

California Low Carbon Fuel Standard Slides for EJAC Meeting

MARCH 15, 2024



Low Carbon Fuel Standard

The Low Carbon Fuel Standard is designed to decrease the carbon intensity of California's transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve air quality benefits.

The Road to Zero Emissions

CARB has put a roadmap in place to drastically reduce our dependence on petroleum in the transportation sector by 2045.

AB 32



Requires we cut GHGs. To reach goals, fuel use must be cut by 94%.

How cuts happen?
Zero emission cars, trucks and fuels.



ACT ACC ACF

CARB rules that make that possible:
Advanced Clean Trucks, Advanced Clean Cars, Advanced Clean Fleets

- ACT: Phases out sale of most fuel-powered trucks by 2035
- ACC: 100% ZEV sales requirement by 2035
- ACF: Requires that trucks in CA be zero emissions by 2045

LCFS

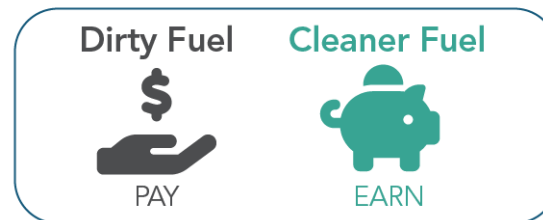
All together, these actions will help us build a cleaner, healthier California for current and future generations.

Governor Newsom creates new oversight committee to monitor oil companies



Makes fuel less polluting and encourages production of cleaner alternatives

How it works:



LCFS Supports ZEV Regulations

- Zero emissions fuels are subsidized through LCFS and contribute to lower Total Cost of Operation for ZEVs
 - Advanced Clean Cars II
 - Advanced Clean Trucks
 - Advanced Clean Fleets
- Other zero emission regulations
 - Shore power, cargo handling, forklifts, and transportation refrigeration units

LCFS Support for ZEV Infrastructure

Historical	Total credits (MT) Q1 2011 - Q3 2023	Value (\$) using avg. 2020-22 credit price
Dispensed electricity (non-residential EVSE)	6,300,000	\$1.07B
Dispensed hydrogen	190,000	\$3.98M
Sum of dispensed fuel	6,500,000	\$1.1B
Fast Charging Infra capacity credits	234,000	\$60M
HRI capacity credits	355,000	\$40M
Sum of HRI/FCI	590,000	\$100M (credits even without dispensing fuel)

Proposed Amendments	Percent of total credits in 2045	Value (\$) using avg. 2020-22 credit price
Dispensed electricity	40%	\$3B
Dispensed hydrogen	5%	\$400M
Dispensed RNG, renewable diesel and biodiesel	0% (generates deficits)	NA

LCFS Support for ZEV Infrastructure Near-Term

Proposed Amendments	Max credits (MT) at 2.5% each of deficits	Value (\$) using avg. 2020-22 credit price
HD HRI/FCI credits in 2030	2,100,000	\$357M
HD HRI/FCI credits in 2035	2,600,000	\$441M

Staff estimates that the proposed HD HRI/FCI provisions could pay for 1.5x the capital costs of **all** the fast chargers and hydrogen stations needed to meet the 2022 Scoping Plan vehicle populations, through 2030 and potentially through 2035

Estimated LCFS Fuel Credits for 2025-2045

Proposed Amendments	Total Credits (net credits/deficits) 2025-2045	Value (\$) using avg. 2020-22 credit price
Dispensed electricity	606,000,000	\$103B
Dispensed hydrogen	34,000,000	\$5.8B
Dispensed renewable diesel and biodiesel	4,490,000	\$764M

Fossil fuels (gasoline and diesel) are a deficit generator and do not generate credits in the LCFS. **Less than \$1 billion estimated for liquid non-fossil drop-in fuels between 2025 and 2045.**

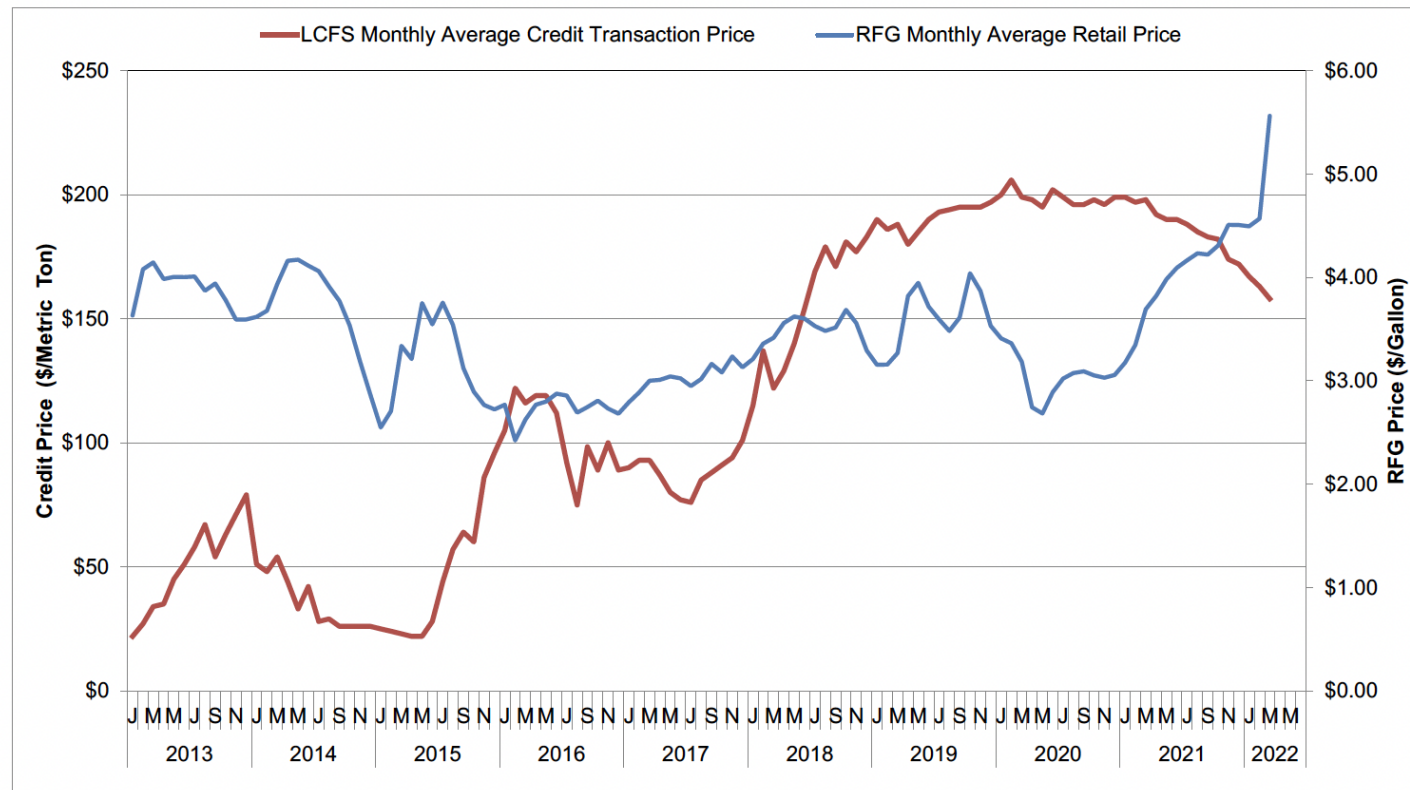
LCFS Supports Transit & Clean Technology

Historical	Total credits (MT)	Value (\$) using yearly average credit prices
Transit credits 2022	302,000	\$36M
Total transit credits (Q1 2011 through Q3 2023)	2,750,000	\$341M

Historical	Total credits (MT) Q1 2011 through Q3 2023	Value (\$) using avg. 2020-22 credit price
Fixed guideways	1,780,000	\$303M
Shore power for ocean going vessels at berth	1,100,000	\$188M
Cargo handling equipment	200,000	\$34M
Forklifts	5,900,000	\$1B
Transport Refrigeration Units	122,000	\$21M

Historical LCFS Credit and Retail Fuel Prices

Figure 1: LCFS Credit Price and Retail Gasoline Price¹



“An assessment of observed market prices shows conclusively that the LCFS program price effect at the pump is not a significant driver of retail fuel prices in California.”

[Executive Summary \(bateswhite.com\)](https://www.bateswhite.com)

LCFS Outcomes

12.6% reduction in the carbon intensity of California's transportation fuels

Over 25 billion gallons of petroleum fuels displaced by low-carbon fuels

60% of fossil diesel displaced by biomass-based diesel in 2023, resulting in PM and NOx benefits

\$4 billion annually to support low-carbon investments and \$341M cumulative for public transit

Supports many State programs and goals, including cars and trucks going to zero-emission vehicles

Financial assistance for vehicle purchases at the state and local level

California LCFS Regulatory Amendment Proposals



Rulemaking Package Posted

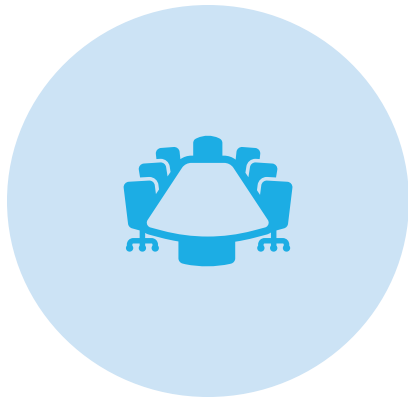
- Initial Statement of Reasons (ISOR) package publicly available on LCFS Rulemaking webpage^{*}
 - Staff Report/ISOR
 - Proposed regulatory text
 - Environmental Impact Analysis
 - Updated Life Cycle Analysis (LCA) modeling tools^{**}
 - Other appendices
- 45-day comment period from Jan 5 - Feb 20, 2024^{***}

* LCFS Rulemaking Webpage: <https://ww2.arb.ca.gov/rulemaking/2024/lcfs2024>

** LCA modeling tools: <https://ww2.arb.ca.gov/resources/documents/lcfs-life-cycle-analysis-models-and-documentation>

*** LCFS Comment Docket: https://www.arb.ca.gov/lispub/comm/iframe_bcsbform.php?listname=lcfs2024&comm_period=A

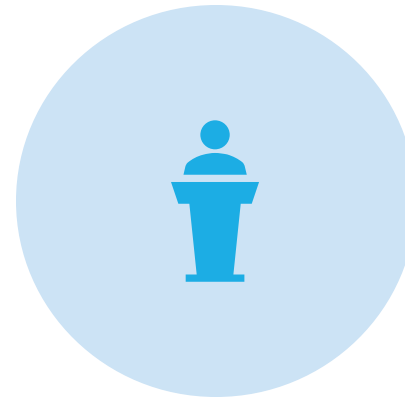
Robust Public Process



9 PUBLIC WORKSHOPS OVER
PAST THREE YEARS WITH
POSTING OF DETAILED
TECHNICAL INFORMATION



2 COMMUNITY MEETINGS



2 BOARD HEARINGS



OVER 800 COMMENT
LETTERS RECEIVED &
DOZENS OF MEETINGS WITH
STAKEHOLDERS

We Received A Diverse Set of Comments

- Strengthen carbon intensity targets and provide long-term price signals
- Maximize crediting opportunities
- Incentivize development of innovative fuels
- Reduce use of combustion fuels
- Eliminate biomethane from the program
- Continue support for biomethane and prevent stranding assets
- Limit or cap crop-based biofuels
- Expand the use of crop-based biofuel crediting
- Concentrate health and economic benefits in communities burdened by current transportation system
- Provide a mix of low-carbon transportation incentives to communities

Key Concepts for Rulemaking

- Increase the stringency of the program to displace fossil fuels
- Strengthen equity provisions to promote investment in disadvantaged, low-income, and rural communities
- Support electric and hydrogen truck refueling
- Increase the use of alternative jet fuel in the State
- Incentivize more production of clean fuels needed in future, such as low-carbon hydrogen
- Support methane emissions reductions and deploy biomethane for best uses across transportation and other sectors
- Consider guardrails on crop-based fuels

Other Considerations

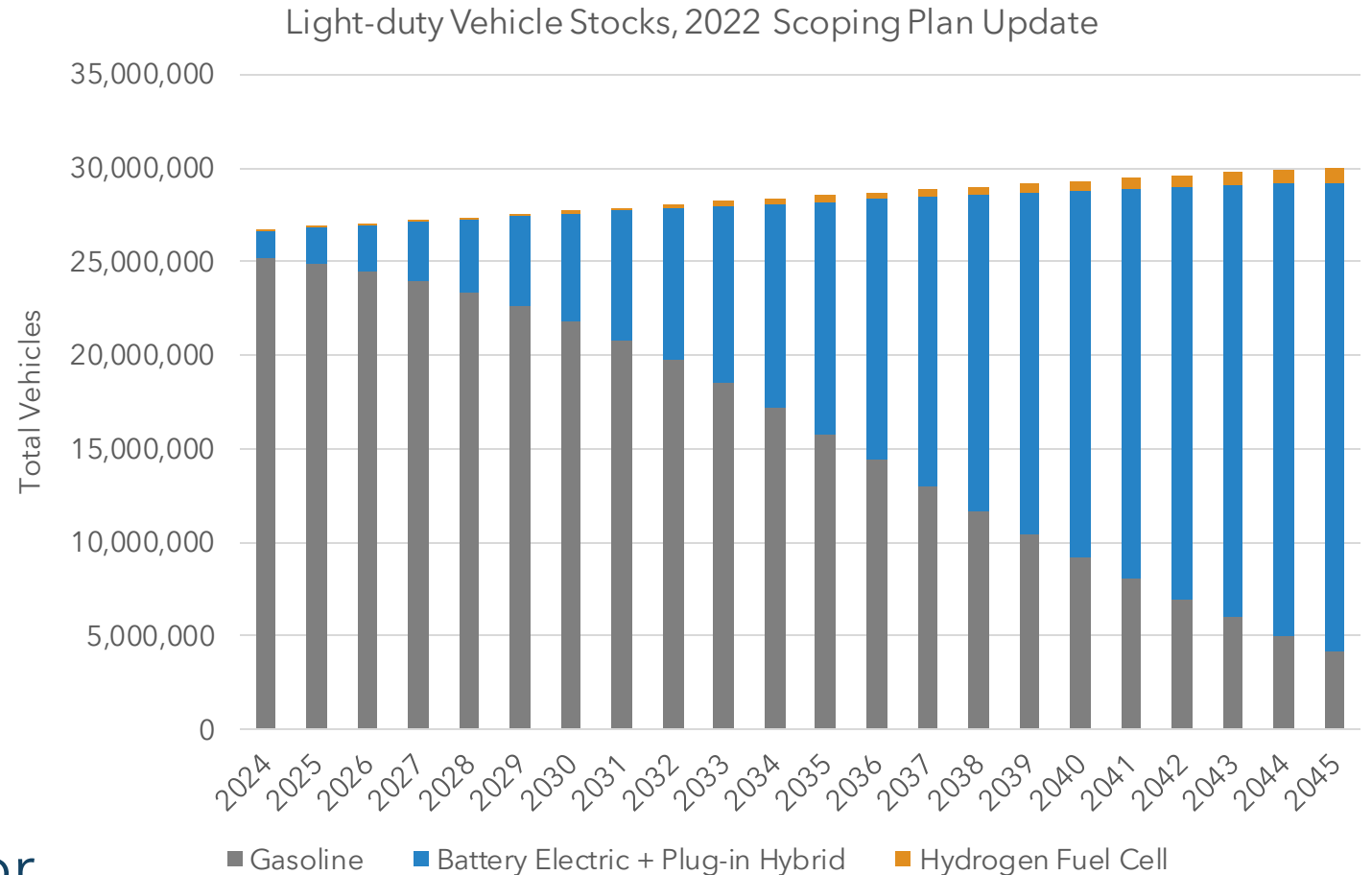
- Needs of light-duty vehicle sector
- Needs of medium/heavy-duty sector
 - Different from LD sector, where VMT reductions can be complimentary
- Federal incentives
- Price-signals for investment
- Air quality benefits
- Transportation costs
- Program administration and streamlining

Proposed Regulatory Provisions

- Increase stringency by increasing CI reduction to 30% by 2030 and 90% by 2045 with near-term step-down in stringency
- Implement Automatic Acceleration Mechanism
- Eliminate Exemption for Intrastate Fossil Jet Fuel
- Expand Zero Emission Vehicle Infrastructure Crediting
- Apply Biomethane Deliverability Requirements and Phase Out Avoided Methane Pathways
- Add Crop-Based Biofuels Sustainability Criteria
- Improve Equity Provisions

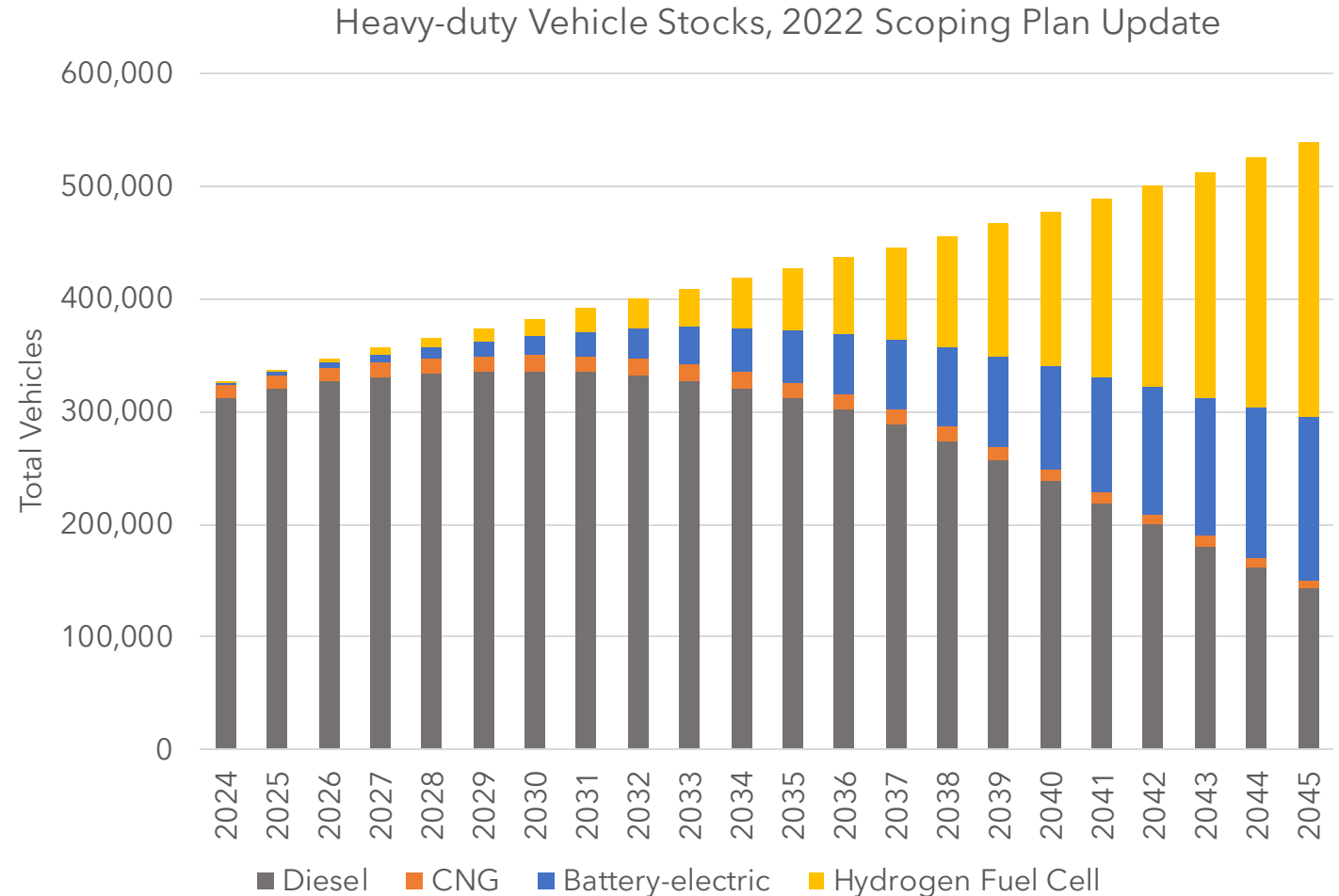
LDVs - Fuel Demand based on Vehicle Population

- Based on implementation of CARB's ACC II regulation, legacy combustion vehicles persist out to 2045—keeping demand for fossil liquid fuels
- % of combustion vehicles
 - 2025: 93%
 - 2030: 79%
 - 2040: 31%
 - 2045: 14%
- Faster turnover in light-duty sector than with trucking sector



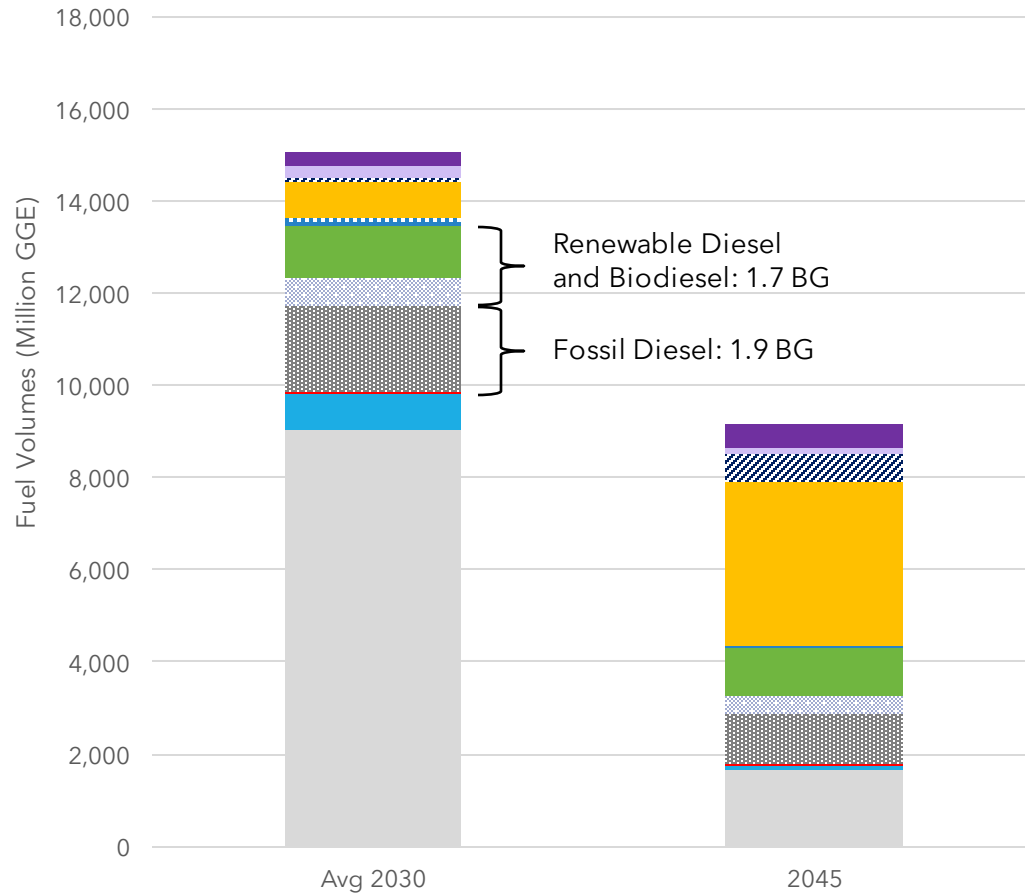
HDVs - Fuel Demand based on Vehicle Population

- Based on implementation of CARB's ACF/ACT regulations:
- Liquid fuel demand will persist for years due to slow turnover of heavy-duty trucks
- Fossil diesel backfills biofuels when biofuel volumes are limited
- % of combustion vehicles
 - 2025: 98%
 - 2030: 92%
 - 2040: 52%
 - 2045: 28%

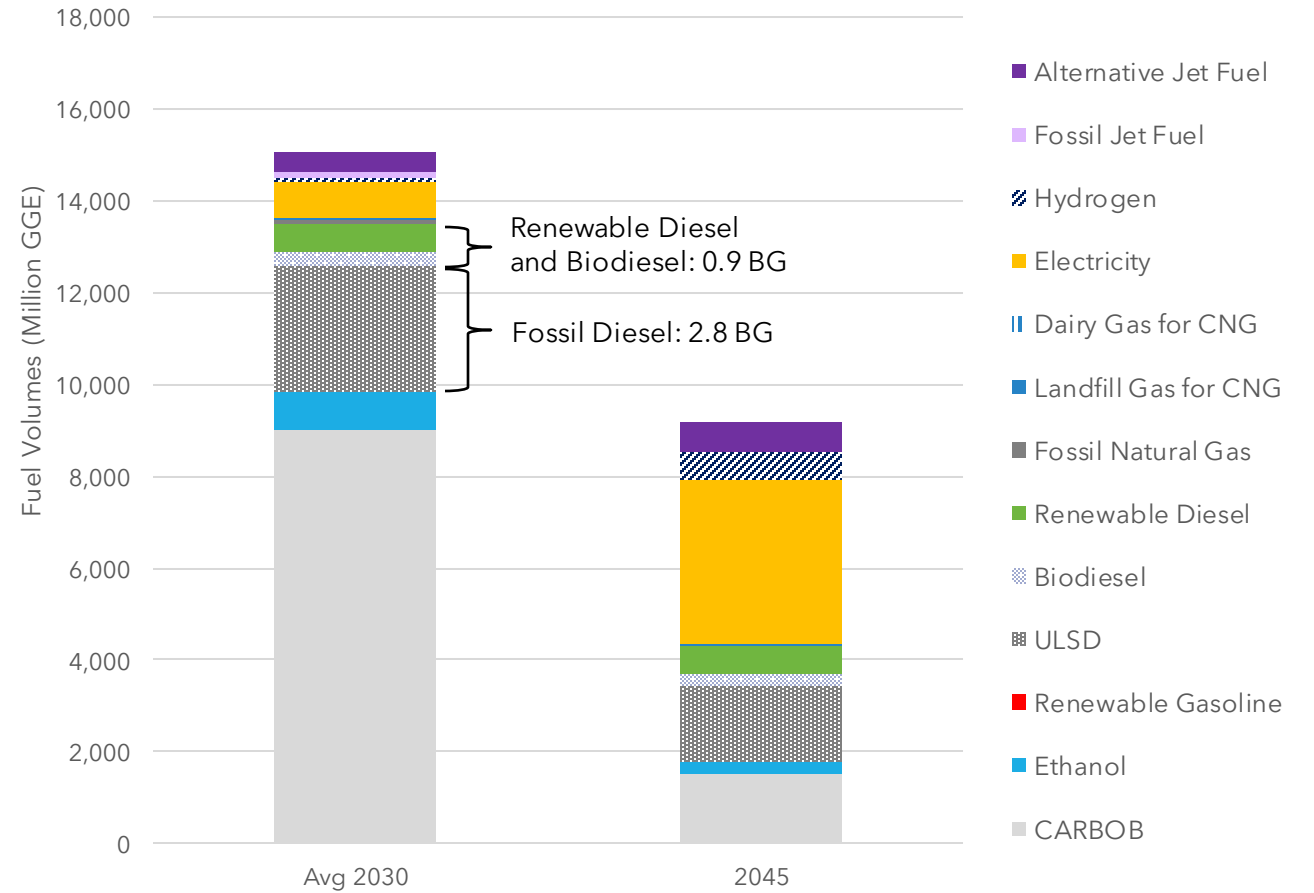


Modeling Comparison: Fuel Volumes

Proposed Scenario Fuel Volumes



EJAC Scenario Fuel Volumes



45-Day Proposal

- 30% CI reduction by 2030, 90% CI reduction by 2045
- Include aviation
- Expand Zero Emission Vehicle Infrastructure Crediting
- Biomethane deliverability and pathways phase out
- Sustainability guardrails

GHGs

558 MMT CO₂e
reduction

Health

\$5B decrease in
costs in 2045

Costs

\$32B net cost
increase

Balances need
for investment
signal with need
for compliance

EJ/EJAC Scenario

- 30% CI reduction by 2030, 90% CI reduction by 2045
- Include aviation
- Expand Zero Emission Vehicle Infrastructure Crediting
- End biomethane crediting
- Apply limits on biomass-based diesel
- No direct air capture credits

GHGs

386 MMT CO₂e
increase

Health

\$2B increase in
costs in 2045

Costs

\$85B net cost
increase

Needs more
credits for
compliance than
available

Other Options Staff Also Evaluated

- Less Stringent Near-Term CI Targets
 - 28% by 2030 with 3% step down in 2025
 - Phasing down biomethane crediting
 - Limits on crop-based diesel
- More Stringent CI Targets
 - 35% by 2030 with 5% step down in 2025
 - No additional crediting constraints

Greater need for fossil diesel, more GHG emissions, higher costs after 2030

Highest cost scenario

External Modeling Efforts

- Questions and differences between staff's modeling and other modeling efforts
- Stanford/Wara
 - Different baseline approach, particularly for VMT and future fuel demand
 - Modeling doesn't conform to statutory rulemaking requirements
- UC Davis Institute of Transportation Studies/Policy Institute
 - Staff still evaluating how different fuels assumptions (e.g. RD volumes) impact future credits/deficits
 - Unclear how a diverse portfolio of non-fossil fuels crowds out any other fuel or alternative option

Questions Raised by Outside Modeling

- Areas that warrant additional staff evaluation:
 - Availability of non-biofuel credit generating opportunities, in particular prior to 2030.
 - Assumptions on future RD volumes and feedstock types/quantities to meet production needs
 - Effect of Auto Acceleration Mechanism on credit/deficit supply
 - Impact of fuel/feedstock combos switching from credit to deficit generating as CI benchmarks continue to decline and program becomes more stringent
 - Potential other alternative fuels to reduce fossil fuel use in legacy combustion vehicles

Rulemaking Timeline

