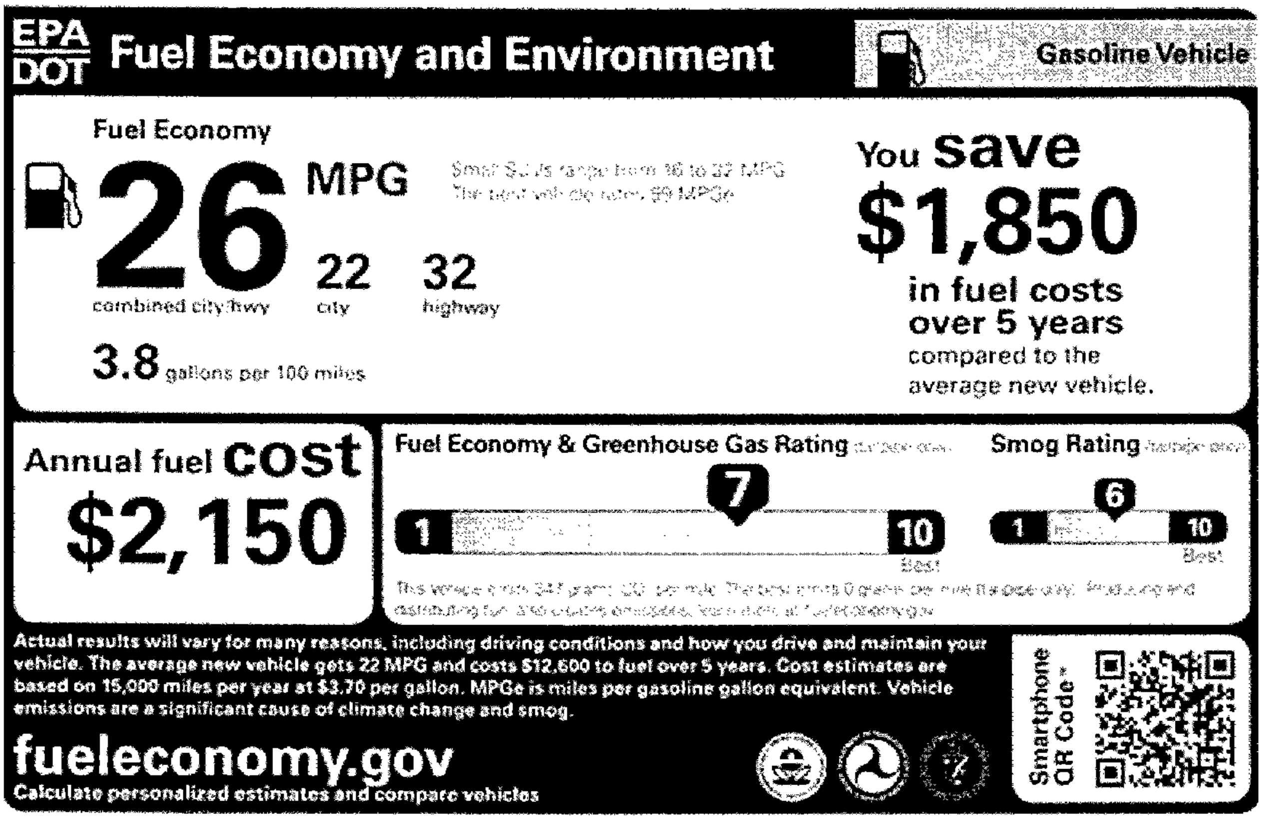


Source: ARB 2011a.

Since 1978, California's Smog Index Label has helped consumers assess the relative smog emissions from new cars. The current EPL regulation requires that both a Smog Score and Global Warming Score be posted on all new cars sold in California. The Smog Score is a simple rating that helps customers understand the level of CAP emissions generated by each particular vehicle model. The Global Warming Score provides a simple way for customers to understand the levels of GHGs emitted by each vehicle model. Both scores are based on a scale of 1 -10 with 10 being the cleanest and 5 representing the score for the average new light- or medium-duty vehicle.

In May 2011, U.S. EPA and NHTSA finalized a new Fuel Economy and Environment Label that is required on all new cars starting with model year 2013. However, the use of this new label is allowed earlier on a voluntary basis. The new Federal Fuel Economy and Environment Label is a redesign of the current fuel economy label found on all vehicles and will now include a Greenhouse Gas and Fuel Economy Rating that ranges from 1 to 10 with 10 being best and a Smog Rating, also from 1 to 10 with 10 being cleanest. The label's graphical representations are similar to and patterned on the Global Warming and Smog Scores on California's EPL shown above. The Fuel Economy and Environment Label is shown in Figure 1-2.

Figure 1-2. Fuel Economy and Environmental Label



Source: DOT and U.S. EPA 2011.

Details about the specific amendments proposed to EPL are presented in Chapter III (Project Description) Section A.1.d.

vi. On-Board Diagnostic System Requirement

Second generation on-board diagnostics (OBD II) systems, which have been required on all 1996 and newer vehicles, consist mainly of software designed into the vehicle's on-board computer to detect emission control system malfunctions as they occur by monitoring virtually every component and system that can cause an increase in emissions. When an emission-related malfunction is detected, the OBD II system alerts the vehicle owner by illuminating a warning light on the instrument panel. By alerting the owner of malfunctions as they occur, repairs can be sought promptly, which results in fewer emissions from the vehicle. Additionally, the OBD II system stores important information including identification of the faulty component or system and the nature of the fault, which would allow for quick diagnosis and proper repair of the problem by technicians. This helps owners achieve less expensive repairs and promotes repairs done correctly the first time.

Since originally adopted in 1989, the regulation has been updated regularly, with the last major update to the regulation occurring in 2006, as well as updates to the medium-duty diesel requirements occurring in 2009. Staff was not scheduled to go to the Board this year to update the OBD II regulation; however, manufacturers recently approached ARB staff and requested regulation changes that they indicated were needed immediately to ensure compliance when they certify their 2013 model year vehicles. Interested manufacturers and ARB staff held discussions about the proposal,, including a meeting on July 27, 2011. In response to the manufacturers' requests, staff is proposing changes to the OBD II regulation, CCR, Title 13, Section 1968.2. The proposed amendments to the OBD II regulation consist of relaxation of a few requirements (e.g., delays to the required start dates) and clarifications.

vii E-10 Certification Fuel

The California certification fuel used for testing exhaust and evaporative emissions on passenger cars, light-duty trucks, and medium-duty vehicles currently contains the oxygenate methyl tertiary butyl ether (MTBE) in the quantity of 10.8 to 11.2 volume percent (equivalent to 2.0 percent by weight). MTBE was banned for use in California gasoline starting December 31, 2003. As a result of the ban of MTBE, ethanol became the prevalent oxygenate used in California gasoline. After the ban, refiners began adding approximately 5.7 volume percent ethanol to gasoline, which is equivalent to 2.0 weight percent. California gasoline contained 5.7 percent ethanol until the end of 2009. In 2010, California refiners transitioned to producing gasoline containing 10 percent by volume ethanol (E10).

As part of the proposed ACC program, staff is proposing to amend certification test fuel specifications by eliminating requited testing with MTBE and requiring 10 percent ethanol by volume instead, as discussed in Section 5 of the Project Description. This proposed modification would better align the specifications of certification test fuel with the properties of in-use fuel. For evaporative emission testing, phase-in of the ethanol-containing certification test fuel is proposed to occur at the same model year percentages being proposed for the LEV III FTP 150,000-mile durability requirements applicable to the light-duty fleet.

b. Zero Emission Vehicle Regulation (ZEV)

ARB first adopted the ZEV requirement in 1990 as part of the LEV regulation discussed above and has since modified the ZEV regulation several times. The ZEV mandate provides more reasonable assurance that ZEVs will be produced in high enough volumes to provide a launch of the technology in the marketplace. The regulation includes specific regulatory mechanisms to reduce the risk of early ZEV market failure.

Under the existing ZEV regulation, manufacturers are required to produce a number of ZEV and ZEV-enabling technologies each year. The types of technologies manufacturers produce to comply with the regulation are listed in Table 1-2.

Table 1-2. Zero Emission Vehicle Types and Technologies

Vehicle Type	Technical Description	Credit Amount	Vehicle Examples
ZEV	Zero tailpipe emissions (i.e., no tailpipe): battery electric vehicles (BEV), and hydrogen fuel cell vehicles (FCV).	1.0 - 7.0	Nissan Leaf, Honda FCX Clarity
Transitional Zero Emission Vehicles (TZEV)	Vehicles certified to PZEV standards that also run on ZEV fuels for at least 10 miles (e.g. plug-in hybrid electric vehicles or hydrogen internal combustion engine vehicle)	1.0 - 2.5	GM Volt
Advanced Technology Partial Zero Emission Vehicle(AT PZEV)	Vehicles certified to PZEV standards and employing ZEV-enabling technologies (e.g. hybrids or compressed natural gas vehicles)	0.5 – 0.7	Toyota Prius
Partial Zero Emission Vehicle (PZEV)	Conventional gasoline vehicles certified to the most stringent tailpipe emission standards, zero evaporative emissions, and extended warranty.	0.2	Ford Focus PZEV

The ZEV regulation is based on a credit mechanism that affords manufacturers flexibility to produce various types of vehicle technologies. Credits are given to vehicles based on zero emission range, refueling capabilities, hybridization, and emissions performance. The credit amounts are also summarized in Table 1-2.

The vehicle types that earn credits to comply with the ZEV regulation also help manufacturers attain the fleet-average emission standards established by the existing LEV regulation (and the proposed LEV III regulation).

ZEV requirements are included in CCR, Title 13, Section 1962.1. Details about the specific amendments proposed to the ZEV regulation are presented in Chapter III (Project Description).

c. Clean Fuels Outlet Regulation (CFO)

The CFO regulation was originally developed in 1990 to apply to all alternative fuel vehicles (AFVs) that, when operated on a designated clean fuel, would achieve LEV emission standards. Types of designated clean fuels include natural gas, ethanol, methanol, and hydrogen. Electricity is specifically excluded from the definition of a designated clean fuel because of its non-liquid form and unique distribution and market characteristics that are unlike other fuels under this regulation. In essence, once the projected numbers of AFVs that use a specific clean fuel reach 20,000, the larger owner/lessors of gasoline retail outlets, i.e., gas stations, would be required to equip a specified number of their outlets with that alternative fuel. When the CFO regulation was written, it was projected that AFVs would be needed in the State's vehicle fleet to meet CAP emission standards; however, the need for AFVs to enter the fleet was negated by the innovation and introduction of cleaner-burning fuels and more advanced emission control technologies for conventional fuel vehicles (i.e., gasoline and diesel) that met LEV II standards.

During development of the original CFO regulation, ARB projected that most early AFVs would be flex or dual-fueled vehicles that could also operate on gasoline and this projection was confirmed by manufacturers' response. This assumption served as the basis for setting the initial trigger at 20,000 AFVs. Market-based analyses were used to determine that fuel providers could feasibly produce and sell alternative fuels at this market volume. California surpassed the 20,000 AFV trigger level for E-85 flex-fuel vehicles in mid-2000, but due in part to concerns over life-cycle emissions from substantially increased ethanol production and distribution, the regulation was never activated. Today, the use of ethanol-gasoline blends is promoted through the federal Renewable Fuels Standard (RFS), which applies to liquid fuels only, and California's Low Carbon Fuel Standard (LCFS). RFS and LCFS both place the responsibility on oil companies and fuel distributors to increase the amount of biofuels and other low-carbon fuels dispensed for transportation.

Thus, the CFO regulation compliments the ZEV regulation, because it ensures the availability of alternative fuels as AFVs are produced and sold in California.

The CFO regulation is included in CCR, Title 13, Sections 2300-2318. Details about the proposed version of the CFO regulation are presented in Chapter III (Project Description).

2. ARB Nexus with the U.S. Environmental Protection Agency and National Highway Traffic Safety Administration

There are currently no comparable federal CAP emission standards for 2015 and subsequent model passenger vehicles as stringent as this proposed California rule. However, U.S. EPA has indicated that it expects to issue a Notice of Proposed Rulemaking (NPRM) for their "Tier 3" next generation of CAP emission standards in January 2012, which will apply to 2017 and subsequent model year vehicles. Staff expects the Tier 3 program to be comparable to the California proposed rule in the applicable timeframe. This national rule is expected to be finalized in late-2012.

With regard to GHGs, U.S. EPA and NHTSA have been working together under the federal Clean Air Act and the Energy Independence and Security Act of 2007 to develop a coordinated national program of harmonized regulations to reduce emissions and improve fuel efficiency. The agencies issued a Final Rulemaking establishing standards for 2012-2016 model year vehicles on April 1, 2010 (U.S. EPA 2010c).

The federal agencies are now developing a rulemaking to set standards for model year 2017-2025 PC and LDT (U.S. EPA 2011a), which is consistent with the Presidential Memorandum regarding fuel efficiency standards (The White House Office of the Press Secretary 2010).

There are currently no comparable federal GHG emission standards that are as stringent as the proposed standards for 2017 and subsequent model passenger vehicles. (The current federal GHG emission standards for the 2016 and subsequent model years are comparable to those applicable in California in the 2016 model year). However, on November 16, 2011, an NPRM was issued by U.S. EPA and NHTSA for a joint rulemaking that proposes a coordinated federal GHG emission reduction and fuel economy program for light-duty vehicles, beginning in the 2017 model year. This national rule is expected to be finalized by the end of July 2012. There are no significant differences between the proposed California GHG regulations and those presented in the NPRM. Furthermore, staff does not expect there to be any significant differences between the proposed California GHG regulations and those in U.S. EPA's Final Rule.

D. ACC Program Objectives

Recognizing the need to attain national and State ambient air quality standards for CAPs, as well as the requirements of AB 1493 and AB 32 and the role of clean car standards in contributing to GHG emission reductions, the following project objectives are presented for the proposed ACC Program:

1. ***Ensure all Californians can live, work, and play in a healthful environment free from harmful exposure to air pollution*** – to protect and preserve public health and well-being, and prevent irritation to the senses, interference with visibility, and damage to vegetation and property (Health and Safety Code [HSC], Section 43000[b]) in recognition that the emission of air pollutants from motor vehicles is the primary cause of air pollution in many parts of the State (HSC, Section 43000[a]);

2. ***Achieve the maximum emissions reduction possible from motor vehicles*** – to attain the national and State ambient air quality standards for CAPs (HSC, Sections 43000.5[b] and 43018[a]);

3. ***Establish a uniform set of vehicle emission standards*** – to provide clarity to vehicle manufacturers about the emission-related requirements by integrating them into a single, coordinated package (HSC, Section 43000[c]);

4. ***Reduce dependence on petroleum as an energy resource*** – to reduce the State's reliance on petroleum and support the use of diversified fuels in the State's passenger vehicle fleet. In addition, petroleum use as an energy resource contributes substantially to the following public health and environmental problems: air pollution, acid rain, global warming, and the

degradation of California's marine environment and fisheries (PRC, Sections 25000.5[b] and [c]);

5. ***Decrease GHG emissions in support of statewide GHG reduction goals*** – to adopt "clean car standards," as identified in the Scoping Plan, which was developed for the purpose of reducing GHG emissions in California, as directed by AB 32, Statutes of 2006. As described in the Scoping Plan recommendations, "these types of compliance options will be key in ensuring that we are able to meet our reduction targets in a cost-effective manner" and "will play a central role in helping California meet its 2020 reduction requirements" and "figure prominently in California's efforts beyond 2020." More specifically, ARB has determined that the proposed ACC Program would need to achieve a reduction of at least 3.8 MMT CO_2e, as described in the Scoping Plan. Implementation of the proposed ACC Program would also provide further GHG reductions pursuant to AB 1493 (Pavley regulations) (Chap. 200, Statutes of 2002). Finally, implementation of the proposed ACC Program would also be a key measure to help California reduce GHGs to 80 percent below 1990 levels by 2050 to further reduce the threat of climate change, which is a goal identified in former Governor Schwarzenegger's Executive Order S-3-05 to minimize climate change impacts and achieve climate stabilization;

6. ***Ensure emission reductions*** – to ensure that emission reductions are real, permanent, quantifiable, verifiable and enforceable, as identified in the Scoping Plan (HSC, Section 38562[d]);

7. ***Improved automotive technologies and fueling infrastructure*** – to guide the acceleration of the development of environmentally superior passenger vehicles that will continue to deliver performance, utility, and safety demanded by the market, and to promote an infrastructure that is supportive of AFVs; and

8. ***Spur economic activity*** – to incentivize innovation that will transition California's economy into greater use of clean and sustainable technologies and to promote increased economic and employment benefits that will accompany this transition (AB 1493 Section 1[g]; HSC, Section 38501[e]).

E. Scope of Analysis and Assumptions

The degree of specificity required in a CEQA document corresponds to the degree of specificity inherent in the underlying activity it evaluates. The environmental analysis for broad programs cannot be as detailed as for specific projects (CCR, Title 14, Section 15146). For example, the assessment of a construction project would naturally be more detailed than for the adoption of a plan, because the construction effects can be predicted with a greater degree of accuracy (CCR, Section 15146 [a]). This analysis addresses a broad regulatory program, affecting statewide sales of millions of new passenger vehicles, from between six and 14 years from now, so a general level of detail is appropriate. The EA provides a good-faith effort to evaluate significant adverse impacts and beneficial impacts of the regulatory program and contains as much information as is currently available, without being speculative.

The scope of analysis in this environmental analysis is intended to help focus public review and to encourage that questions and comments are appropriate and meaningful. This analysis specifically focuses on potential significant, adverse and beneficial impacts on the physical environment resulting from compliance responses to the proposed changes to the existing State regulations regarding emissions from new light- and medium-duty vehicles sold in California, and from actions and infrastructure necessary to provide alternative vehicle fuels.

The analysis of potential significant, adverse environmental impacts from the proposed ACC Program is based on the following assumptions:

1. This analysis addresses the potential significant, adverse environmental impacts resulting from implementing the regulatory amendments of the proposed ACC Program compared to the existing regulations concerning emissions standards for light- and medium-duty vehicles, the availability of alternative fuels, and other applicable existing regulations.

2. The environmental baseline is defined by existing vehicle and related fuel emissions programs, policies, and regulations. The existing regulatory condition includes the existing LEV regulation (LEV II), including the GHG requirements that are part of LEV II (known as the Pavley regulations), the EPL regulation, and the existing ZEV regulation, as well as other relevant, previous California rulemakings, such as the LCFS and all comparable federal regulations.

3. The analysis of environmental impacts and determinations of significance are based on a comparison of the reasonably foreseeable methods of compliance related to the proposed amendments under the ACC Program with the current methods of compliance related to the existing State and federal regulatory framework.

4. The analysis in this EA addresses environmental impacts both within the State of California and outside the State to the extent they are reasonably foreseeable and do not require speculation.

5. The level of detail of impact analysis is necessarily and appropriately general, because the nature of the proposed ACC Program is programmatic and specific infrastructure and facility development projects will not occur solely from approval of this program. Specific projects implementing the proposed ACC Program will undergo their normally required environmental review and compliance processes. In addition, performance standards generally, and the proposed fleetwide CAPs and GHG emissions standards in the LEV III program in

particular, allow a wide variation in compliance responses, which will vary even further by manufacturer due to their differing baseline fleet characteristics that the analysis must necessarily project four to five model years into the future.

6. Because of the statewide reach of the proposed ACC Program and the longer-term future horizon of the achievement of a statewide fleet that is lower in both CAP and GHG emissions, the programmatic impact analysis applies generally across a broad geography, rather than at site- or project-specific locations. However, impact analyses do examine regional (e.g., air basin) and local issues, where feasible and appropriate. As a result, the character of the impact conclusions in the resource-oriented sections of Chapter 5, Impact Analysis and Mitigation, are generally cumulative, considering the potential effects of the full range of reasonably foreseeable methods of compliance, along with expected background growth in California and the U.S., as appropriate. Chapter 8 provides a summary of potential cumulative impacts of the proposed ACC Program in conjunction with other reasonably foreseeable future air quality programs (see "complementary measures" discussion below).

1. Environmental Checklist

An environmental checklist was used to identify and evaluate potential impacts of the proposed ACC Program as contained in Attachment 1. Further discussion is presented in Chapter 5, Impact Analysis, regarding the impacts of the proposed ACC Program, and potential mitigation strategies that can be implemented to lessen any identified potential significant adverse impacts.

2. Basis for Environmental Impact Analysis and Significance Determinations

The policy and direction of the existing LEV II (including the Pavley regulations that address GHG standards), ZEV, and CFO regulations established by previous rulemakings define the current requirements for compliance with emission standards for passenger vehicles in California. In addition, it is important to note that other existing measures are in place to reduce GHGs, as described in the Scoping Plan, to the extent they have been Board-adopted. These are called "reference measures" because they are already in effect and because they help define the existing baseline of GHG emissions in California.

CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (CEQA Guidelines, CCR, Title 14, Section 15125[a]). Therefore, the significance determinations reflected in the EA are based on changes from existing physical conditions, in keeping with CEQA requirements.

In the context of regulatory programs, impacts on the physical environment are the result of compliance responses to regulations. Compliance responses to the existing

LEV II, ZEV, and CFO regulations are already in place and underway. The environmental effects of proposed amendments to regulations that reduce CAP and/or GHG emissions from light- and medium-duty vehicles would build upon the compliance responses to these existing regulations. Approval and implementation of the proposed ACC Program would result in the amendment of existing emission requirements and alternative fuel availability requirements for light- and medium-duty vehicles to a more stringent set of standards and requirements; in response, compliance methods would also change. Comparison of reasonably foreseeable methods of compliance in response to the proposed regulatory amendments with the current and likely compliance responses to the existing standards and requirements and other reference measures is the approach used to estimate the potential environmental effects attributable to the proposed ACC Program. That is, the approach compares one set of projections (2017 – 2025) with compliance responses as of 2016.

Other reasonably foreseeable actions are approved or proposed to take place in the time frame of the proposed ACC Program, but are not yet in effect. These are referred to as "complementary measures" (e.g., Environmental Standards for Hydrogen Production [requires GHG reductions and use of renewables in accordance with SB 1505]). They help define the future, cumulative scenario of reasonably foreseeable compliance measures. The complementary measures are designed to reduce CAPs and GHGs by increasing the efficiency with which California uses all forms of energy and by reducing dependence on the fossil fuels.

a. Adverse Environmental Impacts

The analysis of adverse effects on the environment and significance determinations for those effects in the EA reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance by vehicle manufacturers, hydrogen fuel producers, fuel retailers, and battery recyclers, as well as consumers. These compliance responses are described in greater detail in Chapter 4. Thus, the EA analysis addresses broadly defined types of impacts without the ability to determine the specific project or vehicle locations, facility size and character, or site-specific environmental characteristics affected by the facilities. Environmental impacts may be determined to be potentially significant, because of the inherent uncertainties about the relationship between future infrastructure and vehicle design and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full-disclosure intent of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts recognized as potentially significant in this EA and not already mitigated or avoided with this proposed Board approval can later be avoided or reduced to a less-than-significant level.

Another inherent uncertainty in the EA analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the regulatory amendments that comprise the proposed ACC Program, it does not have authority over the proposal, approval, or implementation of infrastructure and development projects. Also, because the vehicle standards are nearly all performance-based and not prescriptive, the ACC program is generally not mandating any particular technology(ies) on any particular vehicles. ARB also has no control over which vehicles or with which technology(ies) would be purchased and operated in which areas of the State. Other agencies are responsible for the environmental analyses of proposed facilities and infrastructure (e.g., alternative fueling stations, manufacturing facilities, and battery recycling outlets), definition and adoption of project-specific feasible mitigation, and monitoring of mitigation implementation. For example, local cities or counties must approve proposals to construct fueling stations. Additionally, State and/or federal permits may be needed for specific environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because ARB is not responsible for implementation of specific infrastructure projects (such as fueling stations), the programmatic analysis does not allow for a precise description of the details of project-specific mitigation. As a result, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, where appropriate. It is expected that facility and infrastructure projects would be able to feasibly avoid or mitigate to a less-than-significant level many of these potentially significant impacts as an outcome of their project-specific environmental review processes.

b. Beneficial Effects to the Environment

Where applicable, this EA also acknowledges various beneficial effects in each resource area that may result from ARB's adoption and implementation of the proposed ACC Program, consistent with ARB's Certified Regulatory Program requirements (CCR, Title 17, Section 60005[b]).

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2.0 PROJECT DESCRIPTION

The proposed Advanced Clean Cars (ACC) Program consists of amendments to existing regulations to provide a comprehensive approach to further reduce emissions of criteria air pollutants and precursors (CAPs) and greenhouse gases (GHGs) from light- and medium-duty vehicles in California. Toxic air contaminants (TACs) generally decrease in tandem with these. Accordingly, the proposed ACC Program would include more stringent emission standards for CAPs and GHGs, requirements for vehicle manufacturers to increase the proportion of zero emission vehicles (ZEVs) (e.g., hydrogen fuel cell vehicles [FCVs], battery electric vehicles [BEVs] sold in California), requirements for increased availability of alternative fuel stations to support the resultant increase in ZEVs, and changes to the types of emissions information that must be posted on new cars. The major components of the proposed ACC Program are discussed in greater detail below. As discussed further in Section E of this chapter, for CEQA purposes the "project" is the collective set of proposed regulatory amendments that would affect manufacturer design of vehicles and the fueling of a segment thereof to meet these ARB regulations, while also meeting other regulatory requirements.

A. Amendments to the Low-Emission Vehicle and Greenhouse Gas Regulation (LEV III)

The proposed amendments to the Low-Emission Vehicle and Greenhouse Gas regulation (LEV III) would revise and update the standards currently in place under LEV II, which was summarized earlier in Chapter 1. LEV III would consist of a set of more stringent emission standards for the various light- and medium-duty vehicle classes and more stringent fleet average emission standards starting with model year 2015 and becoming more stringent through model year 2025. Like the existing LEV II regulation, LEV III would continue to address exhaust emissions of formaldehyde, non-methane organic gas (NMOG), carbon monoxide (CO), oxides of nitrogen (NO_X), particulate matter, and evaporative emissions of hydrocarbons (HC). In addition to establishing emission standards that are more stringent than current requirements, LEV III would also generally include the following changes regarding CAPs:

- LEV III would replace the separate standards for NMOG and NO_X with a combined standard that is based on the sum of these two pollutants.

- LEV III also would increase the "durability basis" from 120,000 miles to 150,000 miles. The extended durability basis would ensure the effectiveness of a vehicle's emissions control systems over the assumed operational life of the vehicle.

- LEV III would extend applicability of the California Supplemental Federal Test Procedure (SFTP) to medium-duty and alternative-fueled vehicles, and include two options for complying with the SFTP. The SFTP is designed to specifically address off-cycle emissions, which are those not normally accounted for in on-road driving cycles used for vehicle certification, resulting from aggressive operation, typified by high speeds and hard accelerations, and from air conditioner use. LEV III would also extend SFTP applicability throughout the full useful life of affected vehicles. SFTP II would also require standards for controlling exhaust emissions of particulate matter during off-cycle driving.

- LEV III would extend the zero fuel evaporative emissions standards to all vehicles subject to evaporative emission requirements and provide two options by which manufacturers could comply with these standards. The evaporative emissions standards would be fully phased in by model year 2022.

- The proposed LEV III regulation would also include more stringent standards for GHG emissions from light-duty vehicles for model years 2017-2025. As part of this proposal, ARB is working with the U.S. Environmental Protection Agency (U.S. EPA) and the National Highway Traffic Safety Administration (NHTSA) in their development of a national regulation that would require reductions in vehicle GHG emissions and consequent improvements in fuel efficiency that would also serve California's needs to reduce GHG emissions.

As part of LEV III, ARB proposes to continue awarding credits to manufacturers that utilize air conditioning (AC) system technologies that reduce direct emissions (from refrigerant leakage) and indirect emissions (from usage), but amend the credit formulas used as part of California's 2009-2016 model years-GHG standards (i.e., Pavley regulations) so that they align with U.S. EPA's methodology for 2017-2025 model years. Rather than specifying the suite of technologies that must be used by the manufacturer to receive credits, as currently required by the Pavley regulations, ARB proposes to adopt U.S. EPA's approach to award credits based on the individual technologies employed. Thus, direct credit would be given for the reduction of direct refrigerant emissions achieved through improvement of refrigerant containment and/or use of a refrigerant with a global warming potential (GWP) less than or equal to 150. Indirect credit would be given for the reduction of indirect emissions achieved through use of efficiency improvement technologies listed on a menu; however, the total credit would be capped to account for synergistic effects of the various efficiency improvement technologies for AC systems.

Overall, the goal of the proposed LEV III regulation is to make the emissions requirements for light- and medium duty vehicles sold in California generally consistent with requirements of the Tier 3 emission standards proposed by U.S. EPA, and consistent with the federal GHG standards and consequent fuel efficiency standards for motor vehicles.

1. Amendments to the California Evaporative Emission Regulations

To maintain continuity of vehicles certified to the zero evaporative emission standards and to expand the use of existing zero evaporative technology to the remaining vehicle classes, staff proposes to require new passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty vehicles that are gasoline-fueled, liquefied petroleum gas-fueled, and alcohol-fueled, to comply with the zero evaporative emission standards. This would require amending CCR, Title 13, Section 1976 and the incorporated "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles". The proposed lower evaporative emission standards are equivalent in stringency to the current optional LEV II zero evaporative emission standards.

2. Manufacturer Size Definition

To retain a level competitiveness, staff propose two changes to the size definitions of manufacturers:

1) Decrease the intermediate volume manufacturer (IVM) (i.e., large volume manufacturer [LVM] threshold from 60,000 PCs, LDTs, and MDVs on average in California to 20,000 on average); and

2) Aggregation of two manufacturers' sales for determination of size if one manufacturer owns greater than 33.4 percent of another manufacturer.

3. Amendments to the Environmental Performance Label

Some changes would also be made regarding the existing California Environmental Performance Label (EPL) regulation, which is described in Chapter 1, Section C.1.d. More specifically, compliance by manufacturers with the Federal Fuel Economy and Environment Label, as finalized in May 2011, would be deemed compliant with California EPL requirements. This would allow for one label depicting relative vehicle CAP and GHG emissions nationwide, incorporating both the substance and style of California's existing EPL.

4. Amendments to the On-Board Diagnostic System Requirements

The proposed amendments to the OBD II regulation would consist of relaxations to a few requirements (e.g., delays to the required start dates) and clarifications. The proposed relaxations would include the following:

- Delaying the start date for manufacturers to monitor the ability of a catalyst to generate a desired feedgas to promote better performance in a downstream after-treatment component (e.g., generate nitrogen dioxide for higher NOx conversion efficiency in a selective catalytic reduction [SCR] system) from the 2010 model year to the 2015 model year for light-duty vehicles and from the 2013 model year to the 2015 model year for medium-duty vehicles.

- Delaying the start date for manufacturers to monitor the non-methane hydrocarbon (NMHC) conversion capability of catalyzed particulate matter (PM) filters from the 2010 model year to the 2015 model year for light-duty vehicles and from the 2013 model year to the 2015 model year for medium-duty vehicles.

- Extending the allowance for a deficiency by an additional model year for manufacturers unable to meet the requirement to detect malfunctions of the PM filter when the filtering capability degrades to a level such that tailpipe emissions exceed the more stringent 2013 model year thresholds.

- Delaying the start date for manufacturers to monitor the tolerance compensation features of the fuel control system components on diesel vehicles from the 2013 model year to the 2015 model year.

While ARB staff believes all the requirements mentioned above are technically feasible for manufacturers to meet (and hence, are being delayed, not eliminated), circumstances, such as delays in technology development, have prevented manufacturers from implementing the requirements within the required deadlines (e.g., delay in the development of the PM sensor). Additionally, manufacturers have requested that ARB staff propose clarifications to a few requirements in the current OBD II regulations, including those that address hybrid vehicles. The OBD II requirements include software in the car computer that verifies if the diagnostics are running frequently enough. ARB staff is proposing to update these requirements to clarify how to track such data for hybrids and especially plug-in hybrid vehicles that can have all or some portion of driving trips where the engine emission controls are never even operated due to battery/electric vehicle operation. ARB staff has already discussed the proposed amendments with hybrid manufacturers and have come to an agreement regarding these changes, which would only consist of minor software revisions. Similar changes are also being proposed to account for the erasing of fault information in hybrids, which would also only also consist of minor software revisions.

5. Amendments to the Specifications for California Certification Fuel Regulation

Since MTBE was banned for use in California gasoline starting December 31, 2003, ethanol became the prevalent oxygenate used in California gasoline. California gasoline contained 5.7 percent ethanol until the end of 2009. In 2010, California refiners transitioned to producing gasoline containing 10 percent by volume ethanol. Currently, all gasoline in California contains 10 percent ethanol and will continue to contain 10 percent ethanol for the foreseeable future. While the type of oxygenate and oxygenate amount have changed in in-use California gasoline (i.e., fuel used by California consumers), the certification fuel used for emission testing has not, and is no longer representative of in-use fuel. The certification fuel in California is being updated to reflect the in-use fuel. Staff is proposing to amend existing regulations to require use of a certification fuel that contains 10 percent ethanol (E10 fuel). Staff is proposing that the E10 certification fuel to be required beginning 2014, and is also proposing that the E10 certification fuel would be available for optional use upon the Office of Administrative Law's filing of the LEV III rulemaking with the Secretary of State.

B. Amendments to the Zero Emission Vehicle Regulation (ZEV)

The proposed amendments to the ZEV regulation focus on technologies that help meet long-term CAP and GHG reduction goals, including having more battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) in the statewide vehicle fleet, simplifying the ZEV regulation where needed, and increasing requirements for 2018 model year and beyond. A brief description of the current ZEV regulation is provided in Chapter 1 and the amount of ZEV credits that manufacturers currently earned by various vehicle classes is summarized in Table 1-2.

The proposed amendments are divided into two timeframes: model years 2012 through 2017, and 2018 and subsequent model years. For 2012 through 2017, limited amendments are proposed to allow manufacturers to indefinitely bank ZEV credits for use in later years, and to increase the number of credits earned by long-range (300 mile or more) fuel cell vehicles (FCVs).

For 2018 and subsequent model years, the ZEV requirements would be increased, so that by 2025, 15 percent of a manufacturer's new vehicle sales would be required to be ZEVs (e.g., BEVs and FCVs) and Transitional Zero Emission Vehicles (TZEVs) (e.g., PHEVs). In addition to increasing the requirement, the proposed amendments would modify the amount and calculation of credits for ZEVs and TZEVs. Manufacturer's size definition requirements would also be amended, so that 97 percent of manufacturers would be required to fully comply with the regulation. The amendments would also modify the "carry-back" provision, so that manufacturers would be allowed to carry a deficit in their required ZEV credits for only one year, before being subject to penalties. Overall, these amendments would result in a greater proportion of ZEVs in the statewide light- and medium duty vehicle fleet.

C. Amendments to the Clean Fuels Outlet Regulation (CFO)

As explained in Chapter 1, the Clean Fuels Outlets (CFO) regulation was initially developed and approved in 1990 and updated by the Board in 2000, but never activated. As part of the proposed ACC Program, ARB would amend the CFO regulation with updated requirements. The requirements would account for the types of alternatively fueled vehicle (AFV) technologies feasible at this time, particularly those that are most effective at reducing CAPs and GHGs.

With the proposed changes, the CFO regulation would apply only to fuels for ZEVs, specifically hydrogen FCVs, and it would not address natural gas-, ethanol-, or methanol-fueled vehicles like the previously drafted regulation. The CFO regulation would require major refiners and importers of gasoline, instead of owners/lessors of gasoline retail outlets, to build new hydrogen fueling stations based on the projected number of hydrogen FCVs operating in the State. More specifically, major refiners and importers would be required to build retail hydrogen fueling stations when projections indicate there would be 20,000 or more FCVs operating within the State. The amendments would add an additional trigger to build outlets of 10,000 vehicles that would be applied within a specific air basin. Projections would be based on records provided by the Department of Motor Vehicles, and sale and lease forecasts from vehicle manufacturers.

Consistent with the current CFO regulation, the number of FCVs that are as part of an organization's fleet operation would be discounted by 75 percent before they are included in the total tally for the 10,000 and 20,000 trigger levels. This is because an organization operating an FCV fleet (e.g., a private company, government agency, or university campus) would be anticipated to have its own private hydrogen fueling station and would be less dependent on publicly available fueling stations. However, the regulation would provide for an adjustment to the fleet discount factor based on the availability of fuel for that fleet. The proposed regulation would also require vehicle manufacturers to provide ZEV production plans to ARB three years in advance (instead of two years) and to specify where vehicles would be deployed. These changes were designed to provide the refiners and importers with additional time to locate and build stations.

Once the trigger number of vehicles is reached, ARB would determine how many new fueling stations would be needed to support these vehicles, and then allocate the responsibility of establishing new stations among the major refiners and importers of gasoline based on their annual share of gasoline supplied to California. Once notified of their obligation, responsible parties would have approximately 2.5 years to meet their requirements. ARB would inform major refiners and importers of gasoline of the geographic areas where stations are needed to ensure that fueling stations would be constructed in locations that would be adequately accessible by the general public, but the major refiners and importers of gasoline would be responsible for identifying exact station locations. The protocol used to determine station locations would account for the need to provide adequate station coverage in the areas where FCVs are being marketed, leased, and sold. Requirements to build new hydrogen fueling stations would sunset when the number of hydrogen fueling stations statewide represents five percent of the total number of retail fuel outlets; however, major refiners and importers of gasoline would be required to continue operating and maintaining the hydrogen fueling stations that they previously built.

The regulation would also include additional requirements regarding BEVs and BEV-charging infrastructure. It would require ARB to assess the battery-charging infrastructure needs of BEVs within a specified period after the regulation is adopted. The purpose of ARB's assessment would be to determine where BEV drivers are charging their cars (e.g., at home, at workplaces, or at public charging locations), charging frequency, and under what conditions and locations would additional public charging stations be needed to adequately support BEV activity. Following its assessment, ARB would make recommendations regarding public battery-charging infrastructure.

The proposed amendments to the CFO regulation would complement the ZEV regulation, because they ensure the availability of hydrogen to FCVs as they are produced and sold in California. The amended CFO regulation would also ensure vehicle manufacturers and consumers that FCV ownership is a real and viable option for passenger transportation in California. Finally, the amendments would require ARB staff to monitor BEV deployment in an effort to have battery-charging opportunities keep pace with needs.

D. The "Project" as Three Combined Regulatory Amendment Packages.

The "project," as defined by CEQA, undergoing environmental review in this EA is the combined set of amendments to the LEV, ZEV, and CFO regulations. The amendments to these three regulations are analyzed as one project, because the regulations are related and compliance responses by vehicle manufacturers and fuel providers would have a combined effect on the statewide vehicle fleet, the ways light- and medium-duty vehicles are sold and leased, and the availability and use of alternative fuels. This is necessary to provide a comprehensive review of the combined, or cumulative, effect of these regulatory amendments.

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3.0 ENVIRONMENTAL SETTING

Existing physical conditions and the current regulatory framework relevant to each environmental topic are presented in this section. Refer to Chapter 4 for the analysis of environmental impacts and description of mitigation measures, if needed.

A. Aesthetics

1. Existing Conditions

California, by virtue of its size, setting, and topographic and climatic variation, exhibits tremendous scenic diversity. The varied landscape ranges from coastal to desert and valley to mountain. Innumerable natural features and settings combine to produce scenic resources that are treasured by residents and visitors alike.

Visibility is a factor that affects the ability to view and appreciate the aesthetic values in these features and settings and visibility is directly affected by the presence of airborne visibility-reducing particles. Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt (ARB 2009a).

2. Regulatory Setting

Applicable laws and regulations associated with aesthetics and scenic resources are discussed in Table 3.A-1.

Table 3.A-1. Applicable Laws and Regulations for Aesthetic Resources

Applicable Regulation	Description
Federal	
Federal Land Policy and Management Act of 1976 (FLPMA)	FLPMA is the enabling legislation establishing the Bureau of Land Management's responsibilities for lands under its jurisdiction. Section 102 (a) of the FLPMA states that ". . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values .... " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed.
Bureau of Land Management Contrast Rating System	The contrast rating system is a systematic process used by BLM to analyze visual impacts of proposed projects and activities. It is primarily intended to assist BLM personnel in the resolution of visual impact assessment.
Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users	This Act includes numerous provisions for improvements and changes to the implementation of transportation enhancement activities, which are funded by a ten percent set aside of Surface Transportation Program funds that are earmarked for transportation enhancement projects. This Act includes a list of qualifying transportation enhancement activities which include several items supportive of visual

Table 3.A-1. Applicable Laws and Regulations for Aesthetic Resources	
Applicable Regulation	**Description**
	quality enhancement such as acquisition of scenic easements and scenic or historic sites, scenic or historic highway programs, landscaping or other scenic beautification, and control and removal of outdoor advertising, among others. Transportation enhancement activities are not required to have a direct link to surface transportation, and they are sufficiently qualified if they merely relate to surface transportation.
National Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's "setting . . .[or] . . . feeling" in a way that affects the property's eligibility for listing, may result in a potentially significant adverse effect. "Examples of adverse effects . . . include . . .: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features." (36 CFR Part 800.5.)
State	
Ambient Air Quality Standard for Visibility-Reducing Particles	Extinction coefficient (measure of absorption of light in a medium) of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. (Method: Beta Attenuation and Transmittance through Filter Tape.) This value is not to be exceeded (ARB 2010).
California Streets and Highways Code, Sections 260 through 263 – Scenic Highways	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform with requirements of the California Scenic Highway Program.
Local	
County and City Controls	Most local planning guidelines to preserve and enhance the visual quality and aesthetic resources of urban and natural areas are established in the jurisdiction's General Plan. The value attributed to a visual resource generally is based on the characteristics and distinctiveness of the resource and the number of persons who view it. Vistas of undisturbed natural areas, unique or unusual features forming an important or dominant portion of a viewshed, and distant vistas offering relief from less attractive nearby features are frequently considered to be scenic resources. In some instances, a case-by-case determination of scenic value may be needed, but often there is agreement within the relevant community about which features are valued as scenic resources. In addition to federal and State designations, counties and cities have their own scenic highway designations, which are intended to preserve and enhance existing scenic resources. Criteria for designation are commonly included in the conservation/open space element of the city or County General Plan. Cities and counties can use open space easements as a mechanism to preserve scenic resources, if they have adopted open-space plans, as provided by the Open Space Easement Act of 1974 and codified in California Government Code (Section 51070 et seq.) According to the Act, a city or county may acquire or approve an open-space easement through a variety of means, including use of public money.

B. Agricultural and Forest Resources

1. Existing Conditions

Based on the value of agricultural products sold, California is the largest agricultural producer among all states in the U.S. California produces nearly half of the nation's grown fruits, nuts, and vegetables and is the nation's leading dairy state. California's agricultural abundance includes more than 400 commodities, many of which are produced solely in California. (CDFA 2010a). Of California's approximately 100 million acres of land, 43 million acres are used for agriculture (CDFA 2010b). Of this land area, 16 million acres are grazing land and 27 million acres are cropland. Approximately 9 million acres of irrigated land, or one-third of the State's cropland, is considered to be prime, unique, or of statewide importance.

Although California remains the nation's top agricultural producer, it has experienced significant farmland loss as a result of urbanization. The California Department of Food and Agriculture estimates that about 3.4 million acres of land in California's agricultural counties are now urbanized. Development consumes approximately 40,000 acres of agricultural land in California per year (CDFA 2010b). Other causes of agricultural land loss include the removal of agriculture for environmental purposes (such as the creation or enlargement of wildlife refuges) and withdrawals due to water shortages (CDFA 2010b).

California contains over 33 million acres of forests comprising a broad range of tree species, tree sizes, and levels of canopy closure (USFS 2008, p.124). Conifer forests and woodlands cover over 19 million acres and are most extensive in the Sierra, Modoc, and Klamath/North Coast bioregions of the State. Hardwood forests and oak woodlands cover over 13 million acres and extend mostly along the perimeter of the Sacramento and San Joaquin Valleys and throughout the coastal ranges (USFS 2008, p. 128). The most productive timber growing portion of California's forests are approximately 19 million acres of public and private timberland—that is, land capable of growing more than 20 cubic feet of wood per acre per year and statutorily available for timber management (USFS 2008, p. 127). In the case of public ownerships (53 percent of timberlands), many lands capable of timber production have been administratively withdrawn over the past two decades for a variety of purposes and have been directed to primary uses other than timber production. California has 9 million acres of privately owned timberland, of which 5.4 million acres are classified as timberland production zone where long-term tax and regulatory structures favor timber production over potential conversion to other uses (USFS 2008, p. 127).

2. Regulatory Setting

Table 3.B-1 below provides a general description of applicable laws and regulations that may pertain to agriculture and forest resources and the Proposed ACC Program.

Table 3.B-1. Applicable Laws and Regulations for Agriculture and Forest Resources

Applicable Regulation	Description
Federal	
Farmland Protection Policy Act	The Farmland Protection Policy Act (FPPA) directs Federal agencies to consider the effects of Federal programs or activities on farmland, and ensure that such programs, to the extent practicable, are compatible with State, local, and private farmland protection programs and policies. The rating process established under the FPPA was developed to help assess options for land use on an evaluation of productivity weighed against commitment to urban development.
National Forest Management Act of 1976	The National Forest Management Act (NFMA) is the primary statute governing the administration of national forests. The act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. Goal 4 of the U.S. Forest Service's National Strategic Plan for the National Forests states that the nation's forests and grasslands play a significant role in meeting America's need for producing and transmitting energy. Unless otherwise restricted, National Forest Service lands are available for energy exploration, development, and infrastructure (e.g., well sites, pipelines, and transmission lines). However, the emphasis on non-recreational special uses, such as utility corridors, is to authorize the special uses only when they cannot be reasonably accommodated on non-National Forest Service lands.
State	
The California Land Conservation Act, also known as the Williamson Act (Govt. Code, § 51200)	The California Department of Conservation's Division of Land Resource Protection administers the Williamson Act program, which permits property tax adjustments for landowners who contract with a city or county to keep their land in agricultural production or approved open space uses for at least 10 years. Lands covered by Williamson Act contracts are assessed on the basis of their agricultural value instead of their potential market value under nonagricultural uses. In return for the preferential tax rate, the landowner is required to contractually agree to not develop the land for a period of at least 10 years. Williamson Act contracts are renewed annually for 10 years unless a party to the contract files for nonrenewal. The filing of a non-renewal application by a landowner ends the automatic annual extension of a contract and starts a 9-year phase-out of the contract. During the phase-out period, the land remains restricted to agricultural and open-space uses, but property taxes gradually return to levels associated with the market value of the land. At the end of the 9-year non-renewal process, the contract expires and the owner's uses of the land are restricted only by applicable local zoning. The Williamson Act defines *compatible use* of contracted lands as any use determined by the county or city administering the agricultural preserve to be compatible with the agricultural, recreational, or open space use of land within the preserve and subject to contract (Government Code, Section 51202[e]). However, uses deemed compatible by a county or city government must be consistent with the principles of compatibility set forth in Government Code, Section 51238.1. Approximately 16 million acres of farmland (about 50 percent of the State's total farmland) are enrolled in the program.

Table 3.B-1. Applicable Laws and Regulations for Agriculture and Forest Resources	
Applicable Regulation	**Description**
California Farmland Conservancy Program (Public Resources Code, §10200)	The program provides grant funding for agricultural conservation easements. Although the easements are always written to reflect the benefits of multiple resource values, there is a provision in the CFCP statute that prevents easements funded under the program from restricting husbandry practices. This provision could prevent restricting those practices to benefit other natural resources.
Farmland Mapping and Monitoring Program (FMMP) (Gov. Code §65570, PRC §612).	For this program, the California Department of Conservation assesses the location, quality, and quantity of agricultural lands and conversion of these lands over time. Agricultural designations include the categories of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up Land, and Other Land.
State Lands Commission Significant Lands Inventory	The State Lands Commission is responsible for managing lands owned by the State, including lands that the State has received from the federal government. These lands total more than four million acres and include tide and submerged lands, swamp and overflow lands, the beds of navigable waterways, and State School Lands. The State Lands Commission has a legal responsibility for, and a strong interest in, protecting the ecological and Public Trust values associated with the State's sovereign lands, including the use of these lands for habitat preservation, open space and recreation. Scoping Plan projects located within these lands would be subject to the State Lands Commission permitting process.
Local	
Open Space Element	State law requires each city and county to adopt a general plan containing at least seven mandatory elements including an open space element. The open space element identifies open space resources in the community and strategies for protection and preservation of these resources. Agricultural and forested lands are among the land use types identified as open space in general plans.

C. Air Quality

1. Existing Conditions

The effects of the proposed ACC Program are evaluated in detail as contained in each respective Staff Report and are summarized in this EA. This evaluation is extensive because benefitting air quality conditions in California is both one of the primary objectives of the proposed ACC Program and the agency's environmental protection mandate. This environmental setting discussion provides an overview of how air quality is regulated in California and the state of existing air quality conditions. Though the GHG environmental setting is presented separately in Section D below, it is important to note that mobile source control programs address CAPs and TACs, and in the case of GHGs, it's in part to reduce temperature that exacerbates smog and causes PM from wildfires.

a. California's Criteria Air Pollutant and Toxics Regulatory Programs

The federal, State, and local governments all share responsibility for reducing air pollution. ARB is California's lead air agency and controls emissions from mobile sources, fuels, and consumer products, as well as air toxics. ARB also coordinates local and regional emission reduction measures and plans that meet federal and State air quality limits. At the federal level, the U.S. EPA has oversight of State programs. In addition, U.S. EPA alone establishes emission standards for certain mobile sources such as ships, trains, and airplanes.

Two criteria air pollutants and their precursors, (CAPs) are of most health concern in California (i.e., ozone and particulate matter with an aerodynamic diameter of 2.5 micrometers or less [$PM_{2.5}$]). The health risk from diesel particulate matter is the largest air toxics risk, both regionally and at locations such as ports and rail yards. ARB actions are lowering these health risks, and substantial new emission reductions in both CAPs and diesel particulate matter will occur between now and 2020.

Ozone, a major component of "smog", is not directly emitted as a pollutant, but is formed in the atmosphere when reactive organic gases (ROG) and oxides of nitrogen (NO_X) emissions react in the presence of sunlight. Ozone concentrations often peak downwind of the emission sources, which contributes to the regional nature of ozone air pollution.

$PM_{2.5}$ is a mixture of pollutants generated by a variety of sources. $PM_{2.5}$ can either be emitted directly into the air in forms such as soot and smoke, or it can be formed in the atmosphere from the reactions of pollutants including NO_X, oxides of sulfur (SO_X), ROG, and ammonia. While the impacts of directly emitted $PM_{2.5}$ may be seen near sources of air pollution, $PM_{2.5}$ that is formed in the atmosphere has a regional impact similar to ozone.

California's mature air quality program leads the nation in terms of stringency of required emission controls, not only for mobile sources but also for stationary sources.

Reducing emissions from combustion sources is at the core of California's program to meet air quality standards for ozone and $PM_{2.5}$. California's climate and CAP programs are complementary, and the AB 32 regulations ARB is adopting will provide co-benefits that will be incorporated into future air quality plans for ozone and $PM_{2.5}$.

b. Ambient Air Quality Standards and the State Implementation Plan

CAPs are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available. The federal Clean Air Act (CAA) required the U.S. EPA to establish national ambient air quality standards (NAAQS). The California Clean Air Act (CCAA), which was adopted in 1988, required the ARB to establish California ambient air quality standards (CAAQS). In addition to CAPs, ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particulate matter. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard setting process and the interpretation of the studies. The NAAQS and CAAQS are presented in Table 3.C-1.

Table 3.C-1. Ambient Air Quality Standards and Designations

Pollutant	Averaging Time	California	National Standards [1]	
		Standards [2,3]	Primary [3,4]	Secondary [3,6]
Ozone	1-hour	0.09 ppm (180 µg/m³)	–[6]	Same as Primary Standard
	8-hour	0.070 ppm (137 µg/m³)	0.075 ppm (147 µg/m³)	
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)	–
	8-hour	9 ppm (10 mg/m³)	9 ppm (10 mg/m³)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (56 µg/m³)	0.053 ppm (100 µg/m³)	Same as Primary Standard
	1-hour	0.18 ppm (338 µg/m³)	0.100 ppm (188 µg/m³)	
Sulfur Dioxide (SO_2)	24-hour	0.04 ppm (105 µg/m³)		–
	3-hour	–	–	0.5 ppm (1300 µg/m³)
	1-hour	0.25 ppm (655 µg/m³)	0.075 ppm (196 µg/m³)	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m³	–[6]	Same as Primary Standard
	24-hour	50 µg/m³	150 µg/m³	

Table 3.C-1. Ambient Air Quality Standards and Designations

Pollutant	Averaging Time	California Standards [2,3]		National Standards [1] Primary [3,4]	National Standards [1] Secondary [3,6]
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3		15 µg/m^3	Same as Primary Standard
	24-hour	–		35 µg/m^3	
Lead[10]	30-day Average	1.5 µg/m^3		–	–
	Calendar Quarter	–		1.5 µg/m^3	Same as Primary Standard
	Rolling 3-Month Avg.	–		0.15 µg/m^3	
Sulfates	24-hour	25 µg/m^3		**No National Standards**	
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)			
Vinyl Chloride[7]	24-hour	0.01 ppm (26 µg/m^3)			
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer — visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U		

1 National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current federal policies.

2 California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQS are listed in the Table of Standards CCR, Title 17, Section 70200.

3 Concentration expressed first in units in which it was promulgated [i.e., parts per million (ppm) or micrograms per cubic meter (µg/m^3)]. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

5 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

6 The 1-hour ozone NAAQS was revoked on June 15, 2005. The annual PM_{10} NAAQS was revoked in October 2006.

7 ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Source: ARB 2010

Federal clean air laws require areas with unhealthy levels of CAPs (i.e., ozone, carbon monoxide [CO], nitrogen dioxide [NO_2], sulfur dioxide [SO_2], particulate matter with an aerodynamic diameter of 10 micrometers or less [PM_{10}], $PM_{2.5}$, and lead) to develop plans, known as State Implementation Plans (SIPs). SIPs are comprehensive plans that describe how an area will attain national ambient air quality standards (NAAQS). The 1990 amendments to the federal CAA set deadlines for attainment based on the severity of an area's air pollution problem.

The SIP is a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, State regulations and federal controls. Many of California's SIPs rely on the same core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. State law makes ARB the lead agency for all purposes related to the SIP. Local air districts and other agencies, such as the Bureau of Automotive Repair and the Department of Pesticide Regulation, prepare SIP elements and submit them to ARB for review and approval. ARB forwards SIP revisions to the U.S. EPA for approval and publication in the Federal Register. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items which are included in the California SIP. At any one time, several California measures have been submitted to U.S. EPA for their approval into the SIP (ARB 2009b).

c. Air Districts

The CCAA requires that all local air districts in the State endeavor to achieve and maintain the CAAQS by the earliest practical date. The Act specifies that local air districts should focus particular attention on reducing the emissions from transportation operations and area-wide emission sources, and provides districts with the authority to regulate indirect sources.

There are 35 air pollution control districts or air quality management districts (together, referred to as air districts) across California. Air districts attain and maintain air quality conditions in their respective jurisdictions through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy implemented by air districts includes the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. Air districts also inspect stationary sources of air pollution and respond to citizen complaints, monitor ambient air quality and meteorological conditions, and implement programs and regulations required by the CAA, and the CCAA, primarily on stationary sources.

d. Clean Vehicle and Diesel Risk Reduction Programs

i. Criteria Air Pollutant Control Programs

Over the last several decades, California has dramatically tightened emission standards for on-road and off-road mobile sources and the fuels that power them. California's emission control program for on-road motor vehicles is the strongest in the world. New cars are now 99 percent cleaner than their uncontrolled counterparts prior to the mid-1960s. Trucks are now 90 percent cleaner than before the mid-1960s, and will be 98 percent cleaner by 2010.

ARB rules adopted as part of the Diesel Emission Reduction Program and Goods Movement Program are primarily toxics control measures (e.g., California has identified diesel PM as a TAC, but also achieve significant CAP emission reductions.

Working in concert with the U.S. EPA, standards for goods movement sources have also been tightened dramatically. By requiring low-sulfur fuel, SO_X emissions from ship auxiliary engines will be cut 96 percent from before the mid-2000s by 2010. New locomotive engines are now 50 to 60 percent cleaner than before the mid-2000s. Harbor craft emission standards were cut roughly in half from before the mid-2000s. New cargo handling equipment will be 95 percent cleaner by 2011 than before the mid-2000s.

California has also profoundly lowered emission standards for off-road sources, from lawn and garden equipment, to recreational vehicles and boats, to construction equipment and other large off-road sources. From 2010 through 2014, these new off-road sources will be manufactured to operate with 80-98 percent fewer emissions than their uncontrolled counterparts.

ARB has worked closely with U.S. EPA to regulate large diesel, gasoline and liquid petroleum gas equipment, over which authority is split between California and the federal government, and by 2014, new large off-road equipment will be 98 percent cleaner. ARB has also made great strides in reducing emissions from the smaller engines under concurrent State control, like those used in lawn mowers, jet skis, recreational vehicles, and boats. From 2010 to 2015, these new off-road sources will be manufactured with 82-90 percent lower emission levels than their uncontrolled counterparts.

Adopted regulations have made significant strides in reducing emissions from those mobile sources already in use (i.e., the legacy fleet) by keeping existing vehicles cleaner longer, getting cleaner technology on older vehicles and equipment, and replacing older dirtier vehicles and equipment with cleaner ones. Whereas new engine emissions have been regulated for a long time, most of the in-use control programs have just begun to apply and have an impact.

Many programs and rules are currently in place to reduce emissions from the mobile-source legacy fleets. The Smog Check Program ensures that passenger vehicles stay clean as they age and on-board diagnostic systems identify emission control problems. Heavy-duty truck inspection programs help control smoke emissions and detect emission control mal-maintenance and tampering.

ARB has adopted well over 20 regulations in the last eight years. ARB's landmark regulations adopted in 2007 and 2008 will accelerate replacement of higher-emitting heavy-duty trucks, buses and construction equipment. Recently adopted regulations have required use of cleaner fuels, greatly reducing emissions from ships and harbor craft. ARB has adopted public and private fleet rules that require local governments and private companies to incorporate the cleanest vehicles and equipment into their fleets. Testing procedures and verification requirements for current emission control technology have been strengthened. In addition, other operational and emission control technology requirements that help reduce emissions from existing vehicle and equipment have been put into place.

Incentive programs have worked hand-in-hand with regulations, providing added emissions benefits. California is currently investing up to $140 million per year to clean up older, higher-emitting sources through the Carl Moyer Program. The Smog Check Breathe Easier Campaign pays motorists $1,000 to permanently retire their high polluting vehicles. Also, California Proposition 1B, also known as the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006, was on the November 7, 2006 ballot in California as a legislatively-referred bond act, where it was approved. Proposition 1B authorized the State of California to sell $19.925 billion of general obligation bonds to fund transportation projects "to relieve congestion, improve the movement of goods, improve air quality, and enhance the safety and security of the transportation system." Local governments use special vehicle registration fees to fund projects that further reduce emissions from motor vehicles.

In 2007 the Board adopted a new statewide strategy for reducing emissions that contribute to high ozone and $PM_{2.5}$ levels. The 2007 State Strategy, together with local control strategies, is designed to allow California to meet the U.S. EPA's national ambient air quality standards for ozone and $PM_{2.5}$. As of April, 2010, ARB had adopted twelve regulations to reduce CAP emissions and fulfill commitments made in the 2007 State Strategy. Some of the rulemakings were technical corrections to existing rules or deadline modifications, and did not further reduce emissions.

The adopted rules are shown in Table 3.C-2.

Table 3.C-2. Rules Adopted Pursuant to the 2007 State Strategy

ARB Rules	Adoption Date
Enhanced Vapor Recovery for Above Ground Storage Tanks	June 2007
Modifications to Reformulated Gasoline Program – Phase 3	June 2007
Cleaner In-use Off-Road Equipment	July 2007
Light-Duty Vehicle Catalyst Replacement	October 2007
Clean Up Existing Harbor Craft	November 2007
Port Truck Modernization	December 2007/ December 2008
Ship Auxiliary Engines (Cold Ironing)	December 2007
Consumer Products	June 2008/ November 2008
Clean Fuel Requirements for Ship Main Engines	July 2008
Spark-Ignition Marine Engine and Boat Regulations	July 2008
Portable Outdoor Marine Tanks Evaporative Emission Standards (partial)	September 2008
Large Spark-Ignited Engines, Rule Amendment	November 2008
Small Off-Road Engine Regulation	November 2008
Cleaner In-Use Heavy-Duty Trucks	December 2008
Gasoline Dispensing Facility Hoses	May 2009
Enhanced Fleet Modernization Program (Car Scrap)	June 2009
Consumer Products	September 2009
Portable Equipment	January 2010
Commercial Harbor Craft	June 2010
Stationary Compression Ignition Engines	October 2010
Consumer Products	November 2010
Transport Refrigeration Units	November 2010
In-Use Off-Road Diesel-Fueled Fleets	December 2010
Truck and Bus Regulation	December 2010
Ocean-Going Vessels	June 2011
Transport Refrigeration Units	October 2011
California Reformulated Gasoline	October 2011

The SIP and Statewide Strategy are focused on areas with pollution levels that exceed national air quality standards for ozone and $PM_{2.5}$. However, most of the control measures adopted pursuant to the Statewide Strategy will reduce emissions, and improve air quality, throughout the State. These controls also fulfill commitments made in ARB's Diesel Risk Reduction Plan (ARB 2000) and Goods Movement Emission

Reduction Plan (Business, Transportation and Housing Agency and California Environmental Protection Agency 2007), and help all areas make progress towards attaining California's more protective State ambient air quality standards.

ii. Diesel Risk Reduction Plan

In September 2000, ARB adopted an aggressive plan to require cleaner diesel fuel and cleaner diesel engines and vehicles. The Diesel Risk Reduction Plan targets reductions of diesel emissions from year-2000 levels by 75 percent by 2010 and 85 percent by 2020. Since the adoption of the Diesel Risk Reduction Plan, some of the strategies in place today that are reducing diesel PM include:

- Cleaner diesel fuel. The sulfur level in California diesel fuel was lowered to less than 15 parts per million in July 2006. ARB's fuel regulation applies to fuels for on-road, off-road, and stationary engines, while the federal low sulfur diesel rule applies only to on-road vehicles.

- Cleaner new diesel engines. In 2001, ARB adopted new PM and NO_X emission standards to clean up new on-road diesel engines that power big-rig trucks, trash trucks, delivery vans, and other large vehicles. The new PM standard is a 90 percent reduction from the previous PM standard.

- Cleaner in-use diesel engines. ARB has adopted regulations aimed at reducing PM and other pollutants from in-use diesel engines through engine replacement, retrofit with verified diesel emission control system to the existing engine, vehicle replacement with an alternative-fueled vehicle or a vehicle with a new and cleaner diesel engine, and operational modifications including reduced operating time or reduced idling.

iii. Goods Movement Action Plan

Air pollution from international trade and all goods movement in California is a major public health concern at both regional and community levels. Goods movement is now the dominant contributor to transportation emissions in the State. In April 2006, ARB approved the Emission Reduction Plan for Ports and Goods Movement in California to reduce the emissions and health risk in communities near ports, rail yards, and high-traffic corridors. The plan will reduce emissions of diesel PM, the NO_X and SO_X that contribute to fine particles, and, to a lesser extent, the ROG that mixes with NO_X in the atmosphere to form regional ozone. The plan envisions emission reductions at each step in the goods movement path, from ship to shore to truck or locomotive to the final destination.

e. Stationary Source Regulatory Program

Basic elements of the federal CAA include stationary source emissions standards and permits. The ARB does not have authority to issue permits directly to stationary sources of air pollution. Primary responsibility for permitting all sources, except vehicular sources, rests with the local and regional air districts.

f. Air Toxics Programs

Air quality regulations also focus on TACs, or in federal parlance hazardous air pollutants (HAPs). In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the CAPs for which acceptable levels of exposure can be determined and for which the NAAQS and CAAQS have been established (Table 3.C-1). Instead, the U.S. EPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology for toxics (MACT and BACT) to limit emissions. These, in conjunction with additional rules set forth by air districts, establish the regulatory framework for TACs.

i. Federal Hazardous Air Pollutant Programs

The U.S. EPA has programs for identifying and regulating HAPs. Title III of the CAA directed the U.S. EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP may differ for major sources than for area sources of HAPs. Major sources are defined as stationary sources with potential to emit more than 10 tons per year (TPY) of any HAP or more than 25 TPY of any combination of HAPs; all other sources are considered area sources.

The CAA also required the U.S. EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum applying to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1-3-butadiene. In addition, Section 219 required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

ii. State and Local Toxic Air Contaminant Programs

TACs in California are primarily regulated through the Tanner Air Toxics Act (AB 1807, Statutes of 1983) and the Air Toxics Hot Spots Information and Assessment Act (AB 2588, Statutes of 1987). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before ARB can designate a substance as a TAC. To date, ARB has identified over 21 TACs, and adopted the U.S. EPA's list of HAPs as TACs. Most recently, diesel PM was added to the ARB list of TACs.

Existing sources of TACs also include mobile sources (i.e., diesel-fueled internal combustion engines) on nearby roadways. According to the ARB, on-road diesel-fueled vehicles contribute approximately 24 percent of the statewide total of TAC emissions, with an additional 71 percent attributed to other mobile sources such as construction, mining, and agricultural equipment, and transport refrigeration units.

g. Air Quality Conditions

As a result of the emission reduction regulations and programs described above, California has made significant progress in reducing public exposure to unhealthy levels of air pollution, and ambient concentrations are now significantly lower than they were 20 years ago. However, at the same time, the targets for defining clean air have become more stringent. As a result, despite continuing improvements in air quality, more areas violate the new standards. Changes to the national ozone standards provide an illustration of this situation.

To keep pace with the current science, U.S. EPA periodically reviews the NAAQS and revises them as needed to reflect the most recent health information. U.S. EPA initially established the federal ozone standard as a 1-hour standard to protect against short-term exposure impacts. In the late 1990s, the 1-hour standard was replaced with an 8-hour standard to protect against long-term exposure impacts. More recent health studies indicate the need for an even more health protective standard, and U.S. EPA is currently considering an even lower level for the 8-hour standard.

Table 3.C-3 shows how various areas of California compare under the original 1-hour and current 8-hour national ozone standards in 1990 and 2009.

Table 3.C-3. Compliance with Federal Ozone Air Quality Standards in California's Major Urban Areas

AREA	1-Hour Ozone Standard (0.12 ppm)		8-Hour Ozone Standard (0.08 ppm)	
	Area Met Standard in 1990	Area Met Standard in 2009	Area Met Standard in 1990	Area Met Standard in 2009
Monterey Bay Area	✓	✓	✓	✓
Sacramento Metro Area		✓		
San Diego		✓		
San Francisco Bay Area		✓		✓
San Joaquin Valley				
San Luis Obispo County*		✓		✓
Santa Barbara County		✓		✓
South Coast				
Ventura County		✓		

Notes: * Available data show no violation of standard at San Luis Obispo sites, but the current high concentration site was not yet operating. Therefore, is very likely the area violated both standards in 1990. Sacramento has attained the 1-hour standard, based on 2009 data, but U.S. EPA has not yet formally made the announcement.

i. Ozone Trends

California's highest ozone concentrations are now close to half of what they were in 1990. In the South Coast Air Basin, the most populous California air basin, concentrations have decreased approximately 35 percent since 1990, and today nearly half (45 percent) the population (more than 6 million people) live in areas where ozone air quality meets the federal standard. Other portions of the South Coast Air Basin also show substantial improvement. The areas, and population, experiencing the highest ozone levels have decreased in size dramatically, and residents of the air basin experience those elevated levels on fewer days. Since 1990, the annual number of days that exceed the federal ozone standard have been cut nearly in half. Generally, the greatest improvements have occurred in areas that had the largest number of unhealthy days in 1990.

Air quality in California's inland areas continues to remain a significant challenge, and progress in the San Joaquin Valley has been slower than in other parts of California. However, although concentrations in the San Joaquin Valley have seen only a modest decrease, the frequency of exposure to unhealthy air has decreased significantly since 1990, with the average number of days exceeding the federal 8-hour ozone standard declining by 22 percent. In the San Francisco Bay Area ozone concentrations were only slightly higher than the federal standard in 1990 and have decreased approximately 11 percent since then. Ozone concentrations in the region are now below the federal 1-hour standard.

ii. $PM_{2.5}$ Trends

While $PM_{2.5}$ concentrations have only been measured for approximately ten years, significant progress has already occurred in this short time period. Annual average $PM_{2.5}$ concentrations have declined by at least 20 percent since 2002 throughout much of California. Similar progress has been seen in reducing daily (24-hour) concentrations. As with ozone, some of the most significant progress has occurred in the coastal areas.

In the South Coast Air Basin, both annual average and daily $PM_{2.5}$ concentrations have decreased by 30 to 50 percent since 2001. In addition, the number of days above the federal 24-hour $PM_{2.5}$ standard has decreased over 80 percent, dropping from 120 days in 2001 to less than 20 days today.

The San Francisco Bay Area Air Basin met the federal annual average $PM_{2.5}$ standard in 2001, and $PM_{2.5}$ concentrations have decreased nearly 30 percent since then. Daily concentrations are only slightly above the federal standard and occur in only a small region in the East Bay.

We continue to face significant challenges to improving $PM_{2.5}$ levels in the San Joaquin Valley. Nevertheless, annual average concentrations have decreased approximately 10 percent since 2001 and the most recent year's data shows that values continue to decrease. While the Bakersfield region in the southern end of the San Joaquin Valley experiences the highest levels of $PM_{2.5}$, other monitors throughout the San Joaquin Valley are only reaching values at or near the federal standard.

iii. Toxic Air Contaminant Trends

ARB maintains a statewide air quality monitoring network for TACs that currently includes 17 monitoring stations measuring ambient concentrations of over 60 substances. Nine individual air toxics, including diesel PM, account for the majority of the potential health risk in California. Exposure to diesel PM is the largest health concern, accounting for approximately 80 percent of the statewide risk. Unlike other air toxics, there is currently no method for directly monitoring diesel PM concentrations in the ambient air. However, diesel PM concentrations can be estimated from levels of other co-pollutants such as NO_X and elemental carbon. Over the last 20 years, concentrations of these indicators have decreased substantially.

As a result of controls on motor vehicles, fuels, stationary sources, and consumer products, the public's exposure to other air toxics has also decreased dramatically. Between the early 1990's and today, the decrease in statewide average health risk ranged from approximately 20 percent for formaldehyde, to approximately 90 percent for perchloroethylene. Air toxics associated with motor vehicles and their fuels such as 1,3-butadiene and benzene have also seen significant decreases of 80 to 85 percent as a result of ARB's mobile source control program. In aggregate, the estimated cancer risk from air toxics has been reduced by approximately 60 percent since the early 1990s.

It is important to note, however, that the routine air toxics monitoring network is designed to reflect regional exposures. Although ongoing control programs have been effective in reducing regional levels, there may still be situations of localized toxics exposure due to proximity to individual sources. Specialized monitoring studies are often needed to better characterize these localized impacts, which often have very steep gradients that drop off quickly farther from the source. Thus, conducting monitoring to capture these gradients is generally resource intensive.

2. Regulatory Setting

Table 3.C-4 below provides a general description of applicable laws and regulations that may pertain to air quality and the Proposed ACC Program. See Table 3.D-1 for discussion of GHG-related laws and regulations. Though these are not directly related to CAPs, those identified in Table 3.D-X regulate GHGs that contribute to global warming, which in turn impacts compliance with the CAAQS and NAAQS (e.g., climate penalty, where rising temperatures increase ground level ozone and airborne health-damaging particles, despite the reductions achieved by programs targeting smog-forming emissions from cars, trucks and industrial sources).

Table 3.C-4. Applicable Laws and Regulations for Air Quality	
Regulation	**Description**
Federal	
Clean Air Act (40 CFR)	The Clean Air Act, which was last amended in 1990, requires U.S. EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of NAAQS. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. U.S. EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six principal pollutants, which are called "criteria" pollutants. Title III of the CAA directed the EPA to promulgate national emissions standards for HAPs (NESHAP). The CAA also required the EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1-3-butadiene. In addition, Section 219 required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.
Other Applicable Federal-Level Regulations	This includes all other applicable regulations at the federal level for portions of the project area that are outside of the U.S. (e.g., Canada).
State	
CCR (Titles 13 and 17)	ARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required the ARB to establish California ambient air quality standards (CAAQS).
Other Applicable State-Level Regulations	This includes all other applicable regulations at the State level for portions of the project area that are outside of California (e.g., AB 1807 and AB 2588).

D. Greenhouse Gases

1. Existing Conditions

a. Existing Climate

Climate is the accumulation of daily and seasonal weather events over a long period of time, whereas weather is defined as the condition of the atmosphere at any particular time and place (Ahrens 2003). Like its topography, California's climate is varied and tends toward extremes. Generally there are two seasons in California: 1) a long, dry summer, with low humidity and cool evenings and 2) a mild, rainy winter, except in the high mountains, where four seasons prevail and snow lasts from November to April. The one climatic constant for the State is summer drought.

California has four main climatic regions. Mild summers and winters prevail in central coastal areas, where temperatures are more equable than virtually anywhere else in the U.S. For example, differences between average summer and winter temperatures between San Francisco and Monterey for example are seldom more than 10°F (6°C). During the summer there are heavy fogs in San Francisco and all along the coast. Mountainous regions are characterized by milder summers and colder winters, with markedly low temperatures at high elevations. The Central Valley has hot summers and cool winters, while the Imperial Valley and eastern deserts are marked by very hot, dry summers, with temperatures frequently exceeding 100°F (38°C).

Average annual temperatures for the State range from 47°F (8°C) in the Sierra Nevada to 73°F (23°C) in the Imperial Valley. The highest temperature ever recorded in the U.S. was 134° (57°C), registered in Death Valley on 10 July 1913. Death Valley has the hottest average summer temperature in the Western Hemisphere, at 98°F (37°C). The State's lowest temperature was -45°F (-43°C), recorded on 20 January 1937 at Boca, near the Nevada border.

Among the major population centers, Los Angeles has an average annual temperature of 63°F (17°C), with an average January minimum of 48°F (9°C) and an average July maximum of 75°F (24°C). San Francisco has an annual average of 57°F (14°C), with a January average minimum of 42°F (6°C) and a July average maximum of 72°F (22°C). The annual average in San Diego is 64°F (18°C), the January average minimum 49°F (9°C), and the July average maximum 76°F (24°C). Sacramento's annual average temperature is 61°F (16°C), with January minimums averaging 38°F (3°C) and July maximums of 93°F (34°C).

Annual precipitation varies from only 2 in (5 cm) in the Imperial Valley to 68 in (173 cm) at Blue Canyon, near Lake Tahoe. San Francisco had an average annual precipitation (1971–2000) of 20 in (51 cm), Sacramento 17.9 in (45.5 cm), Los Angeles 13.2 in (33.5 cm), and San Diego 10.8 in (27.4 cm). The largest one-month snowfall ever recorded in the US, 390 in (991 cm), fell in Alpine County in January 1911. Snow averages between 300 and 400 in (760 to 1,020 cm) annually in the high elevations of the Sierra Nevada, but is rare in the Central Valley and coastal lowlands.

Sacramento has the greatest percentage (73 percent) of possible annual sunshine among the State's largest cities; Los Angeles has 72 percent and San Francisco 71 percent. San Francisco is the windiest, with an average annual wind speed of 11 mph (18 km/hr). Tropical rainstorms occur often in California during the winter.

b. Attributing Climate Change—The Physical Scientific Basis

Climate change is a long-term shift in the climate of a specific location, region or planet. The shift is measured by changes in features associated with average weather, such as temperature, wind patterns, and precipitation. According to the Intergovernmental Panel on Climate Change (IPCC), a scientific body established by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP), available scientific evidence supports the conclusion that most of the increased average global temperatures since the mid-20th century is very likely due to human-induced increases in GHG concentrations. GHGs, which are emitted from both natural and anthropogenic sources, include water vapor, carbon dioxide, methane, nitrous oxide, halocarbons, and ozone. These gases play a role in the "greenhouse effect" that helps regulate the temperature of the earth.

The current post-industrial warming trend differs alarmingly from past changes in the Earth's climate because GHG emissions are higher and warming is occurring faster than at any other time on record within the past 650,000 years. Historical long-term as well as decadal and inter-annual fluctuations in the Earth's climate resulted from natural processes such as plate tectonics, the Earth's rotational orbit in space, solar radiation variability, and volcanism. The current trend derives from an added factor: human activities, which have greatly intensified the natural greenhouse effect, causing global warming. GHG emissions from human activities that contribute to climate change include the burning of fossil fuels (such as coal, oil and natural gas), cutting down trees (deforestation) and developing land (land-use changes). The burning of fossil fuels emits GHGs into the atmosphere, while deforestation and land-use changes remove trees and other kinds of vegetation that store ("sequester") carbon dioxide. Emissions of GHGs due to human activities have increased globally since pre-industrial times, with an increase of 70 percent between 1970 and 2004 (IPCC 2007b).

A growing recognition of the wide-ranging impacts of climate change has fueled efforts over the past several years to reduce GHG emissions. In 1997, Kyoto Protocol set legally binding emissions targets for industrialized countries, and created innovative mechanisms to assist these countries in meeting these targets. The Kyoto Protocol took effect in 2004, after 55 parties to the Convention had ratified it (Department of Environment 2010). Six major GHGs have been the focus of efforts to reduce emissions: CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). They are regulated under the Kyoto Protocol.

The "global warming potential" (GWP) metric is used to convert all GHGs into "CO_2-equivalent" units. Importantly, metrics such as GWP have been used as an exchange rate in multi-gas emissions policies and frameworks. Each gas's GWP is defined relative to CO_2. For example, N_2O's GWP is 310, meaning a unit mass of N_2O warms the atmosphere 310 times more than a unit mass of CO_2. SF_6 and PFCs have extremely long atmospheric lifetimes, resulting in their essentially irreversible accumulation in the atmosphere once emitted. However, in terms of quantity of emissions, CO_2 dominates world and U.S. GHG emissions.

Because the major GHGs have longer lives, they build up in the atmosphere so that past, present and future emissions ultimately contribute to total atmospheric concentrations. Thus, while reducing emissions of conventional air pollutants decreases their concentrations in the atmosphere in a relatively short time, atmospheric concentrations of the major GHGs can only be gradually reduced over years and decades. More specifically, the rate of emission of CO_2 currently greatly exceeds its rate of removal, and the slow and incomplete removal implies that small to moderate reductions in its emissions would not result in stabilization of CO_2 concentrations, but rather would only reduce the rate of its growth in coming decades. Many of the same activities that emit conventional air pollutants also emit GHGs (e.g., the burning of fossil fuels to produce electricity, heat or drive engines and the burning of biomass). Some conventional air pollutants also have greenhouse effects, for example, soot/black carbon and tropospheric ozone.

In recent years there has been increased attention in the particle research community about the potential of black carbon (BC) to cause global warming. The major anthropogenic sources of BC are fossil fuels and biofuels (biomass burning for domestic energy). The ability of BC to absorb light energy and its role in key atmospheric processes link it to a range of climate impacts, including increased temperatures, accelerated ice and snow melt, and disruptions to precipitation patterns. It has been proposed that light absorbing particles in the atmosphere act as a GHG whose net forcing is warming only second to CO_2 (Ramanathan and Carmichael 2008). This estimate of the forcing due to BC is larger than most prior estimates including those of the IPCC 4th assessment report (IPCC 2007c).

Global warming is no longer a matter of the future or of places far away. Rather, climate change is already evident in California, and it is happening now. Climate change is a critical issue facing California's citizens, ecosystems, and economic vitality. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the State's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. These climate driven changes affect resources critical to the health and prosperity of California. For example, forest wild-land fires are becoming more frequent and intense due to dry seasons that start earlier and end later. Agriculture is especially vulnerable to altered temperature and rainfall patterns, and new pest problems. The State's water supply, already stressed under current demands and expected population growth, will shrink under even the most conservative projected climate change scenario Almost half a million Californians, many without the means to adjust to expected impacts, will be at risk from sea level rise along Bay and coastal areas. California's infrastructure is already stressed and will face additional burdens from climate risks. And as the Central Valley becomes more urbanized, more people will be at risk from intense heat waves (CEC 2009).

Borrowing from recent findings by the IPCC, the projected climate change-related exposures are likely to affect the health status of people, particularly those with low adaptive capacity, increased deaths, disease and injury due to heat waves, floods, storms, fires and droughts (IPCC 2007a). In California, low socioeconomic status and minority communities are potentially more vulnerable to health impacts associated with increasing temperatures due to less access to cooling centers, air conditioning, and limited access to health care. In some instances, limited ability to speak and/or understand English will make it difficult for certain environmental groups to learn about the most up-to-date information on extreme heat events, their impacts, and adaptive strategies. The economic impacts of a warming world will also be felt by all, but especially by low income communities, as the price of energy and food (and possibly health care) increase due to a changing climate.

In summary, extreme events from heat waves to floods to droughts to wildfires and bad air quality episodes are likely to become more frequent in the future and pose serious challenges to Californians. The diversity and size of California's agricultural sector creates unique challenges in its responses to climate changes, as they will affect crop productivity that could lead to large losses. California's water and hydropower energy resources are also vulnerable to climate change. Without changes in operating rules for the water system in California the reliability of water supply will be severely affected. By end of this century electricity demand would increase by 20 to 50 percent even in the low or medium IPCC GHG emission scenarios. These changes represent substantial impacts to California's residents and an added considerable stress to the electricity generating sector. California is one of the few hot spots for biodiversity in the world and new studies, which complementing early studies, suggest that climate change can severely reduce biodiversity in California or at least eliminate important endemic species. Economic evaluations of potential impacts due to climate change show that climate change could impose substantial costs to Californians in the order of tens of billions of dollars per year.

California is exemplary in the nation for its commitment to State-funded climate change research, its efforts to understand the climate risks it faces, and its wide range of efforts to confront the challenge. Abundant scientific evidence now shows that climate change is not just a future problem, but is already observable now, with measurable impacts for the State's citizens, natural resources, and economic sectors. California's position as a national leader of State-sponsored climate change research provides us a unique perspective on how best to manage for the effects of climate change. California must pursue a dual approach to managing its climate risks (e.g., reducing GHGs, mitigation, minimizing the impacts of climate change, and adaptation) with the overall goal of ensuring public safety and welfare, continued economic vitality of the State's climate-sensitive sectors.

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants (TACs), which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on multiple variables and cannot be pinpointed, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO_2 emissions, approximately 54 percent is sequestered through ocean uptake, uptake by northern hemisphere forest regrowth, and other terrestrial sinks within a year, whereas the remaining 46 percent of human-caused CO_2 emissions remains stored in the atmosphere (Seinfeld and Pandis 1998).

Similarly, impacts of GHGs are borne globally, as opposed to localized air quality effects of criteria air pollutants and TACs. The quantity of GHGs that it takes to ultimately result in climate change is not precisely known; suffice it to say, the quantity is enormous, and no single project alone would measurably contribute to a noticeable incremental change in the global average temperature, or to global, local, or micro climate. From the standpoint of CEQA, GHG impacts to global climate change are inherently cumulative.

c. Attributing Climate Change—Greenhouse Gas Emission Sources

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial and agricultural sectors. In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation. Emissions of CO_2 are byproducts of fossil fuel combustion. CH_4, a highly potent GHG, resulting primarily from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions), is largely associated with agricultural practices and landfills. N_2O is also largely attributable to agricultural practices and soil management. CO_2 sinks, or reservoirs, include vegetation and the ocean, which both absorb CO_2 through sequestration and dissolution, respectively, two of the most common processes of CO_2 sequestration.

California is the 12th to 16th largest emitter of CO_2 in the world (CEC 2006a). California produced 484 million gross metric tons of CO_2 equivalent (CO_2e) in 2004 (ARB 2009c). CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect (i.e., global warming potential [GWP]). The GWP is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, "Calculation References," of the General Reporting Protocol of the California Climate Action Registry (CCAR 2009), 1 ton of CH_4 has the same contribution to the greenhouse effect as approximately 21 tons of CO_2. Therefore, CH_4 is a much more potent GHG than CO_2. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

The California GHG inventory compiles statewide anthropogenic GHG emissions and sinks. It includes estimates for CO_2, CH_4, N_2O, SF_6, nitrogen trifluoride (NF_3), HFCs, and PFCs. The current inventory covers years 2000 to 2008 (ARB 2009c).Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions, accounting for 36 percent of total GHG emissions in the State. This sector was followed by the electric power sector (including both in-state and out-of-state sources) (24 percent) and the industrial sector (21 percent).

d. Adaptation to Climate Change

According to the IPCC, which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, global average temperature is expected to increase by 3–7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2007d). Resource areas other than air quality and global average temperature could be indirectly affected by the accumulation of GHG emissions. For example, an increase in the global average temperature is expected to result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the State (including the project site). According to the California Energy Commission (CEC 2006b), the snowpack portion of the water supply could potentially decline by 30–90 percent by the end of the 21st century. A study cited in a report by the California Department of Water Resources (DWR) projects that approximately 50 percent of the statewide snowpack will be lost by the end of the century (Knowles and Cayan 2002). Although current forecasts are uncertain, it is evident that this phenomenon could lead to significant challenges in securing an adequate water supply for a growing population. An increase in precipitation falling as rain rather than snow also could lead to increased potential for floods because water that would normally be held in the Sierra Nevada until spring could flow into the Central Valley concurrently with winter storm events. This scenario would place more pressure on California's levee/flood control system (DWR 2006).

Another outcome of global climate change is sea level rise. Sea level rose approximately 7 inches during the last century and it is predicted to rise an additional 7–22 inches by 2100, depending on the future levels of GHG emissions (IPCC 2007d). If this occurs, resultant effects could include increased coastal flooding, saltwater intrusion (especially a concern in the low-lying Sacramento–San Joaquin River Delta, where pumps delivering potable water could be threatened), and disruption of wetlands (CEC 2006b). As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the State, if suitable conditions are no longer available.

2. Regulatory Setting

Table 3.D-1. Applicable Laws and Regulations for Greenhouse Gases	
Federal	
Mandatory Greenhouse Gas Reporting Rule	On September 22, 2009, U.S. EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the United States. In general, this national reporting requirement will provide U.S. EPA with accurate and timely GHG emissions data from facilities that emit 25,000 metric tons or more of CO_2 per year. This publically available data will allow the reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. Reporting is at the facility level, except that certain suppliers of fossil fuels and industrial greenhouse gases along with vehicle and engine manufacturers will report at the corporate level. An estimated 85 percent of the total U.S. GHG emissions, from approximately 10,000 facilities, are covered by this final rule.
National Program to Cut Greenhouse Gas Emissions and Improve Fuel Economy for Cars and Trucks	On September 15, 2009, U.S. EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) proposed a new national program that would reduce GHG emissions and improve fuel efficiency for all new cars and trucks sold in the United States. U.S. EPA proposed the first-ever national GHG emissions standards under the CAA, and NHTSA proposed Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act. This proposed national program would allow automobile manufacturers to build a single light-duty national fleet that satisfies all requirements under both Federal programs and the standards of California and other states. The President requested that U.S. EPA and NHTSA, on behalf of the Department of Transportation, develop, through notice and comment rulemaking, a coordinated National Program under the Clean Air Act (CAA) and the Energy Policy and Conservation Act (EPCA), as amended by the Energy Independence and Security Act (EISA), to reduce fuel consumption by and GHG emissions of light-duty vehicles for model years 2017-2025. U.S. EPA and NHTSA are developing the proposal based on extensive technical analyses, an examination of the factors required under the respective statutes and on discussions with individual motor vehicle manufacturers and other stakeholders. The National Program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles (light-duty vehicles) built in those model years (76 FR 48758). The first part of this program (i.e., 2012-2016) is implemented. The next part (i.e., 2017-2025) is currently in process for which ARB is proposed to accept compliance thereof as also being acceptable for California compliance, similar to what was done for the first part .

Table 3.D-1. Applicable Laws and Regulations for Greenhouse Gases	
Endangerment and Cause or Contribute Findings	On December 7, 2009, U.S. EPA adopted its Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CAA (Endangerment Finding). The Endangerment Finding is based on Section 202(a) of the CAA, which states that the Administrator (of U.S. EPA) should regulate and develop standards for "emission[s] of air pollution from any class of classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The rule addresses Section 202(a) in two distinct findings. The first addresses whether or not the concentrations of the six key GHGs (i.e., carbon dioxide [CO_2], methane [CH_4], nitrous oxide [N_2O], hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF_6]) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and therefore the threat of climate change. The Administrator found that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the CAA. The evidence supporting this finding consists of human activity resulting in "high atmospheric levels" of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wild fires, droughts, sea level rise, higher intensity storms) are a threat to the public health and welfare. Therefore, GHGs were found to endanger the public health and welfare of current and future generations. The Administrator also found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. U.S. EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHGs fit within the CAA definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements but rather allow U.S. EPA to finalize the GHG standards proposed earlier in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation.
State	
Executive Order S-3-05	Executive Order S-3-05, which was signed by former Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target

Table 3.D-1. Applicable Laws and Regulations for Greenhouse Gases	
	levels. The Secretary will also submit biannual reports to the governor and State legislature describing: progress made toward reaching the emission targets; impacts of global warming on California's resources; and mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the CalEPA created the California Climate Action Team (CCAT) made up of members from various State agencies and commission. CCAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through State incentive and regulatory programs.
Assembly Bill 32, the California Global Warming Solutions Act, Statutes of 2006	In September 2006, former Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from substantial stationary and mobile source categories. AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the State achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.
Assembly Bill 1493, Statutes of 2002	In September 2004, ARB approved regulations to reduce GHG emissions from new motor vehicles. The Board took this action pursuant to Chapter 200, Statutes of 2002 (AB 1493, Pavley regulations) which directed the Board to adopt regulations that achieve the maximum feasible and cost effective reduction in greenhouse gas emissions from motor vehicles. The regulations, which took effect in 2006 following an opportunity for legislative review, apply to new passenger vehicles and light duty trucks beginning with the 2009 model year.
Executive Order S-1-07	Executive Order S-1-07, which was signed by former Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, at over 40 percent of statewide emissions. It establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10 percent by 2020. This order also directed ARB to determine if this Low Carbon Fuel Standard could be adopted as a discrete early action measure after meeting the mandates in AB 32. ARB adopted the LCFS on April 23, 2009.

Table 3.D-1. Applicable Laws and Regulations for Greenhouse Gases	
Senate Bill 1368, Statutes of 2006	SB 1368 is the companion bill of AB 32 and was signed by former Governor Schwarzenegger in September 2006. SB 1368 requires the California Public Utilities Commission (PUC) to establish a GHG emission performance standard for baseload generation from investor owned utilities by February 1, 2007. The CEC must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the greenhouse gas emission rate from a baseload combined-cycle natural gas fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the PUC and CEC.
Senate Bill 1078, Statutes of 2002, Senate Bill 107, Statutes of 2006,and Executive Order S-14-08	SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In November 2008, former Governor Schwarzenegger signed Executive Order S-14-08, which expands the State's Renewable Energy Standard to 33 percent renewable power by 2020.
Senate Bill 97, Statutes of 2007	As directed by SB 97, the Natural Resources Agency adopted Amendments to the CEQA Guidelines for greenhouse gas emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.
Senate Bill 375, Statutes of 2008	SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). ARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every 8 years, but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012. This bill also extends the minimum time period for the Regional Housing Needs Allocation (RNHA) cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or County land use policies (including General Plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of CEQA would incentivize qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

<table>
<tr><th colspan="2">Table 3.D-1. Applicable Laws and Regulations for Greenhouse Gases</th></tr>
<tr><td>Executive Order S-13-08</td><td>Sea level rise is a foreseeable indirect environmental impact associated with climate change, largely attributable to thermal expansion of the oceans and melting polar ice. As discussed above in the environmental setting (subheading “Adaptation to Climate Change”), sea level rise presents impacts to California associated with coastal erosion, water supply, water quality, saline-sensitive species and habitat, land use compatibility, and flooding. Former Governor Arnold Schwarzenegger signed Executive Order S-13-08 on November 14, 2008. This executive order directed the California Natural Resources Agency (CNRA) to develop the 2009 California Climate Adaptation Strategy (CNRA 2009), which summarizes the best known science on climate change impacts in seven distinct sectors—public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture, forestry, and transportation and energy infrastructure—and provides recommendations on how to manage against those threats. This executive order also directed OPR, in cooperation with the CNRA, to provide land use planning guidance related to sea level rise and other climate change impacts by May 30, 2009, which is also provided in the 2009 California Climate Adaptation Strategy (CNRA 2009) and OPR continues to further refine land use planning guidance related to climate change impacts.

Executive Order S-13-08 also directed CNRA to convene an independent panel to complete the first California Sea Level Rise Assessment Report. This report is to be completed no later than December 1, 2010. The report is intended to provide information on the following:

1. Relative sea level rise projections specific to California, taking into account issues such as coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge, and land subsidence rates;
2. The range of uncertainty in selected sea level rise projections;
3. A synthesis of existing information on projected sea level rise impacts to State infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems; and
4. discussion of future research needs regarding sea level rise for California.</td></tr>
</table>

E. Biological Resources

1. Existing Conditions

California is one of the most biologically diverse areas in the world. Its varied topography and climate have given rise to a remarkable diversity of habitats and a correspondingly diverse array of both plant and animal species. California has more species than any other state in the U.S. and also has the greatest number of endemic species, those that occur nowhere else in the world (DFG 2007, p.11).

California contains examples of most of the major biomes in North America, including grassland, shrubland, deciduous forest, coniferous forest, alpine tundra, mountains, deserts, temperate rainforest, marine, estuarine, and freshwater habitats. Each of these biomes contains many different types of plant communities, such as redwood forests, vernal pool wetlands, or blue oak woodlands. Altogether, the State supports 81 types of forests, 107 types of shrub lands, and 52 types of plant communities dominated by herbaceous plants, in addition to 27 other types of vegetation (Sawyer and Keeler-Wolf 1995, vegetation series tables).

Some parts of the State are particularly rich in plant species diversity. Areas with the greatest number of plant species are the Klamath and inner North Coast ranges, the high Sierra Nevada, the San Diego region, and the San Bernardino Mountains. Other regions with considerable plant diversity are the outer North and Central Coast Ranges, the Cascade Range, the Sierra Nevada foothills, and the western transverse Range (DFG 2007, p.13).

California has a great number of animal species, representing large portions of wildlife species nationwide. The State's diverse natural communities provide a wide variety of habitat conditions for wildlife. The State's wildlife species include 84 species of reptiles (30 percent of the total number found in the U.S.); 51 species of amphibians (22 percent of U.S. species); 67 species of freshwater fish (8 percent of U.S. species); 433 species of birds (47 percent of U.S. species); and 197 mammal species (47 percent of U.S. species). Seventeen species of mammals, 17 species of amphibians, and 20 species of freshwater fish live here and nowhere else (DFG 2007, p. 13). Animal species are not equally distributed across the State. Some of California's natural communities are particularly rich in wildlife species, supporting hundreds of species each. Twenty-four habitats—including valley foothill riparian, mixed conifer, freshwater wetlands, mixed chaparral, and grasslands in the State—support more than 150 terrestrial animal species each. Oak woodlands also are among the most biological diverse communities in the State, supporting 5,000 species of insects, more than 330 species of amphibians, reptiles, birds and mammals, and several thousand plant species (DFG 2007, p.14).

2. Regulatory Setting

Biological resources in California are protected and/or regulated by a variety of federal, State, and local laws and policies. Key regulations and polices applicable to the proposed ACC Program are summarized in Table 3.E-1.

Table 3.E-1. Applicable Laws and Regulations for Biological Resources

Applicable Law	Description
Federal	
Federal Endangered Species Act	Designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat.
Migratory Bird Treaty Act	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.
Clean Water Act	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request State certification that the proposed activity would not violate State and federal water quality standards.
Rivers and Harbors Act of 1899	Requires permit or letter of permission from USACE prior to any work being completed within navigable waters.
U.S. Environmental Protection Agency (U.S EPA) Section 404 (b)(1) Guidelines	Requires the USACE to analyze alternatives in a sequential approach such that the USACE must first consider avoidance and minimization of impacts to the extent practicable to determine whether a proposed discharge can be authorized.
California Desert Conservation Area Plan (CDCA)	Comprises one of two national conservation areas established by Congress at the time of the passage of the Federal Land and Policy Management Act (FLPMA). FLPMA outlines how BLM would manage public lands. Congress specifically provided guidance for the management of the CDCA and directed the development of the 1980 CDCA Plan.
Federal Noxious Weed Act of 1974 (P.L. 93-629) (7 U.S.C. 2801 et seq.; 88 Stat. 2148)	Establishes a federal program to control the spread of noxious weeds. Authority is given to the Secretary of Agriculture to designate plants as noxious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit.
Executive Order 13112, "Invasive Species," February 3, 1999	Federal agencies are mandated to take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.

Table 3.E-1. Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
Executive Order 11988, "Floodplain Management," May 24, 1977	Requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.
Executive Order 11990, "Protection of Wetlands," May 24, 1977	Requires all federal agencies to consider wetland protection as an important part of their policies and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," January 10, 2001	Requires that each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations develop and implement a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service (USFWS) that shall promote the conservation of migratory bird populations.
Wild Free-Roaming Horses and Burros Act	Provides for the protection of wild free-roaming horses and burros. Directs BLM and the U.S. Forest Service (USFS) to manage wild horses and burros on lands under their jurisdiction.
Bald and Golden Eagle Protection Act	Declares it is illegal to take, possess, sell, purchase, barter, offer to sell or purchase or barter, transport, export or import a bald or golden eagle, alive or dead, or any part, nest or egg of these eagles unless authorized. Active nest sites are also protected from disturbance during the breeding season.
BLM Manual 6840 — Special Status Species Management (BLM 2001),	Establishes special status species policy on BLM land for plant and animal species and the habitats on which they depend. The policy refers species designated by the BLM State Director as sensitive.
Listed Species Recovery Plans and Ecosystem Management Strategies	Provides guidance for the conservation and management of sufficient habitat to maintain viable populations of listed species and ecosystems. Relevant examples include, but are not limited to, the Desert Tortoise Recovery Plan, Flat-tailed Horned Lizard Rangewide Management Strategy; Amargosa Vole Recovery Plan, Recovery Plan for Upland Species of the San Joaquin Valley, California.
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
Porter-Cologne Water Quality Control Act	Requires that each of the nine RWQCBs prepare and periodically update basin plans for water quality control. Each basin plan sets forth water quality standards for surface water and groundwater and actions to control nonpoint and point sources of pollution to achieve and maintain these standards.
Z'berg-Nejedly Forest Practice Act	Ensures that logging on timberland is performed in a manner that will preserve and protect fish, wildlife, forests and streams, enforced by CAL FIRE.

Table 3.E-1. Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
California Forest Practice Rules 2010	State Board of Forestry and Fire Protection has authority delegated by legislature to adopt forest practice and fire protection regulations on nonfederal lands. These regulations carry out California legislature's mandates to protect and enhance the State's unique forest and wildland resources.
Wetlands Preservation (Keene-Nejedly California Wetlands Preservation Act) (Public Resources Code, Section 5810 et seq.)	California has established a successful program of regional, cooperative efforts to protect, acquire, restore, preserve, and manage wetlands. These programs include, but are not limited to, the Central Valley Habitat Joint Venture, the San Francisco Bay Joint Venture, the Southern California Wetlands Recovery Project, and the Inter-Mountain West Joint Venture.
California Wilderness Preservation System (Public Resources Code, Section 5093.30 et seq.)	Establishes a California wilderness preservation system that consists of State-owned areas to be administered for the use and enjoyment of the people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, provide for the protection of such areas, preserve their wilderness character, and provide for the gathering and dissemination of information regarding their use and enjoyment as wilderness.
Significant Natural Areas (Fish and Game Code section 1930 et seq.)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.
Protection of Birds and Nests (Fish and Game Code section 3503 and 3503.5)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Raptors (e.g., hawks and owls) are specifically protected.
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds.
Fur-bearing Mammals (Fish and Game Code sections 4000 and 4002)	Lists fur-bearing mammals which require a permit for take.
Fully Protected Species (Fish and Game Code Sections 3511,4700, 5050, and 5515)	Identifies several amphibian, reptile, fish, bird and mammal species which are Fully Protected. The California Department of Fish and Game (CDFG) cannot issue a take permit), except for take related to scientific research.
California Environmental Quality Act (CEQA Guidelines, CCR, Title 14, Section 15380)	CEQA defines rare species more broadly than the definitions for species listed under the State and federal Endangered Species Acts. Under section 15830, species not protected through State or federal listing but nonetheless demonstrable as "endangered" or "rare" under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFG's Special Animals List.

Table 3.E-1. Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
Oak Woodlands (California Public Resources Code Section 21083.4)	Requires counties to determine if a project within their jurisdiction may result in conversion of oak woodlands that would have a significant adverse effect on the environment. If the lead agency determines that a project would result in a significant adverse effect on oak woodlands, mitigation measures to reduce the significant adverse effect of converting oak woodlands to other land uses are required.
Lake and Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFG in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 et seq. and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.
Food and Agriculture Code, Section 403	The California Department of Food and Agriculture is designated to prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.
Noxious Weeds (Title 3, California Code of Regulations, Section 4500)	List of plant species that are considered noxious weeds.
Regional and Local	
Regional Habitat Conservation Plans and Natural Communities Conservation Plan (HCP/NCCP)	HCPs and NCCPs establish a coordinated process for permitting and mitigating the incidental take of endangered species and conserving natural resources. Approved HCPs and NCCPs potentially relevant to proposed ACC Program include, but are not limited to, the Western Riverside County HCP; Lower Colorado River Multi-Species Conservation Plan; Coachella Valley Multi-Species HCP; Orange County Central/Coastal NCCP/HCP; Kern Water Bank HCP; Southeastern Lincoln County, NV HCP; and the Mojave and Colorado Desert regions and Solano Multispecies Habitat Conservation Plan.
Various City and County General Plans	General plans typically designate areas for land usages, guiding where new growth and development should occur while providing a plan for the comprehensive and long-range management, preservation, and conservation of and natural resources and open-space lands.
Various Local Ordinances	Local ordinances provide regulations for proposed projects for activities such as grading plans, erosion control, tree removal, protection of sensitive biological resources and open space.

F. Cultural Resources

1. Existing Conditions

Cultural resources include archaeological sites of prehistoric or historic origin, built or architectural resources older than 50 years, traditional or ethnographic resources, and fossil deposits of paleontological importance.

All areas within California have the potential for yielding as yet undiscovered archaeological and paleontological resources and undocumented human remains not interred in cemeteries or marked formal burials. These resources have the potential to contribute to our knowledge of the fossil record or local, regional, or national prehistory or history.

Archaeological resources include both prehistoric and historic remains of human activity. Built environment resources include an array of historic buildings, structures, and objects serving as a physical connection to America's past. Traditional or ethnographic cultural resources may include Native American sacred sites and traditional resources of any ethnic community that are important for maintaining the cultural traditions of any group. "Historical resources" is a term with defined statutory meaning and includes any prehistoric or historic archaeological site, district, built environment resource, or traditional cultural resource recognized as historically or culturally significant (PRC Section 21084.1; 14 CCR Section 15064.5[a]).

Paleontological resources, including mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains, are more than 5,000 years old and occur mainly in Pleistocene or older sedimentary rock units.

California was occupied by different prehistoric cultures dating to at least 12,000 years ago. Evidence for the presence of humans prior to about 8,000 years ago during the Paleoindian Period is relatively sparse and scattered throughout the State. With climate changes and the drying of pluvial lakes, subsistence during the Early and Middle Archaic Periods shifted to an increased emphasis on plant resources, evidenced by an abundance of milling implements in archaeological sites dating between 8,000 and 3,000 years ago. After approximately 3,000 years ago, during the Upper Archaic and Late Prehistoric Periods, the complexity of the prehistoric archaeological record reflects increases in specialized adaptations to locally available resources such as acorns and salmon, permanently occupied settlements, and the expansion of regional populations and trade networks, as well as the development of social stratification and craft specialization.

At the time of European contact, California was the home of approximately 310,000 indigenous people with a complex of cultures distinguished by linguistic affiliation and territorial boundaries. Distinct native Californian cultural groups spoke approximately 74 languages. At least 70 groups, with even more subgroups, inhabited the vast lands within the State. In general, these mainly sedentary, complex hunter-gatherer groups shared similar subsistence practices (hunting, fishing, and collecting plant foods), settlement patterns, technology, material culture, social organization, and religious beliefs. They situated permanent villages along the coast, interior waterways, and near lakes and wetlands. Population density among these groups varied, depending mainly on availability and dependability of local resources, with the highest density of people occurring in the Santa Barbara Channel area and the least in the State's desert region.

The effect of Spanish settlement and establishment of missions in California marks the beginning of a devastating disruption of native culture, with forced population movements, loss of land and territory (including traditional hunting and gathering locales), enslavement, and decline in population numbers from disease, malnutrition, starvation, and violence. California's native population was reduced to about 100,000 people by 1850; by 1900, there were only 20,000--less than seven percent of the pre-contact number (Smithsonian Institution 1978). Existing reservations were created in California by the federal government beginning in 1858 but encompass only a fraction of native lands. Many California groups continue to await federal tribal status recognition.

In 1848, shortly after California became a territory of the U.S., gold was discovered at Sutter's Mill. The resulting Gold Rush era influenced the history of the State and the nation. Thousands of people flocked to the gold fields along the Sierra foothills, and in 1850 California became the 31st State. After the completion of the transcontinental railroad in 1869, settlers and immigrants continued to pour into the State. Settlement of the American West was also encouraged by passage of the Swampland Acts of the mid 1800s-early 1900s and the Homestead Act of 1862, among others. The multi-ethnic character of the State today is one result of the Gold Rush, plus later waves of migration. Buildings and structures in today's urban cores, rural landscapes, coastlines, deserts, forests, and parks, as well as historic archaeological sites, reflect the importance of mining, the growth of agriculture, ranching and transportation networks, and the economic development of industries based on the State's wealth of natural resources, such as lumber, minerals, fish, and petroleum deposits, that contributed to the State's economy and its continuing growth and development. Architectural resources also reflect the development in California in the mid- to late-1900s of the defense, aerospace, communication and tourism industries.

Significant nonrenewable vertebrate or invertebrate fossils or unique geologic units have been documented throughout the State and are likely present in many out-of-state areas. Because the majority of California was underwater until the Tertiary Period, marine fossils older than 65 million years are not common and are exposed mainly in the mountains along the border with Nevada, the Klamath Mountains, Jurassic shales, sandstones and limestones along the edges of the Central Valley, and portions of the Coast and Transverse Ranges, and the Peninsular Ranges. As a result of changes in sea level and increases in tectonic activity during the Tertiary, marine as well as terrestrial fossils may be found scattered about the State, particularly along the coast, edges of the Central Valley, northeastern plateau, and southeastern deserts. Tertiary marine fossils have been found, for example, under the streets of Los Angeles during storm drain and subway construction. Dating between 1.8 million and 11,000 years ago, Pleistocene continental sedimentary rock units are found throughout the State and have yielded a variety of plant and vertebrate fossils. Pleistocene fossil localities include large lake deposits, such as Lake Manix in the Mojave Desert, marine terrace deposits along the coast, particularly the southern coast, and the La Brea Tar Pits, a well-known locality in Los Angeles that has produced a variety of extinct terrestrial fauna dating to the last Ice Age. Extinct Pleistocene fossils, including mammoths, have also been found during development projects near Sacramento, in Livermore, in southern California, and on the Channel Islands. Holocene-age deposits (less than 11,000 years old), such as those that blanket the majority of the Central Valley floor, are geologically immature and generally unlikely to contain fossils. One exception is the Lake Cahuilla deposits in today's Colorado Desert that have yielded freshwater fossils and small terrestrial vertebrates and date between 270 and at least 6,000 years ago.

2. Regulatory Setting

Applicable laws and regulations associated with cultural resources are discussed in Table 3.F-1.

Table 3.F-1. Applicable Laws and Regulations for Cultural Resources

Applicable Regulation	Description
Federal	
National Historic Preservation Act (NHPA) of 1966	Requires federal agencies to consider the preservation of historic and prehistoric resources. The Act authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places (NRHP), and it establishes an Advisory Council on Historic Preservation (ACHP) as an independent federal entity. Section 106 of the Act requires federal agencies to take into account the effects of their undertakings on historic properties and afford the ACHP a reasonable opportunity to comment on the undertaking prior to licensing or approving the expenditure of funds on any undertaking that may affect properties listed, or eligible for listing, in the NRHP.
National Environmental Policy Act of 1969	Requires federal agencies to foster environmental quality and preservation. Section 101(b)(4) declares that one objective of the national environmental policy is to "preserve important historic, cultural, and natural aspects of our national heritage... ." For any major federal actions significantly affecting environmental quality, federal agencies must prepare, and make available for public comment, an environmental impact statement (EIS).
Archaeological Resources Protection Act of 1979 (NRPA) (16 USC 470aa-470ll)	Requires a permit for any excavation or removal of archaeological resources from public lands or Indian lands. The statute provides both civil and criminal penalties for violation of permit requirements and for excavation or removal of protected resources without a permit.

Table 3.F-1. Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
Advisory Council Regulation, Protection of Historic Properties (36 CFR 800)	Establishes procedures for compliance with Section 106 of the National Historic Preservation Act of 1966. These regulations define the Criteria of Adverse Effect, define the role of State Historic Preservation Officer (SHPO) in the Section 106 review process, set forth documentation requirements, and describe procedures to be followed if significant historic properties are discovered during implementation of an undertaking. Prehistoric and historic resources deemed significant (i.e., eligible for listing in the NRHP, per 36 CFR 60.4) must be considered in project planning and construction. The responsible federal agency must submit any proposed undertaking that may affect NRHP-eligible properties to the SHPO for review and comment prior to project approval.
National Park Service Regulations, National Register of Historic Places (NRHP) (36 CFR 60)	Sets forth procedures for nominating properties to the NRHP, and present the criteria to be applied in evaluating the eligibility of historic and prehistoric resources for listing in the NRHP.
Archaeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (FR 190:44716–44742)	Non-regulatory technical advice about the identification, evaluation, documentation, study, and other treatment of cultural resources. Notable in these Guidelines are the "Standards for Archaeological Documentation" (p. 44734) and "Professional Qualifications Standards for Archaeology" (pp. 44740–44741).
American Indian Religious Freedom Act of 1978	The American Indian Religious Freedom Act pledges to protect and preserve the traditional religious rights of American Indians, Aleuts, Eskimos, and Native Hawaiians. Before the act was passed, certain U.S. federal laws interfered with the traditional religious practices of many American Indians. The Act establishes a national policy that traditional Native American practices and beliefs, sites (and right of access to those sites), and the use of sacred objects shall be protected and preserved.
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (PL 101–601)	Vests ownership or control of certain human remains and cultural items, excavated or discovered on federal or tribal lands, in designated Native American tribes, organizations, or groups. The Act further: requires notification of the appropriate Secretary or other head of any federal agency upon the discovery of Native American cultural items on federal or tribal lands; proscribes trafficking in Native American human remains and cultural items; requires federal agencies and museums to compile an inventory of Native American human remains and associated funerary objects, and to notify affected Indian tribes of this inventory; and provides for the repatriation of Native American human remains and specified objects possessed or controlled by federal agencies or museums.
Department of Transportation Act of 1966, Section 4(f)	Section 4(f) of the Act requires a comprehensive evaluation of all environmental impacts resulting from federal-aid transportation projects administered by the Federal Highway Administration (FHA), Federal Transit Administration (FTA), and Federal Aviation Administration (FAA) that involve the use—or interference with use—of several types of land: public park lands, recreation areas, and publicly or privately owned historic properties of federal, state, or local significance. The Section 4(f) evaluation must be sufficiently detailed to permit the U.S. Secretary of Transportation to determine that there is no feasible and prudent alternative to the use of such land, in which case the project must include all possible planning to minimize harm to any park, recreation, wildlife and waterfowl refuge, or historic site that would result from the use of such lands. If there is a feasible and prudent alternative, a proposed project using Section 4(f) lands cannot be approved by the Secretary. Detailed

Table 3.F-1. Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
	inventories of the locations and likely impacts on resources that fall into the Section 4(f) category are required in project-level environmental assessments.
State	
California Health and Safety Code Section and California Public Resources Code, Section	Disturbance of human remains without the authority of law is a felony (California Health and Safety Code, Section 7052). According to State law (California Health and Safety Code, Section 7050.5, California Public Resources Code, Section 5097.98), if human remains are discovered or recognized in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until 1) the coroner of the county has been informed and has determined that no investigation of the cause of death is required; 2)and if the remains are of Native American origin, and if the descendants from the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of with appropriate dignity the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98; or the Native American Heritage Commission was unable to identify a descendent or the descendent failed to make a recommendation within 24 hours after being notified by the Commission. According to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the Native American Heritage Commission, who has jurisdiction over Native American remains (California Health and Safety Code, 7052.5c; Public Resources Code, Section 5097.98).
Local	
City/County General Plans	Policies, goals, and implementation measures in county or city general plans may contain measures applicable to cultural and paleontological resources. In addition to the enactment of local and regional preservation ordinances, CEQA requires that resources included in local registers be considered (pursuant to section 5020.1(k) of the Public Resources Code). Therefore, local county and municipal policies, procedures, and zoning ordinances must be considered in the context of project-specific undertakings. Cultural resources are generally discussed in either the Open Space Element or the Conservation Element of the General Plan. Many local municipalities include cultural resources preservation elements in their general plans that include some mechanism pertaining to cultural resources in those communities. In general, the sections pertaining to archaeological and historical properties are put in place to afford the cultural resources a measure of local protection. The policies outlined in the individual general plans should be consulted prior to any undertaking or project.

Table 3.F-1. Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
Cooperative Agreements Among Agencies	Cooperative agreements among land managing agencies (BLM, National Park Service, U.S. Forest Services, California State Parks, Bureau of Indian Affairs, Department of Defense, to name a few) the SHPO and ACHP may exist and will need to be complied with on specific projects. In addition, certain agencies have existing Programmatic Agreements (PA) requiring permits (CPUC, BLM) to complete archaeological investigations and employ the Secretary of Interior's Professional Qualification Standards and Guidelines (36 CFR 61).

G. Geology and Soils

1. Existing Conditions

a. Soils

California has a diverse, complex and seismically active geology that includes a vast array of landforms. Soils in California are as diverse as its geology, and are described and characterized individually and collectively with other soils, and their various compatible uses in soil surveys published by the U.S. Department of Agriculture. Soils are fundamental and largely non-renewable resources that are the basis for high-level sustained yields of agricultural commodities, forest products, and provide support to the wide variety of ecological communities throughout the State.

b. Geology

California's geologic history is associated with major episodes of tectonic activity including intrusive and extrusive volcanic activity, folding and faulting, and mountain building. The most recent period of mountain building is still going on, and practically all of the current landforms and geographic features are very young in geologic terms, only a few million years old. Rocks older than 600 million years, those of the Precambrian Era, are rare in California.

The oldest rocks, which are more than 1,000 million years old, are located in the eastern deserts and the eastern Transverse Ranges (San Bernardino and San Gabriel Mountains). The distribution of rocks of these ages suggests that the west coast of the North American Continent was well to the east of all but the southern end of what is now California. All of these very old formations have been extensively metamorphosed and, therefore, it is difficult to determine the conditions that existed when they were originally formed. Some of the oldest rocks (around 1,800 million years old) are located in the mountains around Death Valley and are much like the rocks exposed in the inner gorge of the Grand Canyon. Metamorphic rocks around 1,000 million years old are located in the San Gabriel Mountains and the Orocopia Mountains east of the Salton Sea. During the Paleozoic Era, beginning around 400 million years ago (mya), tectonic forces began the process of mountain building and appears to mark the first time the coast moved west into most of what is now California, and the ancestral Sierra Nevada mountains were emplaced. During the Mesozoic Era between 245 to 65 mya, mountain building continued and the beginnings of the Coast Ranges were formed.

The Cenozoic Era, between 65 mya and the present, was marked with continued uplift, erosion and deposition. The Pacific plate became completely overridden by the North American plate forming the San Andreas Fault system, and in turn other faults. Volcanic activity became widespread in the Sierra Nevada and Mojave Desert regions, and a number of deep marine basins formed along the central and southern California coast. About 5 mya, mountain building accelerated resulting in the uplifting of most of the modern mountain ranges, including the Sierra Nevada and the large fault-block ranges to the east, the Coast Ranges, the Transverse Ranges, and the Peninsular Ranges. This was followed by Pleistocene glaciations in the Sierra Nevada and, to a minor extent, in the San Bernardino Mountains; recent volcanic eruptions in the Mojave Desert and Great Basin regions; and the widespread volcanic activity that created the southern Cascade volcanoes (Mt. Shasta and Mt. Lassen) and the lava flows of the Modoc Plateau region.

2. Regulatory Setting

Applicable laws and regulations associated with soils, geology, and mineral resources are discussed in Table 3.G-1.

Table 3.G-1. Applicable Laws and Regulations for Geology and Soils	
Federal	
Clean Water Act	This law was enacted to restore and maintain the chemical, physical, and biological integrity of the nation's waters by regulating point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. This includes the creation of a system that requires states to establish discharge standards specific to water bodies (National Pollution Discharge Elimination System [NPDES]), which regulates storm water discharge from construction sites through the implementation of a Storm Water Pollution Prevention Plan (SWPPP). In California, the State's NPDES permit program is implemented and administered by the local Regional Water Quality Control Boards.
Earthquake Hazards Reduction Act and National Earthquake Hazards Reduction Program Act	This Act established the National Earthquake Hazards Reduction Program to reduce the risks to life and property from future earthquakes. This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act by refining the description of agency responsibilities, program goals and objectives.
State	
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), Section 2621–2630.	The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (formerly the Special Studies Zoning Act) regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. This act mitigates against surface fault rupture of known active faults beneath occupied structures, and requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings. This act groups faults into categories of active, potentially active, and inactive.

Table 3.G-1. Applicable Laws and Regulations for Geology and Soils	
Seismic Hazards Mapping Act, PRC Section 2690–2699.	The Seismic Hazards Mapping Act (the Act) of 1990 (Public Resources Code, Chapter 7.8, Division 2) directs the California Department of Conservation, Division of Mines and Geology (now called California Geological Survey) to delineate Seismic Hazard Zones. The purpose of the Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. These include areas identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Cities, counties, and state agencies are directed to use seismic hazard zone maps developed by CGS in their land-use planning and permitting processes. The Act requires that site-specific geotechnical investigations be performed prior to permitting most urban development projects within seismic hazard zones.
California Division of Oil, Gas, and Geothermal Resources, PRC Section 3106.	Public Resources Code Section 3106 mandates the supervision of drilling, operation, maintenance, and abandonment of oil wells for the purpose of preventing: damage to life, health, property, and natural resources; damage to underground and surface waters suitable for irrigation or domestic use; loss of oil, gas, or reservoir energy; and damage to oil and gas deposits by infiltrating water and other causes. In addition, the California Division of Oil, Gas, and Geothermal Resources (DOGGR) regulate drilling, production, injection, and gas storage operations in accordance with California Code of Regulations (CCR) Title 14, Chapter 4, Subchapter 1.
Landslide Hazard Identification Program, PRC Section 2687(a)	The Landslide Hazard Identification Program requires the State Geologist to prepare maps of landslide hazards within urbanizing areas. According to Public Resources Code Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.
California Building Standards Code (CBSC) (CCR Title 24)	California's minimum standards for structural design and construction are given in the California Building Standards Code (CBSC) (CCR Title 24). The CBSC is based on the Uniform Building Code (International Code Council 1997), which is used widely throughout United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.
Caltrans Seismic Design Criteria	The California Department of Transportation (Caltrans) has Seismic Design Criteria (SDC), which is an encyclopedia of new and currently practiced seismic design and analysis methodologies for the design of new bridges in California. The SDC adopts a performance-based approach specifying minimum levels of structural system performance, component performance, analysis, and design practices for ordinary standard bridges. The SDC has been developed with input from the Caltrans Offices of Structure Design, Earthquake Engineering and Design Support, and Materials and Foundations. Memo 20-1 outlines the bridge category and classification, seismic performance criteria, seismic design philosophy and approach, seismic demands and capacities on structural components and seismic design practices that collectively make up Caltrans' seismic design methodology.

Table 3.G-1. Applicable Laws and Regulations for Geology and Soils	
Local	
Geotechnical Investigation	Local jurisdictions typically regulate construction activities through a process that may require the preparation of a site-specific geotechnical investigation. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate construction design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and the previous history of excavation and fill placement. Proponents of specific projects that require design of earthworks and foundations for proposed structures will need to prepare geotechnical investigations on the physical properties of soil and rock at the site prior to project design.
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of BMPs similar to those contained in a SWPPP.
County General Plans (and EIR)	Some county General Plans provide a regulatory framework to address potential environmental impacts that may result from a proposed project. These include the General Plans for Solano, San Luis Obispo, Los Angeles, Kern, San Bernardino, Riverside, and Imperial counties.

H. Hazards and Hazardous Materials

1. Existing Conditions

Hazardous materials are substances with physical and chemical properties that could pose a substantial present or future hazard to human health or the environment when improperly handled, disposed, or otherwise managed. Hazardous materials are grouped into four categories based on their characteristics: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials) and reactive (causes explosions or generates toxic gases). A hazardous waste is any hazardous material that is finished with its intended use and is discarded. This may include items, such as spent fuels, industrial solvents and chemicals, process water, and other spent materials (i.e., some types of batteries and fuel cells). California's hazardous waste regulations provides the following means to determine whether or not a waste is hazardous: (1) a list of criteria (toxic, ignitable, corrosive and reactive) that a waste may exhibit; (2) a list of those wastes that are subject to regulation (RCRA and mercury-containing); and (3) a list of chemical names and common names that are presumed to be hazardous in California.

2. Regulatory Setting

Table 3.H-1. Applicable Laws and Regulations for Hazards and Hazardous Materials	
Federal	
Clean Air Act (CAA) Act (42 USC Section 9601 et seq.)	The Clean Air Act is the law that defines U.S. EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The last major change in the law, the Clean Air Act Amendments of 1990, was enacted by Congress in 1990. Legislation passed since then has made several minor changes. The Clean Air Act, like other laws enacted by Congress, was incorporated into the United States Code as Title 42, Chapter 85. The House of Representatives maintains a current version of the U.S. Code, which includes Clean Air Act changes enacted since 1990.
Clean Water Act (CWA) (40CFR 112)	The 1972 amendments to the Federal Water Pollution Control Act (known as the Clean Water Act or CWA) provide the statutory basis for the NPDES permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the United States. Section 402 of the CWA specifically required U.S. EPA to develop and implement the NPDES program.
Safe Drinking Water Act (SDWA)	The Safe Drinking Water Act (SDWA) is the main federal law that ensures the quality of Americans' drinking water. Under SDWA, U.S. EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. SDWA does not regulate private wells which serve fewer than 25 individuals.
Federal Hazardous Materials Regulations (FHMR) Title 49, Code of Federal Regulations, Parts 100-180	The regulations establish criteria for the safe transport of hazardous materials. Compliance is mandatory for intrastate and interstate transportation.
Toxic Substances Control Act (TSCA) 15 U.S.C. Section 2601 et seq.	The Toxic Substances Control Act (TSCA) of 1976 provides U.S. EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. TSCA addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls (PCBs), asbestos, radon and lead-based paint.

Table 3.H-1. Applicable Laws and Regulations for Hazards and Hazardous Materials	
Resource Conservation and Recovery Act (RCRA) 42 U.S.C. Section 6901 et seq. Title 40, Code of Federal Regulations (CFR)	The Resource Conservation and Recovery Act (RCRA) of 1976 gives U.S. EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled U.S. EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. HSWA - the Federal Hazardous and Solid Waste Amendments - are the 1984 amendments to RCRA that focused on waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. Some of the other mandates of this law include increased enforcement authority for U.S. EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program. Federal regulations adopted by U.S. EPA are found in Title 40, Code of Federal Regulations (40 CFR).
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the NPL. The Superfund Amendments and Reauthorization Act (SARA) of 1986 reauthorized CERCLA to continue cleanup activities around the country. Several site-specific amendments, definitions clarifications, and technical requirements were added to the legislation, including additional enforcement authorities. Also, Title III of SARA authorized the Emergency Planning and Community Right-to-Know Act (EPCRA).
Emergency Planning and Community Right-to-Know Act (EPCRA) (42 USC Section 9601 et seq.)	The Superfund Amendments and Reauthorization Act (SARA) of 1986 created EPCRA (40 CFR Parts 350-372), also known as SARA Title III, a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by state/tribe and local governments. EPCRA required the establishment of state/tribe emergency response commissions (SERCs/TERCs), responsible for coordinating certain emergency response activities and for appointing local emergency planning committees (LEPCs).

Table 3.H-1. Applicable Laws and Regulations for Hazards and Hazardous Materials	
State	
Various California Air Pollution Control Laws (i.e., Bluebook)	Includes all relevant Health and Safety Code sections of law, plus those air pollution- related statutes from other California codes, and the California Code of Regulations (CCR) Titles 13 & 17 sections that pertain to ARB's air management program.
Hazardous Materials Transportation California Vehicle Code Sections 31301-31309	Regulations pertaining to the safe transport of hazardous materials are in California Vehicle Code Sections 31301-31309. All motor carriers and drivers involved in transportation of hazardous materials must comply with the requirements contained in federal and state regulations, and must apply for and obtain a hazardous materials transportation license from the California Highway Patrol (CHP). A driver is required to obtain a hazardous materials endorsement issued by the driver's country or state of domicile to operate any commercial vehicle carrying hazardous materials. The driver is required to display placards or markings while hauling hazardous waste, unless the driver is exempt from the endorsement requirements. A driver who is a California resident is required to obtain an endorsement from CHP.
Hazardous Waste Control Law California Health & Safety Code, Division 20, Chapter 6.5 CCR, Division 4.5, Title 22	California requirements and statutory responsibilities in managing hazardous waste in California – this includes the generation, transportation, storage, treatment, recycling, and disposal of hazardous waste. The statute and regulation are implemented by Cal/EPA DTSC.
CalARP Program CCR, Title 19, Division 2, Chapter 4.5, Sections 2735-2785	The purpose of the CalARP program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right-to-know laws. This is accomplished by requiring businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop a Risk Management Plan (RMP). An RMP is a detailed engineering analysis of the potential accident factors present at a business and the mitigation measures that can be implemented to reduce this accident potential.
Hazardous Material Business Plan & Area Plan Program Health and Safety Code Sections 25500 – 25520 CCR, Title 19, Division 2, Chapter 4, Article 3 & 4	The business and area plans program, relating to the handling and release or threatened release of hazardous materials, was established in California to protect the public health and safety and the environment. Basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the State, which could be accidently released into the environment, is not now available to firefighters, health officials, planners, public safety officers, health care providers, regulatory agencies, and other interested persons. The information provided by business and area plans is necessary in order to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of hazardous materials into the workplace and environment. CUPAs use information collected from the Business Plan and California Accidental Release Prevention (CalARP) programs to identify hazardous materials in their communities. This information

Table 3.H-1. Applicable Laws and Regulations for Hazards and Hazardous Materials	
	provides the basis for the Area Plan and is used to determine the appropriate level of emergency planning necessary to respond to a release.
Unified Program Administration Health and Safety Code, Chapter 6.11, Sections 25404-25404.8 CCR, Title 27, Division 1, Subdivision 4, Chapter 1, Sections 15100-15620	A CUPA is a Certified Unified Program Agency, which is authorized by the Secretary of Cal/EPA to carry out several of the hazardous waste/hazardous materials regulatory programs administered by the State in a coordinated and consistent manner. The 6 hazardous waste and materials program elements covered by the CUPA include: 1) Hazardous Waste Generators 2) Underground Tanks (UST) 3) Above Ground Tanks (AST) 4) Accidental Release Program (CalARP) 5) Hazardous Material Release Response Plans & Spill Notification (Community Right- to-Know) 6) Hazardous Materials Management Plans & Inventory Reporting The intent of the CUPA is to simplify the hazardous materials regulatory environment and provide a single point of contact for businesses to address inspection, permitting, billing, and enforcement issues.
Various Local Ordinances	Various ordinances and codes may be adopted at the local level to provide stricter requirements in the management of hazardous materials and waste activities within the jurisdiction.

I. Hydrology and Water Quality

1. Existing Conditions

a. Water Supply

California experiences a Mediterranean climate with cool, wet winters and warm, dry summers. Most precipitation (i.e., rain and snow) and peak stream runoff events occur primarily during October through April, and the most extreme events usually occur between November and March. Precipitation rates vary greatly across the State from northern to southern regions, and the State contains many desert regions where annual total precipitation is very low (i.e., less than about 6 inches). In mountainous areas, snowmelt can provide moderate to high runoff rates in the April to July period, and snowmelt generally contributes substantially to the seasonal and annual volume of water that is available for storage in reservoirs and sustained stream flows into the later summer months.

Many rivers are controlled by dams, reservoirs, and levees for a variety of purposes, including but not limited to, flood control, hydroelectric power generation, water storage and transport for municipal/domestic and agricultural water supply, recreation, and fish and wildlife uses. Most of the major rivers on the west side of the Sierra Nevada Mountains are controlled, to some degree, by large dams, reservoirs, and diversions and water conveyance canals. Smaller reservoirs are common at other locations throughout the State. Sierra Nevada Mountain runoff to the Sacramento River and San Joaquin River (i.e., approximately 25 million acre-feet [MAF] in above normal water year types) provides much of the surface water used in the State and managed and conveyed in State Water Project (SWP) and Central Valley Project (CVP) facilities operated by the California Department of Water Resources (DWR) and U.S. Bureau of Reclamation (U.S. BR), respectively (DWR 2011; USBR 2011b). Water from the Sacramento River and San Joaquin River flows into the Sacramento-San Joaquin Delta (Delta), where both the SWP and CVP operate pumps to export water to the southern portion of the State. California also conveys a substantial quantity of water from the Colorado River for agricultural uses in the Imperial Valley and Coachella Valley, and municipal uses in the Los Angeles region. Several large reservoirs are located in the Los Angeles and San Diego areas to store imported Delta and Colorado River water.

California contains vast quantities of groundwater in alluvial aquifers that cover approximately 40 percent of the land surface. Several large groundwater recharge and conjunctive use projects are part of the SWP/CVP operations to provide short-term and long-term sub-surface storage of surplus surface water for later withdrawal for municipal/agricultural uses. Groundwater pumping that exceeds the natural recharge can lead to "overdrafting", which refers to long-term drawdown of groundwater table elevations.

Both groundwater and surface water are used extensively in California for agricultural, municipal, and industrial water supplies. Current annual municipal and industrial water use for the California population of approximately 35 million residents ranges from 10-12 MAF, with demands being lower in drought years when higher levels of conservation occur. Approximately 35 MAF is used for agricultural production. In years with average available surface water supply, groundwater meets about 30 percent of California's urban and agricultural demand, increasing in drought years to about 40 percent or more. While water supplies typically have been sufficient to meet demands, significant water supply and water quality challenges exist at local levels, particularly during extreme drought year types when conservation and cutbacks for agriculture have occurred and the SWP/CVP operations are stressed to meet competing water demands and environmental requirements in the major rivers and Delta.

b. Water Quality

The water quality of surface waters and groundwater varies throughout California. Potential surface sources of water quality impairments include point sources (direct discharges to water bodies) and dispersed non-point sources (e.g., stormwater runoff). Continuous point-source discharges such as domestic wastewater treatment plants can be a source of elevated levels of organic carbon, nutrients (i.e., nitrogen and phosphorus), salinity, or trace metals and organic compounds relative to natural background water concentrations. Potential domestic wastewater discharges of pharmaceutical and other personal care products have been identified as potentially contributing endocrine disrupting compounds (EDCs) and related adverse long-term toxic effects to aquatic organisms. Urban stormwater runoff from residential, commercial, and industrial land uses can mobilize and convey trash, oils, grease, trace metals (e.g., copper and zinc) to drainage systems and natural receiving water bodies. Stormwater runoff from residential and agricultural areas can also contain sediment, pesticides, herbicides, nutrients (e.g., fertilizers), and pathogens (e.g., bacteria and viruses from fecal wastes of pets and livestock). Contaminants of concern that remain in the environment for an extended period after deposition with little degradation include synthetic organic compounds such as chlorinated hydrocarbon pesticides (e.g., dichlorodiphenyltrichloroethane [DDT]), which largely have not been produced or used in California since the late 1970's, polychlorinated biphenyl compounds (PCBs), and dioxin and furan compounds. Improperly managed construction activities-related erosion and stormwater runoff can contribute sediment.

Primary water quality issues vary around the State depending on the location and type of water resources present in an area, the size and extent of the watershed and regional water resources, the location of the water body with respect to potential pollutant sources, seasonal and climatic factors, and many other interacting physical, chemical, and biological processes. The State Water Resources Control Board (SWRCB) conducts monitoring of surface waters through the Surface Water Ambient Monitoring Program (SWAMP), in which the collected data is used in part to support water quality assessments by each Regional Water Quality Control Board for the Clean Water Act (CWA) Section 305(b) reporting process, which mandates the State to identify and prioritize funding efforts for protection, cleanup, and monitoring programs. The most recent Section 305(b) report released in 2002 identified that of the 32,536 miles of rivers/streams assessed, 27,449 were impaired for one or more beneficial uses, as was 361,128 of 576,013 acres of lakes/reservoirs assessed (SWRCB 2003).

Groundwater quality may be adversely affected by all of the sources contributing to surface water impairment discussed above, particularly in alluvial aquifers that are recharged directly through by infiltration and percolation of surface water. Direct inputs of wastes to groundwater include sub-surface sources such as inadequately contained solid waste landfills, failing residential and commercial septic system leachfields, and leaking underground storage tanks that contain fuels, oils, or other industrial chemicals. The level of the major dissolved minerals (e.g., calcium, magnesium, potassium, sodium, sulfate, chloride), or salinity, is an important groundwater quality parameter for drinking water acceptability, agricultural use (i.e., crop tolerance), and aquatic biota. Total dissolved solids (TDS) concentrations that exceed about 500 milligrams per liter (mg/L) reflect generally low salinity, whereas water with TDS levels above about 2,500 mg/L are undesirable for drinking and have severe limitations for agricultural irrigation. Salinity can be naturally high, such as coastal aquifers affected by seawater intrusion or in arid lands where eons of evaporative concentration and locations of prehistoric seas have raised salinity levels.

2. Regulatory Setting

Table 3.I-1 below provides a general description of applicable laws and regulations that may pertain to the Proposed ACC Program as it relates to hydrology, water quality, and water supply.

Table 3.I-1. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply

Applicable Regulation	Description
Federal	
National Flood Insurance Program	Designated floodplain mapping program, flooding and flood hazard reduction implementation, and federal subsidized flood insurance for residential and commercial property. Administered by the Federal Emergency Management Agency (FEMA).
Executive Order 11988	Requires actions to be taken for federal activities to reduce the risks of flood losses, restore and preserve floodplains, and minimize flooding impacts to human health and safety.
Clean Water Act (CWA)	Administered primarily by the U.S. Environmental Protection Agency (U.S. EPA). Pertains to water quality standards, state responsibilities, and discharges of waste to waters of the United States. Sections 303, 401, 402, and 404.
CWA Section 303	Defines water quality standards consisting of: 1) designated beneficial uses of a water, 2) the water quality criteria (or "objectives" in California) necessary to support the uses, and 3) an antidegradation policy that protects existing uses and high water quality. Section 303(d) requires states to identify water quality impairments where conventional control methods will not achieve compliance with the standards, and establish Total Maximum Daily Load (TMDL) programs to achieve compliance.
CWA Section 401	State certification system for federal actions which may impose conditions on a project to ensure compliance with water quality standards.
CWA Section 402	National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point sources and nonpoint source stormwater. Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4) (MS4 Permit). Several of the cities and counties issue their own NPDES municipal stormwater permits for the regulations of stormwater discharges. These permits require that controls are implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, these permit holders have created Stormwater Management Plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects, applicants will be required to follow

Table 3.I-1. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply

Applicable Regulation	Description
	the guidance contained in the Stormwater Management Plans as defined by the permit holder in that location.
CWA Section 404	Permit system for dredging or filling activity in waters of the U.S., including wetlands, and administered by the U.S. Army Corps of Engineers.
National Toxics Rule and California Toxics Rule	Applicable receiving water quality criteria promulgated by U.S. EPA for priority toxic pollutants consisting generally of trace metals, synthetic organic compounds, and pesticides.
State	
California Water Rights	The State Water Resources Control Board (SWRCB) administers review, assessment, and approval of appropriative (or priority) surface water rights permits/licenses for diversion and storage for beneficial use. Riparian water rights apply to the land and allow diversion of natural flows for beneficial uses without a permit, but users must share the resources equitably during drought. Groundwater management planning is a function of local government. Groundwater use by overlying property owners is not formally regulated, except in cases where the groundwater basin supplies are limited and uses have been adjudicated, or through appropriative procedures for groundwater transfers.
Public Trust Doctrine	Body of common law that requires the State to consider additional terms and conditions when issuing or reconsidering appropriative water rights to balance the use of the water for many beneficial uses irrespective of the water rights that have been established. Public trust resources have traditionally included navigation, commerce, and fishing and have expanded over the years to include protection of fish and wildlife, and preservation goals for scientific study, scenic qualities, and open-space uses.
Porter-Cologne Water Quality Control Act and California Water Code (Title 23)	The SWRCB is responsible for statewide water quality policy development and exercises the powers delegated to the State by the federal government under the CWA. Nine Regional Water Quality Control Boards (Regional Water Boards) adopt and implement water quality control plans (Basin Plans) which designate beneficial uses of surface waters and groundwater aquifers, and establish numeric and narrative water quality objectives for beneficial use protection. Regional Water Boards issue waste discharge requirements (WDRs) for discharge activities to water and land, require monitoring and maintain reporting programs, and implement enforcement and compliance policies and procedures. Other state agencies with jurisdiction in water quality regulation in California include the Department of Public Health (drinking water regulations), Department of Pesticide Regulation, Department of Toxic Substances Control, Department of Fish and Game, and the Office of Environmental Health and Hazard Assessment.

Table 3.I-1. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply

Applicable Regulation	Description
Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California	Commonly referred to as the State Implementation Policy (or SIP), the SIP provides implementation procedures for discharges of toxic pollutants to receiving waters.
Thermal Plan	The Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California was adopted by the SWRCB in 1972 and amended in 1975. The Thermal Plan restricts discharges of thermal waste or elevated temperature waste to waters of the state. Generally, the Thermal Plan prohibits discharges from increasing ambient temperatures by more than 1°F over more than 25 percent of a stream cross section, increasing ambient temperatures by more than 4°F in any location, and prohibits discharge of waste that exceeds more than 20°F above the ambient temperature.
Statewide NPDES General Permit for Stormwater Associated with Land Disturbance and Construction Activity (Order No. 2009-0009-DWQ, NPDES No. CAR000002)	NPDES permit for stormwater and non-storm discharges from construction activity that disturbs greater than one acre. The general construction permit requires the preparation of a storm water pollution prevention plan (SWPPP) that identifies best management practices (BMPs) to be implemented to control pollution of storm water runoff. The permit specifies minimum construction BMPs based on a risk-level determination of the potential of the project site to contribute to erosion and sediment transport and sensitivity of receiving waters to sediment. While small amounts of construction-related dewatering are covered under the General Construction Permit, the RWQCB has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit applies to various categories of dewatering activities and may apply to some construction sites, if construction of specific projects required dewatering in greater quantities than that allowed by the General Construction Permit and discharged the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit.
Statewide NPDES General Permit for Discharges of Stormwater Associated with Industrial Facilities (Order No. 97-003-DWQ, NPDES No. CAS000001)	NPDES permit for stormwater and non-storm discharges from types of industrial sites based on the Standard Industrial Classification (SIC). The general industrial permit requires the preparation of a SWPPP that identifies potential onsite pollutants, BMPs to be implemented, and inspection/monitoring.
Local	
Water Agencies	Water agencies enter into contracts or agreements with the federal and state governments to protect the water supply and to ensure the lands within the agency have a dependable supply of suitable quality water to meet present and future needs.
Floodplain Management	General Plans guide County land use decisions, and require the identification of water resource protection goals, objectives, and policies. Floodplain management is addressed through ordinances, land use planning, and development design review and approval. Local actions

Table 3.I-1. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply

Applicable Regulation	Description
	may be coordinated with FEMA for the National Flood Insurance Program. Typical provisions address floodplain use restrictions, flood protection requirement, allowable alteration of floodplains and stream channels, control of fill and grading activities in floodplains, and prevention of flood diversions where flows would increase flood hazards in other areas.
Drainage, Grading, and Erosion Control Ordinances	Counties regulate building activity under the federal Uniform Building Code, local ordinances, and related development design review, approval, and permitting. Local ordinances are common for water quality protection addressing drainage, stormwater management, land grading, and erosion and sedimentation control.
Environmental Health	The Regional Water Boards generally delegate permit authority to County health departments to regulate the construction and operation/maintenance of on-site sewage disposal systems (e.g., septic systems and leachfields, cesspools).

J. Land Use and Planning

1. Existing Conditions

The manner in which physical landscapes are used or developed is commonly referred to as land use. Local governments possess the basic legal authority to control land use, which is part of the police powers to protect community health, safety, and welfare conferred to state governments under the U. S. Constitution and, in turn, delegated by the state to local governments. Cities and counties are the primary entities that determine the types of land use changes that can occur for specific purposes within their jurisdiction, as well as development standards for structures and other development on the land. In incorporated areas, land use decisions are made by the city. In unincorporated areas, land use decisions are made by the county. Sometimes other public agencies have land use authority, either by virtue of land ownership by agencies with sovereignty over local government, such as state or federal land management agencies, or because of other state or federal laws, such as the California Coastal Commission in the coastal zone or the State Lands Commission in submerged and other land held in trust for the public.

In California, the State Planning and Zoning Law (California Government Code section 65000 et seq.) provides the primary legal framework that cities and counties must follow in land use planning and controls. Planned land uses are designated in the city or county General Plan, which serves as the comprehensive master plan for the community. Also, city and county land use and other related resource policies are defined in the General Plan. The primary land use regulatory tool provided by the California Planning and Zoning Law is the zoning ordinance adopted by each city and county. Planning and Zoning Law requirements are discussed in the regulatory setting below.

When approving land use development, cities and counties must comply with the California Environmental Quality Act (CEQA), which requires that they consider the significant environmental impacts of their actions and the adoption of all feasible mitigation measures to substantially reduce significant impacts, in the event a project causes significant or potentially significant effects on the environment. In some cases, building permits may be ministerial, and therefore exempt from CEQA, but most land use development approval actions by cities and counties require CEQA compliance.

2. Regulatory Setting

Table 3.J-1 below provides a general description of applicable laws and regulations that may pertain to land use planning and the Proposed ACC Program.

Table 3.J-1. Applicable Laws and Regulations for Land Use Planning

Applicable Regulation	Description
Federal	
Federal Land Policy Management Act	The Federal Land Policy Management Act of 1976 (FLPMA) is the principal law governing how the BLM manages public lands. FLPMA requires the BLM to manage public land resources for multiple use and sustained yield for both present and future generations. Under FLPMA, the BLM is authorized to grant right-of-ways (ROWs) for generation, transmission, and distribution of electrical energy. Although local agencies do not have jurisdiction over the federal lands managed by the BLM, under FLPMA and the BLM regulations at 43 CFR Part 1600, the BLM must coordinate its planning efforts with state and local planning initiatives. FLPMA defines an Area of Critical Environmental Concern (ACEC) as an area within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The BLM identifies, evaluates, and designates ACECs through its resource management planning process. Allowable management practices and uses, mitigation, and use limitations, if any, are described in the planning document and the concurrent or subsequent ACEC Management Plan. ACECs are considered land use authorization avoidance areas because they are known to contain resource values that could result in denial of applications for land uses that cannot be designed to be compatible with management objectives and prescriptions for the ACEC.

Table 3.J-1. Applicable Laws and Regulations for Land Use Planning	
Applicable Regulation	**Description**
U.S. Bureau of Land Management Resource Management Plans	Established by FLPMA, Resource Management Plans are designed to protect present and future land uses and to identify management practices needed to achieve desired conditions within the management area covered by the Resource Management Plans. Management direction is set forth in the Resource Management Plans in the form of goals, objectives, standards, and guidelines. These, in turn, direct management actions, activities, and uses that affect land management, and water, recreation, visual, natural, and cultural resources.
State	
State Planning and Zoning Law	California Government Code section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of the city or county. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city or county's vision for the area. The general plan is also a long-range document that typically addresses the physical character of an area over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals.
Subdivision Map Act (Government Code section 66410 et seq.)	In general, land cannot be divided in California without local government approval. The primary goals of the Subdivision Map Act are: (a) to encourage orderly community development by providing for the regulation and control of the design and improvements of the subdivision with a proper consideration of its relation to adjoining areas; (b) to ensure that the areas within the subdivision that are dedicated for public purposes will be properly improved by the subdivider so that they will not become an undue burden on the community; and (c) to protect the public and individual transferees from fraud and exploitation. (61 Ops. Cal. Atty. Gen. 299, 301 [1978]; 77 Ops. Cal. Atty. Gen. 185 [1994]). Dividing land for sale, lease or financing is regulated by local ordinances based on the state Subdivision Map Act (Government Code section 66410 et seq.).
Local	
General Plans	The most comprehensive land use planning is provided by city and county general plans, which local governments are required by State law to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or which the jurisdiction has chosen to include. Required topics are: land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address are public facilities, parks and recreation, community design, or growth management, among others. City and county general plans must be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas).

Table 3.J-1. Applicable Laws and Regulations for Land Use Planning

Applicable Regulation	Description
Specific and Community Plans	A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These more localized plans provide for focused guidance for developing a specific area, with development standards tailored to the area, as well as systematic implementation of the general plan. Specific and community plans are required to be consistent with the city or county's general plan.
Zoning	The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, State law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.
Housing Element Law	State law requires each city and county to adopt a general plan containing at least seven mandatory elements including housing. Unlike the other general plan elements, the housing element, required to be updated every five to six years, is subject to detailed statutory requirements and mandatory review by a State agency, the California Department of Housing and Community Development (Department). Housing elements have been mandatory portions of local general plans since 1969. This reflects the statutory recognition that housing is a matter of statewide importance and cooperation between government and the private sector is critical to attainment of the State's housing goals. The availability of an adequate supply of housing affordable to workers, families, and seniors is critical to the State's long-term economic competitiveness and the quality of life for all Californians.

K. Mineral Resources

1. Existing Conditions

Mineral resources are all the physical materials that are extracted from the earth for use. Modern society is dependent on a huge amount and variety of mineral resources. Mineral resources are classified as metallic or non-metallic. As measured by consumption, the most important metallic resources are iron aluminum, copper, zinc and lead. The most important nonmetallic resources include crushed stone, sand and gravel, cement, clays, salt and phosphate. Mineral reserves are known deposits of minerals that can be legally mined economically using existing technology.

The California Geological Survey (CGS), formerly the California Division of Mines and Geology, classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act of 1975 and assists the CGS in the designation of lands containing significant aggregate resources. Mineral Resource Zones (MRZs) have been designated to indicate the significance of mineral deposits. The MRZ categories follow:

- **MRZ-1:** Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.
- **MRZ-2:** Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.
- **MRZ-3:** Areas containing mineral deposits the significance of which cannot be evaluated from available data.
- **MRZ-4:** Areas where available information is inadequate for assignment to any other MRZ.

Lithium and platinum are discussed below, as such relate to the proposed ACC Program.

a. Lithium Mining

i. Basic Processes

Lithium is an elemental metal that is necessary component of lithium-ion batteries. More vehicle manufacturers are considering the use of lithium-ion batteries in their battery electric vehicle (BEV) and hybrid plug-in vehicle models instead of nickel-metal hydride batteries (USGS 2011).

Lithium production comes from deposits in which the lithium has been concentrated above background crustal abundance by natural processes. Lithium deposits are found in brine, which is extracted from wells that penetrate lithium-bearing zones of sediment (e.g., aquifers) and pumped into shallow evaporation ponds, where it is evaporated under controlled conditions that eliminate deleterious elements and compounds, principally magnesium and sulfate (Gruber et al. 2011).

ii. Number of Facilities in California

There are no lithium mines in California. The only commercial lithium brine operation in the U.S. is operated by American Lithium Minerals, Inc. in western Nevada (American Lithium Inc. 2010; USGS 2011). Other nations that are substantial lithium producers include Chile, Argentina, Canada, Bolivia, and China.

a. Platinum Mining

i. Basic Processes

Platinum is a vital component of proton exchange membrane fuel cells, which is the leading type of fuel cell that would be used in fuel cell vehicles (FCVs). The mining of platinum starts with finding an ore body containing (PGM), usually associated with copper and nickel ores. The ore is attained through a combination of digging, drilling, and blasting, and then hauled by a haul dump vehicle to a refining facility.

ii. Number of Facilities in California

There are no platinum mines in California. The only primary platinum-group metal (PGM) mines in the U.S. are the Stillwater and East Boulder Mines in Montana (USGS 2011). Small quantities of PGMs were also recovered as byproducts of copper refining. South Africa, Russia, and Canada are the world's leading producers of platinum.

2. Regulatory Setting

Applicable laws and regulations associated with mineral resources are discussed in Table 3.K-1.

Table 3.K-1. Applicable Laws and Regulations for Mineral Resources

Federal	
Mining and Mineral Policy Act	The Mining and Mineral Act of 1970 declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.
State	
Surface Mining and Reclamation Act (SMARA)	The intent of SMARA of 1975 is to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using Mineral Resource Zones (MRZ) to designate lands that contain mineral deposits are designed to protect mineral deposits from encroaching urbanization and land uses that are incompatible with mining. The MRZ classifications reflect varying degrees of mineral significance, determined by available knowledge of the presence or absence of mineral deposits as well as the economic potential of the deposits.
California Building Standards Code (CBSC) (CCR Title 24)	California's minimum standards for structural design and construction are given in the California Building Standards Code (CBSC) (CCR Title 24). The CBSC is based on the Uniform Building Code (International Code Council 1997), which is used widely throughout United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.

Table 3.K-1. Applicable Laws and Regulations for Mineral Resources	
Local	
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of BMPs similar to those contained in a SWPPP.
County General Plans (and EIR)	Some county General Plans provide a regulatory framework to address potential environmental impacts that may result from a proposed project

L. Noise

1. Existing Conditions

a. Acoustic Fundamentals

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature, and can vary substantially from person to person.

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system, the decibel (dB) scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100-fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this environmental analysis are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation noise sources), such as automobiles, trucks, and airplanes and stationary sources (nontransportation noise sources), such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (walls, building façades, berms). Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dB per doubling of distance.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or “shielding” provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods, and human-made features such as buildings and walls may be used as noise barriers.

b. Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below.

- **Equivalent Noise Level (L_{eq}):** The energy mean (average) noise level.
- **Maximum Noise Level (L_{max}):** The highest A/B/C weighted integrated noise level occurring during a specific period of time.

- **Minimum Noise Level (L_{min}):** The lowest A/B/C weighted integrated noise level during a specific period of time.
- **Day-Night Noise Level (L_{dn}):** The 24-hour Leq with a 10-dB "penalty" applied during nighttime noise-sensitive hours, 10 p.m. through 7 a.m.
- **Community Noise Equivalent Level (CNEL):** Similar to the Ldn described above, but with an additional 5-dB "penalty" for the noise-sensitive hours between 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and watching television.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the L_{eq} descriptor listed above, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The Leq is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

c. Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustom to, the less tolerable the new noise source will be perceived.

With respect to how humans perceive and react to changes in noise levels, a 1 dB increase is imperceptible, a 3 dB increase is barely perceptible, a 6 dB increase is clearly noticeable, and a 10 dB increase is subjectively perceived as approximately twice as loud (Egan 1988). These subjective reactions to changes in noise levels was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 3 dB or more is typically considered substantial in terms of the degradation of the existing noise environment.

d. Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature, explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration [FTA] 2006, California Department of Transportation [Caltrans] 2004). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration that is relevant to this analysis occurs from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2006).

e. Existing Sources and Sensitive Land Uses

The existing noise environment in most urban areas of California area is primarily influenced by transportation noise from vehicle traffic on the roadway systems (e.g., highways, freeways, primary arterials, and major local streets) and non-transportation noise from commercial and industrial operations. Other noise sources that contribute to the existing noise environment include passenger and freight on-line railroad operations and ground rapid transit systems; commercial, general aviation, heliport, and military airport operations (e.g., jet engine test stands, ground facilities and maintenance) and overflights; and to a much lesser extent construction sites, schools (i.e., play fields), residential and recreational areas (e.g., landscape maintenance activities, dogs barking, people talking), agricultural activities, and others. Those noted above are also considered sources of vibration in the project area. With regards to the affected entities, existing noise conditions vary depending on location, but are typically characterized as noisy urban industrial areas including such noise sources as stationary machinery, transportation (e.g., surface vehicles, heavy-duty diesel trucks, construction equipment), and other industrial-related activities. Table 3.L-1 shows typical ambient noise levels based on population density.

Table 3.L-1. Population Density and Associated Ambient Noise Levels

	dBA, L_{dn}
Rural	40-50
Suburban	
Quiet suburban residential or small town	45-50
Normal suburban residential	50-55
Urban	
Normal urban residential	60
Noisy urban residential	65
Very noise urban residential	70
Downtown, major metropolis	75-80
Under flight path at major airport, ½ to 1 mile from runway	78-85
Adjoining freeway or near a major airport	80-90

Notes: A-Weighted Decibel (dBA). An overall frequency-weighted sound level in decibels which approximates the frequency response of the human ear. Day-Night Level (Ldn).
Sources: Cowan, James P. 1994

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also generally considered sensitive to increases in exterior noise levels. Places of worship and transit lodging, and other places where low interior noise levels are essential are also considered noise-sensitive.

Those noted above are also considered vibration-sensitive land uses in addition to commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance. Equipment such as electron microscopes and high-resolution lithographic equipment can be very sensitive to vibration, and even normal optical microscopes will sometimes be difficult to use when vibration is well below the human annoyance level. Manufacturing of computer chips is an example of a vibration-sensitive process. This category does not include most computer installations or telephone switching equipment because most such equipment is designed to operate in typical building environments where the equipment may experience occasional shock from bumping and continuous background vibration caused by other equipment (FTA 2006).

2. Regulatory Setting

The following provides a brief description of the Federal and State noise regulations that could be applicable to the ACC Program. Local regulations may also apply; however, because the specific siting of new hydrogen fueling stations automotive production facilities is not known at this time it would be speculative to present a discussion of applicable local regulations.

Table 3.L-2. Applicable Laws and Regulations for Noise Resources

Regulation	Description
Federal	
Federal Noise Control Act (1972) (U.S. Environmental Protection Agency [U.S. EPA]), 40 CFR 201-211	This act established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. U.S. EPA was given the responsibility for providing information to the public regarding identifiable effects of noise on public health or welfare, publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety, coordinating federal research and activities related to noise control, and establishing federal noise emission standards for selected products distributed in interstate commerce. This act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations.
Quiet Communities Act (1978)	This act promotes the development of effective State and local noise control programs, to provide funds for noise research, and to produce and disseminate educational materials to the public on the harmful effects of noise and ways to effectively control it.
24 CFR, Part 51B (U.S. Department of Housing and Urban Development [HUD])	This regulation established standards for HUD-assisted projects and actions, requirements, and guidelines on noise abatement and control.

Table 3.L-2. Applicable Laws and Regulations for Noise Resources	
Regulation	**Description**
Federal Aviation Administration (FAA) Order 1050.1D	This order contains policies and procedures for considering environmental impacts.
14 CFR, Part 150 (FAA)	These address airport noise compatibility planning and include a system for measuring airport noise impacts and present guidelines for identifying incompatible land uses. All land uses are considered compatible with noise levels of less than 65 dBA L_{dn}. At higher noise levels, selected land uses are also deemed acceptable, depending on the nature of the use and the degree of structural noise attenuation provided.
International Standards and Recommended Practices (International Civil Aviation Organization)	This contains policies and procedures for considering environmental impacts (e.g., aircraft noise emission standards and atmospheric sound attenuation factors).
32 CFR, Part 256 (Department of Defense Air Installations Compatible Use Zones [AICUZ] Program)	AICUZ plans prepared for individual airfields are primarily intended as recommendations to local communities regarding the importance of maintaining land uses which are compatible with the noise and safety impacts of military aircraft operations.
23 CFR, Part 772, Federal Highway Administration (FHWA) standards, policies, and procedures	These provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways.
29 CFR, Part 1910, Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration [OSHA])	This regulation established a standard for noise exposure in the workplace.
Federal Transit Administration (FTA) Guidance (2006)	This guidance presents procedures for predicting and assessing noise and vibration impacts of proposed mass transit projects. All types of bus and rail projects are covered. Procedures for assessing noise and vibration impacts are provided for different stages of project development, from early planning before mode and alignment have been selected through preliminary engineering and final design. Both for noise and vibration, there are three levels of analysis described. The framework acts as a screening process, reserving detailed analysis for projects with the greatest potential for impacts while allowing a simpler process for projects with little or no effects. This guidance contains noise and vibration impact criteria that are used to assess the magnitude of predicted impacts. A range of mitigation is described for dealing with adverse noise and vibration impacts.
49 CFR 210 (Federal Rail Administration [FRA] Railroad Noise Emission Compliance Standards) and FRA Guidance (2005)	This section and guidance provides contains criteria and procedures for use in analyzing the potential noise and vibration impacts of various types of high-speed fixed guideway transportation systems.

Table 3.L-2. Applicable Laws and Regulations for Noise Resources	
Regulation	**Description**
State	
California Public Utilities Code (CPUC) Section 21670	The State Aeronautics Act of the CPUC establishes statewide requirements for airport land use compatibility planning and requires nearly every county to create an Airport Land Use Commission (ALUC) or other alternative.
Section 5000 et seq. (CCR, Title 21, Division 2.5, Chapter 6), California Airport Noise Regulations promulgated in accordance with the State Aeronautics Act	In Section 5006, the regulations state that: "The level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dBA for purposes of these regulations. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep and community reaction.
California Streets and Highways Code Section 216 (Freeway Noise in Classrooms)	This section, known as the Control of Freeway Noise in School Classrooms, requires that, in general, Caltrans abate noise from freeways to specified levels when the noise exceeds specified levels in school classrooms
California Government Code Section 65302 (Provision of Noise Contour Maps)	This section requires Caltrans to provide cities and counties with noise contour maps along State highways.
Title 24, Part 2, California Code of Regulations	These establish standards governing interior noise levels that apply to all new single-family and multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation that will limit maximum L_{dn} levels to 45 dBA in any habitable room.

M. Employment, Population, and Housing

1. Existing Conditions

The employed civilian labor force, unemployment rates, employment opportunities, and population estimates and projections for cities, counties, and states are collected every ten years by the U.S. Census Bureau (Census). The California Employment Development Department (EDD) collects statistics specific to California annually.

Population data for the State of California is collected during the ten year census cycles conducted by the United States Census Bureau. The 2010 Census shows California's total population at 37,253,956 individuals. Minors (9,295,040 individuals, under age 18) account for approximately 25 percent of the population, while adults (27,958,916 individuals, over age 18) account for approximately 75 percent of the population. Senior citizens (4,246,514 individuals, over age 65) account for approximately 15 percent of the adult population or 11 percent of the State's total population (U.S. Census Bureau 2010).

The State of California, Department of Finance (DOF) provides population projections after each ten year census cycle once the Census Bureau releases its Modified Age, Race, and Sex data. For the 2010 Census this data is not expected to be available until 2012. The current DOF projections are based on the 2000 Census and provide population projects in ten year increments through 2050. These projections show California's rate of population growth is expected to decline over time, as follows (DOF 2007):

- From 2000 to 2010: Population growth of approximately 14.7 percent (to 39,135,676)
- From 2010 to 2020: Population growth of approximately 12.8 percent (to 44,135,923)
- From 2020 to 2030: Population growth of approximately 11.6 percent (to 49,240,891)
- From 2030 to 2040: Population growth of approximately 10.1 percent (to 54,226,115)
- From 2040 to 2050: Population growth of approximately 9.7 percent (to 59,507,876)

Based on the 2010 Census, the actual rate of growth from 2000 to 2010 was approximately 9.2 percent, from 34,105,437 (DOF 2007) to 37,253,956 (U.S. Census Bureau 2010).

Current and projected employment data for the State of California is estimated by the State of California Employment Development Department (EDD). Total civilian employment in the State in during 2010 was 15,963,300 individuals (EDD 2011b). The EDD produces short-term (two year) projections of employment annually and long-term (ten year) projections of employment every two years. The current short-term (2010-2012) projections estimate that California's total occupational employment is expected to grow by 3.3 percent during that time (a net increase of 523,600 new jobs) and will reach 16.3 million jobs by the third quarter of 2012 (EDD 2011a). The long-term projections (2008-2018) estimate that California's occupational employment is expected to add over 1.6 million jobs during that decade to reach approximately 18.6 million jobs by 2018 (EDD 2010).

2. Regulatory Setting

Federal and state laws do not control population and employment. See housing-related regulations in Section J, Land Use and Planning.

N. Public Services

1. Existing Conditions

a. Law Enforcement

The U.S. Environmental Protection Agency (U.S. EPA) is an agency of the federal government of the United States charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. The Environmental Protection Agency's Criminal Investigation Division (U.S. EPA CID) primary mission is the enforcement of the United States' environmental laws as well as any other federal law in accordance with the guidelines established by the Attorney General of the United States (18 U.S.C. 3063). These environmental laws include those specifically related to air, water and land resources.

Statewide law enforcement service is provided by the California Highway Patrol (CHP). The CHP is responsible for protecting State resources and providing crime prevention services and traffic enforcement along the State's highways and byways.

Enforcement of environmental laws in California is the responsibility of the AG's Office and Cal/EPA. The Attorney General represents the people of California in civil and criminal matters before trial courts, appellate courts and the supreme courts of California and the United States. In regards to environmental issues, the Attorney General enforces laws that safeguard the environment and natural resources in the State. Recent actions by the Attorney General related to air quality and climate change issues include: legally defending the State's clean cars law against multiple challenges, filing numerous actions against the Bush Administration regarding regulation of global warming pollution, working with local governments to ensure that land use planning processes take account of global warming, promoting renewable energy and enhanced energy efficiency in California, and working with other State leaders and agencies to implement AB 32, the Global Warming Solutions Act of 2006 (DOJ 2011).

The California Environmental Protection Agency (Cal/EPA) was created in 1991 by Governor's Executive Order. Cal/EPA's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality (Cal/EPA 2011a). The Cal/EPA is comprised of various boards, departments and offices, including: Air Resources Board, Department of Pesticide Regulation, Department of Toxic Substances Control, Office of Environmental Health Hazard Assessment, and State Water Resources Control Board (including the nine Regional Water Quality Control Boards) (Cal/EPA 2011b).

California's environmental laws are enforced by State and local agencies, each charged with enforcing the laws governing a specific media such as air, water, hazardous waste, solid waste, and pesticides (Cal/EPA 2011c). Enforcement agencies for these media are as follows:

- Air: Air Resources Board (part of Cal/EPA) and Local Air Districts.
- Water: State Water Resources Control Board (part of Cal/EPA), Regional Water Quality Control Boards (part of Cal/EPA), local waste water officials, and the California Department of Public Health.
- Hazardous Waste: Department of Toxic Substances Control (part of Cal/EPA) and Certified Unified Program Agencies (CUPA).
- Carcinogens/Reproductive Toxins: Prop. 65 through the Office of Environmental Health Hazard Assessment (part of Cal/EPA).
- Pesticides: Department of Pesticide Regulation (part of Cal/EPA) and County Agricultural Commissioners

Community law enforcement service is provided by local police and sheriff agencies (i.e., cities and counties, respectively) to prevent crime, respond to emergency incidents, and provide traffic enforcement on local roadways.

b. Fire Protection and Emergency Medical Response Services

The United States Forest Service is an agency of the United States Department of Agriculture that administers the nation's 155 national forests and 20 national grasslands, which encompass 193 million acres (780,000 km^2), including fire protection and response services. Major divisions of the agency include the National Forest System, State and Private Forestry, and the Research and Development branch. The Fire and Aviation Management part of the US Forest Service works to advance technologies in fire management and suppression, maintain and improve the extremely efficient mobilization and tracking systems in place, and reach out in support of our Federal, State, and International fire partners.

State-level fire protection and emergency response service is provided by the California Department of Forestry and Fire Protection (CAL FIRE), primarily in rural areas of the State. CAL FIRE is an emergency response and resource protection department. CAL FIRE protects lives, property and natural resources from fire, responds to emergencies of all types, and protects and preserves timberlands, wildlands, and urban forests.

Local and urban fire protection service is provided by local fire districts and/or local agencies (e.g., fire departments of cities and counties). In addition to providing fire response services most fire agencies also provide emergency medical response services (i.e., ambulance services) within their service areas.

c. Schools

Education is primarily a state and local responsibility in the United States. States and communities, as well as public and private organizations, establish schools, develop curricula, and determine requirements for enrollment and graduation (U.S. Department of Education 2010). Statewide, the regulation of education for youth is provided by the California Department of Education. The State Board of Education (SBE) is the governing and policy-making body of the California Department of Education. The SBE sets K-12 education policy in the areas of standards, instructional materials, assessment, and accountability (California State Board of Education 2010).

Locally, school districts are responsible for the management and development of elementary, middle, and high-school facilities. Throughout California there are 1,039 school districts.

2. Regulatory Setting

Key regulations and polices applicable to law enforcement, fire protection and emergency medical response services, and schools for the proposed ACC Program are summarized in Table 3.N-1.

Table 3.N-1. Applicable Laws and Regulations for Public Services

Regulation	Description
Federal	None applicable.
American with Disabilities Act	Guidelines to ensure that facilities are accessible to individuals with disabilities. Implements requirements for the design and construction of buildings.
State	
State Fire Responsibility Areas	Areas delineated by the State of California, Department of Forestry and Fire Protection (CAL FIRE) for which the State assumes primary financial responsibility for protecting natural resources from damages of fire. Local jurisdictions are required to adopt minimum recommended requirements for road design, road identification, emergency fire suppression and fuel breaks and greenbelts. All projects within or adjacent to a State Fire Responsibility Area must meet these requirements.
State School Funding	Education Code Section 17620 authorizes school districts to levy a fee, charge, dedication, or other requirement for any development project for the construction or reconstruction of school facilities.

O. Recreation

1. Existing Conditions

Recreational resources and facilities are provided and managed at federal, state, and local levels. The federal government manages a diverse array of recreational facilities and resources in California that include national parks and monuments, national forests and grasslands, wildlife refuges, wilderness areas, lakes and lands managed by different agencies in the federal government, wild and scenic rivers, and back country byways, national trials, and marine reserves and estuaries. The U.S. Fish and Wildlife Service (USFWS) manages the wildlife and fisheries resources and their habitats. Each federal agency's programs include recreation components.

California has over 275 State beaches and parks, recreation areas, wildlife areas, historic parks, and museums, and has authority over fishing and hunting activities, habitat restoration and protection in the State. General plans for State parks, recreation areas, and beaches are publicly available. The California Outdoor Recreation Plan and associated research provide policy guidance to all public agencies – federal, state, local, and special districts that oversee outdoor recreation on lands, facilities and services throughout California Agencies and departments that have involvement in recreational activities include Boating and Waterways, Fish and Game, Tahoe Regional Planning Association, various conservancies, and others (California State Parks 2008, p. 3).

Recreational lands and facilities are also managed by regional and local park and recreation agencies and open space districts. City and county General Plans contain recreation elements that provide framework for planning agencies to consider when projects are developed and implemented.

2. Regulatory Setting

The following provides a brief description of the Federal and State regulations that could be applicable to a new or renovated vehicle production facilities or fueling stations. Local regulations may also apply; however, because the specific siting of new is not known at this time it would be speculative to present a discussion of applicable local regulations.

Table 3.O-1. Applicable Laws and Regulations for Recreation	
Law or Regulation	**Description**
Federal	
Federal Land Policy and Management Act (FLPMA), 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the "multiple use" management, protection, development, and enhancement of public lands. "Multiple use" management, defined as "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people" with recreation identified as one of the resource values (FLPMA 2001).
State	None applicable
Local	General plans for cities and counties contain designations for recreational areas. These are policy documents with planned land use maps and related information that are designed to give long-range guidance to those local officials making decisions affecting the growth and resources of their jurisdictions. Because of the number and variety of general plans and related local plans, they are not listed individually.

P. Transportation and Traffic

1. Existing Conditions

Existing roadway systems in the project area generally consist of highways, freeways, arterials, local streets, and intersections/ramps. The existing average annual daily traffic (AADT) volumes on the roadway segments that comprise these systems vary considerably (i.e., from hundreds to hundreds of thousands). The level of service (LOS), a scale used to determine the operating quality of a roadway segment or intersection based on volume-to-capacity ratio (V/C) or average delay, also vary from LOS A, the best and smoothest operating conditions, to LOS F, most congested operating conditions. Other roadway and traffic volume characteristics such as roadway length, number of lanes and facility type (e.g., two-lane freeway), right-of-way width and pavement width, terrain classification (e.g., flat), percent of heavy-duty truck traffic, and accident rates (e.g., number of accidents per million vehicle miles traveled) also vary substantially depending on the location. In addition to the roadway systems, circulation networks provide additional transportation opportunities and include mass transit, airports, and non-motorized travel (e.g., pedestrian and bicycle paths).

2. Regulatory Setting

Key regulations and polices applicable to utilities for the proposed ACC Program are summarized in Table 3.P-1. See Table 3.D-1 for a description of SB 375.

Table 3.P-1. Applicable Laws and Regulations for Transportation and Traffic

Regulation	Description
Federal	
40 CFR, Part 77 (Federal Aviation Administration)	Requires a determination of no hazard to air navigation for structures that will be more than 200 feet above ground level.
State	
California Vehicle Code (VC) Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620; California Health and Safety Code Section 25160 et seq.	These regulate the highway transport of hazardous materials.
VC Sections 13369; 15275 and 15278	These address the licensing of drivers and the classification of licenses required for the operation of particular types of vehicles and also requires certificates permitting operation of vehicles transporting hazardous materials.
VC Sections 35100 et seq.; 35250 et seq.; 35400 et seq.	These specify limits for vehicle width, height, and length.
VC Section 35780	This requires permits for any load exceeding Caltrans weight, length, or width standards on public roadways.
California Streets and Highways Code Section 117, 660-672	This requires permits for any load exceeding Caltrans weight, length, or width standards on County roads.
California Streets and Highways Code Sections 117, 660-670, 1450, 1460 et seq., and 1480 et seq.	These regulate permits from Caltrans for any roadway encroachment from facilities that require construction, maintenance, or repairs on or across State highways and County roads.

Q. Utilities and Service Systems

1. Existing Conditions

a. Water Supply and Distribution

The principal water supply facilities in California are operated by the USBR and DWR. The USBR is a federal agency and it is the largest wholesaler of water in the U.S. and the second largest producer of hydroelectric power (USBR 2011a). In California, the Mid-Pacific Region of the USBR is responsible for the management of the Central Valley Project (CVP). The CVP serves farms, homes, and industry in California's Central Valley as well as the major urban centers in the San Francisco Bay Area. The CVP consists of 20 dams and reservoirs, 11 power plants, and 500 miles of major canals and reaches from the Cascade Mountains near Redding in the north to the Tehachapi Mountains near Bakersfield in the south. In addition to delivering water for municipal and industrial uses and the environment, the CVP produces electric power and provides flood protection, navigation, recreation, and water quality benefits (USBR 2011b).

DWR is a State agency that is responsible for managing and implementing the State Water Project (SWP). The SWP is a water storage and delivery system of reservoirs, aqueducts, power plants and pumping plants. Its main purpose is to store water and distribute it to 29 urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California (DWR 2010).

Local water districts, irrigation districts, special districts, and jurisdictions (e.g., cities and counties) manage and regulate the availability of water supplies and the treatment and delivery of water to individual projects. Depending on their location and the source of their supplies, these agencies may use groundwater, surface water through specific water entitlements, or surface water delivered through the CVP or SWP. In some remote areas not served by a water supply agency, individual developments may need to rely upon the underlying groundwater basin for their water supply. In these cases, the project would be required to secure a permit from the local land use authority and seek approval for development of the groundwater well(s).

b. Wastewater Collection and Treatment

The California State Water Resources Control Board (SWRCB) is the State agency responsible for the regulation of wastewater discharges to surface waters and groundwater via land discharge. The SWRCB and nine regional water quality control boards (RWQCB) are responsible for development and enforcement of water quality objectives and implementation plans that protect the beneficial uses of the federal and State waters (SWRCB 2010). The State water board also administers water rights in California. The RWQCB's are responsible for issuing permits or other discharge requirements to individual wastewater dischargers and for ensuring that they are meeting the requirements of the permit through monitoring and other controls.

Wastewater collection, treatment, and discharge service for developed and metropolitan areas is typically provided by local wastewater service districts or agencies that may or may not be operated by the local jurisdiction (e.g., city or county). These agencies are required to secure treatment and discharge permits for the operation of a wastewater facility from the RWQCB. Wastewater is typically collected from a specific development and conveyed through a series of large pipelines to the treatment facility where it is treated to permitted levels and discharged to surface waters or the land.

In areas that are remote or that are not served by an individual wastewater service provider, developments would be required to install an individual septic tank or other on-site wastewater treatment system. These facilities would need to be approved by the local land use authority and the RWQCB.

c. Electricity and Natural Gas

The California Public Utilities Commission (CPUC) regulates investor-owned electric and natural gas companies located within California. The CPUC's Energy Division develops and administers energy policy and programs and monitors compliance with the adopted regulations. One-third of California's electricity and natural gas is provided by one of three companies: Pacific Gas and Electric Company, Southern California Edison, San Diego Gas and Electric Company (CPUC 2010).

Locally, energy service is provided by a public or private utility. New development projects would need to coordinate with the local service provider to ensure adequate capacity is available to serve the development.

d. Solid Waste Collection and Disposal

Statewide, the California Department of Resources Recycling and Recovery (CAL Recycle), which is a department of the California Natural Resources Agency (CNRA), is responsible for the regulation of the disposal and recycling of all solid waste generated in California. Cal Recycle acts as an enforcement agency in the approval and regulation of solid waste disposal and recycling facilities. Local agencies can create local enforcement agencies (LEA) and, once approved by Cal Recycle, they can serve as the enforcement agency for landfills and recycling facilities with their jurisdictions (Cal Recycle 2011).

Local agencies or private companies own and operate landfill facilities and solid waste is typically hauled to these facilities by private or public haulers. Individual projects would need to coordinate with the local service provider and landfill to determine if adequate capacity exists to serve the project.

At this time, propulsion batteries are replaced at authorized original equipment manufacturer (OEM) service centers if needed. However, vehicle manufacturers differ in how they are addressing the need to properly handle or dispose of propulsion batteries after they reach the end of their useful life (e.g., recycling programs, switchable battery). Vehicle manufacturers have not provided specific information about how batteries would be handled after their "second life." A study at the National

Renewable Energy Laboratory concludes that if second uses for batteries are determined not to be economical then recycling them would be the next economically superior option (Neubauer and Pesaran 2011).

Federal and state agencies also regulate and/or research how automotive propulsion batteries should be handled at the end of their useful life. Regulations under the federal Resource Conservation and Recovery Act (RCRA) nickel-metal hydride batteries and lithium-ion batteries are classified as non-hazardous waste and are not required to be recycled. Per RCRA hazardous waste listings & criteria (40 CFR 261.4, Exclusions), fully spent consumer lithium batteries are neither toxic nor reactive and are considered non-hazardous (NEMA 2001).

California's hazardous waste management regulations classify all types of batteries, including nickel-metal hydride and lithium-ion batteries, as hazardous waste when discarded and must be managed accordingly. More specifically, facilities that treat, store, dispose and recycle batteries in California are also regulated under California's hazardous waste generator laws and regulations for Universal Waste (CCR, Title 22, Section 66261.9). These facilities are regulated and inspected by the California Department of Toxic Substances Control (DTSC), which is authorized by U.S. EPA to administer its own hazardous waste program for California. The local Certified Unified Program Agency (CUPA) is given authority to enforce hazardous waste management laws and regulations at the local level by the Secretary of Cal/EPA. Generators of universal wastes must recycle their waste by relinquishing it to the following: (1) a universal waste handler (e.g.; household hazardous waste facility, a 'Take-it-Back Partner' such as retailers or manufacturers); (2) a universal waste transporter; or (3) a destination facility (facility permitted by DTSC to treat, store, dispose or recycle).

2. Regulatory Setting

Key regulations and polices applicable to utilities for the proposed ACC Program are summarized in Table 3.Q-1.

Table 3.Q-1. Applicable Laws and Regulations for Public Services

Regulation	Description
Federal	None applicable.
State	
California Public Utilities Commission, Section 95-08-038	This section contains the rules for planning and construction of new transmission facilities, distribution facilities, and substations. The CPUC requires permits for the construction of certain power line facilities or substations if the voltages would exceed certain thresholds.

Table 3.Q-1. Applicable Laws and Regulations for Public Services

Regulation	Description
Section 21151.9 of the Public Resources Code/ Section 10910 et seq. of the Water Code	Required the preparation of a water supply assessment (WSA) for large developments. These assessments are prepared by public water agencies responsible for providing service and address whether there are adequate existing and projected future water supplies to serve the proposed project. All projects that meet the qualifications for preparing a WSA must identify the water supplies and quantities that would serve the project as well as project the total water demand for the service area (including the project's water demands) by source in 5-year increments over a 20-year period. This information must include data for a normal, single-dray, and multiple-dry years. The WSA is required to be approved by the water service agency before the project can be implemented.

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4.0 REGULATED COMMUNITY COMPLIANCE RESPONSES

For LEV III and ZEV, the regulated community would be automobile manufacturers. For CFO, the regulated community would be major refineries and gasoline importers, which would be required to establish the required minimum number of CFO outlets. For the ACC program as a whole, fuel producers (e.g., hydrogen), electricity generators, and mining would also be affected indirectly.

Compliance responses are activities undertaken by regulated communities to comply with regulations. Compliance activities would change in response to regulatory amendments included in the proposed Advanced Clean Cars (ACC) Program. This Environmental Analysis (EA) presents a programmatic evaluation that describes reasonably foreseeable environmental impacts resulting from the change in compliance responses by regulated communities. The analysis considers reasonable, potential compliance responses, but does not speculate as to all of the conceivable iterations of compliance responses that could occur within the passenger vehicle fleet or at the site- or project-specific level.

It is not possible to know with a reasonable level of certainty the specific actions that would be selected by regulated communities to comply with the regulatory changes under the proposed ACC Program. Individual vehicle manufacturers or major refiners and importers of gasoline could choose other compliance responses that result in different project impacts. For the purposes of this EA, the least expensive compliance responses are generally expected to be implemented by covered industries as a whole, although the responses of individual regulated communities within affected industries may differ depending on relative compliance costs and other factors.

The following compliance responses have been identified as reasonably foreseeable actions and provide the basis for a reasoned, good-faith assessment of potential, significant environmental impacts of the regulatory amendments under the proposed ACC Program. The compliance responses associated with each component of the proposed ACC Program are discussed separately below.

A. Low-Emission Vehicle and Greenhouse Gas Regulation (LEV III)

1. Fleet Mix

The proposed LEV III requirements, particularly the fleet average standards, would affect the mix of vehicle models and types that manufacturers would sell and lease in California. Table 4-1 summarizes projections by ARB staff about how a full-line manufacturer (i.e., a company that markets both passenger cars and light-duty trucks) could meet the LEV III fleet average emission standards for ozone precursors (e.g., NMOG and NO_X). It is important to note that Table 4-1 provides an example of how a manufacturer could comply with the ozone precursor standards, but LEV III also addresses CAPs and GHGs, as discussed below.

Table 4-1. Projected Sales Mix of Light-Duty Vehicles to Achieve Compliance with LEV III Emission Standards

Year	Passenger Cars										Fleet Average Standard for Mix of $NMOG+NO_X$ Emissions (g/mile)
	LEV 160	ULEV 125	ULEV 70	ULEV 50	SULEV 30	SULEV 20	PZEV	PHEV	BEV	FCV	
2015	5%	62%	8%	0%	0%	0%	21%	2%	1%	0%	0.100
2016	3%	50%	23%	0%	0%	0%	21%	2%	1%	0%	0.091
2017	3%	38%	35%	0%	0%	0%	21%	2%	1%	0%	0.084
2018	0%	25%	47%	0%	21%	0%	0%	6%	1%	0%	0.072
2019	0%	14%	55%	0%	21%	0%	0%	7%	3%	1%	0.064
2020	0%	2%	59%	0%	21%	5%	0%	8%	4%	1%	0.054
2021	0%	0%	31%	28%	21%	5%	0%	9%	5%	2%	0.046
2022	0%	0%	6%	45%	21%	10%	0%	10%	5%	2%	0.038
2023	0%	0%	5%	32%	33%	10%	0%	11%	6%	3%	0.035
2024	0%	0%	3%	15%	40%	20%	0%	13%	6%	3%	0.029
2025	0%	0%	0%	0%	55%	20%	0%	14%	6%	4%	0.025
Year	**Light-Duty Truck 1 (0-3,750 lb LVW)**										**Fleet Average Standard for Mix of $NMOG+NO_X$ Emissions (g/mile)**
	LEV 160	**ULEV 125**	**ULEV 70**	**ULEV 50**	**SULEV 30**	**SULEV 20**	**PZEV**	**PHEV**	**BEV**	**FCV**	
2015	3%	69%	7%	0%	0%	0%	21%	0%	0%	0%	0.102
2016	3%	52%	24%	0%	0%	0%	21%	0%	0%	0%	0.093
2017	0%	44%	35%	0%	0%	0%	21%	0%	0%	0%	0.086
2018	0%	32%	47%	0%	21%	0%	0%	0%	0%	0%	0.079
2019	0%	20%	59%	0%	21%	0%	0%	0%	0%	0%	0.072
2020	0%	6%	68%	0%	21%	5%	0%	0%	0%	0%	0.062
2021	0%	0%	55%	19%	21%	5%	0%	0%	0%	0%	0.055
2022	0%	0%	11%	58%	21%	10%	0%	0%	0%	0%	0.045
2023	0%	0%	0%	51%	39%	10%	0%	0%	0%	0%	0.039
2024	0%	0%	0%	33%	47%	20%	0%	0%	0%	0%	0.035
2025	0%	0%	0%	0%	80%	20%	0%	0%	0%	0%	0.028

Table 4-1. Projected Sales Mix of Light-Duty Vehicles to Achieve Compliance with LEV III Emission Standards

Year	Light-Duty Truck 2 (3,751 lb LVW – 8,500 lb GVWR)										Fleet Average Standard for Mix of NMOG+NO_X Emissions (g/mile)
	LEV	ULEV	ULEV 70	ULEV 50	SULEV 30	SULEV 20	PZEV	PHEV	BEV	FCV	
2015	5%	81%	14%	0%	0%	0%	0%	0%	0%	0%	0.119
2016	5%	76%	19%	0%	0%	0%	0%	0%	0%	0%	0.116
2017	5%	53%	42%	0%	0%	0%	0%	0%	0%	0%	0.104
2018	5%	53%	42%	0%	0%	0%	0%	0%	0%	0%	0.104
2019	5%	42%	53%	0%	0%	0%	0%	0%	0%	0%	0.098
2020	5%	36%	59%	0%	0%	0%	0%	0%	0%	0%	0.095
2021	4%	24%	72%	0%	0%	0%	0%	0%	0%	0%	0.087
2022	4%	24%	45%	27%	0%	0%	0%	0%	0%	0%	0.081
2023	4%	5%	45%	30%	16%	0%	0%	0%	0%	0%	0.064
2024	3%	0%	20%	50%	27%	0%	0%	0%	0%	0%	0.052
2025	2%	0%	0%	25%	72%	0%	0%	0%	0%	0%	0.038

Notes: These projections reflect a reasonably representative approach for compliance with the LEV III requirements. Other compliance scenarios that would achieve the fleet average emission standards of the LEV III amendments are conceivable. ARB's projections are specifically based on how vehicle manufacturers would be expected to respond to the amended standards for criteria air pollutants and precursors of LEV III and do not reflect the amendments to greenhouse gas (GHG) standards of LEV III. These projections do not account for any potential changes in consumer preference regarding the class of vehicles consumers choose to purchase. Consumer preferences can change according to a number of factors, including changes in fuel costs.
LEV = Low-Emission Vehicle; LEV160 = certified to 0.160 g/mi NMOG plus NOx ; ULEV125 = certified to 0.125 g/mi NMOG plus NOx; ULEV = Ultra-Low-Emission Vehicle; ULEV 70 = certified to 0.070 g/mi NMOG plus NOx; ULEV 50 = certified to 0.050 g/mi NMOG plus NOx; SULEV 30 = certified to 0.030 g/mi NMOG plus NOx; SULEV 20 = certified to 0.020 g/mi NMOG plus NOx; PZEV = Partial Zero Emission Vehicle; PHEV = Plug-in Hybrid Electric Vehicle; BEV = Battery Electric Vehicle; FCV = Fuel Cell Vehicle.
Source: ARB (available in the Staff Report, Section II.A.2)

As shown in Table 4-1, a greater proportion of the vehicle fleet would consist of vehicles from the more stringent emission performance classes (i.e., ULEV 50, SULEV 30, and SULEV 20) in order for manufacturers to comply with the increasingly stringent fleet-average emission standards proposed by the amendments. Thus, because compliance would be based on this proportion shift no changes in the amount of overall vehicle manufacturing or deliveries would be expected.

2. Technology Improvements

To meet the requirements for criteria air pollutant and precursor (CAP) emissions of the proposed ACC Program, manufacturers would be expected to reduce CAPs using a range of technologies. Other specific technology improvements could include load reductions and accessory improvements employed to reduce GHG emissions. Improvements in aerodynamics that reduce drag coefficients include installation of skirts, air dams, underbody covers, and application of more aerodynamic side view mirrors. In addition to the standard aerodynamic treatments, a second level of aerodynamic technologies could include active grille shutters, rear visors, and larger under body panels. Additional actions to reduce emissions may include installation of low drag brakes that reduce sliding friction of disc brake pads on rotors, and installation of front or secondary axle disconnects for four-wheel drive vehicles that reduce energy loss. Improvements to the powertrain (engines and transmissions) and vehicle improvements related to aerodynamics, low rolling resistance tires, auxiliary improvements, mass reduction, electric drive and hybrid systems are further discussed in the LEV III Staff Report, and in the following discussion.

a. Engine Improvements and Emission Control Systems

Manufacturers would be expected to continue to improve valve timing, cylinder deactivation, turbocharging, gasoline direct injection and other systems that would reduce GHG emissions. To reduce CAPs, manufacturers would be expected to improve current emission control system technologies across their light- and medium-duty vehicle fleet. Based on past compliance with previous versions of the LEV regulation (i.e., LEV I and LEV II), these improved emission control systems would be expected to include more efficient catalysts, secondary air injection, hydrocarbon adsorbers, and improved evaporative emission control systems.

Similarly, it is expected that the technologies necessary to meet the proposed LEV III evaporative emission standards would generally be the same as the technologies currently used to meet the existing optional zero evaporative standards. Because the types of technologies used currently would also be employed to meet the amended regulations, no substantial change in the manufacturing of emissions control equipment would be expected. These zero evaporative technologies consist of a hydrocarbon scrubber, air intake system element, and additional use of low/no permeation materials. The hydrocarbon scrubber and the air intake system element both generally consist of activated carbon, which acts to store fuel vapors. Steel would likely be used as no-permeation material, while various polymer materials, such as ethyl vinyl alcohol and fluorinated polymers, would be used as low-permeation materials. ARB staff expects that, for a limited number of vehicle models, a vapor blocking valve would be used to seal vapors in the fuel tank.

b. Improved Transmission Efficiency

In response to current and proposed regulations requiring reductions in GHG emissions from motor vehicles, manufacturers are incorporating improved transmissions on their vehicles. The transmission types involved include conventional automatic transmissions with up to 8 or 9 speeds; dual clutch automated manual transmissions that offer the efficiency of a manual transmission, but shift gears automatically; and continuously variable transmissions (CVTs) that can change seamlessly through an infinite number of effective gear ratios between maximum and minimum values (SAE 2011a). Transmission types installed in vehicles to comply with the proposed GHG emissions reductions would be similar to existing technology and equipment, so substantial changes in manufacturing requirements would not be expected; however, the volume manufactured could change, but would not be anticipated to result in a substantial increase in manufacturing capacity.

c. Improved Air Conditioning Systems

The predominant refrigerant currently used in new vehicles is hydrofluorocarbon-134a (HFC-134a), which has a relatively high GWP of 1,430 (U.S. EPA 2010a). Though the current Pavley regulations (which is part of the LEV II regulation) includes a credit incentive for using refrigerants with a GWP of 150 or less, an industry-wide replacement of HFC-134a with such low GWP refrigerants, most likely 2,3,3,3-tetrafluoropropene (commonly known as HFO-1234yf), is would not anticipated to occur until model year 2017 when availability of the new refrigerant increases and its costs decrease (U.S. EPA 2010a).

It is anticipated that auto manufacturers would work with suppliers of air conditioning (AC) systems to adapt to using HFO-1234yf. Such adaptations would likely include the addition of an internal heat exchanger to maintain AC efficiency. Some modifications at vehicle assembly plants would also be needed to accommodate the mild flammability of HFO-1234yf. By the time LEVIII would go into effect, manufacturers would be familiar with these changes from complying with low-GWP requirements established by the European Commission that start with model year 2011(U.S. EPA 2010a).

In addition, the AC service industry would be expected to purchase new machinery and tools for refrigerant recovery, recycling, and recharging and train and certify technicians on proper handling of new refrigerant (Cancel, 2011). Moreover, chemical manufacturers would need to develop new procedures and construct new facilities to produce the new refrigerant (Honeywell and DuPont, 2010). Again, these types of changes are currently in process to serve the European market, so a substantial increase in manufacturing capacity would not be expected. Additionally, in response to current and proposed regulations requiring reductions in GHG emissions from motor vehicles, manufacturers are incorporating improved AC efficiency technologies in their vehicles. Because the AC hardware installed in vehicles to comply with the proposed GHG emissions reductions would be similar to existing technology and equipment, no substantial changes in manufacturing requirements would be expected.

d. Lighter Materials

Vehicle manufacturers are increasingly seeking to reduce the weight of their vehicles, without compromising vehicle safety, to both reduce emissions and increase fuel efficiency. Typically, for every 10 percent reduction in vehicle weight a 6 to7 percent reduction in GHG emissions is achieved (Cheah 2007). These weight reductions are being achieved through the use of improved vehicle design and lightweight materials, such as high-strength steel, aluminum, magnesium, plastics and carbon composites (polycarbonate). These materials are already incorporated on vehicles today and would be expected to be increasingly used in future vehicle designs. However, such an increase would not be anticipated to result in a substantial increase in manufacturing capacity, mining, or transportation. Existing plants would be retooled for manufacturing these lighter-weight materials. It is expected that more weight reduction would be achieved in heavier vehicle models, as opposed to smaller models, which already achieve most of the weight reductions possible without compromising safety or performance. Thus, the weight reductions would not be expected to alter vehicle safety.

e. Low-Rolling Resistance Tires

One of the technologies under development to reduce vehicle emissions and increase fuel efficiency is the development of low-rolling resistance tires. Rolling resistance is primarily due to deformation of the tire sidewall, which generates heat representing lost energy. It is estimated that 5 to15 percent of light-duty fuel consumption is used to overcome rolling resistance in passenger cars (U.S. Department of Energy 2011). While considerable improvements have been made in reducing the rolling resistance of vehicle tires, tire manufacturers have indicated that further reductions in rolling resistance are possible, i.e., up to 50 percent. For most passenger vehicles, a 10 percent reduction in rolling resistance will have the practical effect of reducing emission by about 1 to 2 percent (TRB 2006). These reductions in rolling resistance would be expected through improved tire designs and materials, such as silicon oxide, a principal component of sand and glass. Low-rolling resistance tires are currently standard equipment on the Chevrolet Volt and Toyota Prius. ARB modeled all vehicles using low rolling resistance tires by 2025.

3. California Evaporative Emission Regulations

The proposed amendments include vehicles certification requirements from zero evaporative emission standards. Manufacturers would comply with these regulations through testing. The equipment needed for compliance would not be anticipated to differ substantially from that which is currently used.

4. Manufacturer Size Definition

Two proposed amendments would affect the size definitions of manufacturers. First, staff propose to decrease the intermediate volume manufacturer (IVM) (i.e., large volume manufacturer [LVM] threshold from 60,000 PCs, LDTs, and MDVs on average in California to 20,000 on average). Staff also propose that two manufacturers' sales be aggregated for determination of size if one manufacturer owns greater than 33.4 percent of another manufacturer, assuring a level playing field. All current IVMs, except Volvo, Subaru, Jaguar/Land Rover and Mitsubishi, would be expected to become LVMs in 2018, and meet the full ZEV requirements starting that year. This is definition change and would not be anticipated to result in any physical changes.

5. Amendments to the Environmental Performance Label

Manufacturer compliance with the Federal Fuel Economy and Environment Label would be deemed compliant with the California Environmental Performance Label. Thus, vehicles would have one single label that would display its Smog Score and Global Warming Score. This would save manufacturers from having to print two separate labels as well as from having to report two separate scores for both the state and federal labels. Reducing the number of labels is preferable to manufacturers because it reduces confusion by consumers who may not easily understand the difference between the two labels, particularly customers in other states who currently are seeing a California-based label on their cars. In response to this regulation, manufacturers would only present the federal label on the vehicles they market, reducing the resources needed to make, print on, and dispose of, a second label.

6. Amendments to the On-Board Diagnostic System Requirements

The proposed amendments to the OBD II regulation would consist of clarifications and relaxations, which include delays to the required start dates of a few OBD II monitoring requirements. Manufacturers would be expected to take advantage of the delays to improve their system strategies and develop robust monitors to meet the requirements.

7. Amendments to the Specifications for California Certification Fuel Regulation

The proposed E10 Certification Fuel changes apply only to on-road vehicles, excluding on-road motorcycles. The California certification exhaust test fuel specifications for the spark-ignition, off-road categories (small off-road engines, large spark-ignition engines, recreational marine spark-ignition engines, and off-highway recreational vehicles) would not change when a new E10-based certification test fuel is adopted under the LEVIII regulatory proposal.

B. Zero Emission Vehicle Regulation (ZEV)

1. Fleet Mix

The requirements of the ZEV regulation as proposed for amendment under the ACC Program are designed to allow vehicle manufacturers to comply with these requirements in a variety of ways. While the proposed amendments to the ZEV regulation would require manufacturers to earn a minimum proportion of the required ZEV credits with actual ZEVs (i.e., battery electric vehicles [BEVs] or hydrogen fuel cell vehicles [FCV]), credits can also be earned from Transitional Zero Emission Vehicles (TZEVs) (i.e., plug-in hybrid electric vehicles).

Compliance by manufacturers with the ZEV regulation as proposed for amendment would increase the number of ZEVs and TZEVs being sold and leased in California, as compared with the current regulation. Table 4-2 summarizes this projected increase. The ZEV regulation would include flexibilities that allow manufacturers to earn ZEV credits in any number of ways. ZEVs and TZEVs would earn different amounts of credits, based on the vehicle's zero emission range, and in some case, the vehicle's power. The proposed ZEV regulation would provide different flexibilities for large- and intermediate-volume vehicle manufacturers in meeting the requirements. Large-volume manufacturers include companies that sell or lease more than 20,000 vehicles per year in California and intermediate volume manufacturers are companies that sell more than 4,500 vehicles per year. Large volume manufacturer's account for approximately 97 percent of California's light-duty vehicle sales, must produce a minimum amount of credits from ZEVs, and are allowed to earn the rest of their requirement with credits from TZEVs. Intermediate volume manufacturers may fulfill their entire requirement with credits from TZEVs. However, any size manufacturer could, in theory, fulfill its entire requirement with ZEVs. Some manufacturers are more focused on fulfilling their ZEV requirements with BEV technologies, while others are more interested in developing FCVs. Because FCVs have a greater driving range than BEVs, FCVs earn more credit than BEVs. Also, the all-electric driving range of TZEVs varies from 10 to over 40 miles; the amount of credit each TZEV earns is linked to its all-electric range. Due to these uncertainties and historic banked credits from over compliance in the ZEV regulation from earlier years, ARB staff developed a "likely compliance scenario," summarized in Table 4-2, which takes into consideration past over-compliance with regulatory requirements, information from vehicle manufacturers, and projected market trends.

Table 4-2. Projected Numbers of Zero Emission Vehicle Types Sold or Leased in California by Type and by Year

ZEV Type	2018	2019	2020	2021	2022	2023	2024	2025
BEV	13,900	27,300	37,700	46,300	52,600	59,500	64,200	65,000
FCVs	2,900	6,200	10,600	15,400	21,600	27,800	35,200	43,600
TZEV	61,300	75,300	89,100	101,900	116,300	131,200	146,900	161,700
Total	78,100	108,800	137,400	163,600	190,500	218,500	246,300	270,700

Notes: ZEV = Zero Emission Vehicle (i.e., battery electric vehicles and fuel cell vehicles); TZEV = Transitional Zero Emission Vehicles (i.e., plug-in hybrid electric vehicles with an electric power range of 20 miles); BEV = Battery Electric Vehicle; FCV = Fuel Cell Vehicle (hydrogen).
Source: ARB's projections of a "likely compliance scenario" are based on past over-compliance with regulatory requirements, information from vehicle manufacturers, and projected market trends. More detailed are provided in the Staff Report.

2. Battery Production

The increase in BEVs and TZEVs (e.g. PHEVs) produced by manufacturers to meet requirements of the amended ZEV regulation would be accompanied by an increase in the production of propulsion batteries. Current BEV and TZEV battery technology involves use of nickel-metal or lithium-ion propulsion batteries.

Table 4-3 shows ARB's estimates of the amount of propulsion batteries that would be produced by vehicle manufacturers to meet the proposed requirements of the ZEV regulation. The projected quantities listed in Table 4-3 represent the amount of battery capacity, which is the amount of energy stored in a battery. Battery capacity is used to express the projected increase in propulsion batteries because the amount of battery capacity installed in each vehicle would vary according to its size and desired range.

Table 4-3. Projected Annual Increase in Battery Production (MW-hr)

Year	2018	2019	2020	2021	2022	2023	2024	2025
Capacity of Propulsion Batteries	108	541	838	1,172	1,459	1,755	2,008	2,182

Notes: MW-hr =megawatt hours = 1,000,000 watts
Source: Projections estimated by ARB 2011b

It is expected that the longevity of batteries would be sufficient to serve their function during the full operational life of the vehicle. For instance, the nickel-metal hydride battery included in the 2011 Toyota Prius (non-plug-in) is designed to last the life of the car or approximately 180,000 miles (Toyota Prius Battery 2011).

Because the number of BEVs and TZEVs produced would generally be offset by a corresponding decrease in production of internal combustion engine-based vehicles, a net increase in vehicle production facilities would not be anticipated. As the demand for propulsion batteries increases, however, new manufacturing facilities may need to be constructed and/or existing plants would be retooled to increase production. Some vehicle manufacturers would produce the batteries used in their cars while others would purchase the batteries from suppliers. Lithium-ion batteries require higher quality-control than nickel-metal batteries, often including clean-room production facilities, which may necessitate the building of new production facilities.

3. Lithium Demand

More vehicle manufacturers are considering the use of lithium-ion batteries in their BEV and TZEV models instead of nickel-metal hydride batteries (USGS 2011). Lithium is a favorable material, because it is the lightest of all metals and an excellent conductor of electricity (Gruber et al. 2011). Lithium-ion batteries are advantageous, because they have no memory effect, little discharge, and no scheduled cycling is required to prolong their useful life (Notter et al. 2010). Memory effect is an alleged effect observed in nickel cadmium rechargeable batteries that causes them to hold less charge. It describes one very specific situation in which certain NiCd batteries gradually lose their maximum energy capacity if they are repeatedly recharged after being only partially discharged. The battery appears to "remember" the smaller capacity. In addition, for production volumes greater than 300,000 units per year, lithium-ion batteries are projected to be less expensive to produce than nickel-metal hydride batteries (Snyder, Yang, and Miller 2009). A study performed at the University of Michigan's Center for Sustainable Systems concluded that the world supply of lithium is sufficient to support lithium demand, even with rapid and widespread adoption of electric vehicles (Gruber et al. 2011). USGS has identified the world supply of economically recoverable lithium to 33 million metric tons (USGS 2011) whereas the highest demand scenario evaluated by Gruber et al. (2011) would not exceed 20 million metric tons for the period 2010 to 2100.

Recycled lithium content has been historically insignificant but has increased steadily due to the growth in the consumption of lithium batteries (USGS 2011). One U.S.

company has recycled lithium metal and lithium-ion batteries since 1992 at its facility in British Columbia and in 2009, the U.S. Department of Energy awarded $9.5 million to a company to construct an advanced lithium battery recycling facility in Ohio (Toxco Inc. 2009; USGS 2011).

4. Battery Disposal, Recycling, and Exchange

At this time, PHEV and BEV propulsion batteries are replaced at authorized original equipment manufacturer (OEM) service centers if needed. However, vehicle manufacturers differ in how they are addressing the need to properly handle or dispose of propulsion batteries after they reach the end of their useful life in the PHEVs and BEVs they power. Toyota has a battery recycling program, in which dealerships will provide a $150 recycle fee to dismantlers that turn in used high-voltage Toyota batteries (Toyota Motor Corporation 2011a; Toyota Motor Corporation 2011b). Both General Motors and Nissan have made arrangements with power companies to develop new ways of using old batteries, including storage of solar or wind energy during peak generating times for later use (renewable power management), backup power management, and peak price arbitrage (St. John 2010; Recycling International 2011; Nissan Motor Co., Ltd. 2011). This approach acknowledges that a large amount of energy remains stored even in partially discharged batteries. Secondary uses for advanced batteries are also being investigated at a number of research institutions (NREL 2011; Neubauer and Pesaran 2011; Williams 2011). An electric taxi battery switchable battery project is underway in Japan and will be developed in San Francisco (Better Place 2010). However, no vehicle manufacturer has yet announced plans to produce a switchable battery electric vehicle. Moreover, vehicle manufacturers have not provided information about how batteries would be handled after their "second life." A study at the National Renewable Energy Laboratory concludes that if second uses for batteries are determined not to be economical then recycling them would be the next economically superior option (Neubauer and Pesaran 2011).

Federal and state agencies also regulate and/or research how automotive propulsion batteries should be handled at the end of their useful life. Regulations under the federal Resource Conservation and Recovery Act (RCRA) nickel-metal hydride batteries and lithium-ion batteries are classified as non-hazardous waste and are not required to be recycled. Per RCRA hazardous waste listings & criteria (40 CFR 261.4, Exclusions), fully spent consumer lithium batteries are neither toxic nor reactive and are considered non-hazardous (NEMA 2001). Lithium is not included on the list of metals that the Occupational Safety & Health Administration considers to be toxic (OSHA 2011), nor does it exhibit any one of the hazardous characteristics according to U.S. EPA's Toxicity Characteristics Leaching Procedure. While there is no lithium metal present in a fully spent lithium-ion battery, the larger lithium-ion battery cells used for automotive propulsion reach the end of their useful life before they are completely spent.

Nonetheless, U.S. EPA does recognize that lithium-ion batteries used for vehicle propulsion are a new and emerging technology and are being studied further. U.S. EPA formed the Lithium-ion Batteries and Nanotechnology Partnership in June 2009 to conduct a screening-level life cycle assessment of current and emerging lithium-ion batteries and battery components (e.g., battery anodes made from single-wall carbon nanotubes) used in TZEVs, ATZEVs, and BEVs (U.S. EPA 2010b). Members of the partnership include battery manufacturers, research institutions, battery recycling companies, the U.S. Department of Energy's Argonne National Laboratory, and the Environmental Defense Fund. The Partnership is examining the potential environmental impacts of lithium-ion batteries, including the extraction and acquisition of raw materials, materials processing, product manufacturing, produce use, and final disposal or disposition. The partnership will also determine whether lithium-ion battery systems present environmentally preferable options to existing systems such as the use of lead-acid batteries in internal combustion systems.

California's hazardous waste management regulations classify all types of batteries, including nickel-metal hydride and lithium-ion batteries, as hazardous waste when discarded and must be managed accordingly. More specifically, facilities that treat, store, dispose and recycle batteries in California are also regulated under California's hazardous waste generator laws and regulations for Universal Waste (CCR, Title 22, Section 66261.9). These facilities are regulated and inspected by the California Department of Toxic Substances Control (DTSC), which is authorized by U.S. EPA to administer its own hazardous waste program for California. The local Certified Unified Program Agency (CUPA) is given authority to enforce hazardous waste management laws and regulations at the local level by the Secretary of Cal/EPA. Generators of universal wastes must recycle their waste by relinquishing it to the following: (1) a universal waste handler (e.g.; household hazardous waste facility, a 'Take-it-Back Partner' such as retailers or manufacturers); (2) a universal waste transporter; or (3) a destination facility (facility permitted by DTSC to treat, store, dispose or recycle).

5. Plug Electric Vehicle Charging Infrastructure

Based on the data summarized in Table 4-2, there would be approximately 367,000 BEVs and 883,000 TZEVs operating in California in 2025. This growth in plug electric vehicles would be accompanied by increased demand for electric charging infrastructure. Virtually all plug electric vehicles require at least one readily available charging station at their "home" location and national travel survey data indicate that vehicles spend 66 percent of their time parked at this their "home" location (EPRI 2011). Thus, it is anticipated that plug electric vehicles, both BEVs and PHEVs, would primarily be charged in residential areas during hours between late afternoon and early morning. A survey conducted by EPRI and Southern California Edison about consumer's perceptions of plug-in hybrid electric vehicles found that 95 percent of respondents would prefer to charge their electric vehicle at home (EPRI and SCE 2010). Nonetheless, some vehicle charging at workplaces and public settings may occur if electric vehicle supply equipment is available. Approximately 1,300 public charging stations are currently being upgraded to the current plug standard and federal programs are funding the installation of close to 2,000 additional public charging stations in California. (California Plug-in Vehicle Collaborative, 2010)

6. Electricity Demand

The charging of BEVs and TZEVs has the potential for both positive and negative effects to the electric grid. The timing of charging is a key determining factor. For residential charging, the general case is that the vehicle will begin charging after it arrives at home and is plugged in. National Personal Transportation Survey data indicate that the peak arrive time is 5-6 p.m.; however, only about 12 percent of vehicles arrive home during this hour, leading to a distribution of charging onset times. This results in an effective peak charging load of about 700 watts per vehicle. Thus, while residential charging power levels vary from about 1.4 to 7.7 kW, the average effect of a single vehicle on the electric system is far lower. There are significant efforts underway to alter the load shape generated by vehicle charging, whether by use of electricity pricing incentives, actively managed or smart charging, or onboard programming of charging times. These would have the effect of moving the load off the peak. At a system level, due to diversity, the electricity demand of these types of vehicles is relatively low, resulting in minimal effects to utility generation and transmission assets, particularly in the near term. According to the Electric Power Research Institute, the potential stresses on the electric grid can be avoided through asset management, system design practices, and managed charging to shift a significant amount of the load away from system peak (Electric Power Research Institute 2011).

7. Fuel Cell Production

The increase in FCVs produced by manufacturers to meet requirements of the amended ZEV regulation would be accompanied by an increase in the production of hydrogen fuel cells. As the demand for automotive fuel cells increases, new manufacturing facilities may need to be constructed and/or existing plants would be retooled to increase production. Some vehicle manufacturers would produce fuel cells in their own facilities cars while others would purchase the fuel cells from suppliers. However, because the number of FCVs produced would generally be offset by a corresponding decrease in production of internal combustion engine-based vehicles, a net increase in vehicle production facilities would not be anticipated.

8. Platinum Demand

Platinum is a vital component of proton exchange membrane fuel cells, which is the leading type of fuel cell that would be used in FCVs. The proton exchange membrane fuel cell's primary advantages include low operating temperature (approximately 80 degrees Celsius), high electric current densities, fast start capability, no corrosive fluid spillage hazard, low weight, small size, and potentially low-cost to manufacture (Spiegel 2004). Platinum serves as the catalyst that splits hydrogen into ions and electrical current (Bourzac 2008). Thus, increased production and sales of FCVs would be accompanied by an increase in demand for platinum and platinum-group metals. However, the leading demand sector for platinum-group metals is currently catalysts to decrease emissions of CAPs in both light- and heavy-duty vehicles (USGS 2011).

9. Fuel Cell Disposal, Recycling, and Exchange

Fuel cells for hybrid vehicles are manufactured once for each vehicle, and are designed to last for the lifetime of the vehicle, which is somewhere between 150,000 and 200,000 miles, or 15 to 20 years (HybridCars.com 2011). Replacement costs for spent fuel cells remains largely unknown because they are seldom replaced; however, there are some anecdotal reports of total battery replacements costing about $3,000 (HybridCars.com 2006a).

Eventually the batteries will no longer hold a significant charge and will need to be properly managed at the end of their life. Once the vehicle battery can no longer be used for its intended purpose, it becomes a waste. In California, all types of batteries are considered to be a hazardous waste and are managed under the Universal Waste Rule, unless determined they do not exhibit a characteristic of a hazardous waste. The Department of Toxic Substances Control's (DTSC) Universal Factsheet noted that, "Universal waste batteries include rechargeable nickel-cadmium batteries, silver button batteries, mercury batteries, small sealed lead acid batteries (burglar alarm and emergency light batteries), most alkaline batteries, carbon-zinc batteries, and any other batteries that exhibit a characteristic of a hazardous waste." DTSC had earlier noted on their website (since removed) that 'Per this definition, hybrid electric vehicle batteries may also be considered Universal Wastes -- check with the manufacturer of the vehicle for further information about the composition of such batteries' (DTSC 2010).

While battery toxicity may be a concern, today's hybrids use nickel–metal hydride (NiMH) batteries or Lithium-Ion batteries, which are not environmentally problematic, as are the rechargeable nickel cadmium or non-rechargeable metallic lithium batteries. Some manufacturers will recycle spent batteries reducing the need for disposal the potential for toxic hazards (HybridCars.com 2006b). Lithium-Ion cells contain no heavy metals, nor any toxic materials (TeslaMotors.com 2008). Unlike caustic lead acid car batteries, advanced Lithium-Ion batteries do not use harmful acids or metals, such as lead, to store electrical power. Lithium-Ion batteries use copper, cobalt, iron and nickel, and are considered safe for landfill disposal and incinerators (HybridCars.com 2009); however, it is currently illegal in most states to dispose of any Lithium-Ion batteries as municipal or household waste. Lithium is fairly valuable, as are the other materials involved, and there is economic incentive to reuse the components.

Manufacturers are currently working on battery recycling infrastructure, and are committed to supporting a responsible disposal and recycling infrastructure for spent batteries, and there are plans to construct America's first recycling facility for Lithium-Ion vehicle batteries via a grant from the U.S. Department of Energy. To encourage recycling, two automobile manufacturers place decals with a toll-free number on their hybrid battery packs. One offers a $200 incentive to ensure that every battery comes back to the company, and has a comprehensive battery recycling program in place and has been recycling nickel-metal hydride batteries since 1998. The other manufacturer collects the batteries and transfers them to a preferred recycler to follow their prescribed process: disassembling and sorting the materials; shredding the plastic material;

recovering and processing the metal; and neutralizing the alkaline material before sending it any waste material to a landfill (HybridCars.com 2006b).

Batteries that power hybrid vehicles will be recycled at recycling facilities, where they will be transformed into valuable scrap commodities like cobalt, copper, nickel and lithium carbonate, which can then be used to more efficiently produce another battery. At the battery recycling plants, the recycling process begins with manually sorting the batteries according to their chemistries (may also be done prior to arrival). NiCd, NiMH, Lithium-Ion and lead acid are often placed in designated boxes at the collection point. Then combustible materials, such as plastics and insulation, are removed using a gas-fired thermal oxidizer. Gases from the thermal oxidizer are sent to the plant's scrubber where they are neutralized to remove pollutants. The process leaves the clean, naked cells, which contain valuable metal content. The cells are then chopped into small pieces, which are heated until the metal liquefies. Non-metallic substances are burned off; leaving a black slag on top that is removed with a slag arm. The different alloys settle according to their weights and are skimmed off (Buchmann 2001).

There is one battery recycling facility in Lancaster, California that collects spent batteries and recycles them. A non-profit corporation was founded to promote the collection and recycling of rechargeable batteries in North America, and there are several facilities in the United States that recycle spent batteries. Europe and Asia are also active in recycling spent batteries and have developed technology to retrieve cobalt and other precious metals from spent Lithium Ion batteries. Lithium can be re-used repeatedly, reducing the concern of potential shortages in the future.

The Society of Automotive Engineers formed a Committee for Fuel Cell Standards that has published "Recommended Practice to Design for Recycling Proton Exchange Membrane (PEM) Fuel Cell Systems". This publication provides guidance about which advises manufacturers to consider environmental impacts and recommended practices when producing recyclable fuel cells for automotive use. More specifically, the report explains ways fuel cell design can account for the need to disassemble and recycle the product at the end of its useful life.

Carbon nanotubes could replace expensive platinum catalysts and help finally make fuel cells economical. The California Department of Toxics Substances Control is currently reviewing waste issues associated with nanotechnologies, including carbon nanotubes which are used in fuel cells (Kang 2010).

Used fuel cells are classified as ignitable hazardous waste under the federal Resource Conservation and Recovery Act.

The Society of Automotive Engineers formed a Committee for Fuel Cell Standards that has published "Recommended Practice to Design for Recycling Proton Exchange Membrane (PEM) Fuel Cell Systems". This publication advises manufacturers to consider environmental impacts and recommended practices when producing recyclable fuel cells for automotive use. More specifically, the report explains ways fuel cell design can account for the need to disassemble and recycle the product at the end of its useful life (SAE 2011b).

10. Hydrogen Fueling Infrastructure

The number of FCVs entering the vehicle fleet is particularly important, because it serves as the trigger that activates the CFO regulation, which is described below in Chapter II, Section C. Detail about the entry of FCVs into the statewide fleet, associated demand for hydrogen fueling stations, and the construction and operation of hydrogen fueling stations is included in the discussion of Clean Fuels Outlets in Section C below.

C. Clean Fuels Outlets

1. Triggering of the Clean Fuels Outlet Requirements

Under the Clean Fuels Outlet (CFO) regulation, requirements for new hydrogen fuel outlets would be activated when Department of Motor Vehicles records and automaker forecasts indicate that, in three years, the total number of FCVs in an air basin would meet or exceed the regional trigger level of 10,000 FCVs. It is more likely that the CFO regulation would initially be triggered by the air basin-wide trigger level of 10,000 FCVs rather than the statewide trigger level of 20,000 FCVs because of the spatial distribution of residential and vehicle population across the State.

Because the ZEV regulation would be flexible in that manufacturers could fulfill their requirements by marketing hydrogen FCVs, as well as other types of vehicles, it cannot be determined ahead of time exactly when the CFO regulation would be activated by the regional or statewide trigger levels. Nonetheless, ARB staff developed a range of compliance scenarios based on confidential surveys of vehicle manufacturers. At one of the fastest rates, the statewide vehicle fleet could consist of up to 53,000 FCVs fleet during the 2015-2017 timeframe. At the slowest entry rate the statewide fleet would not include 20,000 FCVs until 2020 with the10,000 unit trigger level possibly being reached in an air basin in 2018. These two scenarios named fast entry (Upper Bound) and slow entry (Lower Bound) respectively, are discussed in greater detail below.

a. Fast-Entry of Fuel Cell Vehicles into the Vehicle Fleet

In early 2011, ARB, the California Energy Commission, and the California Fuel Cell Partnership conducted a confidential survey of vehicle manufacturers on FCV production and rollout plans, including vehicle numbers and deployment regions (CEC 2011, p. 56). Automakers were asked to assume that hydrogen fueling infrastructure would be in-place ahead of FCV rollouts. This assumption allowed each manufacturer to base its estimates on the status of its FCV technology development and its ability to achieve production numbers necessary to reach an economy of scale suitable for commercialization, including production facilities and supply chains. The results of this survey, which reflect a fast-entry of FCVs into the fleet, are summarized in Table 4-4.

Table 4-4. Projected Number of Fuel Cell Vehicles Entering the Vehicle Fleet by Year for the Upper Bound Scenario

Region	2011	2012	2013	2014	2015-2017
California Statewide	253	312	430	1,389	53,000
South Coast Air Basin	197	240	347	1,161	34,230

Notes: Projections of FCVs are based on a confidential survey of vehicle manufacturers conducted by the California Energy Commission and The California Fuel Cell Partnership and, thus, do not consider over-compliance with the proposed ZEV regulation by vehicle manufacturers.
The South Coast Air Basin consists of all of Orange County and the urban portions of Los Angeles, Riverside and San Bernardino counties and is under the jurisdiction of the South Coast Air Quality Management District.
Source: CEC 2011, p.56.

While the air basins where new FCVs would be sold or leased are not specified by the ZEV regulation, it is anticipated that most of the early FCVs would be sold or leased for operation in the South Coast Air Basin where several hydrogen stations are or will soon be operational. According to the FCV projections for the Upper Bound scenario, the regional trigger of 10,000 FCVs could be activated within the South Coast Air Basin as early as 2015, as shown in Table 4-5, with the statewide trigger of 20,000 FCVs activated shortly thereafter.

b. Slow-Entry of Fuel Cell Vehicles into the Vehicle Fleet (Lower Bound Scenario)

To develop a compliance scenario in which FCVs would enter the vehicle fleet at a slow pace, ARB assumed manufacturers would sell or lease a mix of BEVs, FCVs, and PHEVs to meet the proposed ZEV regulation requirement to have the statewide fleet be 16 percent ZEVs by 2025. This scenario may also be referred to as a Lower Bound compliance scenario. Table 4-5 shows the number and mix of BEVs and FCVs that could enter the statewide vehicle fleet under a minimum compliance scenario. This set of projections is based on the ZEV "likely compliance scenario" summarized on Table 4-2. Table 4-5 also shows how the cumulative number of FCV would grow over ime.

Table 4-5. Projected Number of Fuel Cell Vehicles Entering the Vehicle Fleet by Vehicle Type and Year for a Lower Bound Scenario

ZEV Type	2017	2018	2019	2020	2021	2022	2023	2024	2025
BEVs	—	14,000	27,000	38,000	46,000	53,000	60,000	64,000	65,000
FCVs	—	3,000	6,000	11,000	15,000	22,000	28,000	35,000	44,000
Combined	—	17,000	33,500	49,000	61,000	75,000	88,000	99,000	109,000
Cumulative FCVs	10,500	13,500	19,500	30,500	45,500	67,500	95,500	130,500	174,000

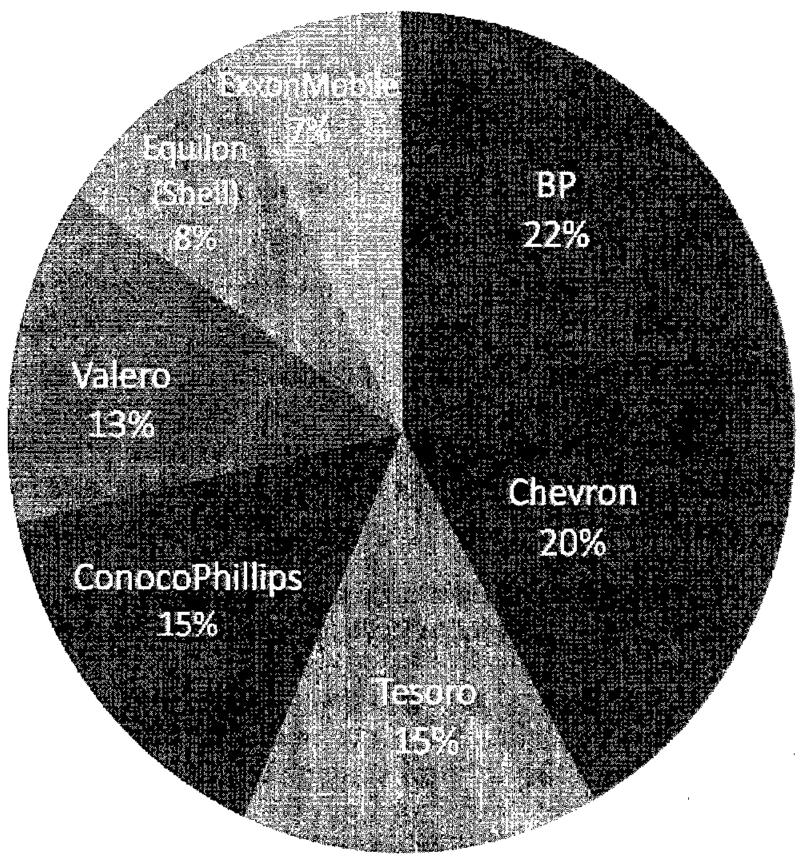
Notes: Cumulative totals do not reflect fleet turnover, which is the rate at which consumers purchase new vehicles to replace old ones.
ZEV = Zero Emission Vehicle; BEV = Battery Electric Vehicle; FCV = Fuel Cell Vehicle.
Source: ARB's projections of a "likely compliance scenario" are based on past over-compliance with regulatory requirements, information from vehicle manufacturers, and projected market trends. More detailed are provided in the Staff Report,

According to the projections for the Lower Bound scenario, the regional CFO trigger of 10,000 ZEVs would be activated in 2018 assuming 75 percent of the total FCVs are placed in one air basin (which will most likely be the South Coast air basin), and the statewide trigger of 20,000 ZEVs would be activated in 2020.

2. New Hydrogen Fueling Stations

The CFO regulation would be activated once the air basin-wide trigger level of 10,000 FCVs is expected to be met. ARB would then calculate the volume of hydrogen fuel the FCV fleet would demand, subtract the fuel availability at the time, and determine the additional number of hydrogen fuel stations needed to meet the projected demand. The requirement to build new stations would then be allocated to the major refiners and importers of gasoline based on their annual share of the gasoline market. Figure 4-1 illustrates each refiner/importer's share of the total gasoline produced or imported into California in 2010 and Table 4-6 summarizes how the required new stations could be divided among each refiner/importer once the trigger level of 10,000 FCVs is reached in an air basin.

Figure 4-1. Market Share of Major Refiners and Importers of Gasoline (2010)



Source: BOE 2010

Table 4-6. Projected Allocation of New Hydrogen Fuel Stations			
Projected Hydrogen Vehicle Fleet in a Single Air Basin (FCVs)			10,200
Hydrogen Fuel Market			
Demand, annual (kg/yr)			3,000,000
Pre-Existing Supply, annual (kg/yr)			1,700,000
Deficit, annual (kg/yr)			1,300,000
Deficit, average daily (kg/day)			3,560
Activated CFO Requirements and Market Share			
	2010 Market Share (%)	**Hydrogen Fuel (kg/day)**	**Stations**
Total	100%	3,560	9
BP	22%	783	2
Chevron	20%	712	2
Tesoro	15%	534	1
ConnocoPhillips	15%	534	1
Valero	13%	463	1
Equilon (Shell)	8%	284	1
ExxonMobil	7%	249	1

Notes: The information presented in this table represents a hypothetical scenario only. Values in the table reflect how the requirements to build new hydrogen fuel stations would be allocated based on total demand (using EMFAC VMT data and a fleet-average fuel economy of 67 mi/kg), pre-existing supply, and the market share of various refiners and importers of gasoline under the fast-entry scenario of FCVs entering the vehicle fleet in the South Coast Air Basin. The total number of new hydrogen fuel stations required would also vary according the proportion of new FCVs that are part of an organization's fleet and have their own privately operated fueling station.
FCV = Fuel Cell Vehicle; kg/yr = kilograms per year; kg/day = kilograms per day
Source: Sample calculations provided by ARB.

As shown in the example in Table 4-6, a minimum of nine new hydrogen stations would be required in the South Coast Air Basin when the trigger level of 10,000 FCVs is reached in the air basin. Based on the Upper Bound scenario presented in Table 4-6, this trigger level and associated allotment of new hydrogen fuel stations could occur as early as 2015.

Starting in 2016 in the Upper Bound Scenario, the number of vehicles statewide would exceed the 20,000 statewide trigger requiring the construction of 39 additional stations.

Under the Lower Bound compliance scenario the regional trigger would be reached in the South Coast Air Basin requiring five new hydrogen stations in 2018 and nine additional stations in 2019. By 2020, 26 new stations would be required statewide.

Once notified of their obligation, responsible parties would have approximately 2-1/2 years to meet fulfill their respective allocation requirements.

3. Locations of Hydrogen Fuel Outlets

When ARB assigns the allocations for new hydrogen fuel outlets, ARB would also inform refiners/importers of the general geographic areas where stations would be most useful to and valued by FCV drivers, but each refiner/importer would be responsible for selecting specific station locations.

While vehicle deployment projections are greatest in the South Coast Air Basin, significant vehicle deployments are also planned for the San Francisco Bay Area (California Fuel Cell Partnership 2009). However, once FCVs reach commercial viability and technology acceptance becomes widespread, the market would dictate where new FCVs are placed. As explained in Chapter II, Section C, it would be dependent upon manufacturers to identify new geographic market sectors and convey this information to ARB in their annual FCV projections.

It is anticipated that new individual hydrogen fueling facilities would be constructed at existing public retail gasoline service stations that are already managed by the retail branches of the respective refiners/importers of gasoline. These locations would also likely be in urban areas where they are positioned to serve the most drivers. Thus, it is unlikely that new hydrogen fuel outlets would be located at greenfield sites (land not previously developed), and that they would be built in locations consistent with local zoning.

4. Construction of Hydrogen Fueling Facilities

Building a new hydrogen fueling facility would typically take place at an existing retail gas station. The facilities and equipment required for hydrogen fueling could fit within the available square footage of larger gas station sites (i.e., within the same footprint of a carwash). Development of a new facility would include obtaining the standard design and building approvals and permits from the City, County and State authorities having jurisdiction. For the equipment area, construction would typically include minor trenching and filling for utilities and pouring concrete foundations for walls and equipment pads. Major equipment present at the station would include hydrogen storage tanks that hold either liquid or compressed gas, a hydrogen compression system, a refrigeration/cooling unit, safety monitors and sensors, and a system control panel. The hydrogen dispenser would typically be added to the end of an existing fueling island. However, in some cases, a gasoline dispenser may be removed and replaced with a hydrogen dispenser, or a separate stand-alone hydrogen dispensing island with or without a canopy may be added to the station. Although there is no standard station size, small volume hydrogen stations (100-250 kg/day dispensing capacity) today typically require approximately 700-800 square feet of surface area for equipment.

5. Hydrogen Station Operations

Like at a gasoline station, a FCV pulls up to a hydrogen dispenser that is designed and built to appear like a gasoline dispenser. The dispenser nozzle looks similar to a nozzle on a natural gas or propane dispenser. The nozzle locks on to the receptacle on the vehicle and, when the seal is tight, gaseous hydrogen fuel flows into the tank. Depending on the vehicle and tank size, a full fill, from empty can take from 3 to 5 minutes (California Fuel Cell Partnership 2011). Hydrogen fuel dispensers, depending on station design, can typically fuel four to eight vehicles per hour. Implementation of CFO would require that compliant stations satisfy the fueling protocol for light duty hydrogen powered vehicles specified in SAE TIR J2601 (SAE 2010).

Like gasoline stations, most hydrogen stations have their onsite fuel supply delivered by a tanker truck. Gaseous hydrogen is stored in banks of long narrow tanks secured to a truck trailer bed (referred to as a tube trailer), and liquid hydrogen is stored in large above-ground tanks. The liquid hydrogen vaporizes at ambient temperature to a gaseous state and is compressed before dispensing into the FCV. Hydrogen stored in gaseous state usually undergoes additional compression before dispensing. Hydrogen delivery frequency depends on the amount stored at each station, state of the hydrogen stored (gaseous or liquid) and demand for hydrogen at the station In the early years when there are relatively few FCVs, deliveries of hydrogen in a gaseous state would occur no more than once a week, and liquid deliveries would occur approximately once per month. Deliveries of gaseous hydrogen involve replacing an empty tube trailer with a full one, a process that takes less than one hour. Delivery of liquid hydrogen involves the transfer of liquid hydrogen from the tanker truck to the station's storage tank, a process that would typically require approximately 2 hours.

Some stations produce hydrogen onsite through electrolysis or steam methane reformation (SMR). An electrolyzer uses electrical power to separate water molecules into hydrogen and oxygen. A SMR generates steam, and uses it to separate the hydrogen from the natural gas molecule. The hydrogen is then purified, stored and then compressed for dispensing. Maintenance of the station consists of regular safety checking of hoses, nozzles and related equipment, calibration of sensors and dispensers, compressor repairs, valve/solenoid checks and normal lubrication.

6. Hydrogen Supply

Using the fast-rate scenario for FCVs entering the vehicle fleet, the total hydrogen demand when the 10,000 FCV trigger is activated in the South Coast Air Basin could represent 1.1 percent of the hydrogen supply in that area. Under the same fast-entry scenario, total statewide demand in 2020 would represent 3.9 percent of the merchant hydrogen supply, and in 2024 (when the regulation sunsets), it could represent 9.2 percent.

Using the more conservative slow-rate scenario for FCVs entering the vehicle fleet, the total statewide hydrogen demand in 2020 could represent 1 percent of the merchant hydrogen supply, and in 2028, it would represent 9 percent.

7. Hydrogen Production Plants

Recently, California has favored hydrogen fueling stations using delivered hydrogen with central production over stations that produce hydrogen on site (CEC 2011). As demand increases, however, on-site reformation may begin to compete on a cost basis with delivered hydrogen. For delivered gaseous hydrogen, modifications of the central plants may be necessary to further purify the hydrogen so that it meets the purity standards required for fuel cell vehicles. Hydrogen as a transportation fuel requires higher purity levels than hydrogen for industrial uses because fuel cells stack membranes are sensitive to impurities (CEC 2011). Plant modifications are also necessary so that purified hydrogen can be compressed and dispensed into delivery trailers. The construction work associated with these plant modifications would have to satisfy State and local requirements for permitting, hazardous materials, and other resource areas, which are typically handled by local agencies. Additional land may be required to install the equipment, which may or may not fit within the hydrogen plant's existing fence line. Any earthwork activities that could generate dust would have to be conducted in accordance with local ordinances regarding dust and earthwork. Emissions associated with the operation of the hydrogen purification and compression equipment would be subject to the authority of the local air pollution control district. Any release of combustible gases could be vented through the facility's existing flare system. Hazardous wastes, such as lubrication oil waste and catalyst waste associated with the purification equipment, would be generated in small quantities. Existing hydrogen production facilities would manage additional hazardous wastes associated with the new operations according to their existing hazardous waste permits.

It is important to note that, once the statewide demand for hydrogen reaches 3.5 million kilograms per year, the California standards for hydrogen production will be in place, which require that 33 percent of the hydrogen that is produced for transportation be made from eligible renewable resources (California Public Utilities Code Section 399.12). This requirement will eventually present a business case for the construction of new hydrogen plants that produce hydrogen from renewable resources such as biogas or biomass. Recently, the world's first combined heat, hydrogen, and electric power system using biogas from the Orange County Sanitation District's wastewater treatment plant started in Fountain Valley, CA. This tri-generation system provides transportation-grade hydrogen to the public (approximately 25-50 fuel cell electric vehicle fill-ups per day), 250 kW of electric power to the wastewater treatment plant, and heat that is also used by the plant (HTAC 2011). ARB anticipates that as costs come down, more tri-generation plants could be constructed at wastewater treatment plants to meet increased demand for transportation-grade hydrogen made from eligible renewable resources. These tri-generation plants may require additional footprint beyond the plant's existing property line.

D. Consumer Response Effects

1. Fleet Turnover and Emissions

ARB's proposed ACC Program would increase new vehicle prices, starting with model year 2015. Regardless of an increase in price, it is likely that many of the technologies employed by manufacturers that lower GHG emissions and implemented to comply with the regulation (including the production of ZEVs) would result in vehicles with lower operating costs than comparable pre-regulation vehicles. Changes in vehicle prices and other attributes may affect consumer purchase decisions. For example, not all consumers would be willing to pay more for the vehicle that they might have otherwise purchased, and some consumers may purchase a used vehicle instead of a new vehicle that would be in accordance with their respective budgets. Others may wait until the following year, or respond in some other way. Still other consumers may be willing to pay the additional upfront cost for greater future reductions in operating cost, in which case the vehicle would be more attractive. Such decision changes, referred to as consumer response, can affect the California vehicle fleet mix and possibly emissions. Due to the concurrent tightening of criteria pollutant standards, even if there is a consumer response to potential price increases and changes in operating costs, the ACC program would continue to have a positive effect on tailpipe criteria pollutant emissions.

Consumer responses that result in increased traffic and vehicle miles travelled (VMT) have been factored into the emissions analysis, and are discussed in Chapter V of the LEV III Staff Report.

2. Impacts on Vehicle Sales, Fleet Size and Average Age

The impacts of the proposed regulation were assessed by forecasting a baseline future fleet mix that assumes that, absent the proposed amendments, vehicle prices and operating costs change only in response to the existing National Program requirements for model year 2012-2016. This baseline then is compared to a regulatory scenario that takes into account the estimated price and operating cost changes resulting from the proposed Advanced Clean Cars Program.

The LEV III Staff Report data reflect the differences in sales, fleet mix, and average age of the fleet between the baseline and regulation scenarios. Initially, there would be a negligible decrease in sales due to compliance with the criteria pollutant standards, while there is no concurrent reduction in operating costs resulting from these proposed amendments. However, once the GHG standards begin to phase in during model year 2017, the reduced operating costs of new vehicles makes them more attractive to consumers and total sales would be expected to increase. Sales continue to grow over the baseline until the standards have been fully phased-in model year 2025. After this point, new vehicles no longer offer any significant advantage in operating costs over used vehicles that become increasingly available on the market. Thus, the change in sales begins to decline, though these levels still represent a relative increase over baseline totals. As a result of these increased sales, the fleet continues to grow slowly with time, making the regulation scenario fleet generally larger in all years compared to the baseline fleet. These sales increases also contribute to decreasing the average age of the fleet, implying that households are not holding onto their older vehicles longer.

3. Vehicle Miles Travelled and Rebound

The rebound effect refers to an economic theory suggesting consumers would drive more if the vehicles they use are cheaper to operate. This is potentially relevant because many of the emissions control technologies that reduce GHG emissions also serve to lower vehicle operating costs. The proposed changes of the ACC program would also result in light-duty vehicles having lower operating costs on a cost-per-mile basis. Staff at ARB examined the extent to which VMT levels in California may increase due to the incremental reduction in operating costs associated with implementation of the proposed regulatory changes under the proposed ACC Program.

The incremental increase in VMT due to rebound effects of the proposed ACC Program was estimated by ARB staff using an econometric model developed by Hymel, Small, and Van Dender (2010). The model estimates the elasticity of VMT with respect to operating costs while considering other factors such as income and congestion. ARB staff then calculated projections (e.g., likely outcomes) of future rebound effect. Based on these projected response levels, the actual expected changes in VMT were calculated using the projected operating cost reductions that would result from the proposed ACC Program. (See the LEV III Staff Report for additional details on projection methodology.) Likewise, increases in VMT due to rebound would occur in the baseline as a result of both State and national vehicle emission standards that are already in place for model years 2012-2016. These changes in VMT are reflected and accounted for in the emission inventories and estimated emission reductions in Section V of the LEV III Staff Report. Staff assumed that the same VMT changes would apply to all vehicle technology types.

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5.0 IMPACT ANALYSIS AND MITIGATION

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning. Thus, the impact discussion below focuses on these particular responses by the regulated community. All other regulated community compliance responses would not be anticipated to result in any physical changes and; thus, would result in no impacts.

A. Aesthetics

1. Scenic Vistas, Scenic Resources, Visual Character, Light and Glare

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning.

However, there is uncertainty as to the exact locations of these new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells and in relation to the location of viewers. Construction and operation of these, though likely to occur in areas with consistent zoning, could introduce or increase the presence of artificial elements (e.g., heavy-duty equipment, removal of existing vegetation, buildings) in areas with national, State, or county designated scenic vistas and/or scenic resources visible from State scenic highways. The visual impact of such development would depend on several variables, including size of facilities, viewing distance, angle of view, visual absorption capacities, and the structure placement in the landscape. In addition, operation may introduce substantial sources of nighttime lighting for safety and security purposes. As a result, this impact would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

<u>Mitigation Measure A.1.</u>

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations that provide protection of aesthetic resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts to aesthetic resources include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.

- The project proponent would color and finish the surfaces of all project structures and buildings visible to the public to ensure that they: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The project proponent would submit a surface treatment plan to the lead agency for review and approval.

- To the extent feasible, the sites selected for use as construction staging and laydown areas would be areas that are already disturbed and/or are in locations of low visual sensitivity. Where possible, construction staging and laydown areas for equipment, personal vehicles, and material storage would be sited to take advantage of natural screening opportunities provided by existing topography and vegetation.

- All construction, operation, and maintenance areas would be kept clean and tidy, including the revegetating and regarding disturbed soil, and storage would be screened from view and/or are generally not visible to the general public.

- Siting projects and their associated elements next to prominent landscape features or in a setting for observation from national historic sites, national trails, and cultural resources would be avoided to the greatest extent.

- The project proponent would contact the lead agency to discuss the documentation required in the lighting mitigation plan, submit to the lead agency for review and approval a plan that describes the measures to be used and that demonstrates that the requirements of this condition will be satisfied, and notify the lead agency that the lighting has been completed and is ready for inspection.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding aesthetics resulting from the construction and operation of new plants, stations, and modifications may be significant and unavoidable.

B. Agriculture and Forestry Resources

1. Farmland, Zoning for Agricultural Use or Williamson Act Contract, Forest Land and Timberland

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations would also be constructed and operated along with modifications to existing hydrogen production plants.

There is uncertainty as to the exact locations of these new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells; however, these would likely occur within existing facility footprints or in areas with consistent zoning. Thus, implementation of the proposed ACC Program would not be anticipated to result in the conversion of farmland, conflict with existing zoning for agricultural use or a Williamson Act contract, conflict with existing zoning for (or cause rezoning of) forest land or timberland, the loss of forest land (or conversion of forest land to non-forest use), or involve other changes resulting in conversion of farmland or forest land to non-agricultural use or non-forest use, respectively. As a result, this impact would be less than significant.

Mitigation

No mitigation is required.

C. Air Quality

1. Air Quality Plan, Air Quality Standards and Violations, Cumulative Criteria Pollutants, and Sensitive Receptors

a. Construction Impacts

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed along with modifications to existing hydrogen production plants. Construction-related activities, if they occur, would be anticipated to result in an increase in CAPs and TACs (e.g., use of heavy-duty construction equipment). All projects, no matter their size or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with California environmental review requirements (e.g., CEQA) and other applicable local requirements (e.g., local air district rules and regulations). This environmental review process would assess whether project implementation would result in short-term construction air quality impacts.

At this time, the specific location, type, and number of construction activities is not known and would be dependent upon a variety of factors that are not within the control of ARB. Nonetheless, the analysis provided herein provides a reasonable accounting of the types of environmental impacts that would occur with implementation of the proposed ACC Program as discussed below for short-term construction emissions. Further, subsequent environmental review would be conducted at such time that an individual project is proposed and land use entitlements are sought.

During the construction phase, CAPs and TACs could be generated from a variety of activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would generate fugitive PM dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (including PM_{10} and $PM_{2.5}$) vary as a function of parameters such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. Exhaust emissions from construction-related mobile sources also include ROG and NO_X emissions. These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment.

The site preparation phase typically generates the most substantial emission levels because of the on-site equipment and ground-disturbing activities associated with grading, compacting, and excavation. Site preparation equipment and activities typically include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Although detailed construction specific information is not available at this time, based on the types of activities that could be conducted it would be expected that the primary sources of construction-related emissions include soil disturbance- and equipment-related activities (e.g., use of backhoes, bulldozers, excavators, and other related equipment). Based on typical emission rates and default parameters for above mentioned equipment and activities, construction activities could result in hundreds of pounds of daily NO_X and PM, which may exceed general mass emissions limits depending on the exact location of generation. Thus, implementation of the proposed ACC Program could generate levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, result in a cumulatively considerable net increase in non-attainment areas, or expose sensitive receptors to substantial pollutant concentrations. As a result, this short-term impact would be potentially significant.

This impact would be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

b. Operational Impacts

Appendix T of the LEV III Staff Report provides a baseline for analysis for CAPs and GHGs, and the emissions impacts of the proposed rulemaking. This chapter began with a statistic that there are currently roughly 25 million cars operating in California, and that by 2035 more than 30 million cars will be operating in California. Prior to the establishment of ARB in 1968 photochemical smog pollution was a major health concern that caused major acute health impacts to Californians. Much of this smog was formed by automobile emissions. Over the next 40 years the ARB adopted the most stringent automobile emissions standards in the Country, including requiring use of the catalytic converter that revolutionized emissions control and dramatically reduced emissions from automobiles. Those regulations, in conjunction with regional programs to reduce emissions from refineries, power plants, and other stationary sources, led to a major improvement in air quality. In 1980, the South Coast Air Basin experienced widespread ozone levels which exceeded air quality standard for 179 days per year. In 2010 that number was reduced to 63 days per year, and those violations occurred in a much smaller portion of the Air Basin. During this same period, peak ozone concentrations in Southern California dropped more than 60percent - from 273 parts per billion (ppb) to 112 ppb. Similar air quality improvements were seen in many other regions of California.

Despite these major improvements air quality both the greater Los Angeles region and the San Joaquin Valley are classified by the U.S. EPA as "extreme" ozone non-attainment areas. This is the highest federal non-attainment classification, and these two areas of California are the only two areas of the nation granted this designation. Bringing these regions into attainment requires more significant emission controls than anywhere else in the United States.

In 2007, California adopted State Implementation Plans (SIPs) to chart the course to attainment of the 1997 federal 8-hour ozone standard. To achieve the 1997 ozone standard by the attainment date in 2023, NO_x emissions in the greater Los Angeles region must be reduced by two thirds, even after considering all of the regulations in place today, with the most significant share of needed emission reductions will come from long-term advanced clean air technologies. In the San Joaquin Valley, the SIP identified the need to reduce NOx emissions by 80 tons/day in 2023 through the use of long-term and advanced technology strategies. To put this in context, this is equivalent to eliminating the NOx emissions from all on-road vehicles operating in these regions.

Despite the dramatic emission reductions and air quality improvements achieved to date, most urban areas of California, including Southern California, the Bay Area, and the Central Valley continue to exceed the federal ozone standard . The ARB, the South Coast Air Quality Management District, and the San Joaquin Valley Air Pollution Control District are beginning to evaluate the emission reductions needed to attain the more health-protective ozone standard U.S. EPA established in 2008. In order to meet these challenges, air quality and land-use agencies in the South Coast and San Joaquin Valley must actively pursue a coordinated strategy that results in the widespread use of zero emission technologies on transportation networks designed to reduce smog forming emissions from single occupant vehicle use.

The proposed ACC Program would reduce emissions from conventional gasoline vehicles to incredibly low levels. Over a typical vehicle's 15 year lifetime ACC compliant cars would emit less than a pound of particulate matter, and less than 10 pounds of smog forming pollutants. The proposed regulation would also continue ARB's commitment to zero emission technologies, requiring roughly 6percent of vehicles sold in California to be true zero emission vehicles. Through that mandate, ZEV technologies will continue to improve and expand into wider applications, making them a viable option for many consumers in California. The proposed ACC regulation achieves maximum feasible emission reductions from automobiles and places the State on a continuing path to ultimately meet national ambient air quality standards.

In 2006 the legislature adopted Assembly Bill 32 which outlined California's major initiatives to reduce GHG emissions, and set an emissions reduction target of meeting 1990 emissions levels by 2020, which is a reduction of roughly 30percent. In 2005 then Governor Schwarzenegger established an emissions reduction target of achieving an 80 percent reduction in 1990 GHG emissions levels by 2050. In December 2008 the Board adopted ARB's Scoping Plan which outlined the initiatives that will be implemented to reach the 2020 GHG emissions target. The proposed ACC regulation is a major component of the Scoping Plan.

In addition to meeting ozone air quality standards, achieving an 80 percent reduction in GHG emissions by 2050 will also require widespread electrification of transportation networks in California. The proposed ACC regulation and associated ZEV mandate continues ARB's path towards meeting long-term GHG emissions goals.

Overall, implementation of the proposed ACC Program would result in an emissions benefit as compared to current regulations. Table 5-1, Table 5-2, and 5-3 provide the emission benefits for calendar years 2023, 2025, 2035, and 2040 for ROG, NO_x, and particulate matter ($PM_{2.5}$) respectively. Emission benefits are fully realized in the 2035-2040 timeframe when nearly all vehicles operating in the fleet are expected to be compliant with the proposed ACC Program. By 2035 ROG statewide emissions would be reduced by an additional 34 percent, NO_x emissions by an additional 37 percent, and $PM_{2.5}$ emissions by 10 percent.

Table 5-1. Statewide and Regional Emission Benefits of the Advanced Clean Car Program: Reactive Organic Gas (ROG)

Statewide ROG (tons/day)				
Calendar Year	**Adjusted Baseline with Rebound**	**Proposed Regulation with Rebound**	**Benefits**	**Percent Reduction**
2023	189.6	182.9	6.6	3%
2025	175.5	164.4	11.1	6%
2035	141.1	93.6	47.4	34%

Table 5-2. Statewide Emissions Benefits of the Advanced Clean Car Program: Oxides of Nitrogen (NO_x)

Statewide NOX (tons/day)				
Calendar Year	**Adjusted Baseline with Rebound**	**Proposed Regulation with Rebound**	**Benefits**	**Percent Reduction**
2023	201.3	185.6	15.7	8%
2025	183.6	161.2	22.4	12%
2035	136.8	86.4	50.4	37%

Table 5-3. Statewide and Regional Emissions Benefits of the Advanced Clean Car Program: Particulate Matter ($PM_{2.5}$)

Statewide PM2.5 (tons/day)				
Calendar Year	**Adjusted Baseline with Rebound**	**Proposed Regulation with Rebound**	**Benefits**	**Percent Reduction**
2023	26.7	26.0	0.6	2%
2025	27.2	26.3	0.9	3%
2035	29.7	26.8	2.9	10%

In all calendar years between 2015 and 2030, all CAP emissions remain lower for the proposed ACC program than the baseline even when accounting for any possible increases due to changes in consumer purchasing patterns. The results without consumer response are analogous to the emissions benefits described in Section V-D of the LEV III Staff Report.[1] These curves (dashed lines, open markers) reflect the

[1] The CARBITS population reflects only twenty vintages of light-duty vehicles in any calendar year which represents a subset of the EMFAC population used for the emission reductions presented in Section V-D. The emissions estimates from the two models are therefore not necessarily expected to match exactly,

changes only from improvements in tailpipe emission rates and assume there are no changes in fleet composition, though do account for any emissions increases due to the rebound effect.

Changes in the fleet size and average age would also affect CAPs. ARB staff used the fleet composition generated by CARBITS in a modified emissions inventory tool to estimate the changes in CAP emissions shown in Figure 5-1. An additional change due to a different fleet mix yields the results with consumer response (solid line, closed markers). In this case, the distribution of vehicles not only includes a greater proportion of newer vehicles, but also more vehicles in total. Total emissions are a function of both the vehicle emission rates and the number of miles that vehicles are driven. While newer vehicles will have lower emission rates, separate from the expected increase in VMT due to the rebound effect resulting from the lower operating costs, vehicles also tend to be driven more intensively in their younger years. Thus, having a greater proportion of newer vehicles and a larger total fleet size would generate additional VMT as an artifact of the modeling methodology. As a result, consumer responses to new vehicle offerings could reduce some of the expected emission reductions of $PM_{2.5}$ (circles) as a result of an increase in VMT. However these same forces could further enhance emission reductions of ROG (triangles) and have essentially no effect on NO_x (squares). For all pollutants the proposed ACC Program would continue to produce net benefits when allowing for changes in fleet composition.

In the event that total fleetwide VMT is solely a function of the rebound effect, renormalizing VMT to account only for those effects but maintaining the changes in fleet composition would result in similar changes to the percent reductions without consumer response. Appendix S contains a detailed discussion on the relationship between fleet turnover, fuel price and emission reductions and indicates that although the magnitude of emission reductions could vary, the Program would result in an overall net emission reduction. (See Appendix T of the LEV III Staff Report for emission calculation methodologies and Appendix S of the LEV III Staff Report for more detailed emission results related to economic factors.)

Overall, staff believes that consumer response to new vehicle offerings would not negate any of the positive effects on criteria pollutant emissions that are expected to result from the proposed Advanced Clean Cars Program, including resultant upstream emission reductions (as discussed in Section V of the LEV III Staff Report).

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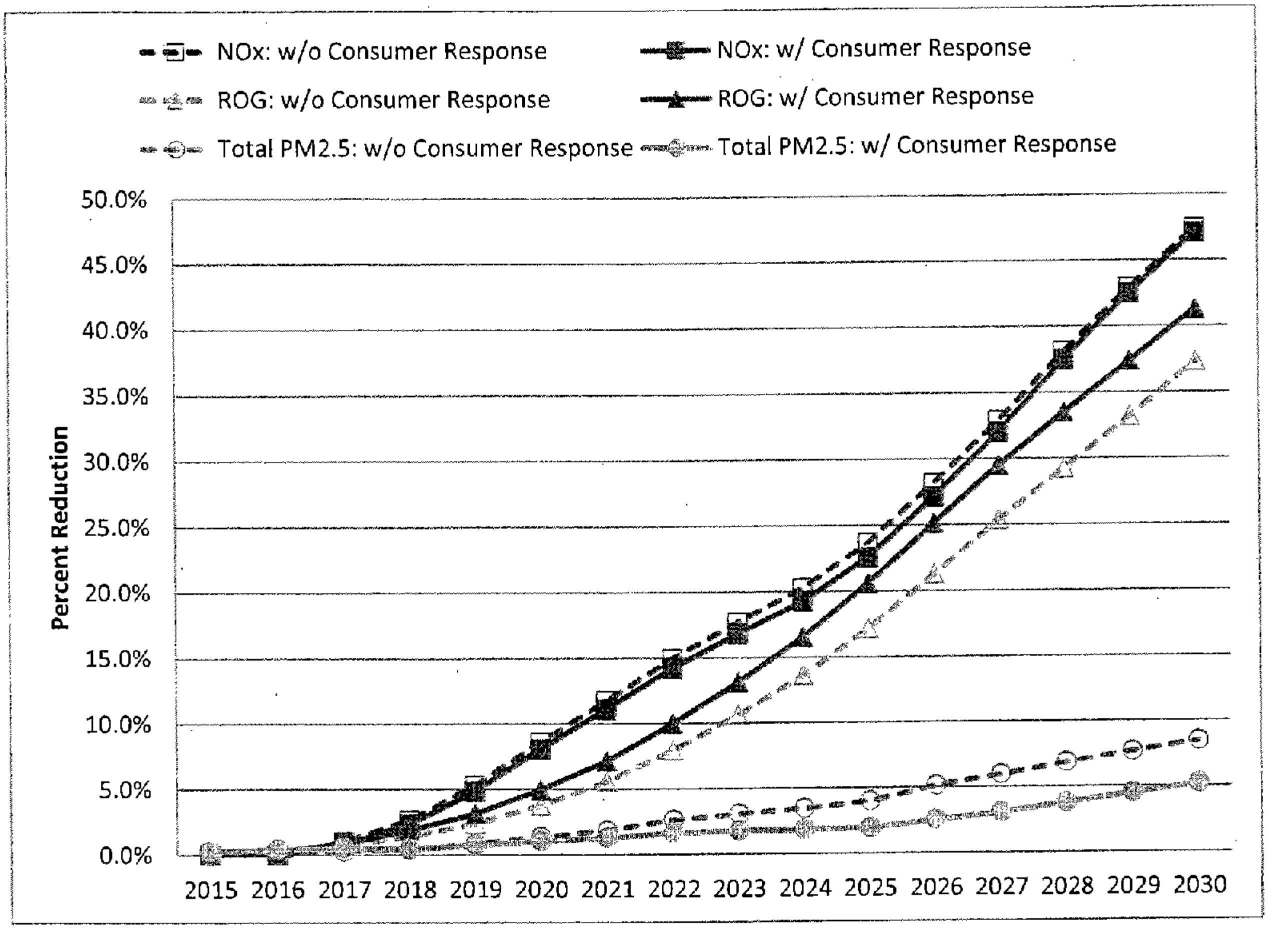
however the CARBITS subset covers an overwhelming majority of vehicles in the on-road fleet and their associated VMT.

Figure 5-1.
Advanced Clean Cars, Changes in ROG, NO_x, and $PM_{2.5}$ Emissions due to Consumer Response (percent)



Mitigation Measure C.1. (Construction)

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations that provide protection of air quality resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts to air resources include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.
- Specifically, apply for, secure, and comply with all appropriate air quality permits for project construction and operations from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to construction mobilization.
- Compliance with the CAA and the CCAA (e.g., NSR and BACT criteria if applicable).
- Comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure (e.g., construction-related fugitive PM dust regulations, indirect source review, and payment into offsite mitigation funds).
- For projects located in PM nonattainment areas, prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.

The proponents and local land use agencies can and should be the parties responsible for the project approval and implementation, its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. However, because of above mitigation are required by law, implementation would reduce this impact to a less-than-significant level.

2. Odors

There is uncertainty as to the exact locations of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells, new hydrogen fueling stations, and modifications to existing hydrogen production plants. However, these would likely occur within existing footprints or in areas with consistent zoning and would not include activities or processes that are associated with major odor sources (e.g., landfills). Additionally, new people would not be located near existing odor sources because implementation of the proposed ACC Program would not include the development of sensitive uses (e.g., residences). Thus, implementation of the proposed ACC Program would not create objectionable odors affecting a substantial number of people. As a result, this impact would be less than significant.

Mitigation

No mitigation is required.

D. Greenhouse Gases

1. Greenhouse Gases; Plan, Policy, or Regulation

As mentioned above in the air quality discussion, the proposed ACC Program would result in an emissions benefit as compared to current regulations. Table 5-4 shows the GHG emission benefits in 2020, 2025, 2035, and 2050. By 2025, CO_2 equivalent emissions would be reduced by almost 14 MMT/yr, which is 12 percent from baseline levels. The reduction increases in 2035 to 32 MMT/Year, a 27 percent reduction from baseline levels. By 2050, the proposed regulation will reduce emissions by more than 42 MMT/yr, a reduction of 33 percent from baseline levels. Viewed cumulatively over the life of the regulation (2017-2050), the proposed ACC Program would reduce emissions by more than 870 MMT CO_2e. With respect to energy, it is also important to note that energy consumption associated with implementation of the proposed ACC Program would displace gasoline (a higher carbon transportation fuel) resulting in additional benefits.

Table 5-4. CO_2-Equivalent (CO_2e) Emission Benefits from Advanced Clean Car Regulations

Statewide CO_2e Emissions (Million Metric Tons / Year)				
Calendar Year	**Adjusted Baseline with Rebound**	**Proposed Regulation with Rebound**	**Benefits**	**Percent Reduction**
2020	111.2	108.1	3.1	3%
2025	109.9	96.3	13.7	12%
2035	114.8	83.2	31.5	27%
2050	131.0	88.3	42.7	33%

Mitigation

No mitigation is required.

E. Biological Resources

1. Candidate, Sensitive, or Special Status Species; Riparian Habitat or Sensitive Natural Community; Wetlands; Movement, Local Policies and Ordinances; Plans

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning.

However, there is uncertainty as to the exact locations of these new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells and in relation to the location of biological resources. Construction of new plants could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. These activities would have the potential to adversely affect biological resources (e.g., species, habitat) that may reside or be present in those areas. Because there are biological species that occur, or even thrive, in developed settings, resources could also be adversely affected by the installation of hydrogen fuel dispensing units at existing gasoline service stations and modifications to existing hydrogen production plants within existing footprints, or at other sites in areas with consistent zoning.

Long-term operation of new plants, stations, and modifications would often include the presence of humans; movement of automobiles, trucks and heavy equipment; and operation of stationary equipment. This environment would not be conducive to biological resources located on-site or nearby. The biological resources that could be affected by construction and operation associated with implementation of the proposed ACC Program, would depend on the specific location of each facility and its environmental setting. Harmful effects could include modifications to existing habitat; including removal, degradation, and fragmentation of riparian systems, wetlands, or other sensitive natural wildlife habitat and plan communities; interference with wildlife movement or wildlife nursery sites; loss of special-status species; and/or conflicts with the provisions of adopted habitat conservation plans, natural community conservation plans, or other conservation plans or policies to protect natural resources. Consequently, this impact would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

Mitigation Measure E.1.

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations that provide protection of biological resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to biological resources include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Preparation of a biological inventory of site resources by a qualified biologist prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Ensure that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.

- Preparation of a wetland survey of onsite resources. Establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 3030(d) of the Clean Water Act and is administered by the U.S. Army Corps of Engineers.

- Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices.

- Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring as needed to ensure that project activity does not cause an active nest to fail.

- Preparation of site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevents stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board.

- Plant replacement trees and establish permanently protection suitable habitat at ratios considered acceptable to comply with "no net loss" requirements.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding biological resources resulting from the construction and operation of new plants, stations, and modifications may be significant and unavoidable.

F. Cultural Resources

1. Historic Resources, Archaeological Resources, Paleontological Resources, Unique Geologic Features, Human Remains

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning.

However, there is uncertainty as to the exact locations of these new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells and in relation to the location of cultural resources.

The long-term operation of new plants, stations, and modifications would not include any ground disturbance or demolition activities, which are the primary detriments to historical, archaeological, and paleontological resources. However, construction of new plants could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist. Historic buildings and structures may also be adversely affected by demolition-related activities. Such resources may occur individually, in groupings of modest size, or in districts. Because culturally sensitive resources can also be located in developed settings, historic, archeological, and paleontological resources, and places important to Native American communities, could also be adversely affected by the installation of hydrogen fuel dispensing units at existing gasoline service stations and modifications to existing hydrogen production plants within existing footprints, or at other sites in areas with consistent zoning. As a result, this impact would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

Mitigation Measure F.1.

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations that provide protection of cultural resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to cultural resources include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant cultural impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).

- Seek guidance from the State and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.

- Consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies will provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.

- Define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE should include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access.

- Retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures (Society of Vertebrate Paleontology 1995).

- Conduct initial scoping assessments to determine whether proposed construction activities would disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment should be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements.

- The project proponent's qualified paleontological resources specialist would determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossiliferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:

  — a preliminary survey (if not conducted earlier) and surface salvage prior to construction;

  — physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries;

  — monitoring and salvage during excavation;

  — specimen preparation;

  — identification, cataloging, curation and storage; and

  — a final report of the findings and their significance.

  — Choose sites that avoid areas of special scientific value.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding cultural resources resulting from the construction and operation of new plants, stations, and modifications may be significant and unavoidable.

G. Geology and Soils

1. Risk of Loss, Injury, or Death; Unstable Geologic Unit or Soil; Expansive Soil

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants.

New manufacturing plants and new hydrogen fueling stations could be located in a variety of relatively high-risk geologic and soil conditions that are considered to be potentially hazardous. For instance, the seismic conditions at the site of a new plant that may have high to extremely high seismic-related fault rupture and ground shaking potential associated with earthquake activity. New facilities could also be subject to seismic-related ground failure, including liquefaction and landslides.

New facilities could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil erosion. Strong ground shaking could also trigger landslides in areas where the natural slope is naturally unstable or is over-steepened by the construction of access roads and structures.

New facilities could also be constructed in locations that would expose facilities and structures to expansive soil conditions. Expansive soils, those with high-plasticity clay content, can cause structural failure of the foundations and footings. The presence of expansive soils as defined in Table 18-1-B of the Uniform Building Code (1994) could create substantial risks to life or property. The potential for expansive soils is not well documented in all areas. Therefore, development of new manufacturing plants and new hydrogen fueling stations are potentially susceptible to the presence of expansive soils particularly in areas of fine-grained sediment accumulation typically associated with playas, valley bottoms, and local low-lying areas.

The specific design details, siting locations, seismic hazards, and geologic, slope, and soil conditions for a particular manufacturing plant or hydrogen fueling station are not known at this time and would be analyzed on a site-specific basis at the project level.

Therefore, for purposes of this analysis, development of these facilities could expose people and structures to relatively high levels of risk associated with strong seismic ground shaking, including liquefaction and landslides, and instability. These geologic, seismic, and soil-related conditions could result in damage to structures, related utility lines, and access roads, blocking access and posing safety hazards to people. As a result, this impact would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

2. Substantial Soil Erosion or the Loss of Topsoil

New plants, stations, and modifications could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to both soil erosion and loss of topsoil during construction. The level of susceptibility varies by location. However, the specific design details, siting locations, and soil erosion hazards for particular manufacturing plants and hydrogen fueling stations are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of this analysis, the potential soil erosion hazard impacts would be considered potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

3. Septic Tanks or Alternative Waste Water Disposal Systems

New manufacturing plants would not be anticipated to require the installation or use of septic tanks or alternative waste water disposal systems. Industrial land uses, manufacturing processes in particular, would require more advanced treatment systems that would likely be served by centralized wastewater treatment plants. New hydrogen fueling stations and modifications would not generate waste water and, thus, would not require new waste water treatment disposal systems. In addition, although there is uncertainty as to the exact locations of new plants, stations, and modifications, these would likely occur within existing footprints or in areas with consistent zoning. Consequently, if new hydrogen fueling stations or modification were to result in waste water generation, it could likely be served by an existing waste water treatment plant located in the surrounding urban areas. Therefore, the impacts related to adequately supporting septic tanks or alternative wastewater disposal systems would be less than significant.

Mitigation Measure G.1 and G.2.

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations that provide protection of geology and soils. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology and soils include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Prior to the issuance of any development permits, proponents of new manufacturing plants and hydrogen fueling stations would prepare a geotechnical investigation/study, which would include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, minerals resources and the presence of hazardous materials.

- Proponents of new manufacturing plants and hydrogen fueling stations would provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents would avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact to geology and soils resulting from the construction and operation of new plants, stations, and modifications may be significant and unavoidable.

H. Hazards and Hazardous Materials

1. Routine Transport, Use, or Disposal of Hazardous Materials

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning.

The long-term operation of new plants, stations, and modifications would result in the routine transport, use, and disposal of hazardous materials (i.e., propulsion batteries, fuel cells, and hydrogen). However, as discussed in Chapter 5, Regulated Community Compliance Responses, the transport, use, and disposal of hazardous materials would be required to comply with all applicable federal, State and local laws. In addition, although there is uncertainty as to the exact locations of these new plants, stations, and modifications, these would likely occur within existing footprints or in areas with consistent zoning where hazardous materials are currently in use. As a result, this impact would be less than significant.

2. Upset and Accident Conditions

Implementation of the proposed ACC Program would result in mass reductions in regards to the heavier vehicle classes. There are recent studies that analyze the relationship between vehicle weight, size (wheelbase, track width, and their product, footprint), and safety, for individual vehicle makes and models. Based on these studies, the principal difference between the heavier vehicles, especially truck-based LTVs, and the lighter vehicles, especially passenger cars, is that mass reduction has a different effect in collisions with another car or LTV. When two vehicles of unequal mass collide, the delta V is higher in the lighter vehicle, in the same proportion as the mass ratio. As a result, the fatality risk is also higher. Removing some mass from the heavy vehicle reduces delta V in the lighter vehicle, where fatality risk is high, resulting in a large benefit, offset by a small penalty because delta V increases in the heavy vehicle, where fatality risk is low – adding up to a net societal benefit. It is also important to note that once differences in vehicles, drivers and crash times/locations are accounted for, there is essentially no correlation between vehicle mass and US fatality risk per VMT (Wenzel 2011).

Also, with regards to battery fires and/or explosions, there are existing propulsion battery system safety documents that define evaluation methods and make recommendations for battery system performance. The SAE Standard defines a minimum set of acceptable safety criteria for a lithium-based rechargeable battery system to be considered for use in a vehicle propulsion application as an energy storage system connected to a high voltage power train. The purpose of the SAE Standard is to assure that a battery pack can safely be integrated into an electric or hybrid vehicle. Specifically, it is designed to assure that a single point fault will not result in fire, explosion, battery enclosure rupture or high voltage hazard.

However, construction activities would use heavy-duty equipment requiring periodic refueling and lubricating. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site as they are not designed for use on public roadways. Thus, such maintenance uses a service vehicle that mobilizes to the location of the construction equipment. It is during the transfer of fuel that the potential for an accidental release is most likely. Although precautions would be taken to ensure that any spilled fuel is properly contained and disposed, and such spills are typically minor and localized to the immediate area of the fueling (or maintenance), the potential still remains for a significant release of hazardous materials into the environment. Consequently, the project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Therefore, this impact would be potentially significant. This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

3. Hazardous Emissions, Materials, or Substances Near Schools, Hazardous Material Site, Airport Land Use Plan, Private Airstrip, Emergency Response Plan or Emergency Evacuation Plan, Wildland Fires

As discussed above, although there is uncertainty as to the exact locations of these new plants, stations, and modifications, these would likely occur within existing footprints or in areas with consistent zoning where hazardous materials are currently in use. Thus, implementation of the proposed ACC Program would not be anticipated to result in locating new plants, stations, or modifications near schools, public (or public use) airports, private airstrips, or wildlands; or on sites included on a list of hazardous materials sites or impair implementation of or physically interfere with an adopted emergency response or evacuation plan. In addition, as noted above, the handling of hazards materials would be required to comply with all applicable federal, State and local laws. As a result, this impact would be less than significant.

Mitigation Measure H.2.

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations in regards to hazards. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid upset and accident-related impacts include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant upset and accident-related hazard impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Handling of potentially hazardous materials/wastes should be performed under the direction of a licensed professional with the necessary experience and knowledge to oversee the proper identification, characterization, handling and disposal or recycling of the materials generated as a result of the project. As wastes are generated, they would be placed, at the direction of the licensed professional, in designated areas that offer secure, secondary containment and/or protection from stormwater runoff. Other forms of containment may include placing waste on plastic sheeting (and/or covering with same) or in steel bins or other suitable containers pending profiling and disposal or recycling.

- The temporary storage and handling of potentially hazardous materials/wastes should be in areas away from sensitive receptors such as schools or residential areas. These areas should be secured with chain-link fencing or similar barrier with controlled access to restrict casual contact from non-Project personnel. All project personnel that may come into contact with potentially hazardous materials/wastes will have the appropriate health and safety training commensurate with the anticipated level of exposure.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding upset and accident-related hazards resulting from the construction and operation of new plants, stations, and modifications may be significant and unavoidable.

I. Hydrology and Water Quality

1. Water Quality Standards or Waste Discharge Requirements; Groundwater Supplies or Groundwater Recharge; Runoff Water

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning.

The long-term operation of new plants, stations, and modifications would be required to comply with applicable erosion, water quality standards, and waste discharge requirements (e.g., NPDES, SWPPP). With respect to depleting groundwater supplies, impairing quality, and runoff issues, new facilities would not be anticipated to result in substantial demands due to the nature of associated activities. As a result, this impact would be less than significant.

2. Drainage Patterns; Flood Hazards; Seiche, Tsunami, or Mudflow

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations would also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning.

New plants, stations, and modifications could be located in a variety of conditions with regards to altering drainage patters, flooding, and inundation by seiche, tsunami, or mudflow. The level of susceptibility varies by location. However, the specific design details, siting locations, and associated hydrology and water quality issues are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of this analysis, these potential hydrology and water quality-related impacts would be considered potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

Mitigation Measure I.2.

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations in regards to hydrology and water quality. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or mitigate hydrology and water quality-related impacts include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding hydrology and water quality resulting from the construction and operation of new plants, stations, and modifications may be significant and unavoidable.

J. Land Use Planning

1. Divide an Established Community, Land Use Plan, Habitat Conservation Plan or Natural Conservation Plan

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning. Thus, implementation of the proposed ACC Program would not be anticipated to divide an established community or conflict with a land use or conservation plan. This impact would be less than significant.

Mitigation

No mitigation is required.

K. Mineral Resources

1. Availability of a Known Mineral Resource or Recovery Site

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning where original permitting and analyses considered these issues. In addition, implementation of the proposed ACC Program would not significantly deplete the supply of lithium or platinum and both are currently used in auto manufacturing processes. As a result, this impact would be less than significant.

Mitigation

No mitigation is required.

L. Noise

1. Noise Levels in Excess of Standards, Excessive Groundborne vibration or Groundborne Noise Levels, Substantial Increases in Ambient Noise Levels

Construction noise levels in the vicinity of new plants, stations, and modifications would fluctuate depending on the particular type, number, size, and duration of usage for the varying equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Construction generally occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. These variations in the operational characteristics of the equipment change the effect they have on the noise environment of the project site and in the surrounding community for the duration of the construction process.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes, mobile and stationary. Mobile equipment sources move around a construction site performing tasks in a recurring manner (e.g., loaders, graders, dozers). Stationary equipment operates in a given location for an extended period of time to perform continuous or periodic operations. Operational characteristics of heavy construction equipment are additionally typified by short periods of full-power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

Additionally when construction-related noise levels are being evaluated, activities that occur during the more noise-sensitive evening and nighttime hours are of increased concern. Because exterior ambient noise levels typically decrease during the late evening and nighttime hours as traffic volumes and commercial activities decrease, construction activities performed during these more noise-sensitive periods of the day can result in increased annoyance and potential sleep disruption for occupants of nearby residential uses.

The site preparation phase typically generates the most substantial noise levels because of the on-site equipment associated with grading, compacting, and excavation, which uses the noisiest types of construction equipment. Site preparation equipment and activities include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Construction of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which may also generate noise levels. Although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of noise would include backhoes, bulldozers, and excavators. Noise emission levels from typical types of construction equipment can range from approximately 74 to 94 dBA at 50 feet.

Based on this information and accounting for typical usage factors of individual pieces of equipment and activity types, on-site construction could result in hourly average noise levels of 87 dBA L_{eq} at 50 feet and maximum noise levels of 90 dBA L_{max} at 50 feet from the simultaneous operation of heavy-duty equipment and blasting activities, if deemed necessary. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within thousands of feet from project sites could exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours).

Additionally, construction activities may result in varying degrees of temporary groundborne noise and vibration, depending on the specific construction equipment used and activities involved. Groundborne noise and vibration levels caused by various types of construction equipment and activities (e.g., bulldozers, blasting) range from 58-109 VdB and from 0.003 to 0.089 in/sec PPV at 25 feet. Similar to the above discussion, although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of groundborne vibration and noise would include bulldozers and trucks. According to FTA, levels associated with the use of a large bulldozer and trucks are 0.089 and 0.076 in/sec PPV (87 and 86 VdB) at 25 feet, respectively. With respect to the prevention of structural damage, construction-related activities would not exceed recommended levels (e.g., 0.2 in/sec PPV). However, based on FTA's recommended procedure for applying a propagation adjustment to these reference levels, bulldozing and truck activities could exceed recommended levels with respect to the prevention of human disturbance (e.g., 80 VdB) within 275 feet.

With respect to operational-related transportation activities, new plants, stations, and modifications would not be anticipated to result in a doubling of ADT volumes on affected roadway segments (e.g., the amount associated with a substantial traffic noise increase as discussed above). However, new plants, stations, and modifications, could introduce new on-site stationary noise sources (e.g., pumps, motors, compressors, fans, generators, and other equipment). Noise levels associated with these types of sources vary greatly, but would generally range from 70 dBA L_{eq} to 80 dBA L_{max} at 50 feet. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within hundreds of feet from the location of the project sites could exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours). Thus, implementation of the proposed ACC Program could result in the generation of short-term construction noise and long-term stationary noise levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels. As a result, this impact would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

2. People Residing or Working in the Area to Excessive Airport-Related Noise Levels

As discussed above, although there is uncertainty as to the exact locations of these new plants, stations, and modifications, these would likely occur within existing footprints or in areas with consistent zoning. Thus, implementation of the proposed ACC Program would not be anticipated to result in locating new plants, stations, or modifications near existing public (or public use) airports or private airstrips. In addition, implementation of the proposed ACC Program would not result in any housing placement or substantial increases in airport-activities. As a result, this impact would be less than significant.

Mitigation Measure L.1.

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations that pertain to noise. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize noise include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant noise impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Ensure noise-generating construction activities (including truck deliveries, pile driving and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors.

- Consider use of noise barriers, such as berms, to limit ambient noise at property lines, especially where sensitive receptors may be present.

- Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment.

- All construction equipment used would be adequately muffled and maintained.

- Consider use of battery powered forklifts and other facility vehicles.

- Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby sensitive receptors or shielded.

- Properly maintain mufflers, brakes and all loose items on construction and operational-related vehicles to minimize noise and ensure safe operations. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum.

- Use noise controls on standard construction equipment; shield impact tools.

- Consider use of flashing lights instead of audible back-up alarms on mobile equipment.

- Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines.

- Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.
- Contain facilities within buildings or other types of effective noise enclosures.
- Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding noise resulting from the construction and operation of new plants, stations, and modifications may be significant and unavoidable.

M. Population and Housing

1. Population Growth, Displace Housing or People

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. Construction activities would be anticipated to require relatively small crews as new plants, stations, and modifications would likely occur within existing footprints or in areas with consistent zoning. In addition, demand for these crews would be temporary (e.g., 6-12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Furthermore, it would not be anticipated that a substantial amount of new personnel would be needed to operate the facilities and that sufficient employment base would likely be available because these would likely occur within existing footprints or in areas with consistent zoning. Therefore, this impact would be less than significant.

<u>Mitigation</u>

No mitigation is required.

N. Public Services

1. Response Time for Fire Protection, Police Protection, Schools, Parks, and Other Facilities

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. Construction activities would be anticipated to require relatively small crews as new plants, stations, and modifications would likely occur within existing footprints or in areas with consistent zoning. In addition, demand for these crews would be temporary (e.g., 6-12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Furthermore, it would not be anticipated that a substantial amount of new personnel would be needed to operate the facilities and that sufficient employment base would likely be available because these would likely occur within existing footprints or in areas with consistent zoning. Implementation of the proposed ACC Program would not require new additional housing or land use types that do not currently exist in the area; therefore, not affecting the provision of public services. As a result, this impact would be less than significant.

Mitigation

No mitigation is required.

O. Recreation

1. Regional Parks or Other Recreational Facilities

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants. Construction activities would be anticipated to require relatively small crews as new plants, stations, and modifications would likely occur within existing footprints or in areas with consistent zoning. In addition, demand for these crews would be temporary (e.g., 6-12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Furthermore, it would not be anticipated that a substantial amount of new personnel would be needed to operate the facilities and that sufficient employment base would likely be available because these would likely occur within existing footprints or in areas with consistent zoning. Thus, implementation of the proposed ACC Program would not be anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur. In addition, new (or expansion of) recreational-related facilities would not occur; therefore, not physically affecting the environment. As a result, this impact would be less than significant.

Mitigation

No mitigation is required.

P. Transportation/Traffic

1. Performance of Circulation System; Congestion Management Programs; Air Traffic Patterns; Hazards; Emergency Access, Policies, Plans and Programs

a. Construction Impacts

Although detailed information about specific construction activities is not currently available, new plants, stations and modifications would be anticipated to result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would fluctuate depending on the particular type, number, and duration of usage for the varying equipment, and the phase of construction. These variations would affect the amount of project-generated traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. As a result, this impact would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

b. Operational Impacts

With respect to operational-related activities, it would not be anticipated that a substantial amount of new personnel would be needed to operate the facilities and that sufficient employment base would likely be available because these would likely occur within existing footprints or in areas with consistent zoning. In addition, as discussed in Chapter 4, Regulated Community Compliance Responses, deliveries associated with long-term operational activities (e.g., hydrogen deliveries) would not be anticipated to result in a substantial number of new trips (or associated VMT). Thus, implementation of the proposed ACC Program would not be anticipated to result in substantial traffic volumes on local roadways and; therefore, would not generate long-term operational traffic that conflicts with applicable programs, plans, ordinances, or policies; result in a change in air traffic patterns; substantially increase hazards due to design features; or result in inadequate emergency access. As a result, this impact would be less than significant.

Mitigation Measure P.1. (Construction)

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations in regards to transportation. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize construction traffic impacts include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant traffic impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Minimize the number and length of access, internal, service and maintenance roads and use existing roads when feasible.

- Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements.

- If new roads are necessary prepare a road siting plan and consult standards contained in federal, State, or local requirements. The plans should include design and construction protocols to ensure roads will meet the appropriate standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and minimize side-hill cuts. Roads internal to a project site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils.

- Prepare a Construction Traffic Control Plan and a Traffic Management Plan.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding traffic resulting from the construction of new plants, stations, and modifications may be significant and unavoidable.

Q. Utilities and Service Systems

1. Water Supply, Wastewater Treatment, and Storm Water, and Solid Waste Infrastructure

As discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations could also be constructed and operated along with modifications to existing hydrogen production plants.

As discussed in Chapter 4, Regulated Community Compliance Responses, new hydrogen fueling stations would likely be located in urban areas consistent with local zoning. These locations would likely be served by utility and service systems that are already in place at the time the stations are built. Such systems would include water supply service providers, centralized wastewater treatment systems, storm water drainage infrastructure, and solid waste service providers and related infrastructure. Additionally, the demand for these utilities and services from hydrogen fueling stations would be minimal and not be unlike the demand from existing gasoline service stations. For these reasons, demand for these utilities and services would not be expected to exceed the capacity of the local providers or necessitate an increase in service capacities and associated infrastructure and, therefore, would not result associated environmental impacts.

New manufacturing plants, however, could generate substantial increases in the demand for water supply, wastewater treatment, storm water drainage, and solid waste services in their local areas. These new facilities, no matter their size and location would be required to seek local land use approvals prior to their development. Part of the land use entitlement process for facilities proposed in California requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the State CEQA Guidelines. It is assumed that facilities proposed in other states would be subject to comparable federal, state, and/or local environmental review requirements (e.g., CEQA) and that the environmental review process would assess whether adequate utilities and services (i.e., wastewater services, water supply services, solid waste facilities) would be available and whether the project would result in the need to expand or construct new facilities to serve the project. Through the environmental review process, utility and service demands would be calculated, agencies would provide input on available service capacity and the potential need for service-related infrastructure including expansions to waste water treatment plants, new water supply entitlements and infrastructure, storm water infrastructure, and solid waste handling capacity [e.g., landfills]). Resulting environmental impacts would also be determined through this process.

At this time, the specific location, type, and number of new manufacturing plants developed is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, product demands, environmental constraints, and other market constraints. Thus, the specific impacts from new manufacturing plants on utility and service systems cannot be identified with any certainty, and individual plants could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impacts to a less-than-significant level. Thus, for purposes of this analysis, this impact is considered potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

Mitigation Measure Q.1.

The Regulatory Setting in Chapter 3 includes, but is not limited to, applicable laws and regulations that related to utilities and service systems. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local land use and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize utility and service-related impacts include:

- Proponents of new or modified facilities constructed as a compliance response to the ACC regulations would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant utility or service-related impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Comply with local plans and policies regarding the provision of water supply, wastewater treatment, and storm water drainage utilities, and solid waste services.
- Where an on-site wastewater system is proposed, submit a permit application to the appropriate local jurisdiction and include the application with applications to appropriate lead agencies.
- Where appropriate, prepare a Water Supply Assessment (WSA) consistent with the requirements of Section 21151.9 of the Public Resources Code/ Section 10910 et seq. of the Water Code. The WSA would be approved by the local water agency/purveyor prior construction of the project.
- Comply with local plans and policies regarding the provision of wastewater treatment services.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact to utilities and service systems resulting from the construction and operation of new plants and modifications to existing plants may be significant and unavoidable.

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6.0 CUMULATIVE AND GROWTH-INDUCING IMPACTS

Cumulative impacts are impacts on the environment that result from the incremental impacts of a proposed project when added to other past, present, and reasonably foreseeable future actions (CEQA Guidelines, CCR, Title 14, Section 15355[b]). Such impacts can result from individually minor, but collectively significant actions taking place over time. CEQA Guidelines, CCR, Title 14, Section 15130 states that the discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone.

Recognizing the programmatic nature of the EA, cumulative impacts for resource topics are disclosed in general qualitative terms as they pertain to reasonably foreseeable compliance responses. The State CEQA Guidelines require that cumulative impacts be addressed when the cumulative impacts are expected to be significant and when the project's incremental contribution to the effect is cumulatively considerable (CEQA Guidelines, CCR, Title 14, Section 15130[a]). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. EIRs must consider "other projects creating related impacts." (CEQA Guidelines, CCR, Title 14, Section 15130[a][1]). CEQA Guidelines, CCR, Title 14, Section 15355(b) requires an analysis of "other closely related past, present, and reasonably foreseeable probable future projects". ARB is, accordingly, considering in the cumulative impacts analysis of other projects that, like the proposed ACC Program, are designed to *reduce* annual emissions of CAPs and GHGs, and not simply every project that emits CAPs or GHGs. This approach is "guided by the standards of practicality and reasonableness" (CEQA Guidelines, CCR, Title 14, 15130[b]) and serves the purposes of the cumulative impacts analysis, which is to provide "a context for considering whether the incremental effects of the project at issue are considerable" when judged "against the backdrop of the environmental effects of other projects." (CBE v. Cal. Res. Agency [2002] 103 Cal.App.4th 98, 119).

The level of detail in this section has been guided by what is practical and reasonable, and contains the following elements:

- An analysis of related future projects or planned regulatory programs that would affect resources in the project area similar to those affected by the proposed project;

- A summary of the expected environmental effects to be produced by those reasonably foreseeable future projects with specific reference to additional information stating where that information is available; and

- A reasonable analysis of the cumulative impacts of the relevant projects. An environmental document must examine reasonable feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

Due to the statewide reach of the proposed ACC Program and the longer-term future horizon for the reduction achievements, the impact analysis is inherently cumulative in nature, rather than site or project specific. As a result the character of impact conclusions in the resource-oriented sections of Chapter 5 are cumulative, considering the potential effects of the full range of reasonably foreseeable methods of compliance, along with expected background growth in California, as appropriate.

This section evaluates the cumulative and growth-inducing impacts associated with implementation of the proposed ACC Program and the potential contribution of the program to those impacts. The impact assessment discusses each resource topic evaluated in this EA.

A. Aesthetics

There is uncertainty as to the exact locations of new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells and in relation to the location of viewers. Construction and operation of these, though likely to occur in areas with consistent zoning, could introduce or increase the presence of artificial elements (e.g., heavy-duty equipment, removal of existing vegetation, buildings) in areas with national, state, or county designated scenic vistas and/or scenic resources visible from State scenic highways. The visual impact of such development would depend on several variables, including size of facilities, viewing distance, angle of view, visual absorption capacities, and the structure placement in the landscape. Operation may introduce substantial sources of nighttime lighting for safety and security purposes. Implementation of Mitigation Measure A.1. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative aesthetics-related impact.

B. Agriculture and Forestry Resources

Implementation of the proposed ACC Program could result in the construction and operation of new manufacturing plants that specialize in the production of propulsion batteries and fuel cells. New hydrogen fueling stations would also be constructed and operated along with modifications to existing hydrogen production plants. There is uncertainty as to the exact locations of these new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells; however, these would likely occur within existing facility footprints or in areas with consistent zoning. Thus, implementation of the proposed ACC Program would not be anticipated to result in the conversion of farmland, conflict with existing zoning for agricultural use or a Williamson Act contract, conflict with existing zoning for (or cause rezoning of) forest land or timberland, the loss of forest land (or conversion of forest land to non-forest use), or involve other changes resulting in conversion of farmland or forest land to non-agricultural use or non-forest use, respectively. Thus, the proposed ACC Program would not result in a considerable contribution to a cumulative agriculture-related impact.

C. Air Quality

A majority of California is designated as a nonattainment area for ozone and PM_{10}, and to a lesser degree for $PM_{2.5}$, and areas with high levels of TACs. As described in above in Chapter 5, future projects associated with implementation of proposed ACC Program and other cumulative development projects would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review and through this process, air quality levels and associated exposure of sensitive receptors would be calculated and resulting impacts would be determined. With respect to long-term operational emissions, implementation of the proposed ACC Program would result in a beneficial impact.

However, depending on the specific location, type, and number, construction activities could generate short-term emissions that conflict with applicable air quality plans, or violate or contribute substantially to an existing or projected violation. Additionally, implementation could also result in the exposure of sensitive receptors to substantial pollutant concentrations. Implementation of Mitigation Measure C.1. (Construction) would reduce these impacts to a less-than-significant level. Thus, all potentially significant air quality impacts associated with the implementation of the proposed ACC Program would be reduced to a less-than-significant level with mitigation and would not result in a considerable contribution to a cumulative air quality impact.

D. Greenhouse Gases

The proposed ACC Program would result in an emissions benefit as compared to current regulations. Table 5-4 shows the GHG emission benefits in 2020, 2025, 2035, and 2050. By 2025, CO_2 equivalent emissions would be reduced by almost 14 MMT/yr, which is 12 percent from baseline levels. The reduction increases in 2035 to 32 MMT/Year, a 27 percent reduction from baseline levels. By 2050, the proposed regulation will reduce emissions by more than 42 MMT/yr, a reduction of 33 percent from baseline levels. Viewed cumulatively over the life of the regulation (2017-2050), the proposed ACC Program would reduce emissions by more than 870 MMT CO_2e. Thus, the proposed ACC Program would not result in a considerable contribution to a cumulative GHG-related impact.

E. Biological Resources

There is uncertainty as to the exact locations of these new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells and in relation to the location of biological resources. Construction of new plants could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. These activities would have the potential to adversely affect biological resources (e.g., species, habitat) that may reside or be present in those areas. Because there are biological species that occur, or even thrive, in developed settings, resources could also be adversely affected by the installation of hydrogen fuel dispensing units at existing gasoline service stations and modifications to existing hydrogen production plants within existing footprints, or at other sites in areas with consistent zoning. Long-term operation of new plants, stations, and modifications would often include the presence of humans; movement of automobiles, trucks and heavy equipment; and operation of stationary equipment. This environment would not be conducive to biological resources located on-site or nearby.

The biological resources that could be affected by construction and operation associated with implementation of the proposed ACC Program, would depend on the specific location of each facility and its environmental setting. Harmful effects could include modifications to existing habitat; including removal, degradation, and fragmentation of riparian systems, wetlands, or other sensitive natural wildlife habitat and plan communities; interference with wildlife movement or wildlife nursery sites; loss of special-status species; and/or conflicts with the provisions of adopted habitat conservation plans, natural community conservation plans, or other conservation plans or policies to protect natural resources. Implementation of Mitigation Measure E.1. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative biology-related impact.

F. Cultural Resources

There is uncertainty as to the exact locations of these new plants, stations, and modifications, especially in regards to new manufacturing plants for producing propulsion batteries and fuel cells and in relation to the location of cultural resources. The long-term operation of new plants, stations, and modifications would not include any ground disturbance or demolition activities, which are the primary detriments to historical, archaeological, and paleontological resources. However, construction of new plants could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist. Historic buildings and structures may also be adversely affected by demolition-related activities. Such resources may occur individually, in groupings of modest size, or in districts. Because culturally sensitive resources can also be located in developed settings, historic, archeological, and paleontological resources, and places important to Native American communities, could also be adversely affected by the installation of hydrogen fuel dispensing units at existing gasoline service stations and modifications to existing hydrogen production plants within existing footprints, or at other sites in areas with consistent zoning. Implementation of Mitigation Measure F.1. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative cultural resource-related impact.

G. Geology and Soils

As discussed in Chapter 5, new manufacturing plants would not be anticipated to require the installation or use of septic tanks or alternative waste water disposal systems, but rather likely be served by centralized wastewater treatment plants. New hydrogen fueling stations and modifications would not generate waste water and, thus, would not require new waste water treatment disposal systems. However, new manufacturing plants and new hydrogen fueling stations could be located in a variety of relatively high-risk geologic and soil conditions that are considered to be potentially hazardous. New facilities could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil erosion and the loss of topsoil during construction. New facilities could also be constructed in locations that would expose facilities and structures to expansive soil conditions. Development of these facilities could expose people and structures to relatively high levels of risk associated with strong seismic ground shaking, including liquefaction and landslides, and instability; or result in substantial soil erosion or the loss of topsoil. These geologic, seismic, and soil-related conditions could result in damage to structures, related utility lines, and access roads, blocking access and posing safety hazards to people. Implementation of Mitigation Measure G.1. and G.2. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative geology and soils-related impact.

H. Hazards and Hazardous Materials

As discussed in Chapter 5, the long-term operation of new plants, stations, and modifications would result in the routine transport, use, and disposal of hazardous materials (i.e., propulsion batteries, fuel cells, and hydrogen); however, such would be required to comply with all applicable federal, State and local laws. Implementation of the proposed ACC Program would not be anticipated to result in locating new plants, stations, or modifications near schools, public (or public use) airports, private airstrips, or wildlands; or on sites included on a list of hazardous materials sites or impair implementation of or physically interfere with an adopted emergency response or evacuation plan. In addition, as noted above, the handling of hazards materials would be required to comply with all applicable federal, State and local laws; and, although there is uncertainty as to the exact locations of these new plants, stations, and modifications, these would likely occur within existing footprints or in areas with consistent zoning where hazardous materials are currently in use. Implementation of the proposed ACC Program would result in mass reductions in regards to the heavier vehicle classes. When two vehicles of unequal mass collide, the delta V is higher in the lighter vehicle, in the same proportion as the mass ratio. As a result, the fatality risk is also higher. Removing some mass from the heavy vehicle reduces delta V in the lighter vehicle, where fatality risk is high, resulting in a large benefit, offset by a small penalty because delta V increases in the heavy vehicle, where fatality risk is low – adding up to a net societal benefit. It is also important to note that once differences in vehicles, drivers and crash times/locations are accounted for, there is essentially no correlation between vehicle mass and US fatality risk per VMT (Wenzel 2011). Also, with regards to battery fires and/or explosions, there are existing propulsion battery system safety documents that define evaluation methods and make recommendations for battery system performance. However, the project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment primarily related to construction activities as discussed in Chapter 5. Implementation of Mitigation Measure H.2. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative hazards-related impact.

I. Hydrology and Water Quality

The long-term operation of new plants, stations, and modifications would be required to comply with applicable erosion, water quality standards, and waste discharge requirements (e.g., NPDES, SWPPP). With respect to depleting groundwater supplies, impairing quality, and runoff issues, new facilities would not be anticipated to result in substantial demands due to the nature of associated activities. However, new plants, stations, and modifications could be located in a variety of conditions with regards to altering drainage patters, flooding, and inundation by seiche, tsunami, or mudflow. Implementation of Mitigation Measure I.2. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative hydrology and water quality-related impact.

J. Land Use Planning

New hydrogen fueling stations would also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning. Thus, implementation of the proposed ACC Program would not be anticipated to divide an established community or conflict with a land use or conservation plan. Thus, the proposed ACC Program would not result in a considerable contribution to a cumulative land use planning-related impact.

K. Mineral Resources

New hydrogen fueling stations would also be constructed and operated along with modifications to existing hydrogen production plants. These would likely occur within existing footprints or in areas with consistent zoning where original permitting and analyses considered these issues. In addition, as discussed in Chapter 4, Regulated Community Compliance Responses, implementation of the proposed ACC Program would not significantly deplete the supply of lithium or platinum and both are currently used in auto manufacturing processes. Thus, the proposed ACC Program would not result in a considerable contribution to a cumulative mineral resources-related impact.

L. Noise

As discussed above, although there is uncertainty as to the exact locations of these new plants, stations, and modifications, these would likely occur within existing footprints or in areas with consistent zoning. Thus, implementation of the proposed ACC Program would not be anticipated to result in locating new plants, stations, or modifications near existing public (or public use) airports or private airstrips. In addition, implementation of the proposed ACC Program would not result in any housing placement or substantial increases in airport-activities. With respect to operational-related transportation activities, new plants, stations, and modifications would not be anticipated to result in a doubling of ADT volumes on affected roadway segments (e.g., the amount associated with a substantial traffic noise increase as discussed above). However, the construction and operation of new plants, stations, and modifications, could introduce new on-site construction- and stationary- source noise (e.g., heavy-duty construction equipment, pumps, motors, compressors, fans, generators, and other equipment) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels. Implementation of Mitigation Measure L.1. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative noise-related impact.

M. Population and Housing

Construction activities would be anticipated to require relatively small crews as new plants, stations, and modifications would likely occur within existing footprints or in areas with consistent zoning. In addition, demand for these crews would be temporary (e.g., 6-12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Furthermore, it would not be anticipated that a substantial amount of new personnel would be needed to operate the facilities and that sufficient employment base would likely be available because these would likely occur within existing footprints or in areas with consistent zoning. Thus, the proposed ACC Program would not result in a considerable contribution to a cumulative population and housing-related impact.

N. Public Services

Construction activities would be anticipated to require relatively small crews as new plants, stations, and modifications would likely occur within existing footprints or in areas with consistent zoning. In addition, demand for these crews would be temporary (e.g., 6-12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Furthermore, it would not be anticipated that a substantial amount of new personnel would be needed to operate the facilities and that sufficient employment base would likely be available because these would likely occur within existing footprints or in areas with consistent zoning. Implementation of the proposed ACC Program would not require new additional housing or land use types that do not currently exist in the area; therefore, not affecting the provision of public services. Thus, the proposed ACC Program would not result in a considerable contribution to a cumulative population and public services-related impact.

O. Recreation

As discussed above, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a substantial amount of new personnel would not be needed to operate the facilities. Thus, implementation of the proposed ACC Program would not be anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur. In addition, new (or expansion of) recreational-related facilities would not occur; therefore, not physically affecting the environment. Thus, the proposed ACC Program would not result in a considerable contribution to a cumulative recreation-related impact.

P. Transportation/Traffic

With respect to operational-related activities, it would not be anticipated that a substantial amount of new personnel would be needed to operate the facilities and that sufficient employment base would likely be available because these would likely occur within existing footprints or in areas with consistent zoning. In addition, deliveries associated with long-term operational activities (e.g., hydrogen deliveries) would not be anticipated to result in a substantial number of new trips (or associated VMT). However, depending on the amount of trip generation associated with construction activities and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. Implementation of Mitigation Measure P.1. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative transportation/traffic-related impact.

Q. Utilities and Service Systems

New hydrogen fueling stations would likely be located in urban areas consistent with local zoning. These locations would likely be served by utility and service systems that are already in place at the time the stations are built and the demand would be minimal and not be unlike the demand from existing gasoline service stations. Thus, such would not be expected to exceed the capacity of the local providers or necessitate an increase in service capacities and associated infrastructure. However, new manufacturing plants could generate substantial increases in the demand for water supply, wastewater treatment, storm water drainage, and solid waste services in their local areas. Implementation of Mitigation Measure Q.1. would not reduce these impacts to a less-than-significant level. Thus, the proposed ACC Program could result in a considerable contribution to a cumulative utilities and service systems-related impact.

R. Growth-Inducing Impacts

The proposed ACC Program would not directly result in any growth in population or housing. Implementation would support job formation in the affected industries (e.g., manufacturing associated with batteries, advanced clean cars, and material and technology improvements). The job formation would support improved employment in the State, which may indirectly encourage population growth. Any growth would occur over the long-term period of the ACC Program's regulations, which could be accommodated within the normal planning process in California communities, including environmental review. California is renowned for its environmentally progressive laws and regulations, and the proposed ACC Program would contribute to California's effort to improve public health, contribute towards healthy lifestyles and improved quality of life.

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7.0 ALTERNATIVES ANALYSIS

Under ARB's CEQA certified regulatory program, an environmental analysis shall address "feasible alternatives to the proposed action [that] would substantially reduce any significant adverse impact identified" (CCR, Title 17, Section 60005[b]). Additionally, any ARB action or proposal for which significant adverse environmental impacts have been identified shall not be approved or adopted as proposed, if there are "feasible alternatives available [that] would substantially reduce such adverse impact" (CCR, Title 17, Section 60006). CEQA Guidelines, CCR, Title 14, Section 15126.6(a) also indicates the need for an evaluation of "a range of reasonable alternatives to the project, or the location of the project, [that] would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives."

The purpose of the alternatives analysis is to determine whether or not a variation of the proposed project would reduce or eliminate significant project impacts, within the framework of achieving the basic project objectives. The proposed ACC Program could be designed differently, which provides opportunities to define alternatives for the EA analysis. Options for the emission requirements under the LEV regulation, vehicle requirements under the ZEV regulation, and provisions of the CFO regulation are discussed below. No alternatives are discussed for the EPL, on-board diagnostics, or certification fuel components of the LEV regulation, because the proposed amendments to those parts by this regulatory package would not result in any significant impacts to the environment.

A. No Project Alternative

1. Description of the No Project Alternative

CEQA requires a specific alternative of "No Project" to be evaluated. Under the No Project Alternative, amendments would not occur to the existing LEV (including EPL), ZEV, and CFO regulations. Thus, the emission requirements for CAPs in place for model year 2010, the final year of implementation of the existing LEV II regulation, would remain in effect for subsequent model years. The existing requirements of the ZEV regulation would continue without the additional requirement that manufacturers earn a minimum proportion of the required credits by selling AT PZEVs, TZEVs, and PZEVs. The EPL regulation would continue to be required on new cars. In addition, the Pavley regulations would also continue at 2016 model year standard levels.

2. Consistency with Project Objectives

The No Project Alternative would fail to achieve the project objectives listed in Chapter 1, Section C, because enhancements to programs for CAP and GHG reductions necessary to achieve air quality standards and GHG requirements and targets would not occur.

Under the No Project Alternative, ARB would continue to implement other existing programs and regulations intended to reduce emissions of CAPs and GHGs in California, but without the proposed ACC Program. Vehicle emissions of CAPs and GHGs would continue to decrease as the vehicle fleet turns over under the existing LEV and ZEV regulations. This is because, typically, almost all of the State's fleet of light- and medium-duty vehicles turns over in an approximately 15-year cycle. Thus, because 2010 is the last model year addressed by the existing LEV regulation, the vehicle fleet would continue to become incrementally cleaner and more efficient until approximately 2025. After that complete turnover cycle, the emissions efficiency of the vehicle fleet would not improve with subsequent fleet turnover, because new vehicles would no longer be cleaner than the older vehicles they replace. The No Project Alternative would not fulfill the requirement of HSC Section 43018(a), which requires ARB to reduce vehicle emissions of CAPs to the maximum extent feasible. Further, the No Project Alternative would not help attain the California and national ambient air quality standards and it would fail to ensure all Californians live, work, and play in a healthful environment free from harmful exposure to air pollution.

The No Project Alternative would also fail to fulfill either the AB 1493 mandate to achieve maximum feasible GHG reductions or the AB 32 mandate to reduce GHG emissions to 1990 levels by 2020. ARB has identified that an additional reduction of 3.8 MMT CO_2e would be needed from light- and medium-duty vehicles to achieve the goals of AB 32, which would be in addition to compliance with the existing LEV and ZEV regulations (ARB 2011b). ARB would attempt to develop and implement other regulations or programs to achieve a reduction a minimum of 3.8 MMT CO_2e; however, it is too speculative at this time to determine whether this reduction could be achieved or when a new regulation would be able to go into effect. Therefore, it is reasonable to conclude that this reduction would not likely be achieved by 2020 with a new regulation or program and California would not achieve the AB 32 mandate.

In addition, implementation of the No Project Alternative would prevent ARB from coordinating with the national Tier 3 standards for CAP emissions that are currently being developed by U.S. EPA, as well as efforts by U.S. EPA and NHTSA to develop GHG standards for light-duty vehicles. For instance, the credit formula that applies to GHG standards for air conditioning systems under the existing Pavley regulation would not align with U.S. EPA's methodology for model years 2017 – 2025. Such inconsistencies between the State and federal requirements would likely result in compliance difficulty and confusion for manufacturers. In addition, Board approval of a "No Project" Alternative would threaten California's nation-leading role in forcing new motor vehicle technology, making it more likely that U.S. EPA and NHTSA could finalize weaker standards than they have proposed, and consequently, would prevent California from achieving needed emission reductions.

Without regulatory requirements, development and use of ZEVs would not increase fast enough to meet ARB's air quality standards and GHG reduction targets. It is unlikely that vehicle manufacturers would increase production of BEVs or hydrogen FCVs above existing levels in response to market demand alone. Economies of scale in production costs would not be realized unless manufacturers commit to producing larger volumes of these alternative vehicles. Consumers would be expected to hesitate to purchase BEVs and FCVs because of doubts about sufficient availability of charging and fueling stations. Left unchanged, the existing CFO regulation would not require the installation of hydrogen fueling infrastructure until the projected number of vehicles reaches 20,000 FCVs. Once activated, the existing regulation only requires a few oil companies and convenience store and supermarket chains to build the stations, leaving several large oil companies that own smaller numbers of gasoline stations (or no stations) out of the requirement in the early years. Also, with a 20,000 vehicle trigger, hydrogen fueling infrastructure would not be sufficient to support the FCV market before the trigger is reached, making it unlikely that the cumulative total of FCVs in the State would ever reach 20,000 vehicles. Thus, it is uncertain whether any entities would build new hydrogen fueling facilities if vehicle manufacturers do not increase production of hydrogen FCVs. Similarly, it is unlikely that vehicle manufacturers would commit to increasing production of FCVs without having a high level of confidence that the fueling infrastructure would be in place to support the FCVs.

In addition, the EPL would not be changed to be consistent with the federal Fuel Economy and Environment label. Cars sold and leased in California would be required to have both the California EPL and the federal Fuel Economy and Environment label, which would supply different sets of information to consumers and could result in buyer confusion.

In summary, the No Project Alternative would neither meet the objectives of the project, nor create an environmentally advantageous outcome.

3. Environmental Impacts

There would be no new environmental impacts under the No Project Alternative, because compliance responses by vehicle manufacturers and refiners and importers of gasoline would be the same as under the existing regulatory environment.

Because the emission standards under the LEV regulation and the proportion of ZEVs would not change and because the vehicle manufacturing industry has already met these requirements for its 2010 and 2011 vehicle models with existing production facilities, it is anticipated that the No Project Alternative would not result in the development of new manufacturing plants that specialize in the production of propulsion batteries or fuel cells, or the modification or expansion of existing production facilities. The proportion of ZEVs and ZEV credit-qualifying vehicles in the statewide vehicle fleet would likely not increase and, therefore, new hydrogen fueling stations would not be developed under the existing CFO regulation. Thus, no environmental impacts related to new or expanded facilities would occur under the No Project Alternative.

Beneficial impacts resulting from the proposed ACC Program would not occur under the No Project Alternative. This would include reduction of CAPs and GHG beyond what is required under existing regulations and reduction in dependence on conventional petroleum fuels. In addition to failing to meet project objectives, this would put the No

Project Alternative at a substantial environmental disadvantage, compared to the proposed ACC Program.

B. More Stringent Emissions Standards in the Low-Emission-Vehicle and Zero Emission Vehicle Regulations

1. Description of the Alternative

This alternative is referred to as the More Stringent Alternative. It would amend the existing LEV regulation to have more stringent emission standards for light- and medium-duty vehicles for both CAPs and GHGs than the proposed amendments to the ACC Program. More specifically, the standards under this alternative would be more stringent for each model year than those in the proposed ACC Program. While the overall strictness of the standards would increase annually with this alternative, many attributes would be similar to the proposed ACC Program. This includes replacement of separate standards for NMOG and NO_x with a combined standard that would be based on the sum of these two pollutants. A more robust Federal Test Procedure for measuring emissions would still be required and the "durability basis" would still be extended to 150,000 miles to ensure the effectiveness of a vehicle's emissions control systems over the operational life of the vehicle. Also, the California Supplemental Federal Test Procedure (SFTP) would still be extended to more medium-duty vehicles the SFTP (known as SFTP II) and would include standards for exhaust emissions of particulate matter. In addition, evaporative emission standards would still be extended to more vehicle types and to vehicles fueled by gasoline that contains higher percentages of ethanol or other biofuels.

This alternative would amend the ZEV regulation to require manufacturers to earn more ZEV credits than would be required under the proposed ACC Program for model years 2015 to 2025. Amendments to the CFO regulation would be the same as under the proposed project.

2. Consistency with Project Objectives

Because manufacturers would have less time, compared to the proposed ACC Program, to develop more cost-effective innovations that could achieve the more stringent emission standards under this alternative, the production costs of building vehicles that meet these standards would likely be higher and would be passed on to the consumer at the point of sale. Manufacturers have indicated that a more stringent set of standards within this timeframe would be prohibitively expensive, because time is needed to design the necessary innovations and establish production lines. The incremental increase in cost borne by consumers would be greater than under the proposed ACC Program and could result in slower turnover of the statewide fleet. Thus, the emissions reductions realized by requiring lower-emission vehicles would be offset to some degree by the slowdown in vehicle turnover. While overall emissions reductions from the statewide fleet would still be achieved, due to potential fleet turnover delays it is not certain that this alternative would reduce vehicle CAP emissions to the maximum extent feasible, as required by HSC Section 43018(a). The emissions reduction that would occur would nonetheless help air basins throughout California attain the California and national ambient air quality standards.

For these same reasons, it is also not certain that this alternative would achieve a reduction of 3.8 MMT CO_2e by 2020 that has been identified by ARB in the adopted Scoping Plan as the reduction needed from an ACC Program (ARB 2011b). Thus, California's ability to achieve additional reductions in furtherance of AB 1493 and to attain the GHG reduction goal of AB 32 could be affected, particularly if ARB cannot develop other programs or regulations to reduce GHG emissions in time.

This alternative would achieve the objective to establish a uniform set of vehicle emission standards in California, and would ensure that some emission reductions would occur. In addition, the statewide fleet of light- and medium-duty vehicles would become more fuel efficient and, thus, help the State become less dependent on petroleum as an energy source. However, the degree of this effect is unknown in light of the expected delay in the vehicle fleet turnover, as discussed above.

More specifically, as described Appendix T (LEV III Mobile Source Emissions Inventory Technical Support Document), ARB staff analyzed an alternative scenario that would have accelerated fleet average emission standards by three years to 2022. To reflect the accelerated regulatory scenario, staff assessed the population fraction by technology group and vehicle class that would be sold in each calendar year, by emissions process (e.g., exhaust and evaporative emissions). Tables 2-27 through 2-30 of Appendix T provide, for the accelerated CAPs regulatory scenario, population splits by technology group for each regulated vehicle class. From this analysis, ARB found that an acceleration of three years would provide very small additional emission benefits relative to the proposed ACC program scenario, as shown in Figures 7-1 through 7-4 below.

The proposed ACC Program includes new future-year GHG emission standards that reduce emissions as cleaner vehicles penetrate into the fleet. Because the standards are a fleet mix by calendar year, fleets have the option to comply with them in different ways, and the penetration of ZEV vehicles is one of many ways in which the standards could be met. As a result, ARB staff modeled GHG benefits of the combined program and did not evaluate the tailpipe emission benefits of ZEV apart from the other components of the proposed ACC Program.

As part of this analysis, ARB staff evaluated a more aggressive option, which is consistent with this alternative. Under this more aggressive scenario, emissions would be reduced by 3 percent per year between 2016 and 2025. Using the proposed phase-in schedule for the regulation, ARB staff estimated the percent reduction in CO_2 emission rates by model year for those vehicles subject to the proposed ACC Program. Table 2-35 of Appendix T shows the more stringent alternative GHG standard for new vehicles in California. Figure 7-1 through 7-3 show the proposed ACC Program scenario along with the more stringent alternative (i.e., dashed line).

Figure 7-1. ROG Emissions: Baseline, Proposed, and Accelerated Scenarios

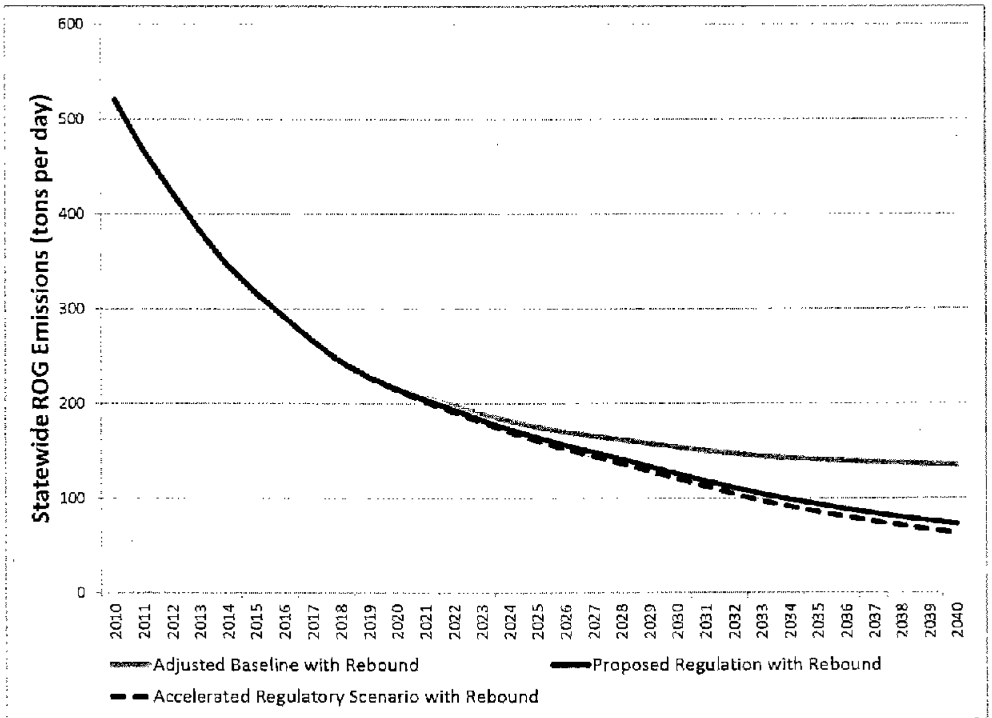


Figure 7-2. NO_x Emissions: Baseline, Proposed, and Accelerated Scenarios

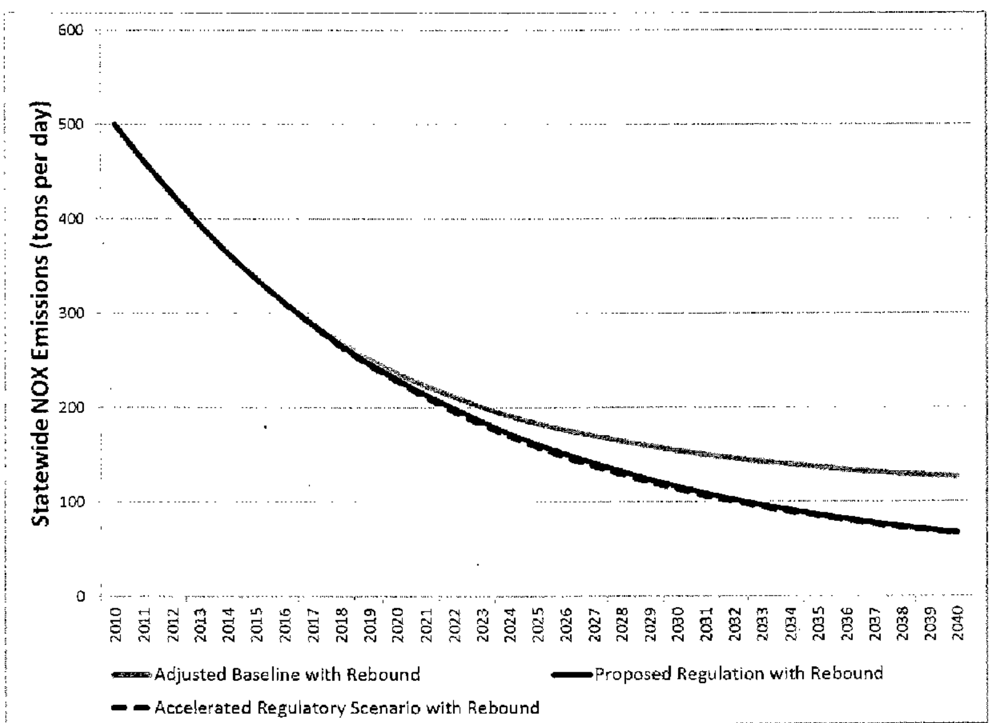


Figure 7-3. CO Emissions: Baseline, Proposed, and Accelerated Scenarios

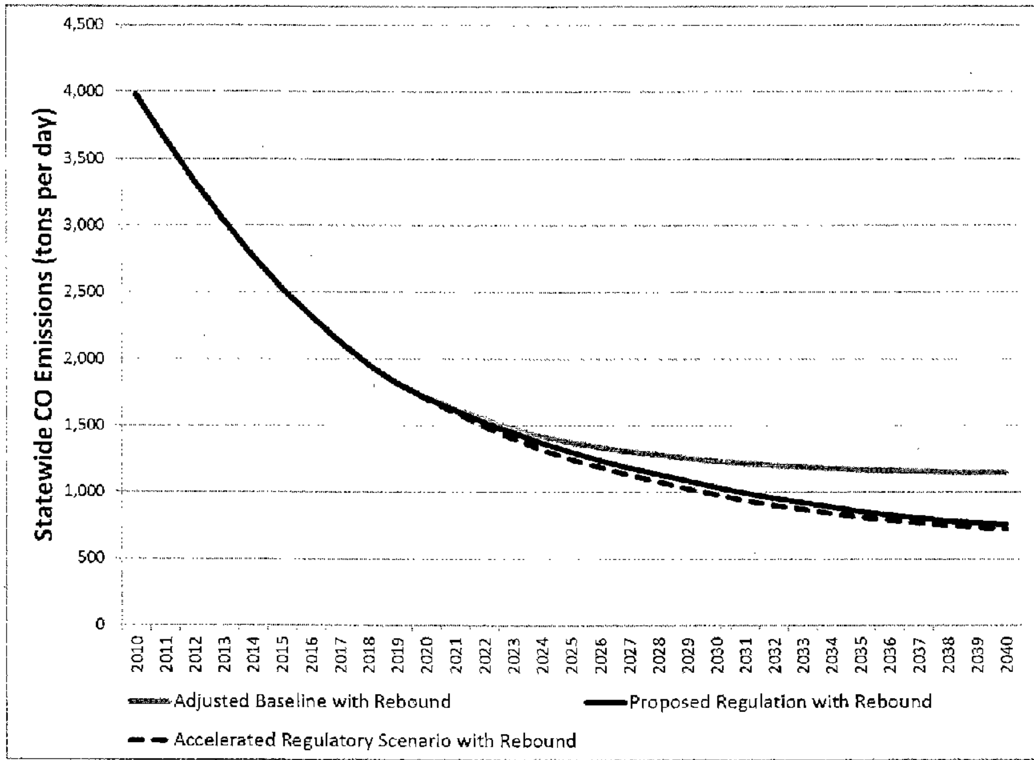
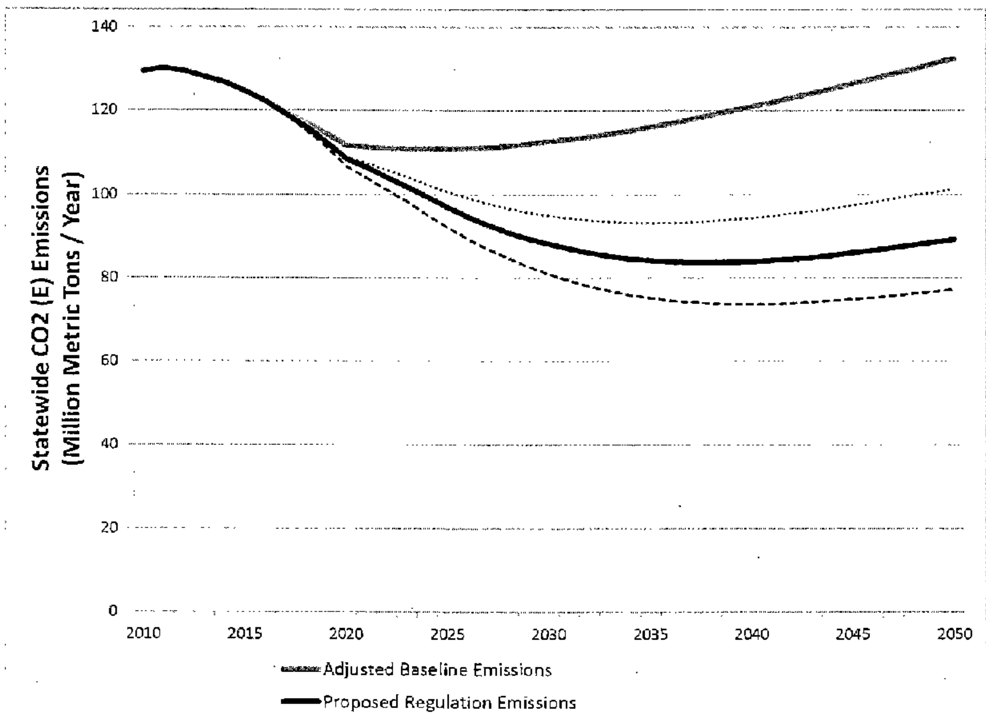


Figure 7-4. Statewide CO_2e Emissions Proposed vs Alternative Greenhouse Gas Regulatory Scenarios (with Rebound)



3. Environmental Impacts

The types of impacts under the More Stringent Alternative would be the same as the proposed amendments to the ACC Program, including potentially significant adverse impacts related to aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation/traffic, and utilities and service systems. However, because many of the adverse environmental effects would be associated with the development of new or modified manufacturing plants and/or new hydrogen fueling stations, these impacts from compliance responses under the More Stringent Alternative may occur slower as discussed above, but could be greater after complete implementation, than under the proposed ACC Program. This is because the More Stringent Alternative would result in greater penetration of ZEVs and ZEV credit-qualifying vehicles into the statewide vehicle fleet and manufacturers may produce and sell more BEVs and hydrogen FCVs, which earn the highest credit value, to achieve the more requirements of a more stringent ZEV regulation. The More Stringent Alternative could result in more or larger manufacturing plants being constructed, or more intense modifications or expansions to existing plants, and an associated increase in the potential or intensity of those significant adverse impacts identified for the proposed ACC Program in Chapter 6, Impact Analysis and Mitigation. The increase in hydrogen FCVs in the vehicle fleet would then trigger requirements for major refiners and importers of gasoline to build hydrogen fueling stations (i.e., a trigger of 10,000 vehicles within an air basin and 20,000 vehicles statewide). Moreover, the types of environmental impacts associated with the production, distribution, and sale of hydrogen would be the same as for the proposed project with the exception that more hydrogen production and distribution activity and hydrogen fuel outlets would occur. Assuming the trigger level for building required hydrogen fueling stations would occur earlier in time, the impact associated with construction and operation of these stations may be experienced earlier as well.

Beneficial air quality, GHG, and energy effects would be anticipated to be greater overall, but could occur at a slower pace.

C. Less Stringent Emissions Standards in the Low-Emission-Vehicle and Zero Emission Vehicle Regulations

1. Description of the Alternative

This alternative is referred to as the Less Stringent Alternative. It would amend the existing LEV regulation to include less stringent emission standards for light- and medium-duty vehicles for both CAPs and GHGs. More specifically, the standards under this alternative would be less stringent for each model year than those in the proposed ACC Program. This alternative would also amend the ZEV regulation to require manufacturers to earn fewer ZEV credits than would be required under the proposed amendments to the ACC Program. Under this alternative the set of emission standards and ZEV credit requirements that would be phased in for model years 2015 – 2025 would also be less stringent than the proposed ACC Program.

Some attributes of this alternative would be similar to the proposed project, including the replacement of separate standards for NMOG and NO_x with a combined standard that that is based on the sum of these two pollutants. A more robust Federal Test Procedure for measuring emissions would also be required and the "durability basis" would be extended to 150,000 miles to ensure the effectiveness of a vehicle's emissions control systems over the operational life of the vehicle. Also, the SFTP would be extended to medium-duty vehicles the SFTP (known as SFTP II) and would include standards for exhaust emissions of particulate matter. Evaporative emission standards would be extended to more vehicle types and vehicles fueled by gasoline that contains higher percentages of ethanol or other biofuels. Amendments to the CFO regulation would be the same as under the proposed ACC Program.

2. Consistency with Project Objectives

Emissions generated by the statewide fleet of light- and medium-duty vehicles would decrease because the LEV standards under this alternative would be more stringent than the existing LEV regulation standards and the ZEV requirements would be increased from the current ZEV regulation. However, the emissions reduction achieved under this alternative would not be as great as the reductions that would be achieved under the proposed ACC Program. Also, the emissions reduction would not be the maximum feasible reduction that is mandated by HSC Section 43018(a). Thus, this alternative would limit the ability of various air districts throughout the State to attain the State and national ambient air quality standards in their respective air basins.

Similarly, the statewide fleet of light- and medium-duty vehicles would become more GHG-efficient, which would help the State attain its GHG reduction goals; however, the extent of the reduction would be less than the 3.8 MMT CO_2e by 2020 that is identified by ARB as the reduction needed from a ACC Program as identified in ARB's adopted Scoping Plan (ARB 2011b). Thus, this could prevent California from achieving the GHG reduction goal of AB 32, particularly if ARB cannot develop other programs or regulations to reduce GHG emissions. In addition, this alternative would not meet the maximum feasible emission reductions in furtherance of AB 1493.

In addition, the statewide fleet of light- and medium-duty vehicles would become more fuel efficient and, thus, help the State become less dependent on petroleum as an energy source, but not to the extent that it would under the proposed ACC Program.

This alternative would achieve the objective to establish a set of vehicle emissions standards in California and would ensure that some emission reductions would occur.

As described above, the proposed ACC Program includes new future year GHG emission standards that reduce emissions as cleaner vehicles penetrate into the fleet. Because the standards are a fleet mix by calendar year, fleets have the option to comply with them in different way, and the penetration of ZEV vehicles is one of many ways in which the standards could be met. As a result, ARB staff modeled GHG benefits of the combined program and did not evaluate the tailpipe emission benefits of ZEV apart from the other components of the proposed ACC Program.

As part of this analysis, ARB staff evaluated a less aggressive option, which is consistent with this alternative. Under this less aggressive scenario, emissions would not be reduced by 3 percent per year between 2016 and 2025. Using the proposed phase-in schedule for the regulation, ARB staff estimated the percent reduction in CO_2 emission rates by model year for those vehicles subject to the proposed ACC Program. Table 2-34 of Appendix T shows the Less Stringent Alternative GHG standard for new vehicles in California.

3. Environmental Impacts

The types of impacts under the Less Stringent Alternative would be the same as the proposed amendments to the ACC Program, including potentially significant adverse impacts related to aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation/traffic, and utilities and service systems. However, because many of the adverse environmental affects would be associated with the development of new or modified manufacturing plants and/or new hydrogen fueling stations, the degree of these impacts from these compliance responses under the Less Stringent Alternative may be less, or occur later in time, than under the proposed ACC Program. This is largely because the Less Stringent Alternative would result in slower penetration of ZEVs and ZEV credit-qualifying vehicles into the statewide vehicle fleet and associated production by manufacturers. Nonetheless, this could result in the construction of new manufacturing plants, or modifications or expansions to existing plants, and the same associated impacts identified for the proposed ACC Program in Chapter 5, Impact Analysis and Mitigation. The penetration of hydrogen FCVs in the vehicle fleet would trigger requirements for major refiners and importers of gasoline to build hydrogen fueling stations (i.e., a trigger of 10,000 vehicles within an air basin and 20,000 vehicles statewide). Moreover, the types of environmental impacts associated with the production, distribution, and sale of hydrogen would be the same as for the proposed project with the exception that less hydrogen production and distribution activity would occur and fewer hydrogen fuel outlets would be constructed. Assuming the trigger level for building required hydrogen fueling stations would occur later in time, the impact associated with construction and operation of these stations may be experienced later as well.

Beneficial air quality, GHG, and energy effects would be anticipated to be less than those that would occur with implementation of the proposed ACC program.

D. A Clean Fuels Outlet Regulation Based on a Memorandum of Agreement with Major Refiners and Importers of Gasoline

1. Description of the Alternative

This alternative is referred to as the Memorandum of Agreement (MOA) Alternative. Under the alternative, the obligations of the CFO regulation would be based on an MOA between ARB, major refiners and importers of gasoline, gasoline station owners, hydrogen fuel providers, vehicle manufacturers, and other government entities rather than a codified regulation. The MOA would describe a multilateral agreement among these parties that outlines the criteria that determine the timing and responsibility of constructing new hydrogen fueling stations at various locations in California. Vehicle manufacturers would commit to providing sales forecasts about the number and locations of hydrogen FCVs they anticipate selling or leasing in the State. The MOA would have the binding power of a contract and be legally enforceable.

All other changes to the LEV and ZEV regulations and the EPL would be the same as the proposed ACC Program.

2. Consistency with Project Objectives

Under the MOA Alternative, it is assumed that the requirements for major refiners and importers of gasoline to establish new hydrogen fueling stations outlined in the MOA would be set by agreement, but not more strictly bound by regulation, increasing the potential for varying levels of commitment. This is typically true of MOAs for multiple reasons including that each party to the agreement may interject its own unique stipulations. It is not clear whether a party to the MOA would face penalties if it failed to fulfill the MOA. This could ultimately result in fewer hydrogen fueling stations being constructed in California under an agreement than if the CFO requirements were codified in regulation. Thus, there may not be a sufficient availability of hydrogen fuel for hydrogen fuel vehicles produced and sold by automobile manufacturers to fulfill the requirements of the ZEV regulation. This could ultimately affect California's ability to achieve the maximum emissions reduction possible from motor vehicles as required by HSC Section 43018(a) and to help local air basins attain the California and national ambient air quality standards. It could also hinder California's ability to achieve a reduction of 3.8 MMT CO_2e by 2020 that ARB identified as the reduction needed from an ACC Program to support the adopted Scoping Plan and achieve AB 32 goals (ARB 2011b), and to further AB 1493 reductions. It is too speculative to determine whether ARB would be able to develop and implement other programs or regulations that would achieve this reduction in time Limited availability of hydrogen fuels stations would also adversely affect the objective of reducing California's dependence on petroleum because a sufficient number and variety of fuel options would not be available to consumers.

3. Environmental Impacts

The types of impacts under the MOA Alternative would be the same as the proposed amendments to the ACC Program, including potentially significant adverse impacts related to aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation/traffic, and utilities and service systems. However, because many of the adverse environmental affects would be associated with the development of new or modified manufacturing plants and/or new hydrogen fueling stations, the degree of these impacts from these compliance responses under the MOA Alternative may be similar to or less than the proposed ACC Program, depending on the degree of commitment to the agreement. Nonetheless, this could result in the construction of new manufacturing plants, or modifications or expansions to existing plants, and the same associated impacts identified for the proposed ACC Program in Chapter 5, Impact Analysis and Mitigation. The penetration of hydrogen FCVs in the vehicle fleet would then trigger requirements for major refiners and importers of gasoline to build hydrogen fueling stations (i.e., a trigger of 10,000 vehicles within an air basin and 20,000 vehicles statewide). Moreover, the types of environmental impacts associated with the production, distribution, and sale of hydrogen would be the same as for the proposed project with the exception that less hydrogen production and distribution activity would occur and fewer hydrogen fuel outlets would be constructed. Assuming the trigger level for building required hydrogen fueling stations would occur later in time, the impact associated with construction and operation of these stations may be experienced later as well.

Beneficial air quality, GHG, and energy effects would be anticipated to be similar to those that would occur with implementation of the proposed ACC program.

E. Alternatives Considered but Rejected as Infeasible

1. Feebate Regulation

A feebate regulation is a new car pricing scheme where consumers who purchase high-emitting vehicles would pay an extra fee that would be used to fund rebates to consumers who purchase low-emitting vehicles. ARB has sponsored research on the potential benefits of a feebate regulation for new vehicles and eliminated it as an option for a number of reasons (ITS 2011). First, given the aggressive performance standards proposed for new vehicles, the additional emission reductions achieved from increased sales of low-emitting vehicles that could result from a feebate regulation would likely be minimal, because the sale of low-emitting vehicles would be partially offset by the sale of high-emitting vehicles. Manufacturers already need to install all available, cost-effective emission-reducing technology, as well as adopt their own internal pricing strategies to comply with the existing LEV standards. A feebate regulation would replace this internal pricing strategy and would only induce substantial, additional emissions reductions if fees and rebates were very high, leading to greater economic impacts on consumers.

In terms of implementation, maintaining a revenue-neutral regulation would likely be a significant challenge given that vehicle purchase behavior would vary based on current economic conditions, but fee and rebate levels would need to be set in advance. More importantly, ARB may not have the legal authority to pursue feebates and could face challenges similar to pursuing a carbon fee or tax. In addition to legal opposition, there may be public opposition because some consumers would have to pay more for new vehicles. The administration of a feebate regulation would require ARB to collect revenues and then disperse funds. ARB may need additional authority from the Legislature to both disperse funds and collect feebate revenues. Consequently, in light of the legal and administrative challenges for minimal emissions reductions, ARB did not pursue the further evaluation of this alternative.

2. Targeting High-Emitting Vehicles in the Existing Fleet

ARB considered a regulation that would specifically target high-emitting vehicles in the existing vehicle fleet and would require that they install add-on emission controls to control CAPs. However, this type of regulation would not be cost-effective and would be difficult to enforce. In addition, there is a range of technological difficulties associated with after-market equipment and aftermarket technologies generally are not as cost effective at reducing emissions as emission control systems integrated in a vehicle design without compromising driving performance, ease of use, and/or safety. This approach would not fulfill the requirement of HSC, Section 43018(a), which requires ARB to reduce vehicle emissions of CAPs to the maximally extent feasible.

3. Battery Electric Vehicles or Hydrogen Fuel Cell Vehicles Only

ARB considered requiring all light- and medium-duty vehicles to be BEVs or hydrogen FCVs. Market studies by manufacturers have shown that the market for BEVs and hydrogen FCVs is limited to approximately 30 percent of the light- and medium-duty vehicle fleet.

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8.0 MANDATORY FINDINGS OF SIGNIFICANCE

Consistent with the requirements of CEQA Guidelines, CCR, Title 14, Section 15065 and Appendix G, Environmental Checklist, Section 18, this EA addresses the mandatory findings of significance for a project.

A. Mandatory Findings of Significance

1. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat for a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

Under CCR, Title 14, Section 15065(a) of the CEQA Guidelines, a finding of significance is required if a project "has the potential to substantially degrade the quality of the environment." In practice, this is the same standard as a significant effect on the environment, which is defined in CCR, Title 14, Section 15382 of the CEQA Guidelines as "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects associated with implementation of the proposed ACC Program, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

This EA, in its entirety, addresses and discloses potential environmental effects associated with construction and operation of the proposed ACC Program, including direct, indirect, and cumulative impacts in the following resource areas:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Greenhouse Gas Emissions

- Biological Resources
- Cultural Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems

As described in Chapter 5, this EA discloses potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures.

a. Impacts on Species

Under CCR, Title 14, Section 15065(a)(1) of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to (1) substantially reduce the habitat of a fish or wildlife species; (2) cause a fish or wildlife population to drop below self-sustaining levels; or (3) substantially reduce the number or restrict the range of an endangered, rare, or threatened species. Chapter 5, "Biological Resources," of this EA addresses impacts related to the reduction of the fish or wildlife habitat, the reduction of fish or wildlife populations, and the reduction or restriction of the range of special-status species.

b. Impacts on Historical Resources

CCR, Title 14, Section 15065(a)(1) of the CEQA Guidelines states that a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to eliminate important examples of a major period of California history or prehistory. CCR, Title 14, Section 15065(a)(1) amplifies Public Resources Code (PRC) Section 21001(c) requiring that major periods of California history are preserved for future generations. It also reflects the provisions of PRC Section 21084.1 requiring a finding of significance for substantial adverse changes to historical resources. CCR, Title 14, Section 15064.5 of the CEQA Guidelines establishes standards for determining the significance of impacts to historical resources and archaeological sites that are a historical resource. Chapter 5, "Cultural Resources," of this EA addresses impacts related to California history and prehistory, historic resources, archaeological resources, and paleontological resources.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

2. Does the project have impacts that are individually limited, but cumulatively considerable?

As required by CCR, Title 14, Section 15065 of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has potential environmental effects that are individually limited, but cumulatively considerable. As defined in CCR, Title 14, Section 15065(a)(3) of the CEQA Guidelines, cumulatively considerable means "that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." Cumulative impacts are addressed for each of the environmental topics listed above and are provided in Chapter 6, "Cumulative and Growth-Inducing Impacts," of this EA.

3. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

Consistent with CCR, Title 14, Section 15065(a)(4) of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to cause substantial adverse effects on human beings, either directly or indirectly. Under this standard, a change to the physical environment that might otherwise be minor must be treated as significant if people would be significant affected. This factor relates to adverse changes to the environment of human beings generally, and not to effects on particular individuals. While changes to the environment that could indirectly affect human beings would be represented by all of the designated CEQA issue areas, those that could directly affect human beings include air quality, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation/traffic, and utilities, which are addressed in Chapter 5 of this EA.

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12.0 ACRONYMS AND ABBREVIATIONS

AADT	average annual daily traffic
AB	Assembly Bill
AC	air conditioning
ACC	Advanced Clean Cars
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
AFV	alternatively fueled vehicle
AICUZ	Department of Defense Air Installations Compatible Use Zones
ALUC	Airport Land Use Commission
APS	Alternative Planning Strategy
ARB or Board	California Air Recourses Board
AST	Above Ground Tanks
BC	black carbon
BEV	battery electric vehicle
BMPs	best management practices
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CAL FIRE	California, Department of Forestry and Fire Protection
CAL Recycle	California Department of Resources Recycling and Recovery
CalARP	California Accidental Release Prevention
CalEPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CAP	criteria air pollutant and precursor

CBSC	California Building Standards Code
CCAR	California Climate Action Registry
CCAT	California Climate Action Team
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
Census	U.S. Census Bureau
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFO	Clean Fuels Outlets
CGS	California Geological Survey
CH_4	methane
CHP	California Highway Patrol
CN	California Natural Resources Agency
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPUC	California Public Utilities Code
CUPA	Certified Unified Program Agency
CVP	Central Valley Project
CVTs	continuously variable transmissions

CWA	Clean Water Act
dB	decibel
dBA	A-Weighted Decibel
Delta	Sacramento-San Joaquin Delta
DFG	Department of Fish and Game
DoE	Department of Environment
DOF	State of California, Department of Finance
DOGGR	California Division of Oil, Gas, and Geothermal Resources
DOJ	California Department of Justice
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
E10	10 percent by volume ethanol
E10 fuel	fuel that contains 10 percent ethanol
EA	Environmental Analysis
EDCs	endocrine disrupting compounds
EDD	California Employment Development Department
EIS	environmental impact statement
EISA	Energy Independence and Security Act
EPCA	Energy Policy and Conservation Act
EPCRA	Emergency Planning and Community Right-to-Know Act
EPL	California Environmental Performance Label
FAA	Federal Aviation Administration
FCVs	fuel cell vehicles
FEMA	Federal Emergency Management Agency

FHA	Federal Highway Administration
FHMR	Federal Hazardous Materials Regulations
FHWA	Federal Highway Administration
FLPMA	Federal Land and Policy Management Act
FRA	Federal Rail Administration
FSOR	Final Statement of Reasons
FTA	Federal Transit Administration
g/mi	grams per mile
gCO_2/mile	grams of CO_2 per mile
GHGs	greenhouse gas
GWP	global warming potential
HAPs	hazardous air pollutants
HC	hydrocarbons
HC	particulate matter, and evaporative emissions of hydrocarbons
HFCs	hydrofluorocarbons
HFCV	hydrogen fuel cell vehicles
HSC	Health and Safety Code
HTAC	Hydrogen and Fuel Cell Technical Advisory Committee of the U.S. Department of Energy
HUD	U.S. Department of Housing and Urban Development
HV	High-Voltage
in/sec	inches per second
IPCC	Intergovernmental Panel on Climate Change
ITS	Institute of Transportation Studies

IVM	intermediate volume manufacturer
kg/day	kilograms per day
kg/yr	kilograms per year
LCFS	Low Carbon Fuel Standard
L_{dn}	Day-Night Noise Level
LDTs	light-duty trucks
LEA	local enforcement agencies
LEPCs	local emergency planning committees
L_{eq}	Equivalent Noise Level
LEV II	LEV regulation
LEV III	Low-Emission Vehicle and Greenhouse Gas Regulation
L_{max}	Maximum Noise Level
L_{min}	Minimum Noise Level
LOS	level of service
LVM	large volume manufacturer
MACT and BACT	maximum or best available control technology for toxics
MDPVs	medium-duty passenger vehicles
MDV	medium-duty vehicles
mg/L	milligrams per liter
MMT	Million Metric Tons
$MMTCO_2e$	million metric tons of carbon dioxide equivalent
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPOs	Metropolitan Planning Organizations

MRZs	Mineral Resource Zones
MS4 Permit	General Permit for Municipal Separate Storm Sewer Systems Permit
MTBE	methyl tertiary butyl ether
mya	million years ago
N_2O	nitrous oxide
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NEMA	Association of Electrical and Medical Imaging Equipment Manufacturers
NESHAP	national emissions standards for HAPs
NF_3	nitrogen trifluoride
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NiMH	nickel–metal hydride
NMHC	non-methane hydrocarbon
NMOG	non-methane organic gas
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
OAQPS	Office of Air Quality Planning and Standards
OEM	original equipment manufacturer
ORVR	onboard refueling vapor recovery
OSHA	U.S. Department of Labor Occupational Safety and Health Administration

PA	Programmatic Agreements
PCBs	polychlorinated biphenyl compounds
PCs	passenger cars
PEM	Proton Exchange Membrane
PFCs	perfluorocarbons
PGM	platinum-group metal
PHEVs	plug-in hybrid electric vehicles
PIER	Public Interest Energy Research
PM	particulate matter
polycarbonate	plastics and carbon composites
ppb	parts per billion
PPV	peak particle velocity
PRC	Public Resources Code
PUC	California Public Utilities Commission
PZEV	Partial Zero Emission Vehicle
RCRA	Resource Conservation and Recovery Act
RFS	Renewable Fuels Standard
RMP	Risk Management Plan
RMS	root-mean-square
RNHA	Regional Housing Needs Allocation
ROG	reactive organic gas
ROWs	right-of-ways
RTP	Regional Transportation Plan
RWQCB	regional water quality control board

SAE	Society of Automotive Engineers
SARA	Superfund Amendments and Reauthorization Act
SBE	State Board of Education
SCR	selective catalytic reduction
SCS	Sustainable Communities Strategy
SDC	Seismic Design Criteria
SDWA	Safe Drinking Water Act
SERCs/TERCs	state/tribe emergency response commissions
SF_6	sulfur hexafluoride
SFTP	California Supplemental Federal Test Procedure
SHPO	State Historic Preservation Officer
SIC	Standard Industrial Classification
SIPs	State Implementation Plans
SMARA	Surface Mining and Reclamation Act
SMR	steam methane reformation
SULEVs	Super-Ultra-Low-Emission Vehicles
SUVs	sport utility vehicles
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
TACs	toxic air contaminants
TDS	Total dissolved solids
TMDL	Total Maximum Daily Load

TPY	tons per year
TSCA	Toxic Substances Control Act
TZEV	Transitional Zero Emission Vehicles
U.S. BR	U.S. Bureau of Reclamation
U.S. EPA	U.S. Environmental Protection Agency
ULEVs	Ultra-Low-Emission Vehicles
UNEP	United Nations Environment Programme
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UST	Underground Tanks
V/C	volume-to-capacity ratio
VC	California Vehicle Code
VdB	vibration decibels
VMT	vehicle miles travelled
WDRs	waste discharge requirements
WMO	World Meteorological Organization
WSA	water supply assessment
ZEV	Zero Emission Vehicle

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ATTACHMENT 1. ENVIRONMENTAL CHECKLIST

Refer to Chapter 5.0, Impact Analysis and Mitigation, for a full discussion of the environmental issues.

A. Aesthetics

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Aesthetics. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☒	☐	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	☒	☐	☐	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☒	☐	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☒	☐	☐	☐

B. Agriculture and Forest Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Agriculture and Forest Resources. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the State's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☒	☐
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☒	☐
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220[g]), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104[g])?	☐	☐	☒	☐
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☒	☐
e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☒	☐

C. Air Quality

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Air Quality.				
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make the following determinations.				
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				
Construction Impacts	☐	☒	☐	☐
Operational Impacts	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?				
Construction Impacts	☐	☒	☐	☐
Operational Impacts	☐	☐	☐	☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?				
Construction Impacts	☐	☒	☐	☐
Operational Impacts	☐	☐	☐	☒
d) Expose sensitive receptors to substantial pollutant concentrations?				
Construction Impacts	☐	☒	☐	☐
Operational Impacts	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

D. Greenhouse Gas Emissions

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Greenhouse Gas Emissions. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☒
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

E. Biological Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Biological Resources. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or the U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Game or the U.S. Fish and Wildlife Service?	☒	☐	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?	☒	☐	☐	☐

F. Cultural Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Cultural Resources. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	☒	☐	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☒	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☒	☐	☐	☐

G. Geology and Soils

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Geology and Soils. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)	☒	☐	☐	☐
ii) Strong seismic ground shaking?	☒	☐	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv) Landslides?	☒	☐	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☒	☐	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?	☒	☐	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☒	☐

H. Hazards and Hazardous Materials

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Hazards and Hazardous Materials. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☒	☐
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☒	☐
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐

I. Hydrology and Water Quality

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Hydrology and Water Quality. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial on- or off-site erosion or siltation?	☒	☐	☐	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding?	☒	☐	☐	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☒	☐	☐	☐
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☒	☐	☐	☐
i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☒	☐	☐	☐
j) Result in inundation by seiche, tsunami, or mudflow?	☒	☐	☐	☐

J. Land Use and Planning

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Land Use and Planning. Would the project:				
a) Physically divide an established community?	☐	☐	☒	☐
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☒	☐

K. Mineral Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Mineral Resources. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?	☐	☐	☒	☐
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☒	☐

L. Noise

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Noise. Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or in other applicable local, State, or federal standards?	☒	☐	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☒	☐
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☒	☐

M. Population and Housing

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Population and Housing. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing homes, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐

N. Public Services

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Public Services. Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☒	☐
Police protection?	☐	☐	☒	☐
Schools?	☐	☐	☒	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐

O. Recreation

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Recreation. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☒	☐

P. Transportation/Traffic

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Transportation/Traffic. Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?				
Construction Impacts	☒	☐	☐	☐
Operational Impacts	☐	☐	☒	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?				
Construction Impacts	☒	☐	☐	☐
Operational Impacts	☐	☐	☒	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				
Construction Impacts	☒	☐	☐	☐
Operational Impacts	☐	☐	☒	☐
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				
Construction Impacts	☒	☐	☐	☐
Operational Impacts	☐	☐	☒	☐
e) Result in inadequate emergency access?				
Construction Impacts	☒	☐	☐	☐
Operational Impacts	☐	☐	☒	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				
Construction Impacts	☒	☐	☐	☐
Operational Impacts	☐	☐	☒	☐

Q. Utilities and Service Systems

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Utilities and Service Systems. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☒	☐	☐	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☒	☐	☐	☐
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☒	☐	☐	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☒	☐	☐	☐
g) Comply with federal, State, and local statutes and regulations related to solid waste?	☒	☐	☐	☐

R. Mandatory Findings of Significance

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact/No Impact	Beneficial Impact
Mandatory Findings of Significance.				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Authority: Public Resources Code Sections 21083, 21083.5.
Reference: Government Code Sections 65088.4.
Public Resources Code Sections 21080, 21083.5, 21095; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.

APPENDIX C

STATUS OF ALTERNATIVE FUEL INFRASTRUCTURE

FOR NON-ZEV ALTERNATIVE FUEL VEHICLES

Appendix C

Status of Alternative Fuel Infrastructure for Non-ZEV Alternative Fuel Vehicles

Currently, the number of facilities offering alternative fuel in California represents just over five percent of the total number of retail gasoline outlets in California. Approximately 580 outlets offer compressed natural gas (CNG), E85, or liquefied petroleum gas (LPG), and most of these outlets are not associated with a retail gasoline outlet. Our records indicate that no stations offer methanol.

Sales and leases of non-ZEV alternative fuel vehicles (i.e., vehicles that can operate on CNG, LPG and E85) in California has increased substantially since the late 1990s. In 1997, only 282 alternative fuel vehicles were sold or leased in California; however by 2010, that figure increased to over 63,000. The cumulative number of alternative fuel vehicles sold or leased from 1997 to 2010 is over 475,000.

The following provides a summary of the status of alternative fuel infrastructure and vehicles for each of these non-ZEV fuels and vehicles.

A. CNG Vehicles and Fueling Infrastructure

Auto manufacturers started making dedicated CNG vehicles and bi-fuel vehicles, which operate on either gasoline or CNG, in the late 1990's. Starting in mid-2000, certified after-market CNG conversions started replacing the CNG vehicles being produced by auto manufacturers. In 1999, ARB estimated that nearly 95 percent of the CNG vehicles in the State were fleet-operated and the majority of CNG fueling facilities were private or government owned with limited to no public access.[1] Following is a discussion of the current status of natural gas fueling infrastructure and CNG vehicle development.

1. CNG Vehicles

From 1997 through model year 2009, approximately 23,500 light and medium duty AFVs operating on CNG were sold or leased in California. That number of CNG vehicles is projected to increase to over 30,000 by the end of the 2014 model year. The majority of CNG vehicles operating in California are light and medium duty vehicles that are owned and operated as part of fleets and are fueled at private refueling facilities. A significant portion of the CNG fleet includes after-market conversions.

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[1] ARB, 1999b. "Staff Report: Initial Statement of Reasons for Proposed Amendments to the Clean Fuels Regulations Regarding Clean Fuel Outlets," June 4, 1999.

2. CNG Infrastructure

The US Department of Energy (US DOE) Alternative Fuels and Advanced Vehicle Data Center indicates there are 224 CNG fueling facilities in California. Of these stations, 126 are accessible to the public and 98 are exclusively private. Most CNG fueling facilities, including facilities classified as "public," do not offer unrestricted access to the general public. Most require the motorist to prearrange the acquisition of a key card for entry into the facility and/or purchase of CNG. It is noteworthy that the profitability of a CNG station is largely based upon the volume of CNG sold. However, stations that have the lowest CNG sales are public stations not associated with a fleet operator, especially since these public stations are rarely co-located with retail gasoline or convenience stores. This explains why exclusively public stations, with unrestricted access, are on the decline; less than ten CNG stations are integrated with retail gasoline stations, and currently there are no CNG stations that operate as joint ventures with major petroleum companies.[2]

Table C-1 shows the total number of CNG fueling facilities in California by type (i.e., public vs. private) and location.

Table C-1: CNG Refueling Stations in California[3]

	Northern CA	Southern CA	Total
Public/Retail	47	79	126
Private/Fleet	21	77	98
Total	68	156	224

For proprietary reasons, it is difficult to obtain exact funding information for public CNG fueling stations. However, many governmental programs like Congestion Mitigation and Air Quality (CMAQ), Federal tax credits, California's Mobile Source Air Pollution Reduction Review Committee (AB 2766), AB 118, and local air district grants fund CNG infrastructure. Additionally, CNG refueling equipment can cost between $750,000 to several million dollars, so many of the existing public CNG refueling stations would not have been built without the assistance of various governmental incentive programs due to low potential for gaining return on their investment. This low potential can be attributed to the following: 1) the price for natural gas is set by the California Public Utilities Commission; 2) usage by fleets is low due to the availability of private fueling; and 3) most non-fleet customer's CNG vehicles are light-duty and require small amounts of fuel compared to the medium and heavy duty vehicles typically operated by

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[2] CEC, 2006. California Energy Commission. "California Alternative Fuels Market Assessment." Oct. 2006. Pg. 2-21,

[3] US DOE 2010b. United States Department of Energy. Website. Alternative Fuel & Advanced Vehicle Data Center. Last Updated 2010. http://www.afdc.energy.gov/afdc/fuels/natural_gas_locations.html. Accessed Aug. 18, 2011.

fleets. Previously, CEC invested $5.7 million for up to 20 CNG stations from funding allocated through their 2008-09 and 2009-10 AB 118 Investment Plan. The current 2011-2012 AB 118 Investment Plan allocates $8 million for CNG fueling infrastructure, and $12 million in vehicle incentives for medium and heavy duty natural gas vehicles.[4] At an investment level of approximately $500,000 per station, it is anticipated that private sector investment will compliment State funds.

Most CNG facilities utilize high pressure systems and are classified as "fast fill" facilities. As the name implies, these "fast fill" facilities can refuel a vehicle in minutes and providing the facility with a higher annual throughput. Home refueling devices are also available and are most practical for owners of light-duty CNG vehicles and are incentivized by rebates in some areas.[5] These home refueling devices require up to ten hours to dispense and fully pressurize a tank of natural gas from a standard utility gas line – ideal for overnight refueling and similar to the amount of time required to charge a BEV with a 110 volt outlet.

3. Station coverage for CNG vehicles

With an estimated 25,000 light and medium duty CNG vehicles in operation in California today and approximately 220 public and private stations offering CNG, each public station could serve 114 light and medium duty vehicles on average. If the number of CNG vehicles increases to 30,000 by 2013 as projected above and approximately 32 new CNG stations are added with the help of CEC funding, the average number of vehicles per station increases to 119. As mentioned earlier, public access stations have lower CNG sales compared to private stations, and station profitability is primarily based on the volume of CNG sold. One could reason that increasing CNG vehicle sales to private customers in addition to fleet customers would result in increased utilization and profitability of public CNG stations. It is interesting to note that, verbal comments submitted by Clean Energy[6] and the California Natural Gas Vehicle Coalition on the draft 2011-2012 AB 118 Investment Plan urged CEC to reallocate the money slated for CNG infrastructure toward incentives for purchasing CNG vehicles.[7]

In addition to the funding and rebates offered for CNG fueling, California and the federal government offer incentives for buying or leasing CNG vehicles, such as high

[4] CEC, 2011c. California Energy Commission. "2011-2012 Investment Plan for the Alternative Fuels and Vehicle Technology Program." Publication No. CEC-600-2011-006-CMF. Sept. 7, 2011.
[5] SCAQMD, 2005. South Coast Air Quality Management District. "Incentives Offered to Refuel Natural Gas Vehicles At Home" May 6, 2005 web-site, http://www.aqmd.gov/news1/2005/phillhomerefuelingunitpr.html
[6] Clean Energy builds and operates natural gas fueling stations, and owns a significant number of the public natural gas fueling stations in California. http://www.cleanenergyfuels.com/main.html.
[7] CEC, 2011c.

occupancy vehicle (HOV) lane access, federal tax credits, and vehicle rebates (limited to available funding). A few cities are also offering rebates for certain CNG vehicles while funds last.[8] These incentives are an important factor in customers' decisions to purchase CNG vehicles.

While natural gas continues to play an important role in emission reductions in public and private fleets, especially in the heavy duty sector, NGVs are not a necessary part of State and federal long-term strategies for reducing emissions from the light duty vehicle sector. In the near term, however, the State will continue to incentivize CNG through station funding, HOV access and vehicle rebates, while they last.

B. E85 Vehicles and Fueling Infrastructure

Flex fuel vehicles that can operate on gasoline-blends of up to 85 percent ethanol were introduced in small quantities in 1997. Auto manufacturers started increasing production in 2000 – the trend has continued upward ever since. FFV buyers include both fleet and private customers. Development of E85 fueling infrastructure has lagged behind vehicle deployments, primarily because E85 is not required for FFV operation. In fact, most early FFV buyers did not know that their vehicles could run on E85. In late 2000, federal and State regulations pertaining to biofuels prompted the funding and development of E85 fueling infrastructure in an effort to encourage FFV drivers to choose E85 over gasoline. Following is a discussion of the current status of E85 fueling and FFVs in California as well as activities and rules that may affect future trends.

1. E85 Vehicles

In the late 1990s, manufacturers began selling flex-fuel vehicles (FFV) capable of running on either E85 or traditional gasoline. FFVs have been extremely popular from an auto manufacturer's perspective because of the relatively low incremental production cost and the fleet average fuel economy compliance benefits discussed below. As a result, E85 FFVs comprise approximately 96 percent of the alternative fuel vehicle fleet in California. In 1998, only 200 FFVs were sold or leased in California. By 2009, over 684,000 FFV were sold or leased in California, and by 2013, the cumulative number of FFVs is projected to exceed one million vehicles. Figure C-2 show the actual and projected growth of FFV.

[8] ARB's DriveClean website provides a complete list of incentives offered to CNG vehicle owners. http://www.dirveclean.ca.gov.

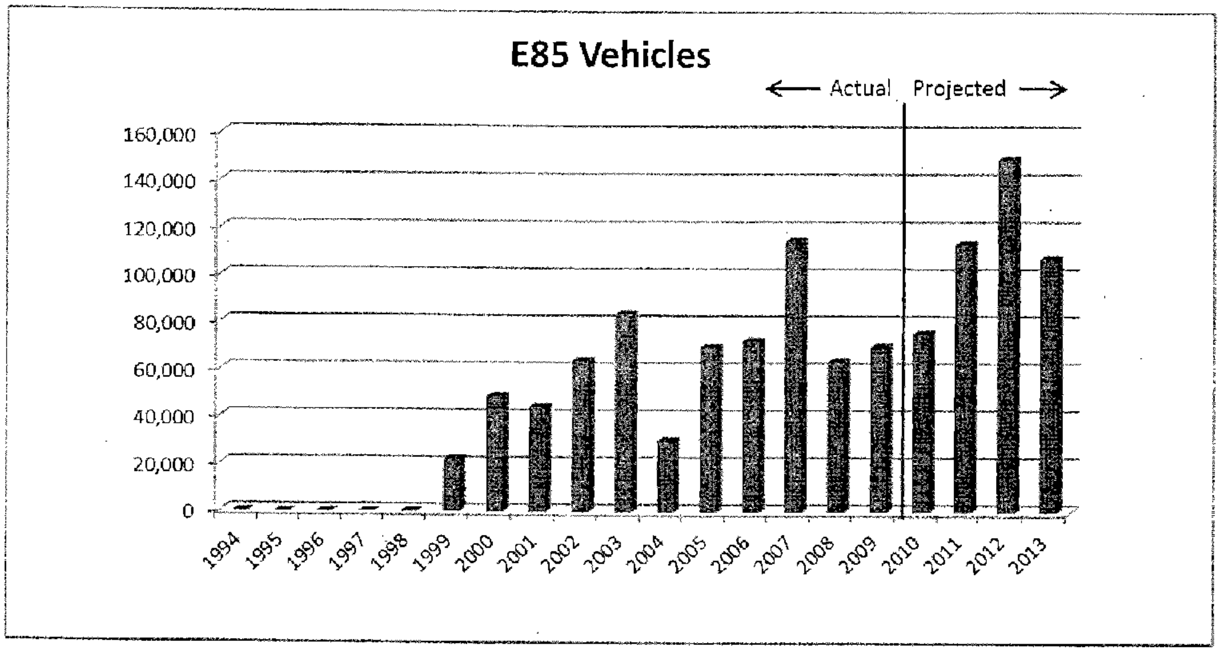

Figure C-2: Light and Medium Duty E85 FFV Sales and Leases

This increase in production and availability of E85 FFVs, as well as projections for even greater numbers in the future, can be attributed to the federal Corporate Average Fuel Economy (CAFE) credits offered to auto manufacturers that produce FFVs. Auto manufacturers can use special calculations to boost their FFV fuel economy levels for compliance purposes under CAFE; these boosts help to offset the reductions in their fleet average fuel economy caused by producing vehicles with low fuel economy. The maximum fleet average offset of 1.2 miles per gallon (mpg) will be available to auto manufacturers through model year 2014. The offset will be reduced by 0.2 mpg per year until it is phased out completely after model year 2019. Starting model year 2016, auto manufacturers wishing to use the calculations to boost their FFV fuel economy must provide data demonstrating that alternative fuels are being used.[9] Given that it is the FFV driver who decides which fuel to purchase, it will be interesting to see how the above changes to the treatment of FFVs in calculating CAFE credits will affect auto manufacturers' plans and projections for model years beyond 2014.

2. E 85 Infrastructure

The growth of E85 fueling stations over the past decade has been a success. In the late 1990s, no E85 refueling stations existed; today there are 118 E85 fueling facilities

[9] USEPA, 2010. United States Environmental Protection Agency, National Highway Transportation and Safety Administration, California Air Resources Board. "Interim Joint Technical Assessment Report: Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2017-2025." Docket ID Number: EPA-HQ-OAR-2010-0799. September 2010. http://www.epa.gov/otaq/climate/regulations/ldv-ghg-tar.pdf. Page 5-2.

in California. Of these facilities, 63 are public or retail facilities and 55 are private fleet facilities. Table C-2 shows the details the number of E85 stations.

Table C-2: E85 Fueling Stations

	Northern CA	Southern CA	Total
Public/Retail	41	22	63
Private/Fleet	35	20	55
Total	76	42	118

Tanks and pumps at existing gasoline fueling stations can be modified to sell E85. Although there are questions about the cost of modifications vs. new installations, most E85 retail outlets are co-located with traditional gasoline outlets. This provides convenience to the consumer but can work against the ethanol distributor, and possibly the retailer, if drivers can choose between E85 and gasoline. A gallon of E85 has approximately 23% to 28% less energy than a gallon of gasoline and consequently, these vehicles cannot travel as far on E85 compared to the same volume of gasoline. Studies have shown that drivers of flex-fuel vehicles are aware of this energy reduction and will purchase E85 when it is priced proportionally lower than gasoline. [10] Over the past decade, gasoline prices have seen considerable fluctuation; this has resulted in swings in E85 sales. This lack of consistent demand for E85 has led some retailers to report that it is difficult to justify the investment in equipment to sell E85.

Construction of many of the current E85 stations has been co-funded by government grants. In 2010 Propel Fuels, Inc. was awarded $6.9 million in Federal stimulus funds from the U.S. Department of Energy. Under AB 118, the CEC allocated $5 million in fiscal year 2011-2012 for the construction of up to 50 E85 stations and $8 million for advanced ethanol and gasoline substitute production plants. Through prior AB 118 funding, CEC has invested $1 million for E85 fueling stations, $6 million to incentivize California's ethanol production, and $5.4 million toward the development of advanced ethanol and gasoline substitutes. [11] Propel Fuels matched these State and federal grants with $16.2 million in private equity funding for the construction of up to 75 E85 facilities. Federal tax credits of up to $50,000 were available to parties installing E85 stations through 2009 and 2010, and up to $30,000 for stations installed in 2011.[12] However, as previously stated, it is difficult to justify the investment in E85 infrastructure due to the lack of consistent demand for E85. Therefore, the government's involvement in funding these stations has been essential.

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[10] ORNL, 2006. Oak Ridge National Laboratory. Anderson, Soren, "The Demand for E85 Ethanol," University of Michigan, 2006. https://biokdfapp.ornl.gov/node/228. Accessed Nov. 10, 2011.
[11] CEC, 2011c.
[12] US DOE, 2010. U.S. Department of Energy Alternative Fuel Infrastructure Tax Credit. http://www.afdc.energy.gov/afdc/laws/law/US/351

3. Fuels Regulations Affecting Ethanol

In 2007, the federal government passed the Energy Independence and Security Act, which include changes to the Renewable Fuels Standard (RFS).[13] By 2022, U.S. transportation fuels used each year must include a minimum of 36 billion gallons of biofuels. Starting in 2016, the increases over the prior year must be comprised of advanced biofuels, defined as cellulosic ethanol and other biofuels derived from feedstock other than corn starch. In 2009, California adopted the Low Carbon Fuel Standard (LCFS) to reduce greenhouse gas emissions associated with the lifecycle of transportation fuels used in California. LCFS is designed to ensure that producers and importers of transportation fuel collectively reduce the overall carbon intensity of California's fuel pool by ten percent by 2020. LCFS is not limited to liquid biofuels and includes CNG, electricity and hydrogen.

For both regulations, compliance rests primarily in the hands of producers and importers of transportation fuels. For RFS, compliance may include increasing the amount of liquid biofuels used in conventional gasoline and diesel vehicles and/or offering biofuel blends, such as E85, that require infrastructure and vehicle adaptations. For compliance with LCFS, regulated parties may choose the above options as well, but may also include CNG, electricity and/or hydrogen in their compliance portfolio.

The State and federal government are promoting increased utilization of ethanol in transportation fuels through RFS and LCFS–both of which give regulated parties some flexibility in how they increase the use of biofuels, including ethanol, in transportation. Mandating E85 outlets in addition to these requirements could be conflicting, counter-productive, and does not address the customer choice issue. Also, like CNG, E85 FFVs are not a necessary part of State and federal long-term strategies for reducing emissions from the light duty subsector.

C. LPG Vehicles and Fueling Infrastructure

Liquefied Petroleum Gas (LPG) is gaseous hydrocarbon consisting primarily of propane and butane. Sometimes LPG is simply referred to as "propane". LPG has a lower energy content than gasoline and its use as a motor vehicle fuel is very limited. According to American Petroleum Institute approximately three percent of the LPG sold in the United States is for transportation. The majority of LPG use is for industrial, commercial, and recreational applications.

[13] Federal Register, National Archives and Records Administration, March 26, 2010, pages 14669-15320 http://edocket.access.gpo.gov/2010/pdf/2010-3851.pdf

Due to the limited use of LPG as a transportation fuel, the majority of LPG fueling facilities are not designed for exclusive motor vehicle refueling. Most "stations" are collated with other commercial ventures like commercial equipment rental or industrial gas suppliers. Currently there are 238 LPG facilities in California, 233 public facilities and 5 private facilities. It should be noted that most public facilities do not offer unrestricted access, most require a key card or the customer to call ahead for access and service.

Except for safety and storage, LPG is essentially an unregulated fuel in California. ARB does not have standards for LPG as a transportation fuel. Therefore, no data is collected by the state on LPG sales or usage. LPG prices are set by the market.

The CEC estimates that the cost to retrofit an existing station to dispense LPG is between $37,000 and $152,000. Existing federal incentives cover 30 percent of this cost, up to $30,000. Given the relatively low cost of LPG infrastructure and existing incentive programs, only a minimal amount of support is needed to continue the growth of LPG stations. Under AB 118 the CEC is allocating $500,000 in fiscal year 2011-2012 for LPG fueling infrastructure.[14] This funding is intended to cover the cost of ten fueling stations along the I-5 corridor in Northern California. No AB 118 funding was provided for LPG infrastructure in fiscal years 2008-2009 and 2009-2010.[15]

While LPG to has an important role in reducing emissions primarily in the heavy duty vehicle sector, it is not part of State and federal long-term strategies for reducing emissions from light duty vehicles.

D. Methanol

Methanol flex fuel vehicles (vehicles that run on up to 85 percent methanol/gasoline blends [M85]) started to receive attention in the late 1970s and by the 1990s over 20,000 methanol FFVs had been introduced into the market, with over 100 M85 fueling stations in California. When compared to gasoline, one gallon of M85 contains slightly more than half the energy as a gallon of gasoline; however, methanol is typically less expensive on an energy equivalent basis. In the 1980s and 1990s when gasoline was cheap, methanol fuel costs to the consumer were generally equivalent to premium gasoline. As a result, consumers opted to fill their FFVs with gasoline most of the time, making it difficult to build volume sales to encourage the operation of M85 retail pumps.[16] Methanol's decline was also affected by technology advancements that

[14] CEC, 2011c.
[15] CEC, 2009. California Energy Commission. "Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program." Publication No. CEC-600-2009-008-CMF. April 22, 2009.
[16] Methanol Institute, 2011. "Methanol, The Clear Alternative for Transportation." April 2011. http://www.methanol.org/Energy/Resources/Alternative-Fuel/Methanol-Flexible-Fuel-Vehicles.aspx

enabled LEV standards to be met through improved emissions controls and cleaner burning gasoline formulations, and without alternative fuels. Currently, ARB has no records of public or fleet methanol refueling stations in California. The CEC has allocated no funds for methanol infrastructure under AB 118.

APPENDIX D

EMISSIONS IMPACTS ANALYSIS

Appendix D

Emissions Impacts Analysis

Air Resources Board (ARB) staff conducted a detailed analysis of the air quality benefits and impacts associated with the proposed amendments to the Clean Fuels Outlet (CFO) regulation. This document includes an overview of the greenhouse gas (GHG) emissions and criteria pollutant emissions associated with the production and distribution of hydrogen.

A. Summary of the Analysis and Results

The environmental analysis of the proposed CFO regulation identified significant decreases in the Greenhouse Gas emissions and local criteria pollutants that would result from the displacement of petroleum-based fuels by hydrogen used in fuel cell vehicles. These reductions result partly from the commercial-scale production of hydrogen with improved production efficiencies and fuel delivery methods, and penetration of large numbers of fuel cell vehicles (FCVs) in to the light duty vehicle fleet.

Modeling Scenarios and Assumptions

Two scenarios were analyzed based on the anticipated number of FCVs deployed in California. The Upper Bound Scenario, which serves as the upper limit in vehicle population, includes FCVs numbers reported by the automakers in an annual survey conducted by ARB and the California Energy Commission (discussed in Section I B of this staff report). The Lower Bound Scenario includes staff's estimate of the number of FCVs to be deployed in compliance with the Zero Emissions Vehicle (ZEV) regulation and serves as the lower limit in vehicle population. For the GHG analyses, staff assumed the existing California Low Carbon Fuel Standard (LCFS)[1] regulation reduces emissions of the gasoline baseline over time and the Pavely regulation[2] lowers the gasoline vehicle fleet-average carbon dioxide emissions. Although currently not in effect, the SB1505 regulation,[3] which will establish environmental and energy standards for hydrogen, will likely influence the "grades" of hydrogen available during the lifetime

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[1] ARB, 2011a. Proposed Regulation Order "Subchapter 10. Climate Change, Article 4. Regulations to Achieve Greenhouse Gas Emission Reductions, Sub article 7. Low Carbon Fuel Standard." October 14, 2011.
[2] AB 1493, 2002. California Assembly Bill. Pavley, Fran (Assemblyman). "Vehicular emissions: greenhouse gases," Chapter 200, Statutes of 2007, July 2, 2002..
[3] SB 1505, 2006. California Senate Bill. Lowenthal, Alan (Senator). Chapter 877, Statutes of 2006, September 20, 2006.

of the CFO. A brief discussion is included in this report to evaluate the impact of its trigger.

GHG Emission Results

GHG emissions were analyzed using a life cycle analysis model called the Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) that was modified for California conditions (CA-GREET). Life cycle emissions include various stages in the production of hydrogen, including the collection and processing of feedstock, the production of the fuel, and transportation and delivery of the finished fuel. GHG emissions per mile and total annual GHG reduction were evaluated for six hydrogen production options including hydrogen by central plant steam-methane reformation (SMR) with liquid delivery, central SMR with gaseous delivery, on-site SMR, on-site SMR with renewable inputs, and two different mixtures containing central and on-site production technologies.

Modeling results showed that GHG emission reductions relative to the gasoline baseline will vary depending upon when and how quickly FCVs enter the market, as well as the method(s) used for hydrogen production and delivery. If vehicles enter the market according to the Upper Bound Scenario, GHG reductions will overall be greater than the Lower Bound Scenario because, in the Upper Bound Scenario, emissions are being compared to an earlier gasoline baseline. Over time, both LCFS and LEV will drive well-to-wheel gasoline emissions down, reducing the overall GHG emissions reduction benefit.

The total GHG emissions reduction for Upper Bound Scenario ranged from approximately 0.03 to 0.8 million metric tons of carbon dioxide equivalent per year (MMTCO2e/year), based on the hydrogen production method. For the Lower Bound Scenario, the range was 0.02 to 0.7 MMTCO2e/year and the GHG reduction benefits were realized approximately three to four years later compared to the Upper Bound Scenario due to the slower growth in FCV numbers.

Hydrogen produced at a central SMR plant with liquid delivery, which is anticipated to contribute significantly to the commercialization of hydrogen, demonstrates per-mile GHG reductions in the Upper Bound Scenario of 25 to 38 percent during the span of the CFO. For the same central SMR/liquid delivery pathway, per mile GHG reductions were lower in the Lower Bound Scenario with reductions ranging from 21 to 32 percent. This shows that, if SB1505 was triggered, the central SMR/liquid delivery pathway will likely fail to meet SB1505's 30 percent GHG reduction requirement during the span of the CFO. In the Lower Bound Scenario where the regulation is triggered later, hydrogen production will likely require more immediate improvements to achieve the 30 percent

GHG reductions required under SB1505. For hydrogen produced by other methods, per-mile GHG emissions reductions were greater, ranging from approximately 60 to 67 percent with on-site-SMR using renewable under the Upper Bound Scenario.

Criteria Pollutant Emission Results

Criteria pollutant emissions were estimated using GREET for the various stages in the production of hydrogen, including the collection and processing of feedstock, the production of the fuel, and transportation and delivery of the finished fuel. For the CFO, local criteria pollutants were evaluated at the CFO midpoint in the Upper Bound Scenario in 2020 for various pathways. Local criteria pollutants are expected to be reduced, on average, by more than 50 percent when compared to gasoline. This represents one of the most conservative reductions based on hydrogen produced by central SMR with liquid delivery. Other methods of producing hydrogen generally yield equal or greater reductions in local criteria pollutants.

Additionally, staff also evaluated the various contributions to criteria pollutants based on hydrogen production technology. For hydrogen produced by central SMR with liquid-delivery, the largest contribution to criteria pollutants was the liquefaction of the fuel followed by the production process. Fuel liquefaction contributes to over 50 percent of criteria pollutant emissions and fuel production results in over 80 percent of the particulate matter emissions. For hydrogen produced by central SMR with gaseous delivery, on site SMR, or on-site electrolysis, fuel production is the main source of local criteria pollutant emissions, followed by fuel compression. In contrast, transportation and delivery contribute minimally to the overall emissions.

Based on lifecycle results relative to gasoline, the proposed CFO regulation is expected to result in no additional adverse impacts to California's air quality due to emissions of criteria pollutants. There may be additional reductions as the technology matures.

Analysis of Greenhouse Gas Emissions Benefits

Following is a detailed discussion of the modeling protocol, calculations, assumptions and scenarios used to estimate GHG emissions associated with the production and use of hydrogen in fuel cell vehicles.

Greenhouse Gas Emissions Modeling Protocol

GHG emissions calculations were conducted using a life cycle analysis model called the Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) originally developed by Argonne National Laboratory. Lifecycle analysis (LCA) is an analytical method for estimating the aggregate quantity of greenhouse gas emissions from a full fuel cycle. In general, the lifecycle analysis includes the direct effects of producing and using the fuels and indirect effects that may be associated with the particular fuel. The direct effects typically include the generation or extraction of feedstock's; the conversion of feedstock's to finished fuel or fuel blend stock; and the distribution, storage, delivery and final use of the finished fuel by the end user. Direct effects are responsible for the generation of several species of GHGs, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), volatile organic compounds (VOCs) and carbon monoxide (CO). Non-CO_2 species are adjusted to account for their global warming potential relative to carbon dioxide. Because hydrogen does not involve the conversion of food-related crops, such as corn and soybeans used for biofuels, the combined direct effects of the global warming potential of all inputs are accounted for as discussed above. Indirect effects, such as those associated with displacing production and use of food crops for fuel, are not included in the GHG value.

The version of GREET used under the CFO is the same as the one used under the LCFS adjusted for California conditions. This model was initially modified by TIAX under contract to the California Energy Commission during the AB 1007 process. Changes were restricted to mostly input variables, such as electricity generation factors, transportation distances, with no changes in methodology inherent in the original GREET model. A subsequent modification was done by Life Cycle Associates, a private consulting firm, and released as California-modified GREET model (CA GREET) version 1.8b in February 2009.[4] CA GREET v1.8b served as a basis for all hydrogen pathways published in this report.

For the CFO, staff evaluated the total well-to-tank (WTT)[5] carbon intensity of hydrogen produced by various processes. These fuel pathways, shown in Table D-1, represent the total emissions contribution without considering vehicle drivetrain efficiencies in grams CO2-equivalents per megajoule (gCO2e/MJ). These values reasonably represent the GHG emissions that would occur in California as a result of hydrogen production, per unit of energy produced, and are similar to the results shown in the LCFS Initial Statement of Reason (ISOR).[6]

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[4] ARB, 2009e. Argon National Laboratory "Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model" modified by Lifecycle Associates. Feb. 2009. http://www.arb.ca.gov/fuels/lcfs/lcfs.htm

[5] ARB, 2009b. "Staff Report: Initial Statement of Reasons for Proposed Regulation to Implement the Low Carbon Fuel Standard." March 5, 2009. See Volume 1, for detailed information on lifecycle analysis, including definitions of wells-to-tank and wells-to-wheel.

[6] ARB, 2009b.

Table D-1. WTT GHG Carbon Intensity Values for Various Hydrogen Production and Delivery Pathways

Hydrogen Fuel Pathways	Carbon Intensity
Description	(gCO_2e/MJ)
Hydrogen by central SMR, liquid delivered	142.18
Hydrogen by central SMR, gas delivered	101.04
Hydrogen by central SMR, pipeline delivered	98.21
Hydrogen by onsite SMR	98.21
Hydrogen by onsite SMR with 33% renewable feedstock	76.10
Hydrogen by onsite electrolysis	148.49

To complete the analysis on emissions resulting from hydrogen used as transportation fuel, the use of the fuel in the vehicle must be included. The wells-to-wheel (WTW) GHG, measured on a per mile basis, is calculated by including vehicle powertrain efficiencies reflected in the fuel consumption of fuel cell vehicles (FCVs). Equation 1 below shows the calculation of the hydrogen WTW GHG emissions used in the CFO.

$$GHG_{WTW} = \frac{(GHG_{WTT})(ED)}{FC} \qquad \text{(Equation 1)}$$

Where:

GHG_{WTT} is the WTT GHG emissions calculated by GREET, measured in gCO_2e/MJ, corresponding to the pathways in Table D-1;

ED Is the energy density of hydrogen with value of 120 MJ/kg?

FC Is the fleet-averaged fuel consumption of FCVs for a given year, measured in kilograms per mile (kg/mi); and

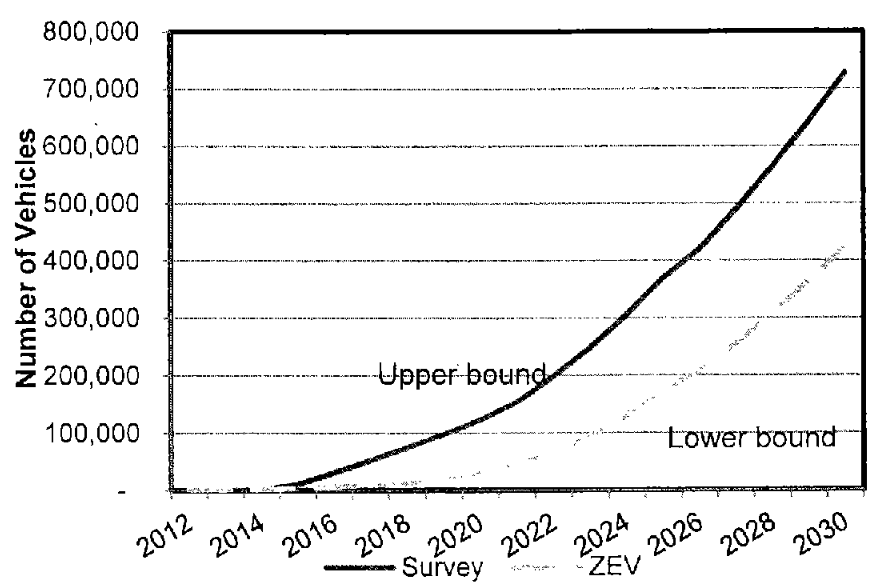
GHG_{WTW} Is the WTW GHG emission of hydrogen, measured in gCO_2e/mi?

The LCFS takes a similar approach in the use of an Energy Economy Ratio (EER) that defines the miles traveled per unit energy of hydrogen FCV relative to a reference gasoline vehicle.

Estimating Hydrogen Demand by FCVs

Numbers of FCVs introduced each year, their respective per mile fuel consumption, and miles traveled each year all affect hydrogen usage by FCVs. A changing fleet-average is used for the fuel consumption value. The fleet composition of FCVs is expected to change with each year: the number of vehicles increases, new models is introduced into the fleet, and older models are retired. Staff assumed two FCV ramp-up scenarios for the GHG analyses. The first scenario, serving as the upper bound, is based on surveys conducted by ARB and the California Energy Commission in which the auto manufacturers reported 53,000 vehicles by 2017. After 2017, staff utilized a ZEV compliance scenario with high numbers of FCVs and graphical best-fit algorithms to populate the data set through 2030. The second scenario, serving as the lower bound, is based on an estimated minimum number of FCVs automakers will likely deploy to meet the ZEV mandate. Figure D-1 below shows graphically the number of total FCVs anticipated under each Upper Bound and Lower Bound scenarios for 2012 to 2030.

Figure D-1: Estimated number of FCVs 2012 to 2030



Estimating GHG Emission Reductions due to Gasoline Vehicle Displacement

In addition to evaluating GHG emissions per mile, staff also analyzed the total GHG emissions reductions resulting from displacement of gasoline vehicles by FCVs under each the Upper Bound and Lower Bound scenarios. Equation 2 defines the total GHG emissions reduction resulting from the displacement of gasoline vehicles by FCVs.

$$GHG_{red} = [(GHG_{baseline} - GHG_{WTW}) * VMT] * K \qquad \text{(Equation 2)}$$

Where:

GHG_{red} is the GHG emissions reduction resulting from the displacement of gasoline vehicles by FCVs, measured in million metric tons of carbon dioxide equivalent per year (MMTCO2e/yr);

$GHG_{baseline}$ is the per mile GHG emissions from the gasoline vehicle fleet assuming no penetration of FCVs (business as usual or baseline), measured in gCO2e/mi;

GHG_{WTW} is as defined in Equation 1;

VMT is the annual vehicle miles traveled for gasoline determined from ARB EMission FACtors (EMFAC) model 2011[7], measured in miles per year. Since FCVs are assumed to completely displace gasoline vehicles, the same gasoline VMTs are used for FCVs; and

K Is a unit conversion factor with value $\frac{1x10^{-12}\ MMTCO2e}{gCO2e}$

Assumptions at Upper Bound Scenario CFO Trigger Points

In the Upper Bound Scenario, the number of FCVs available in California is based on the automaker reported number of 53,000 by 2017, with the data extended to 2030 as discussed above. Staff estimates that the CFO regional trigger is reached when a region reaches approximately 85 percent of the total number of FCVs in California. This regional trigger is estimated to occur in 2015. The statewide trigger based on the number of FCVs reported by the automakers is estimated to occur around 2016. The CFO sunset occurs when the number of stations reaches a total of 5 percent of all gasoline stations statewide with a minimum production capacity of 400kg/day. This is estimated to occur at about 2024 when there are approximately 306,033 FCVs deployed.

For the GHG analysis, four representative years were evaluated: 2015 and 2016 (for the regional and statewide triggers, respectively), 2020 (a midpoint for the scenario), and 2024 (as an estimated year of regulation sunset). For each year, the number of FCVs is assumed to penetrate the gasoline pool and completely replace the VMT of the light-duty gasoline counterpart. Hydrogen GHG emissions were compared to a gasoline baseline, assuming California Reformulated Gasoline (CaRFG) with 10 percent ethanol

[7] ARB, 2011b. EMFAC is used to calculate emission rates from all motor vehicles, such as passenger cars to heavy-duty trucks, operating on highways, freeways and local roads in California.

content by volume, which is affected by the Low Carbon Fuel Standard (LCFS) regulation currently in effect for all transportation fuels in California. The LCFS is assumed to affect the amount and type of ethanol produced or imported into California with an overall effect of lowering the gasoline emissions between 2015 and 2020, when a large number of low carbon-intensity ethanol is anticipated to be available.

The GHG emissions analysis also takes into consideration SB1505, Environmental and Energy Standard for Hydrogen Production (SB 1505, Statutes of 2006, Chapter 877),[8] which is anticipated to be in effect shortly after the CFO is triggered. In the early years prior to 2016, it is assumed that some of the hydrogen produced is SB1505 compliant. As the number of commercial-scale stations increase around 2016 and beyond, it is assumed that all hydrogen produced will be SB1505 compliant. Table D-2 summarizes the key assumptions and parameters used for the GHG emissions analyses.

[8] SB 1505, 2006. California Senate Bill. Lowenthal, Alan (Senator). Chapter 877, Statutes of 2006, September 20, 2006.

Table D-2. Summary of Assumptions and Parameters Used for the GHG Emissions Analyses for the Upper Bound Scenario

Upper Bound Scenario: Assumptions				
Year	2015	2016	2020	2024
Number of FCVs	12,000	32,000	124,202	306,033
VMT Replaced by FCVs (mi)	208 million	534 million	1.9 billion	4.2 billion
FCV Fleet Fuel Consumption (gge/100 mi)	1.49	1.40	1.44	1.46
Gasoline Fleet Fuel Consumption (g/100mi)	3.46	3.40	3.21	3.02
Gasoline GHG Emissions (gCO2e/mi)	376.95	370.24	340.86	320.99
CFO and SB1505 Status	CFO regional trigger is reached. Some hydrogen produced meet SB1505 requirements.	CFO statewide trigger is reached. All hydrogen produced meet SB1505 requirements.	All hydrogen produced meet SB1505 requirements.	CFO sunset. All hydrogen produced meet SB1505 requirements.
LCFS Status	LCFS is in effect with mixture of alternative fuel-vehicle systems that result in minimum of **2.5%** carbon intensity reduction. CI of gasoline reduced to **94.1 g/MJ.**	LCFS is in effect with mixture of alternative fuel-vehicle systems that result in minimum of **3.5%** carbon intensity reduction. CI of gasoline similar to year before at **94.1 g/MJ.**	LCFS is in effect with a mixture of alternative fuel-vehicle systems remains with overall minimum **10%** carbon intensity reduction. CI of gasoline reduced to **91.7 g/MJ.**	Overall minimum **10%** carbon intensity reduction remains. CI of gasoline reduced to **91.7 g/MJ.**

Results: Upper Bound Scenario GHG Analysis

GHG emissions, in grams of carbon dioxide equivalent per mile (gCO2e/mi), were calculated for the variety of hydrogen production and delivery technologies included in

Table D-1. A total of six options (A through F below) were analyzed based on several factors including:

a) Staff's estimate of the most probable methods for the commercial-scale production and delivery of hydrogen to meet the rapid ramp-up of FCVs; and

b) Available lifecycle data at the time the report was prepared.

Each option represents the available technology that will likely be used by hydrogen suppliers in California during the course of the CFO. For instance, Option A assumes all hydrogen is produced by steam methane reformation in a central production facility and delivered to the stations in a liquid state. Option B represents a mixture in which 75 percent of the stations in California receive liquid hydrogen delivered from a central SMR plant, 20 percent is central SMR production with gaseous delivery, and 5 percent is produced by at the hydrogen station using SMR. Options B, C, and D are variations of mixtures of production technologies anticipated to be available. Option F is currently the only renewable pathway for which lifecycle analyses have been completed.[9] Additional pathways, including those that incorporate renewables, will be forthcoming under the SB1505 regulation.[10]

Option A = 100 percent Central SMR liquid delivery

Option B = 75 percent central SMR liquid delivery, 20 percent central SMR gaseous delivery, 5 percent onsite SMR

Option C = 75 percent central SMR liquid delivery, 20 percent central SMR gaseous delivery, 5 percent onsite SMR with 33 percent renewable

Option D = 40 percent by central SMR liquid delivery 60 percent central SMR gaseous delivery

Option E = 100 percent Central SMR gaseous delivery

Option F = 100 percent Onsite SMR with 33 percent renewable feedstock's

Figure D-2 shows a graph of the per mile emissions of hydrogen from 2015 to 2024 calculated for the six production options listed above. Data associated with the graph are shown in Table D-3.

Relative to gasoline, hydrogen shows a range of per-mile GHG emissions reductions

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[9] At the writing of this report, several renewable hydrogen pathways are still under development. Their omission in this report is a result of timing and does not imply non-viability of those pathways in the future. Renewable pathways will be critical in meeting requirements under the SB1505 program.

[10] Other production options such as hydrogen by central SMR delivered by pipeline and onsite electrolysis were not included due to their uncertain participation in commercial-scale production of hydrogen.

based on the method of production and the year in which the evaluation was done. Hydrogen produced by Option A (central SMR with liquid delivery) shows a 35 percent reduction in GHG emissions on a per mile basis in 2015 and the reduction decreases to 25 percent in 2024. This reduction in GHG emission benefit is primarily caused by the reduction in the carbon intensity of the baseline gasoline under the LCFS. For Option F (onsite SMR with renewables), per-mile GHG emission reductions range from 60 to 65 percent.

When looking at the GHG emissions, it is important to recognize that the percent GHG emissions reductions for hydrogen is typically greater in the early years as the gasoline fleet-averaged fuel consumption is higher and gasoline baseline emissions are higher. Over time, emission reductions decreases as both gasoline vehicle performance and GHG emissions improve. When SB1505 is activated, a 30 percent reduction in GHG emissions of hydrogen measured relative to gasoline would be required. Figure D-2 also includes lines showing the 30 percent reduction targets for each year analyzed. Between 2015 and 2024, the 30 percent reduction lines decrease as a result of the decrease in the gasoline vehicle carbon dioxide emissions due to Pavley and a decrease in the GHG emissions due to the LCFS.

For each production option, the emissions increase over time as the fuel consumption of FCVs increases due to entry of larger vehicles into the fleet. An exception occurs between 2015 and 2016 when GHG emissions are reduced as a result of the decrease in FCV fuel consumption between 2015 and 2016.

Comparing across production technologies, Option A (central SMR with liquid delivery), shows the highest emissions with values ranging from 230.06 to 244.73 gCO2e/mi. Option F (on-site SMR with renewables), shows the lowest emissions with values ranging from 123.14 to 130.99 gCO2e/mi. Hydrogen produced by Option A demonstrates a 35 percent GHG emissions reduction at CFO onset. This value decreases to 25 percent at CFO sunset. For hydrogen produced by Option A, there are significant emissions associated with hydrogen liquefaction, which contributes to over 30 percent of the total GHG emissions for the production of the liquid hydrogen by central SMR.[11] Production options that have greater GHG emissions reductions include those that incorporate a greater percentage of central SMR with gaseous delivery and on site SMR pathways (Options B to F).

[11] ARB, 2009c. California Air Resources Board. Detailed California Modified GREET Pathway for Compressed Gaseous Hydrogen from North American Natural Gas, http://www.arb.ca.gov/fuels/lcfs/022709lcfs_h2.pdf

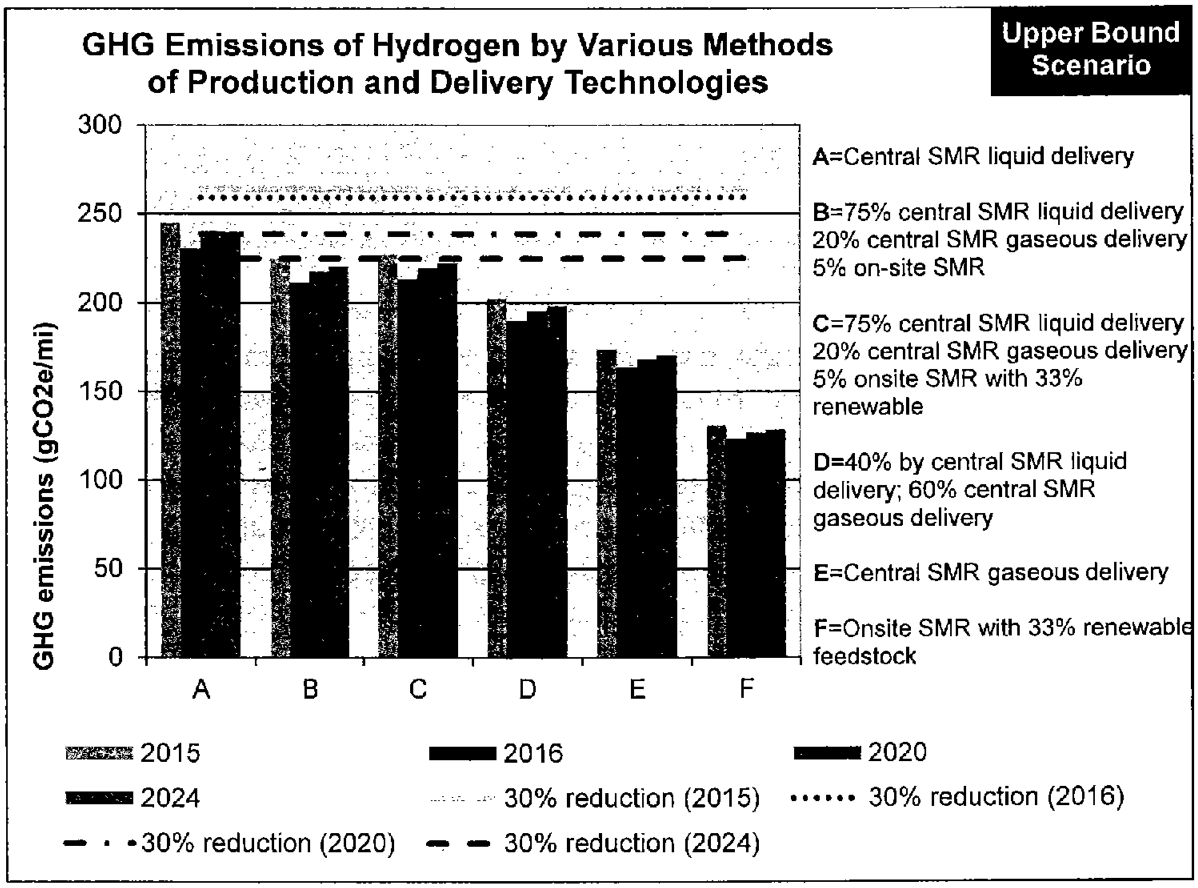


Figure D-2. Upper Bound Scenario GHG Emissions Profile of Hydrogen Produced by Various Pathways over the Lifetime of the CFO

In addition to the per-mile GHG emissions reductions, total emission reductions due to the displacement of gasoline vehicles were calculated for various hydrogen production technologies (Table D-3). For each production technology, reductions in total GHG emissions increase from 2015 to 2024 as a larger numbers of FCVs penetrate the gasoline pool. For the Option A, the total GHG emissions benefit increases from about 0.028 to 0.34 million metric tons of carbon dioxide equivalent per year (MMTCO2e/year) between 2015 and 2024. Option A represents the lower end of the emission reduction potential. If a majority of the hydrogen is produced using renewable sources, as reflected in Option F, it is likely that the GHG emission reduction could range from 0.051 MMTCO2e/year in 2015 when the CFO regional trigger is activated to about 0.80 MMTCO2e/year at CFO sunset in 2024.

Table D-3. GHG Emissions from Various Hydrogen Pathways - Upper Bound Scenario

Upper Bound Scenario		Per Mile GHG Emissions (gCO2e/mi) and (Percent Reduction)				Total GHG Emissions Reduction (MMTCO2e/year)			
Options	Years	2015	2016	2020	2024	2015	2016	2020	2024
Baseline	Gasoline	376.95	370.24	340.86	320.99	-	-	-	-
A	Central SMR liquid delivery	244.73 (35%)	230.06 (38%)	236.63 (31%)	239.74 (25%)	0.028	0.07	0.19	0.34
B	75% central SMR liquid delivery 20% central SMR gaseous delivery 5% onsite SMR with 33% renewable Average WTT CI is 130.65 g/MJ	224.88 (40%)	211.40 (43%)	217.44 (36%)	220.30 (31%)	0.032	0.08	0.23	0.42
C	75% central SMR liquid delivery 20% central SMR gaseous delivery 5% onsite SMR Average WTT CI is 131.75 g/MJ	226.78 (40%)	213.19 (42%)	219.28 (36%)	222.16 (31%)	0.031	0.08	0.22	0.41
D	40% by central SMR liquid delivery 60% central SMR gaseous delivery Average WTT CI is 117.50 g/MJ.	202.24 (46%)	190.12 (49%)	195.55 (43%)	198.12 (38%)	0.036	0.10	0.27	0.51
E	Central SMR gaseous delivery	173.92 (54%)	163.50 (56%)	168.16 (51%)	170.37 (47%)	0.042	0.11	0.32	0.63
F	Onsite SMR with 33% renewable feedstock	130.99 (65%)	123.14 (67%)	126.65 (63%)	128.32 (60%)	0.051	0.13	0.40	0.80

Assumptions at Lower Bound Scenario CFO Trigger Points

Under the Lower Bound Scenario, staff estimated the number of FCVs that will likely be deployed by automakers to meet the requirements under the ZEV program. Under this scenario, the number of vehicles is expected to ramp up slowly in the early years between 2015 and 2020 and increases more rapidly in later years (see Lower Bound line on Figure D-1). The representative years analyzed for GHG emissions in the Lower Bound Scenario are: 2018 (regional trigger), 2020 (statewide trigger), 2023 (midpoint), and 2028 (sunset). For each year of interest, modeling parameters such as FCV and gasoline fleet fuel consumption values, and vehicle VMTs were calculated similarly as in the Upper Bound Scenario. Similarly, gasoline baseline emissions were determined with the assumption that LCFS impacts the overall mixture of ethanol available on the market, therefore, lowering the overall gasoline emissions profile over time. Key assumptions and parameters used in the determination of GHG emissions for hydrogen under the Lower Bound Scenario are summarized in Table D-4.

Table D-4. Summary of Assumptions and Parameters Used for the GHG Emissions Analyses for the Lower Bound Scenario.

Lower Bound Scenario: Assumptions				
Year	2018	2020	2023	2028
Number of FCVs	13,424	30,265	95,092	307,140
VMT Replaced by FCVs (mi)	211 million	451 million	1.3 billion	4 billion
FCV Fleet Fuel Consumption (gge/100 mi)	1.45	1.46	1.47	1.47
Gasoline Fleet Fuel Consumption (g/100 mi)	3.30	3.21	3.07	2.87
Gasoline GHG Emissions (gCO2e/mi)	350.52	340.86	326.06	305.07
CFO and SB1505 Status	CFO regional trigger is reached. Some hydrogen produced meet SB1505 requirements.	CFO statewide trigger is reached. All hydrogen produced meet SB1505 requirements.	All hydrogen produced meet SB1505 requirements.	CFO sunset. All hydrogen produced meet SB1505 requirements.

Lower Bound Scenario: Assumptions (cont'd)			
LCFS Status	LCFS is in effect with mixture of alternative fuel-vehicle systems that result in overall minimum of **6.5%** carbon intensity reduction. CI of gasoline is **91.7 g/MJ.** Assume gasoline CI remains constant onwards and LCFS standard is met through mixture of electricity, hydrogen, low-CI biofuels and other low-CI fuels.	LCFS is in effect with mixture of alternative fuel-vehicle systems that result in overall minimum of **10%** carbon intensity reduction. CI of gasoline similar to year before at **91.7 g/MJ.**	Overall minimum **10%** carbon intensity reduction remains. CI of gasoline reduced to **91.7 g/MJ.**

Results: Lower Bound Scenario GHG Analysis

As in the Upper Bound Scenario, the same six hydrogen production options were analyzed. Figure D-3 shows the GHG emissions per mile for hydrogen produced by the same pathways analyzed for the Upper Bound Scenario. GHG emissions follow the expected similar trend as those in the Upper Bound Scenario with an increase in the per mile emissions over time (decreasing percent reduction relative to gasoline). For Option A, per-mile GHG emissions range from 238.30 gCO2e/mi in 2018 to 241.29 in 2028, representing reductions between 21 and 32 percent compared to the gasoline baseline. For hydrogen produced by Option F, the emissions range from 127.54 to 129.15 gCO2e/mi – more than 60 percent reduction compared to the gasoline baseline.

In the later years, hydrogen fleet fuel consumption is typically higher as larger FCVs are introduced into pool. Simultaneously, gasoline fleet fuel carbon dioxide emissions decreases due to Pavley and the gasoline GHG emissions improve with the availability of lower carbon intensity ethanol through the LCFS. Because the years analyzed in the Lower Bound Scenario are later than those of the Upper Bound Scenario, hydrogen produced by mainly central SMR with liquid delivery (Option A) shows lower GHG emissions reduction than those in the Upper Bound Scenario. The central SMR with liquid delivery pathway demonstrate a 32 percent reduction at CFO onset and 21 percent reduction at CFO sunset. On the other hand, Options E and F (central-SMR-gaseous-delivery and onsite-SMR-with-renewables) generally exceed the 30 percent reduction. The analyses suggest that time plays a critical role in evaluating the GHG emissions of hydrogen relative to the increasingly stringent standards for conventional vehicles and fuels. Although the lower number of vehicles in the Lower Bound Scenario would allow more time for hydrogen to comply with SB1505, the SB1505 standard, once it is triggered, could be more stringent than if it had been triggered earlier.

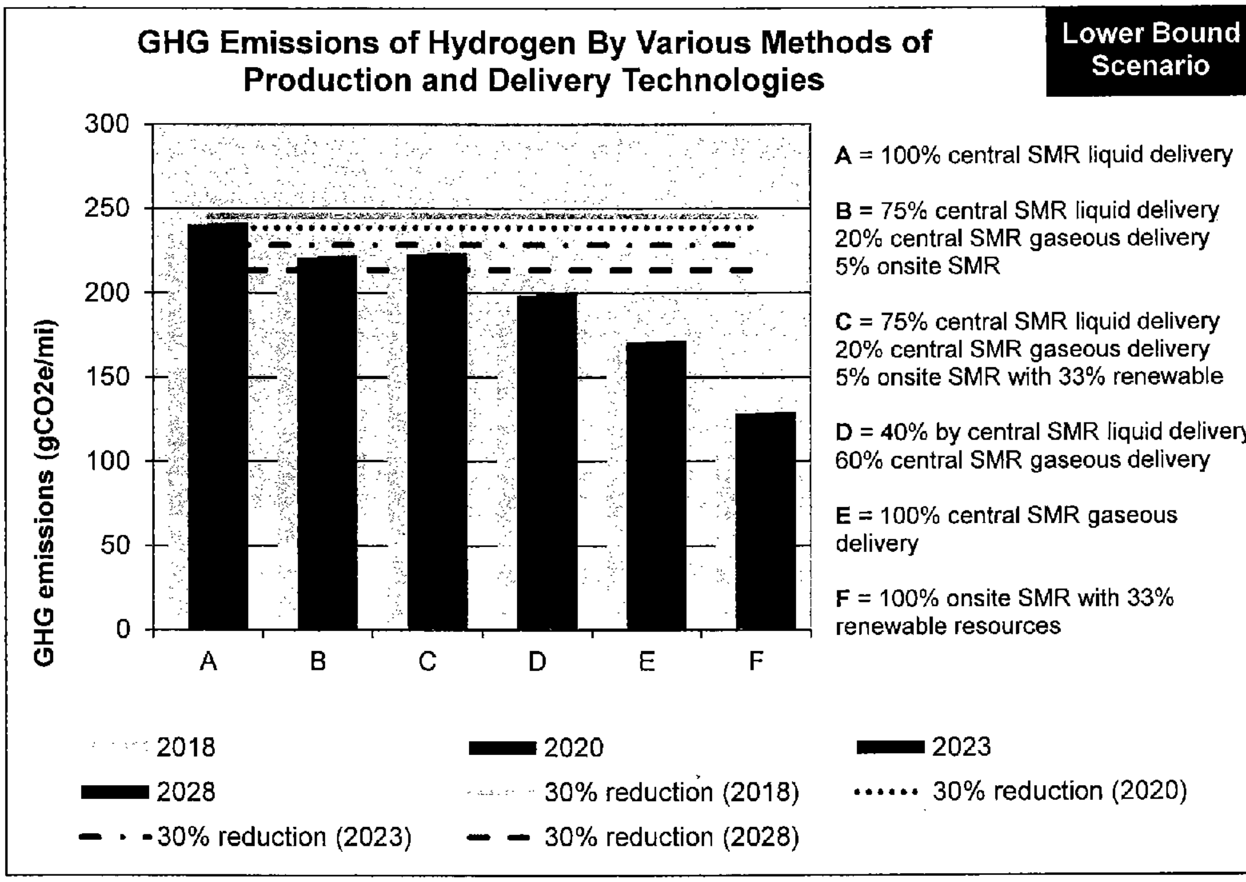


Figure D-3. Lower Bound Scenario GHG Emissions Profile of Hydrogen Produced by Various Pathways over the Lifetime of the CFO

Similar to the Upper Bound Scenario, total GHG emissions benefit was calculated assuming the number of FCVs in Lower Bound Scenario completely replace the same numbers of comparable gasoline vehicles and their associated VMT. Table D-5 summarizes the results of the GHG emission reduction over the lifetime of the CFO. For hydrogen produced by Option A, the expected GHG emission reductions at CFO sunset is about 0.25 MMT CO2e/year. If hydrogen was to be produced with renewable feedstocks, Option F demonstrates a benefit of 0.70 MMT CO2e/year at CFO sunset. This reduction at CFO sunset is about 13 percent lower than the reduction in the Upper Bound Scenario. Time and FCVs numbers are two critical factors in the reduced emissions benefits compared to the Upper Bound Scenario. With smaller numbers of FCVs in the Lower Bound Scenario, higher FCV fleet fuel consumption due to increasing vehicle sizes, and lower gasoline fleet fuel consumption in later years, GHG emissions benefits under the Lower Bound Scenario are lower overall.

Table D-5. GHG Emissions from Various Hydrogen Pathways - Lower Bound Scenario

Lower Bound Scenario		Per Mile GHG Emissions (gCO2e/mi) and (Percent Reduction)				Total GHG Emissions Reduction (MMTCO2e/year)			
Options	Years	2018	2020	2023	2028	2018	2020	2023	2028
Baseline	Gasoline	350.52	340.86	326.06	305.07	-	-	-	-
A	Central SMR liquid delivery	238.30 (32%)	240.37 (29%)	241.15 (26%)	241.29 (21%)	0.024	0.05	0.11	0.25
B	75% central SMR liquid delivery 20% central SMR gaseous delivery 5% onsite SMR with 33% renewable Average WTT CI is 130.65 g/MJ	218.97 (38%)	220.87 (35%)	221.59 (32%)	221.72 (27%)	0.028	0.05	0.14	0.33
C	75% central SMR liquid delivery 20% central SMR gaseous delivery 5% onsite SMR Average WTT CI is 131.75 g/MJ	220.82 (37%)	222.74 (35%)	223.46 (31%)	223.60 (27%)	0.027	0.05	0.14	0.32
D	40% by central SMR liquid delivery 60% central SMR gaseous delivery Average WTT CI is 117.50 g/MJ.	196.93 (44%)	198.64 (42%)	199.28 (39%)	199.40 (35%)	0.032	0.06	0.17	0.42
E	Central SMR gaseous delivery	169.35 (52%)	170.82 (50%)	171.37 (47%)	171.47 (44%)	0.038	0.08	0.20	0.53
F	Onsite SMR with 33% renewable feedstock	127.54 (64%)	128.65 (62%)	129.07 (60%)	129.15 (58%)	0.047	0.10	0.26	0.70

Analysis of Criteria Pollutant Emissions Benefits

Criteria air pollutants are regulated under U.S. EPA's National Ambient Air Quality Standards. Both the California and federal governments have adopted health-based standards for criteria pollutants including ozone, particulate matter (PM2.5 and PM10), carbon monoxide (CO), oxides of nitrogen (NOx), oxides of sulfur (SOx), and volatile organic compounds (VOC).

Criteria Pollutant Emissions Modeling Protocol

Staff performed WTW lifecycle analyses of the criteria pollutants using GREET, similar to the GHG analyses, to examine all potential air emissions from hydrogen production including those from transportation and distribution of feedstock's, the actual production of hydrogen, the transportation and distribution of the fuel (including dispensing to vehicles), and the use of the fuel in vehicles. Following the requirements established in SB1505 to mitigate local criteria pollutant emissions associated with hydrogen, this WTW evaluation includes those emissions occurring on a local level.

For the CFO, criteria pollutants for four fuel pathways were analyzed using year 2020 fuel demand associated with the midpoint of the Upper Bound Scenario, shown in Table D-6. All pathways were compared to gasoline baseline assuming California Reformulated Gasoline (CaRFG) with 10 percent ethanol content by volume.

Criteria Pollutant Emissions Modeling Results

Table D-6 shows local criteria pollutant emissions associated with the various hydrogen pathways in 2020 and percent reductions relative to the gasoline baseline. The highest criteria pollutant emissions for all hydrogen production methods are NO_x and CO; however, criteria emissions from all pathways are significantly lower than the gasoline baseline. When compared to gasoline, local criteria pollutant emissions are significantly lower, ranging from 24 percent to nearly 100 percent, depending on the hydrogen production technology and criteria pollutant evaluated.

To understand the relative significance of the criteria pollutant emissions from hydrogen, data from typical petroleum refining and industrial chemical processing were obtained for the South Coast AQMD region.[12] Data extracted from the ARB emissions almanac for 2020[13] estimates that a typical industrial process for chemicals will contribute 0.08 tons/day of NO_x and 0.14 tons/day of CO (Table D-7). Since NO_x and CO represent the

[12] The SCAQMD basin is anticipated to be the likely region for the initial deployment of a large number of FCVs and was, therefore, chosen for the comparison.
[13] ARB, 2009d. ARB Planning and Technical Support Division (PTSD) 2009 Almanac Emission Projection Data at http://www.arb.ca.gov/app/emsinv/emssumcat.php

greatest criteria pollutant emissions for hydrogen production, a comparison of these values shows that hydrogen production ranks comparable to a typical industrial process for chemicals.

Table D-6. Criteria Pollutants from Various Hydrogen Production Methods and Percent Reductions Relative to Gasoline Baseline

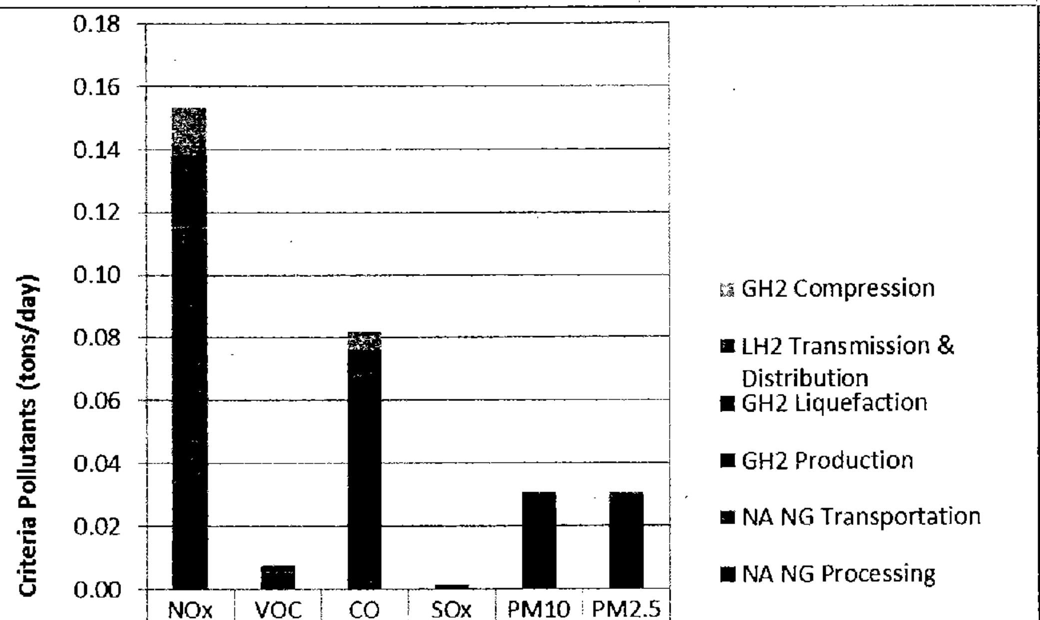
Hydrogen Criteria Pollutants Emissions (tons/day) and Percent Reduction Relative to Baseline						
	NO_x	VOC	CO	SO_x	PM10	PM2.5
Gasoline (baseline)	0.47	0.23	0.24	0.15	0.15	0.06
Hydrogen by central SMR, liquid delivered	0.15 (67%)	0.0078 (97%)	0.082 (66%)	0.0018 (99%)	0.031 (80%)	0.031 (45%)
Hydrogen by central SMR, gas delivered	0.068 (86%)	0.0089 (96%)	0.041 (83%)	0.0042 (97%)	0.028 (82%)	0.027 (52%)
Hydrogen by onsite SMR	0.057 (88%)	0.0065 (97%)	0.036 (85%)	0.0 (100%)	0.026 (83%)	0.026 (54%)
Hydrogen by onsite electrolysis	0.36 (24%)	0.013 (94%)	0.14 (43%)	0.0037 (98%)	0.017 (89%)	0.017 (70%)

Table D-7. Estimated Criteria Pollutant Emissions for SCAQMD in 2020 from Petroleum Refining and Industrial Chemical Processing

Estimated 2020 Average Criteria Pollutants Emissions in South Coast AQMD (tons/day)[14]						
	NOx	VOC	CO	SOx	PM10	PM2.5
Petroleum Refining	4.32	4.58	8.83	6.53	2.46	2.06
Industrial processes - Chemical	0.08	11.16	0.14	1.07	0.76	0.66

[14] Ibid.

Figures D-4a through D-4d show criteria pollutant emissions from various stages of the hydrogen production process. For hydrogen produced by central SMR with liquid delivery, fuel liquefaction contributes to over 50 percent of the NOx, VOC, CO, and SOx emissions. For particulate matter (PM10 and PM2.5), fuel production contributes to over 80 percent of the emissions. In contrast, fuel delivery only contributes to about one percent of the particulate matter emissions.

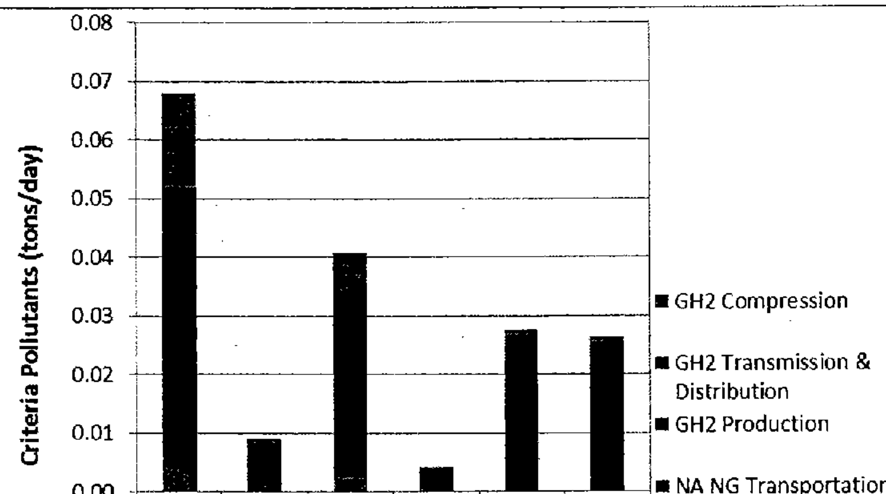


	NOx	VOC	CO	SOx	PM10	PM2.5
GH2 Compression	0.0157	0.0006	0.0061	0.0002	0.0007	0.0007
LH2 Transmission & Distribution	0.0225	0.0016	0.0076	0.0003	0.0004	0.0004
GH2 Liquefaction	0.0996	0.0036	0.0385	0.0010	0.0047	0.0047
GH2 Production	0.0143	0.0019	0.0272	0.0003	0.0247	0.0247
NA NG Transportation	0.0008	0.0001	0.0024	0.0000	0.0001	0.0001
NA NG Processing	0.0002	0.0000	0.0001	0.0000	0.0000	0.0000
NA NG Recovery	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000

Figure D-4a. Criteria Pollutants – Hydrogen by Central SMR with Liquid Delivery

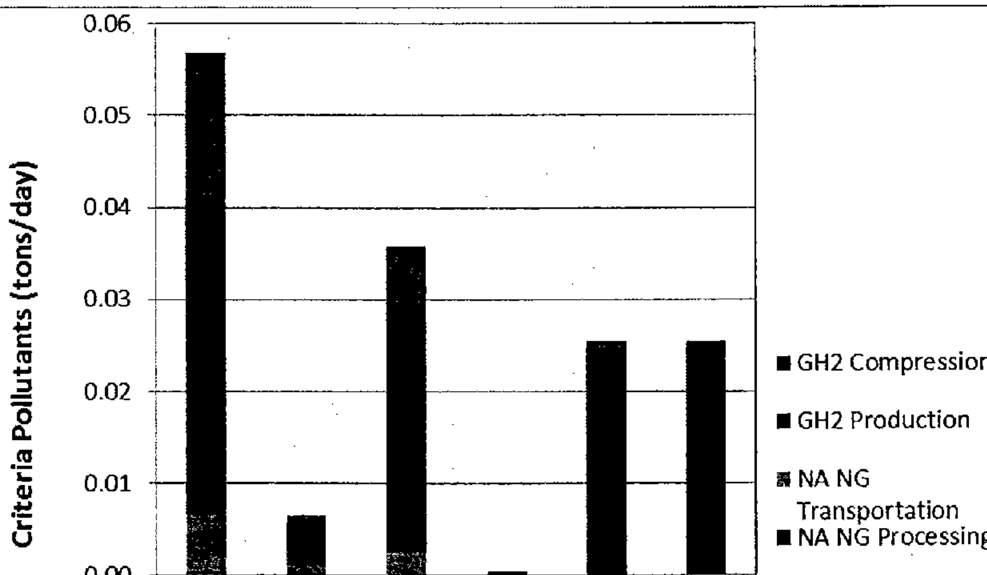
For hydrogen produced by central SMR with gaseous delivery, the greatest impact on overall criteria pollutants emissions is the fuel production process, which is estimated to contribute to over 50 percent each of the NOx, VOC, and CO, and about 90 percent of the particulate matter emissions. Fuel compression shows a slight impact of 23 percent for NOx, 15 percent for CO, less than 7 percent for all other criteria pollutants.

For hydrogen produced on site either by SMR or electrolysis, the greatest overall contribution to criteria pollutants is the fuel production process, with impact ranging from 60 to 96 percent.



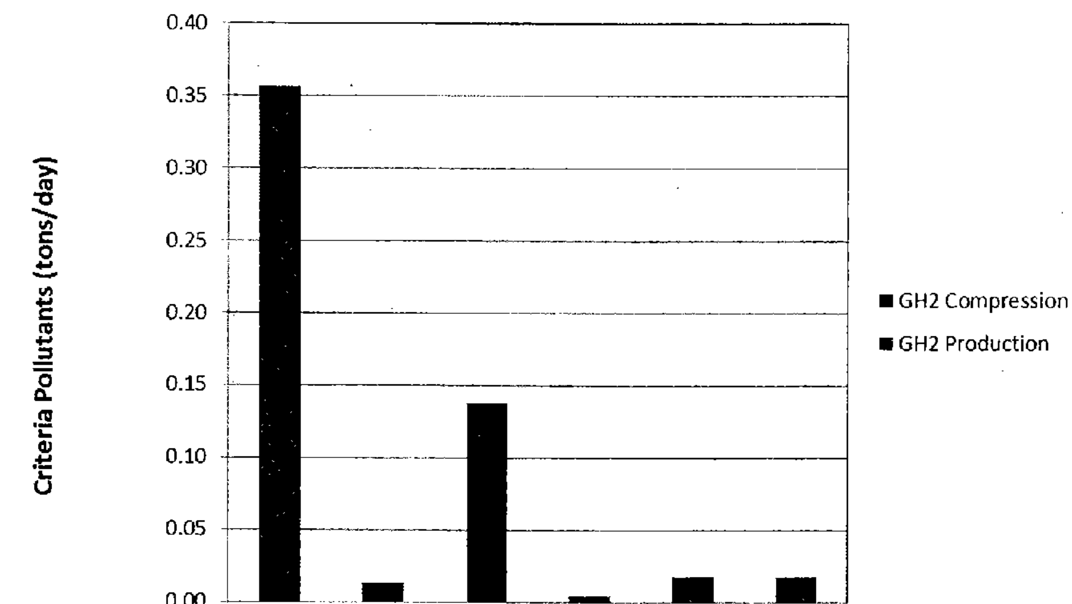
	NOx	VOC	CO	SOx	PM10	PM2.5
GH2 Compression	0.01572	0.00057	0.00607	0.00016	0.00074	0.00074
GH2 Transmission & Distribution	0.01099	0.00245	0.00499	0.00377	0.00198	0.00093
GH2 Production	0.03458	0.00486	0.02723	0.00029	0.02469	0.02469
NA NG Transportation	0.00621	0.00099	0.00236	0.00001	0.00013	0.00013
NA NG Processing	0.00021	0.00001	0.00008	0.00000	0.00001	0.00001
NA NG Recovery	0.00012	0.00007	0.00004	0.00000	0.00000	0.00000

Figure D-4b. Criteria Pollutants – Hydrogen by Central SMR with Gaseous Delivery



	NOx	VOC	CO	SOx	PM10	PM2.5
GH2 Compression	0.01572	0.00057	0.00607	0.00016	0.00074	0.00074
GH2 Production	0.03458	0.00486	0.02723	0.00029	0.02469	0.02469
NA NG Transportation	0.00621	0.00099	0.00236	0.00001	0.00013	0.00013
NA NG Processing	0.00021	0.00001	0.00008	0.00000	0.00001	0.00001
NA NG Recovery	0.00012	0.00007	0.00004	0.00000	0.00000	0.00000

Figure D-4c. Criteria Pollutants – Hydrogen by On-Site SMR



	NOx	VOC	CO	SOx	PM10	PM2.5
■ GH2 Compression	0.01572	0.00057	0.00607	0.00016	0.00074	0.00074
■ GH2 Production	0.34120	0.01230	0.13176	0.00352	0.01617	0.01616

Figure D-4d. Criteria Pollutants – Hydrogen by On-Site Electrolysis

Criteria Pollutant Emissions during Station Permitting

Under State law, the air pollution control and air quality management districts (local districts) have the primary responsibility for controlling air pollution from non-vehicular sources, including stationary sources such as hydrogen production facilities.[15] Each local district has a program designed to address new stationary sources of air pollution. For most local districts, these programs are referred to as new source review (NSR) programs.[16] NSR programs provide mechanisms to: (1) reduce emission increases up-front through the use of clean technology; and (2) achieve no net increases in emissions of nonattainment pollutants or their precursors for all new or modified sources that exceed particular emission thresholds. This is accomplished through two major requirements in each district NSR rule: best available control technology (BACT)[17] and offsets. The local air districts also develop rules to reduce emissions from specific sources and govern the overall permitting process. Local districts enforce their local rules and prepare air quality plans to achieve ambient air quality standards.

[15] Health and Safety Code section 39002.
[16] See, e.g., Bay Area Air Quality Management District Regulations 2-1 through 2-6. A few local districts, because of their federal attainment status for certain pollutants, implement a Prevention of Significant Deterioration (PSD) program.
[17] In California, BACT is synonymous with the federal term Lowest Achievable Emission Rate (LAER) for nonattainment area permit requirements.

In addition to meeting local district NSR rules, new hydrogen production facilities must meet California Environmental Quality Act (CEQA)[18] requirements as part of the permitting process. As these facilities are industrial facilities, an environmental impact report (EIR) must be prepared. To comply with CEQA requirements, the EIR must identify any significant environmental impacts, identify feasible alternatives, and incorporate feasible mitigation measures to minimize the significant adverse environmental impacts identified in the environmental impacts analysis. CEQA prohibits the adoption of projects as originally proposed if they have significant adverse environmental impacts, and feasible alternatives or mitigation measures are available to reduce or eliminate such impacts (except if specific overriding considerations are identified that outweigh the potential adverse consequences of any unmitigated impacts).

[18] Public Resources Code section 21000 et seq.

APPENDIX E

ECONOMIC MODEL

Appendix E

Economic Model

This appendix presents a summary of calculations used to complete the economic analysis presented in Section IV, and describes the model used to develop the cost and payback numbers presented in the Upper and Lower Bound FCV scenarios. This model, entitled "CFO Station Cost Calculator," is included as part of this staff report.

<Include discussion of credit card fees>

Equation for estimating the number of required new CFOs:

$$Number\ of\ New\ Stations = \frac{MXDV - Existing\ supply}{Per\ station\ throughput\ volume}$$

Where:

> $MXDV$ means Maximum Demand Volume for a specific designated clean fuel in gallons gasoline equivalent calculated pursuant to the equations specified in section 2304 of the regulation. The calculation uses vehicle numbers and fuel economy values by model year presented in Table IV-1.
>
> $Existing\ supply$ upon regulation activation is the maximum annual capacity of the stations listed in Table I-1 that are anticipated to be in operation for the year in which the calculations are being made.
>
> $Existing\ supply$ for years following the year that the regulation is activated also includes stations that were required to be constructed per the regulation in prior years and assuming that they each can supply a maximum volume equal to the per station throughput volume.
>
> $Per\ station\ throughput\ volume$ is 146,000 kilograms per year (which equals 400 kilograms per day for 365 days per year) for hydrogen.

Equation for station initial cost annual payments:

$$Annual\ payment = \frac{Present\ Value}{PVIFA}$$

Where:

$Present\ value$ is the total initial station cost presented in Table IV-3 in 2009 dollars.

$PVIFA$ is the present value interest factor of annuity (5.5824), which represents seven annual payments with a 6 percent interest rate.

Table E-1. Annual Payments Required to Amortize Hydrogen Station Loans ($2009)

Type of 400 kg/day station	Initial Cost (Present Value)	Annual Payment
Central SMR with delivered gaseous hydrogen	$1.5 million	$269,000
Central SMR with delivered liquid hydrogen (Early years)	$1.8 million	$332,000
Central SMR with delivered liquid hydrogen (Later years)	$1.4 million	$251,000
On-site SMR	$2.4 million	$430,000

Estimating Operation and Maintenance Costs

$$Operating\ costs = fixed\ costs + variable\ costs$$

$$Variable\ costs\ (delivered\ H2) = \left(146{,}000\frac{kg}{year} \times \%\ utiliztion\right) \times (delivered\ H2\ cost + onsite\ electricity\ cost + SB1505\ premium)$$

$$Variable\ costs\ (onsite\ SMR) = \left(146{,}000\frac{kg}{year} \times \%\ utiliztion\right) \times (natural\ gas\ cost + onsite\ electricity\ cost + SB1505\ premium)$$

Where:

Fixed costs include annual costs not associated with fuel throughput such as hydrogen station upkeep, regular maintenance, repair and replacement of station equipment due to normal wear and tear, and rental of retail space.

Variable costs include costs that are dependent on hydrogen throughput such as the purchase of hydrogen (or the on-site production hydrogen) and the electricity required to chill and dispense the hydrogen at 5000 and 10,000 psi.

SB 1505 premium is the per kilogram incremental cost increases due to the 33 percent renewable requirements of SB 1505 including the price premium associated with purchasing renewable electricity and renewable biogas. This premium was applied to the variable costs starting 2017 in the Upper Bound Scenario and 2021 in the Lower Bound Scenario.

Table E-2 lists the assumptions and information sources for fixed and variable O&M costs used in the economic model. Station utilization rates presented in Table IV-5 are also factored into the variable costs.

Table E-2. Fixed and Variable Operation and Maintenance Costs (2009 dollars)

Fixed Costs	$100,000 per year (all pathways)[1]			
Variable costs	**Dollars per kilogram of hydrogen produced/dispensed**			
Hydrogen Pathway	**Delivered H2 Cost[2]**	**On-site Electricity**	**On-site Natural Gas**	**SB 1505 Premium[3]**
Delivered Gaseous	$2.85	$0.15[4] (1 kwh/kg)[5]	N/A	$0.70
Delivered Liquid	$2.70	$0.15 (1 kwh/kg)	N/A	$0.70
On-site SMR	N/A	$0.45 (3 kwh/kg)	$1.00[6]	$0.70

[1] UCD, 2011. University of California, Davis. Ogden, Joan et al. UCD Institute of Transportation Studies. "Analysis of a "Cluster" Strategy for Introducing Hydrogen Fuel Cell Vehicles and Infrastructure in Southern California." Sept. 16, 2011. Revised Oct. 5, 2011.
[2] US DOE, 2011b. United States Department of Energy. Satyapal, Sunita. US DOE Fuel Cell Technologies Program. "Overview of Hydrogen and Fuel Cells." March 3, 2011.
[3] Staff assumed that a kilowatt-hour of renewable electricity would cost almost three times that of commercial grid electricity, and biogas inputs would cost 2.5 times that of conventional natural gas.
[4] Based on average commercial electricity for California's three investor-owned utilities.
[5] UCD, 2011. University of California, Davis. Ogden, Joan et al. UCD Institute of Transportation Studies. "Analysis of a "Cluster" Strategy for Introducing Hydrogen Fuel Cell Vehicles and Infrastructure in Southern Califor¬ia." Sept. 16, 2011. Revised Oct. 5, 2011.
[6] Estimate base on data from US DOE, 2001, and EIA, 2011.

Calculating annual costs to all regulated parties

$$Total\ annual\ cost_y = \sum_y Annual\ cost_i - \sum_y (kg\ hydrogen\ sold_i \times price)$$

Where:

$Annual\ cost_i$ is the annual payment plus annual operating costs for station i in year y.

$kg\ hydrogen\ sold_i$ is the estimated amount of hydrogen in kilograms sold at station i in year y. For the economic model, $kg\ hydrogen\ sold\ at\ each\ station = 146{,}000 \times \%\ utilization.$

$Price$ is the example per-kilogram hydrogen price from Table IV-6. For this analysis, credit card fees are assumed to be included in the example hydrogen price. It is difficult to predict how credit card fees affect the cost to provide hydrogen since fees will vary from station to station and will not be applied when fuel is purchased with cash or a gas card.

Calculating cost to regulated parties if stations are not utilized – worst case scenario

$$Total\ cost = total\ investment_{year\ 1} + 75\%\ investment_{year\ 2} + 10\%\ investment_{year\ 3}$$

Where:

$Total\ investment_{year\ 1} =$
$\sum_{year\ 1}(7 \times annual\ payment)_i + (1 \times fixed\ operating\ cost)_i +$
$Decommissioning\ cost_i$

$year$ 1 applies to the stations installed for the first compliance year for which the vehicle trigger has been reached. This would be 2018 in the Lower Bound Scenario and 2015 in the Upper Bound Scenario.

$year$ 2 applies to the stations required to be installed for the second compliance year after the vehicle trigger has been reached. This would be 2019 in the Lower Bound Scenario and 2016 in the Upper Bound Scenario.

$year$ 3 applies to the stations required to be installed in for the third compliance year after the vehicle trigger has been reached. This would be 2020 in the Lower Bound Scenario and 2017 in the Upper Bound Scenario.

$annual\ payment_i$ is the annual payment for station i. The calculation assumes that regulated parites will have incurred 100 percent of their initial costs for $year\ 1$ stations.

$fixed\ operating\ cost_i$ is the fixed annual cost of $100,000 from Table E-2 applied to each station. The calculation assumes that fixed costs will be incurred by $year\ 1$ stations and for only one year.

$Decommissioning\ cost_i$ is assumed to be $100,000.[7]

$75\%\ investment_{year\ 2}$ is 75% of the total initial cost for all stations required to be installed in $year\ 2$.

$10\%\ investment_{year\ 3}$ is 10% of the total initial cost of all stations required to be installed in $year\ 3$.

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7 Decommissioning cost is estimated to be $50,000 to $100,000. Sources: bids received by CaFCP to decommission their liquid delivery hydrogen fueling station in West Sacramento. $100,000 was used in the above estimates.

APPENDIX F

LEGAL AUTHORITY

State of California
Air Resources Board

MEMORANDUM

RECEIVED
AUG 3 1990
Stationary Source Division
Air Resources Board

To: Peter Venturini, Chief
Stationary Source Division

Through: Michael P. Kenny
General Counsel

From: W. Thomas Jennings
Senior Staff Counsel

Date: July 31, 1990

Re: Authority of Air Resources Board to Adopt Requirements for the Distribution and Retail Availability of Clean Motor Vehicle Fuels

The staff of the Air Resources Board (ARB or Board) has prepared a regulatory proposal which would establish stringent, long-term tiered exhaust emission standards for low-emission motor vehicles. It is expected that, in order to meet these stringent standards, vehicle manufacturers will design some of the vehicles to operate on clean alternative fuels. An integral part of the proposal is that, to the extent vehicles are certified to meet the applicable emission standards only when operated on alternative fuels, gasoline suppliers will be required to distribute appropriate quantities of the fuels to be used in the vehicles. In addition, owners or lessors of service stations will be required to equip a specified percentage of stations to dispense clean fuels used to certify vehicles, and station operators will have to have the fuel available at the stations. Certain _de minimis_ trigger levels for the number of clean fuel vehicles operated would have to be reached before the clean fuel requirements become applicable. The regulatory proposal is described in detail in the public hearing notice dated July 31, 1990.

This memorandum addresses the authority of the Board to adopt the clean fuel portions of the proposal.

SUMMARY

The California Clean Air Act of 1988 (CCAA) among other things enacted Health and Safety Code section 43018. It is our opinion that section 43018 authorizes the Board, upon appropriate findings, to adopt clean fuel regulations of the sort proposed by the staff. The CCAA expanded the Board's previous authority to regulate and control the sale of motor vehicle fuels. Section 43018 does not limit the Board's regulatory options to "specifications" of fuels. Rather, it authorizes the Board to adopt

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whatever control measures pertaining to fuels it finds are technologically feasible, cost-effective, and necessary to attain the state ambient air quality standards at the earliest practicable date and to meet the emissions reductions mandated in the statute. Therefore, the Board has the statutory authority to adopt the proposal as long as it makes the requisite statutory findings.

The staff proposal would not constitute on its face an unconstitutional taking of property under the fifth amendment to the U.S. Constitution. There does not appear to be any "property" that would be "taken" by the proposal. In any case, the clean fuel proposal would substantially advance legitimate state interests, and there is an identifiable nexus between the activities regulated and the governmental interests being furthered. In addition, the proposal cannot be shown on its face to deny gasoline suppliers or service station owners or operators the economically viable use of their property, because the extent to which the clean fuel requirements will be triggered by new alternative clean fuel vehicles is not yet known.

The proposal also would not violate "substantive" due process under the fifth amendment. The proposed regulations are rationally related to a legitimate state interest. The proposal does not trigger the more stringent substantive due process requirements which apply when a regulation infringes on a constitutionally protected personal liberty or fundamental right.

ANALYSIS

I. STATUTORY AUTHORITY

A. Background--The ARB's authority to regulate motor vehicle fuels before enactment of the California Clean Air Act of 1988.

Prior to enactment of the CCAA in 1988, the ARB was only expressly authorized to regulate motor vehicle fuels in two areas--limiting the Reid vapor pressure (RVP) of gasoline (Health and Safety Code section 43830[1]) and limiting the degree of unsaturation of gasoline (measured by bromine number) in the South Coast Air Basin (section 43831). However, the California Supreme Court had determined in Western Oil and Gas Ass'n [WOGA] v. Orange County APCD, 14 Cal.3d 411 (1975), that the Board had additional authority to regulate motor vehicle fuel stemming from its authority to establish motor vehicle emission standards. In 1975, former section 39052.6 provided that the Board could adopt and implement motor vehicle emission standards for the control of air contaminants, other than standards specified by the Legislature, where the Board found its standards to be

1. All section references are to the Health and Safety Code unless otherwise indicated.

necessary and technologically feasible to carry out the purposes of the state air pollution laws. The WOGA court held that section 39052.6 authorized the ARB to control emissions of lead from motor vehicles not just by setting vehicle emission standards which require the use of a mechanical device on the vehicle, but also by regulating the fuel composition and limiting the lead content of gasoline. (id., 14 Cal.3d at 419-420.) Noting the ambitious air quality goals imposed by the Legislature on the ARB and the unavailability of mechanical devices for reducing lead emissions, the court stated:

> If we were to hold that the ARB has no power to regulate fuel content, we would be attributing to the Legislature an intention to deprive the agency of the only realistic means at its disposal to achieve the purposes of the act. (id. at 420)

In 1975, section 39052.6 was recodified as sections 43013 and 43101. (Stats 1975 ch 957, sec. 12.) Section 43013 permitted, and section 43101 mandated, the Board to adopt and implement motor vehicle emission standards that it found necessary and technologically feasible to carry out the purposes of the state clean air laws. Pursuant to these sections and the WOGA case, the Board adopted limits on the lead content of gasoline (13 CCR sections 2253, 2253.2), the sulfur content of unleaded gasoline (13 CCR section 2252(a)-(c)), and the sulfur content of diesel fuel (13 CCR section 2252(d) ff).

In addition, in 1988 the Legislature enacted sections 39663 and 39667, which require the Board to consider additional motor vehicle fuels regulations to control the emissions of toxic air contaminants. (Stats. 1988 ch. 940) Section 39663 directs the Board to prepare a report addressing specific aspects of exposure to known and suspected toxic air contaminants emitted by vehicular sources in California, and by June 30, 1990 to consider a plan for reducing exposure to such air contaminants. Section 39677 directs the Board to consider, in light of its determinations pursuant to section 39663, revisions to its regulations specifying the content of motor vehicle fuel, and its vehicular emission standards, in order to achieve the maximum possible reduction in public exposure to toxic air contaminants. Section 39667 continues,

> Those regulations may include, but are not limited to, the modification, removal, or substitution of vehicle fuel, vehicle fuel components, or fuel additives, or the required installation of vehicular control measures on new motor vehicles.

B. The California Clean Air Act of 1988.

The California Clean Air Act of 1988 is ambitious and far-reaching legislation enacted in recognition of the fact that most urban areas of the state had not attained federal ambient air quality standards by the federal deadline of August 31, 1988. (Stats. 1988, ch. 1568, uncodified section 1(b)(4).) The CCAA directed the development and implementation of

California's own program to attain the ambient air quality standards at the earliest practicable date. (id., uncodified section 1(b).)

While much of the CCAA involves establishment of a process for developing and implementing air pollution control district plans for attaining the ambient standards, it also contains important provisions directing the ARB to reduce emissions from motor vehicles. In the motor vehicle area, the CCAA added a new findings and declaration section (sec. 43000.5), amended section 43013, and enacted a central new section 43018.[2]

In new section 43000.5(d), the Legislature finds and declares that, "the state board should take immediate action to implement both short- and long-range programs of across-the-board reductions in vehicular emissions which can be relied upon by the districts in the preparation of their attainment plans or plan revisions...." In section 43000.5,(e), the Legislature declares that,

> [I]n order to attain the state and federal standards as expeditiously as possible, it is necessary for the authority of the state board to be clarified and expanded with respect to the control of motor vehicles and motor vehicle fuels.

The CCAA amended section 43013 by adding additional subsections specifically authorizing standards and regulations for identified types of motor vehicles and equipment, and making the following additions to the first paragraph:

> 43013. (a) The state board may adopt and implement motor vehicle emissions standards, in-use performance standards, and motor vehicle fuel specifications for the control of air contaminants and sources of air pollution which the state board has found to be necessary, cost-effective, and technologically feasible to carry out the purposes of this division.

Finally, the CCAA enacted new section 43018. Subsections (a)-(c) are set forth below. Subsection (d) establishes a specific timetable for the Board to conduct workshops and rulemaking hearings for specific regulations regarding motor vehicles and motor vehicle fuels. The full text of section 43018 is attached.

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2. The only other CCAA amendment to Division 26, Part 5 ("Vehicular Air Pollution Control") was the enactment of section 43019 regarding expanded fees for the certification of motor vehicles and engines.

43018. (a) The state board shall endeavor to achieve the maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish the attainment of the state standards at the earliest practicable date.

(b) Not later than January 1, 1992, the state board shall take whatever actions are necessary, cost-effective, and technologically feasible in order to achieve, not later than December 31, 2000, a reduction in the actual emissions of reactive organic gases [ROG] of at least 55 percent, [and] a reduction in emissions of oxides of nitrogen [NOx] of at least 15 percent from motor vehicles. These reductions in emissions shall be calculated with respect to the 1987 baseline year. The state board also shall take action to achieve the maximum feasible reductions in particulates, carbon monoxide, and toxic air contaminants from vehicular sources.

(c) In carrying out this section, the state board shall adopt standards and regulations which will result in the most cost-effective combination of control measures on all classes of motor vehicles and motor vehicle fuel, including, but not limited to, all of the following:

(1) Reductions in motor vehicle exhaust and evaporative emissions.
(2) Reductions in emissions from in-use emissions from motor vehicles through improvements in emission system durability and performance.
(3) Requiring the purchase of low-emission vehicles by state fleet operators.
(4) Specification of vehicular fuel composition.

C. Effect of the California Clean Air Act of 1988

It is our opinion that section 43018 authorizes the Board, upon appropriate findings, to adopt clean fuel regulations of the sort prepared by the staff. The CCAA expanded the Board's previous authority to regulate and control the sale of motor vehicle fuels. Section 43018 does not limit the Board's regulatory options to "specifications" of fuels. Rather, section 43018 authorizes the Board to adopt whatever control measures pertaining to fuels it finds are technologically feasible, cost-effective, and necessary to attain the state ambient air quality standards at the earliest practicable date and to meet the emissions reductions specified in section 43018(b).

Section 43018(a) and (b) spell out the goals and objectives the ARB must pursue in its motor vehicle regulatory program. Section 43018(a) directs the Board to endeavor to achieve the maximum degree of reductions possible from vehicles, in order to attain the state ambient standards by the earliest practicable date. Section 43018(b) directs the Board to achieve the specified percentage reductions in emissions of reactive organic gases and oxides of nitrogen from motor vehicles by December 31, 2000, as well as maximum feasible reductions in particulates, carbon monoxide, and toxic air contaminants from vehicular sources. To do so, the Board is directed to take "whatever actions are necessary, cost effective, and technologically feasible." (emphasis added)

Section 43018(c) spells out the means by which the Board is to achieve the required goals and objectives. While sections (c) and (d) mandate consideration of numerous potential controls, the Board is given wide authority to enact whatever vehicle and fuels controls are necessary to attain the ambient standards and mandated emissions reductions. Section 43018(c) directs the Board to adopt "standards and regulations which will result in the most cost-effective combination of control measures on all classes of motor vehicles and motor vehicle fuel . . . ." (emphasis added) The Legislature then lists in section 43018(c)(1)-(4) four broad types of control measures the Board must consider, but the sorts of control measures the Board is authorized to adopt are expressly not limited to those specifically identified.

It is evident that section 43018 provides the ARB with broad regulatory motor vehicle and fuel authority not otherwise granted in the Health and Safety Code, including authority beyond the grants in section 43013. First, one of the nonexclusive control measures specifically identified in section 43018(c) is "requiring the purchase of low-emission vehicles by state fleet operators." (Section 43018(c)(3).) Such a requirement does not fall within the authority granted by section 43013 to adopt "motor vehicle emission standards, in-use performance standards, and motor vehicle fuel specifications." Neither is the authority to require state fleet operators to purchase low-emission vehicles granted to the ARB in the low-emission fleet provisions in sections 43800-43805[3], 40447.5, 40920(a)(3), and 41011. Since the Legislature has listed among the specific control measures to be considered by the ARB a measure nowhere else authorized, it is clear that section 43018 grants the Board expanded authority to adopt regulatory control measures regarding motor vehicle fuels.

Second, the categories of control measures identified in section 43018(c)(1), (2) and (4) essentially correlate to the three categories authorized by section 43013. "Reductions in motor vehicle exhaust and evaporative emissions" in section 43018(c)(1) correlates to "motor vehicle

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3. Section 43802 requires the ARB annually to submit a listing of certified low-emission vehicles to the Department of General Services. Section 43804 provides that if a low-emission vehicle meets the performance, cost, service, and maintenance requirements of the Department of General Services, and if funds are appropriated, the Department shall purchase as many low-emission vehicles as it determines are reasonable and available to meet state needs.

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emission standards," "reductions in emissions from in-use emissions from motor vehicles through improvements in emission system durability and performance" in section 43018(c)(2) correlates to "in-use performance standards," and "specification of vehicular fuel composition" in section 43018(c)(4) correlates to "motor vehicle fuel specifications." However, although these three categories are effectively coterminous with the categories authorized in section 43013, section 43018(c) expressly provides that the control measures the Board may adopt <u>are not limited to these categories.</u> Therefore, the Board's authority under section 43018 is necessarily broader than its authority under section 43013.

Third, a broader reading of the authority to control motor vehicle fuels granted by section 43018 is consistent with section 43000.5(d). As discussed above, the 1975 <u>WOGA</u> case had already recognized the Board's authority to regulate the specifications of motor vehicle fuel, stemming from the predecessor statute to sections 43013 and 43101. This preexisting authority was codified by the CCAA amendments to section 43013 which expressly authorized the Board to adopt "motor vehicle fuel specifications." However, in section 43000.5(d) the Legislature declared the necessity that the Board's authority with respect to motor vehicle fuels be "clarified and <u>expanded</u>." That <u>expanded</u> authority to control motor vehicle fuels must be found in section 43018.

Fourth, an analysis of the various versions of section 43018(c) as the CCAA moved through the Assembly and Senate strongly suggests that the Legislature intended a broad grant of authority. The California Clean Air Act was was considered by the legislature as Assembly Bill 2595 (Sher). When the bill was initially introduced March 3, 1987, there were no specific motor vehicle provisions. Language for a new section 43018 was first introduced in a set of May 14, 1987 amendments in the Assembly Natural Resources Committee. At that time the section consisted of a subsection (a), which directed the Board to take whatever actions are necessary to achieve specified ROG and NOx reductions by year 2000, and a subsection (b), which read as follows:

> (b) In carrying out this section, the state board shall adopt standards and requirements which result in the most cost-effective combination of control measures, including but not limited to, reductions in new motor vehicle emissions, <u>requiring use of clean burning fuels</u>, and improvements of in-use vehicle emissions from all classes of motor vehicles sold within the state. (emphasis added)

On April 14, 1988, section 43018 was amended in the Senate Government Organization committee. A new subsection (a) was relatively similar to the version finally enacted, as was subsection (b). The amended version of section 43018(c) read as follows:

> (c) In carrying out this section, the state board shall adopt standards and regulations which will result in the most cost-effective combination of control measures on all classes of motor vehicles and motor vehicle

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fuel, including but not limited to, all of the following:

(1) Reductions in motor vehicle exhaust and evaporative emissions.

(2) Reductions in emissions from in-use emissions from motor vehicles through improvements in vehicle certification procedures and emission system durability and performance.

(3) Requiring the manufacture of vehicles capable of utilizing cleaner-burning fuels.

(4) Requiring the purchase of clean fuel vehicles by state fleet operators.

(5) Specification of vehicular fuel composition.

The April 14, 1988 amendments also added for the first time a schedule of workshops and rulemaking hearings the Board was to follow in considering specifically identified control measures. Subsequent amendments to section 43018(c) on May 18, 1988 and June 28, 1988 resulted in the finally enacted text.

The intermediate versions quoted above of what ultimately became section 43018(c) followed the same structure as the enacted text. The Boarc was mandated to meet certain air quality goals, and then was broadly directed to carry out the mandates by adopting a cost-effective combination of control measures. The Legislature further itemized specific categories of control measures which the broader range of measures were to include but not be limited by. The Legislature did not meaningfully change in the various versions the description of the broader range of control measures the Board was authorized to adopt. It therefore follows that each of the specifically itemized categories listed in the intermediate versions of the bill fell within the broader range of control measures the Legislature intended to authorize for Board action. These more specific categories included "requiring the use of clean burning fuels" (May 14, 1987 version) and "requiring the manufacturer of vehicles capable of utilizing cleaner-burning fuels." (April 14, 1988 version.) The ARB would not have the authority to adopt such approaches, particularly a mandate for the use of clean fuels, unless section 43018 is interpreted as granting broad regulatory authority.[4]

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4. The Legislature's ultimate decision to delete the specific references to clean fuels did not demonstrate an intent to limit the Board's authority to act in this area. The listing of specific control measures in section 43018(c), particularly in the versions that referred to control measures "including, but not limited to, all of the following," imposed an affirmative requirement that the Board consider or adopt the specific measures. The legislature also established in section 43018(d) a specific

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Fifth, legislative analyses of the CCAA prepared during the enactment process indicate a legislative recognition that the widespread introduction of clean fuels could well be necessary to meet the air quality goals the CCAA imposes on the ARB. In a June 15, 1987 report on the bill as amended May 14, 1987, the Legislative Analyst took note of the original language for section 43018 and stated:

> Reduced Motor Vehicle Emissions. The bill requires the Air Resources Board (ARB) to take necessary actions by January 1, 1992 to reduce motor vehicle emissions by the year 2000 to certain levels. According to the ARB, methanol fuel powered vehicles would be required to meet the emission reductions mandated by the bill.

Similarly, In a June 5, 1987 analysis of the May 14, 1987 version of the bill, transmitted to bill author Assemblyman Sher from the Department of Finance, the Department stated:

> The bill would also require that the ARB develop a plan by January 1, 1992 to reduce pollutants from mobile sources by a specified amount by the year 2000. The ARB indicates that this is an indirect mandate to shift to alternative fuels such as methanol because it is the only way this mandate could be met. The issue is more adequately addressed in AB 234 (Leonard), and the ARB indicates it may be appropriate to delete it from this bill.

While the specific reference to control measures "requiring use of clean burning fuels" in the May 14, 1987 version of the bill was deleted, the basic mandate for the ARB to meet specified emissions reductions by year

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schedule for workshops and rulemaking hearings on identified measures including, in the April 14, 1988 version, the required manufacture of vehicles capable of utilizing cleaner burning fuels. Elimination of the references to these clean fuel control measures simply eliminated the <u>mandate</u> that those specific approaches be considered or adopted; in no way did it remove the discretionary authority of the Board to adopt clean fuel control measures if deemed necessary to attain and maintain the ambient standards.

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2000 was not.[5] In fact, the mandates on the ARB were strengthened by the new requirement in section 43018(a) that the ARB endeavor to achieve the maximum emissions reductions possible from vehicular sources in order to attain the state ambient standards at the earliest practicable date. The bill analyses quoted above indicate that the legislature was aware that the goals mandated on the ARB by section 43018 might only be achievable through the introduction of clean fuels such as methanol. The decision to retain the mandates in light of such information strongly indicates that the Legislature intended to authorize the Board to adopt control measures related to clean fuels if necessary to meet the mandated goals.

Finally, in this regard the Supreme Court's analysis in the WOGA case demonstrates that a broader reading of the Board's motor vehicle fuel authority under section 43018 is appropriate. As discussed above, the court expressed an unwillingness to attribute to the Legislature an intention to deprive the Board of the only realistic means at its disposal to achieve the clean air goals identified in state law. (WOGA, *supra*, 14 Cal.3d at 420.) This was a primary reason the court unanimously interpreted the Board's authority to adopt motor vehicle emission standards to include the authority to regulate the composition of motor vehicle fuel. Similarly, in the CCAA the Legislature has mandated in section 43018(a) and (b) ambitious goals for maximum possible reductions of emissions from motor vehicles, as well as specific percentage reductions. To the extent these goals may only be achieved through the introduction of clean fuels and clean fuel vehicles, section 43108 should not be read narrowly to deprive the Board of the means to achieve the mandated goals.

D. Appropriate findings to support adoption of the clean fuels regulations.

As indicated above, it is our opinion that the Board has the statutory authority to adopt the clean fuels regulations described above upon the making of appropriate findings. First, a finding is required that the regulations are necessary to achieve the goals set forth in section 43018(a) or (b). It would be appropriate for the Board to explore other alternative vehicular control measures, and to determine whether the state and federal ambient air quality standards could be expected to be achieved throughout the state without the clean fuels components of the proposed regulations. In this respect, reference to the Air Quality Management Plan for the South Coast Air Quality Management District would be appropriate. A determination that the state ambient standard could not reasonably be attained in the south coast air basin without the clean fuel requirements would help support a conclusion that they are within the range of control measures authorized by section 43018.

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5. The only revisions to the specifically mandated reductions were the change in ROG emission reductions from 50% to 55%, and the change in NOx emissions reductions from 25% to 15%.

In addition, the Board must determine that the requirements are technologically feasible, and are among the most cost-effective control measures that could be expected to result in statewide attainment of the ambient ozone standards.

II. CONSTITUTIONAL AUTHORITY

A. The "Takings" Clause of the Fifth Amendment.

The Western States Petroleum Association (WSPA) and various oil companies have claimed that the provisions in the staff proposal requiring gasoline suppliers to distribute specified quantities of clean fuels violate the "takings clause" of the fifth amendment to the U.S. Constitution, which provides that "private property [shall not] be taken for public use without just compensation." We have considered these assertions and have concluded that on its face the proposal would not constitute an unconstitutional taking.

The threshold question is whether there is any property involved that could legitimately be claimed to be taken by the state or ARB. WSPA has asserted that the staff proposal in effect requires that a portion of each service station, bulk plant and perhaps each refinery be dedicated to the manufacture and distribution of alternative clean fuels, and that a regulation which requires dedication of private property for a public use constitutes a "taking." WSPA analogizes to Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419 (1982), which held that an ordinance requiring landlords to allow the installation of cable TV hook-up equipment constituted a "per se" taking of property because it sanctioned a "permanent physical occupation" of the landlord's property by the third party cable TV company. Loretto is clearly distinguishable because the proposed regulations in no way mandate the "occupation" of a refiner's or service station owner's property by the state or a third party. The business premises will continue to belong entirely to the refiner or station owner or lessor.

The staff proposal is much more closely analogous to other air pollution control regulations, promulgated under the state's basic police powers, which may necessitate the construction or installation of substantial equipment incident to meeting mandated emission reductions. A regulation prohibiting the sale of gasoline which exceeds specified sulfur or lead content limits may necessitate the installation of expensive new desulfurization or reforming equipment if the refiner is to continue to produce and distribute gasoline. Similarly, a gasoline vapor recovery regulation will necessitate the installation of vapor recovery systems if a service station is to continue operating. In neither of these cases is the necessary equipment--or the business as a whole--considered to be "occupied," "invaded," or "owned" by the state or a third party even though the sole reason for the equipment is the public purpose of reducing air pollution. While regulations of business activities such as these may raise issues of substantive due process (discussed below) in extreme situations, it is generally recognized that they do not constitute "takings of property" by the state.

Even if the proposed regulations were deemed to involve property interests that could be claimed subject to the "takings clause", we do not believe the regulations on their face impose a "taking." One of the key factors in a takings analysis is the "character of the governmental action." (Penn Central Transportation Co. v. New York, 438 U.S. 104 (1978).) This factor typically involves the question whether the government has "physically invaded" the claimant's property; as noted above, the proposed regulations do not present such an invasion. At times the U.S. Supreme Court has viewed the character of the governmental action in terms of the government's justification of the action--whether the regulation "substantially advance[s] legitimate state interests." (See Keystone Bituminous Coal Ass'n v. DeBenedictis, 480 U.S. 470, 485 (1987), quoting Agins v. Tiburon, 447 U.S. 255, 260 (1980).)

We believe that there are important ways in which the clean fuel provisions substantially advance legitimate governmental and public interests. Most broadly, the clean fuel program is designed to serve the public interest by contributing to the reduction of emissions of air pollutants from motor vehicles. The people of California face a very serious air pollution problem, and the clean fuel program is proposed as an integral part of the ARB's efforts to address the problem.

Moreover, the clean fuel requirements are expressly imposed as conditions upon the permissible distribution of gasoline, and the clean fuel program will help mitigate the air pollution burdens created by the sale of gasoline. Therefore there is a definite nexus between the activities regulated and the governmental interests being furthered.

First, the gasoline distributed and sold by those subject to the proposed regulations contributes to the very serious air pollution problems that exist in California. The alternative clean fuels that will be distributed under the program are expected to result in less pollution than gasoline. In particular, a majority of the alternative fuel vehicles will likely be designed to also run on gasoline so that they can be used in areas where only gasoline is available. Under the proposed regulations, such a vehicle would not be counted as a clean fuel vehicle unless it is certified to a more stringent standard while operating on the alternative fuel than while operating on gasoline. Therefore, such vehicles will clearly pollute less when fueled with the alternative fuel than they will if operated when only gasoline is available. In this connection, the regulatory program is similar to the regulations adopted by EPA in the mid-1970's requiring any person operating a gasoline outlet with sales of more than 200,000 gallons per year to offer at least one grade of 87 octane unleaded gasoline. (40 CFR sec. 80.22(b).)

Second, oil companies have cumulatively contributed to the development of a motor vehicle fuel distribution network in which gasoline and diesel fuel are the only liquid fuels widely and conveniently available to the motoring public. This situation presents a strong deterrent to the effective introduction of alternative fuel vehicles. Requiring the distribution of appropriate volumes of clean alternative fuels for use in motor vehicles directly mitigates the present problem of a motor fuel distribution system focused almost exclusively on gasoline and diesel fuel.

Finally, the gasoline production and distribution operations of refiners and service station operators emit substantial amounts of ozone-precursors and other air pollutants. The emissions reductions attributable to the clean fuel program will help mitigate these emissions.

Another key factor in a takings analysis is the economic impact of the government action. The U.S. Supreme court has stated that the nature of this inquiry depends on whether a regulation constitutes a taking "on its face" or "as applied" to a specific fact situation. Where a government action is challenged "on its face", it does not constitute a taking unless it denies an owner economically viable use of his or her property. (Keystone, supra, 480 U.S. at 494-495.) At this point the clean fuel regulations can only be analyzed on their face, as we do not know the extent to which clean fuel vehicles will be sold and the distribution of the clean fuels will be required, and what the economic impacts on refiners and station owners will be.

In evaluating the necessary effects of the proposed regulations on the economically viable use of the property of gasoline producers and service station owners, it is appropriate to look in the context of a reasonable unit of their business operations, rather than only the specific and limited operations of distributing the clean fuels. (see Keystone, supra, 480 U.S. at 499.) We believe that the refiners and others will be able to absorb the costs of the clean fuel program in their broader operations for distributing gasoline and diesel fuels. We are satisfied that gasoline producers and service station owners will continue to be able to operate on an adequately profitable basis.

B. "Substantive" Due Process

Police power regulations affecting economic interests generally satisfy the constitutional requirements of "substantive" due process as long as they are rationally related to a legitimate governmental interest. (American Bank & Trust Co. v. Community Hospital, 36 Cal.3d 359 (1984).) If such a regulation infringes upon a constitutionally protected personal liberty or fundamental right, it must be narrowly drawn and must further a sufficiently substantial government interest. (Griffin Development Co. v. City of Oxnard, 39 Cal.3d 256, 265 (1985).)

The "rational relationship" test is a less stringent variant of the "takings" test of whether a regulation substantially advances a legitimate state interest. We discuss above the ways in which the clean fuel regulations will substantially advance a legitimate state interest. These same factors demonstrate the rational relationship necessary to satisfy substantive due process.

Finally, the regulations do not trigger the more stringent substantive due process requirements which must be met where a constitutionally protected personal liberty or fundamental right is infringed. Selling gasoline is not a constitutionally protected activity. The California courts have held that constitutionally protected personal liberties and fundamental rights are not involved where a city prohibits the demolition or conversion of an apartment building to other uses unless no low or moderate income persons occupy or could afford units in the building, removal will not adversely affect housing supply, and the owner cannot make a reasonable return on his property (Nash v. City of Santa Monica, 37 Cal.3d 97 (1984)); where a city imposes stringent standards on conversions of apartment buildings to condominiums (Griffin Development, supra); and where a city prohibits the conversion of a residential hotel to another use unless one-to-one replacement of the hotel units is provided. (Terminal Plaza Corp. v. San Francisco, 177 Cal.App. 3d 892 (1986).) In light of these cases, we are not aware of any personal liberties or fundamental rights that would be infringed by the proposed regulations.

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