Assessment of a Zero Emission Vehicle Requirement for Light and Heavy-Duty Vehicle Fleets

Public Workshop

August 30, 2018

CALIFORNIA AIR RESOURCES BOARD

ZEV Fleet Directive from Governor Brown

Explore new regulatory actions to accelerate zero emission vehicles in light and heavy-duty vehicle fleets

Consider opportunities in a broad range of fleets:

- Public and private
- New mobility fleets
- Large employer fleets
- Rental fleets
- Delivery fleets

Workshop Goal and Agenda

***Goal**: Stakeholder input on what to consider in evaluating fleet EV requirements*

- Background
- Light Duty Vehicle Programs
- Medium and Heavy Duty Programs
- ZEV Fuel infrastructure and incentive policies
- ZEV Fleet Considerations
- Next Steps
- CPUC and CEC Supporting Actions

California's Climate Policy Portfolio

Double building efficiency

50% renewable power

More clean, renewable fuels

Cleaner zero or near-zero emission cars, trucks, and buses

Walkable/Bikeable communities with transit

Cleaner freight and goods movement

Slash potent "super-pollutants" from dairies, landfills and refrigerants

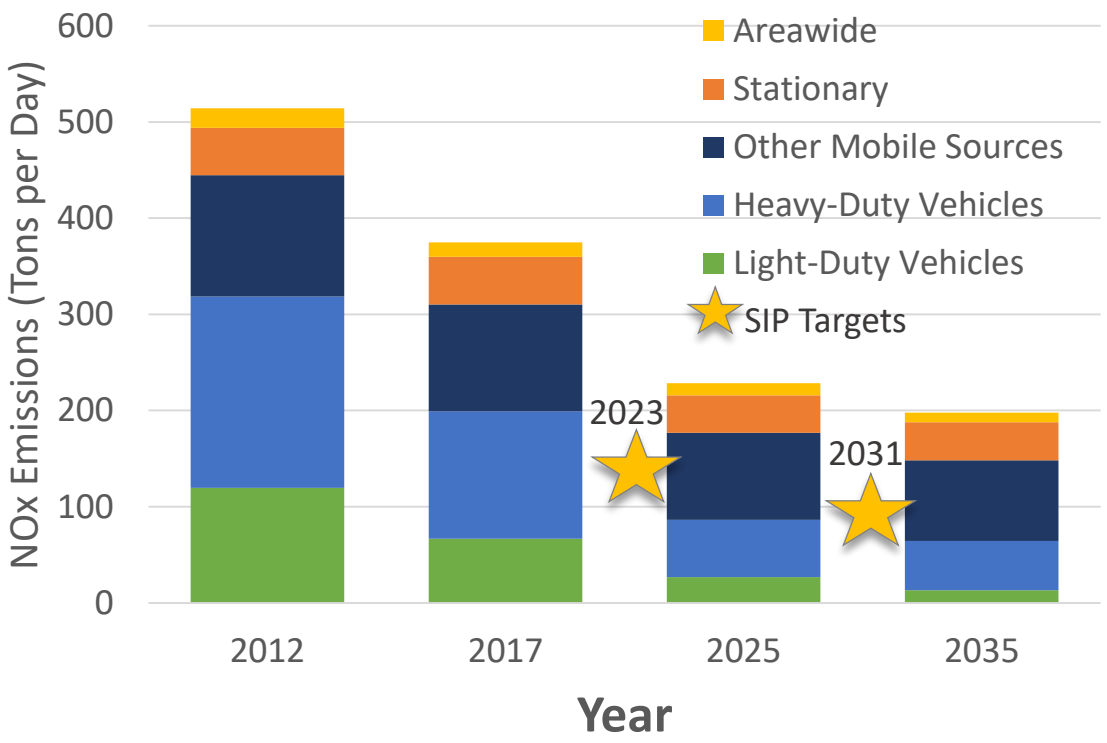
Cap emissions from transportation, industry, natural gas, and electricity

Invest in communities to reduce emissions

Emissions Targets & Sector Contributions

NOx, South Coast

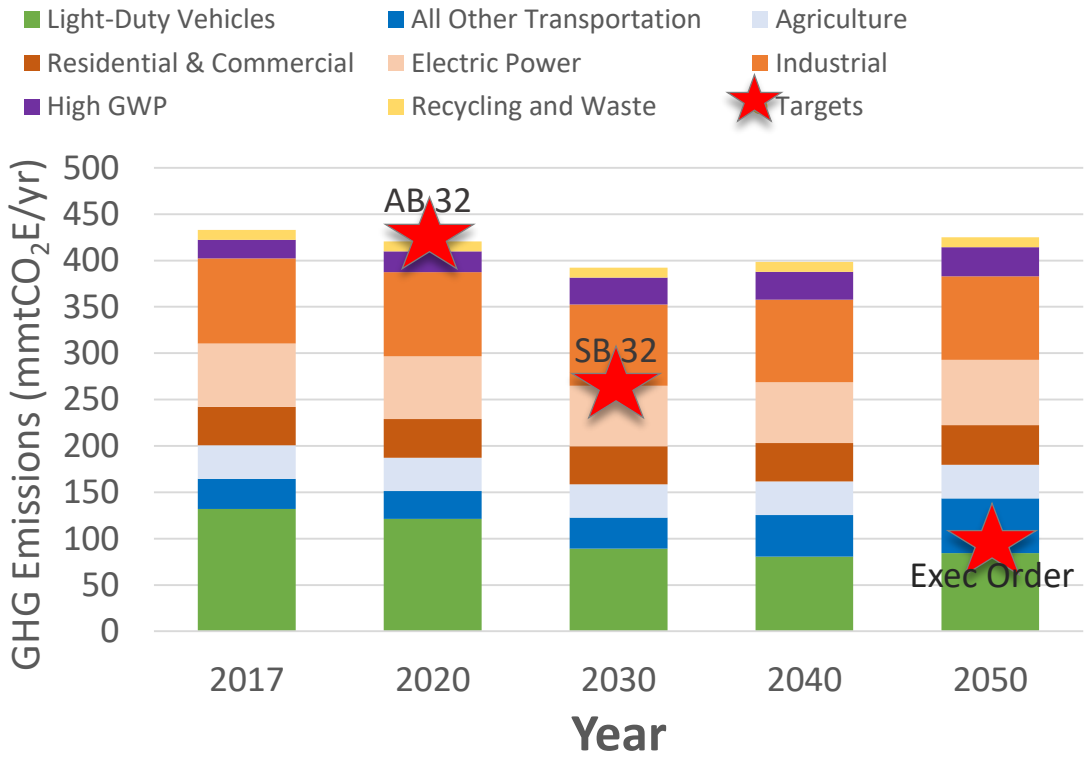
Under Current Programs



Source: CEPAM 2016 SIP, https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php

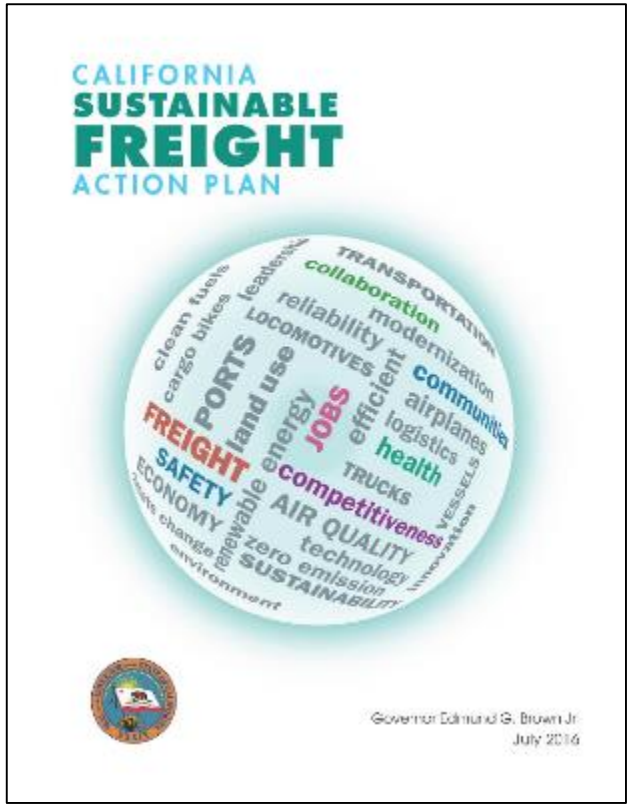
GHGs, Statewide

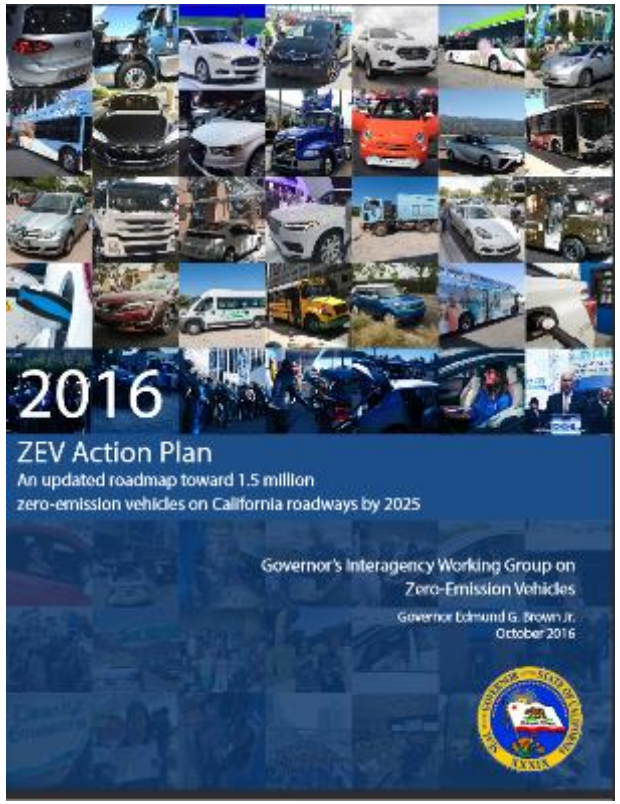
Under Current Programs

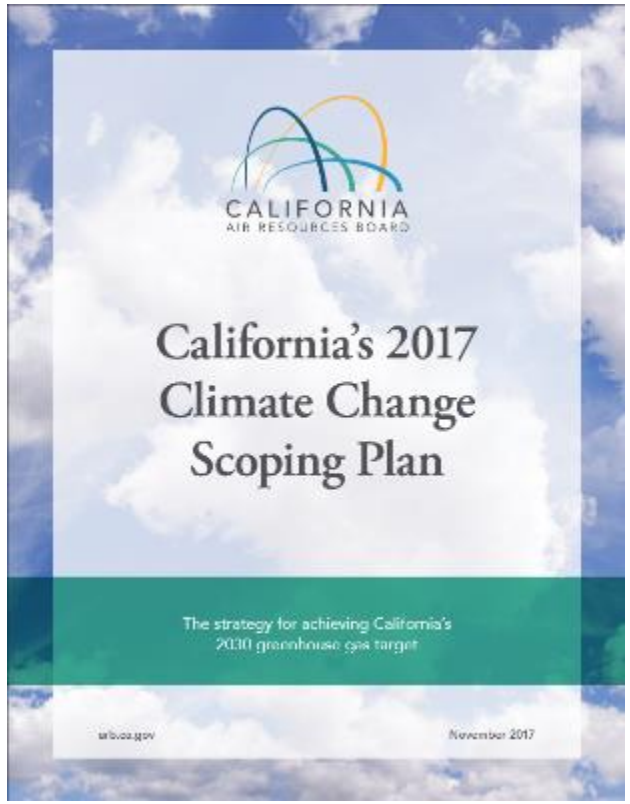


Note: CARB 2030 Scoping Plan contains strategies for achieving 2030 GHG target, https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf

Zero-Emission is Key to California's Future







ZEV Trajectories from Plans

- Mobile Source Strategy and Scoping Plan
  - 4 to 5 million LDV ZEVs + PHEVs on road by 2030
- Sustainable Freight:
  - 100,000 ZEVs and pieces of equipment by 2030
- ZEV Action Plan: Key barriers to ZEV market:
  - Consumer awareness
  - Vehicle costs
  - Fueling infrastructure available

Light Duty Vehicle Programs and Actions

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Major State Policies for LDV Emission Reductions

<u>Vehicles</u>:

Rules: Advanced Clean Cars Regulations

Incentives: Clean Vehicle Rebate Program

<u>Efficient Safe Access</u>:

375: Sustainable Community Strategies

$$ transit, active trans., affordable housing

<u>Fuels</u>:

Rules: Low Carbon Fuels Standard

Incentives: Infrastructure funding, planning

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Low Carbon Transportation Program Investments

- Clean Vehicle Rebate Program (CVRP):
  - Consumer rebates for ZEVs, higher rebates for low-income consumers
- Transportation Equity Projects to Increase Access:
  - Car scrap and replace, financing assistance, and car sharing/mobility options

Cap and Trade Dollars at Work

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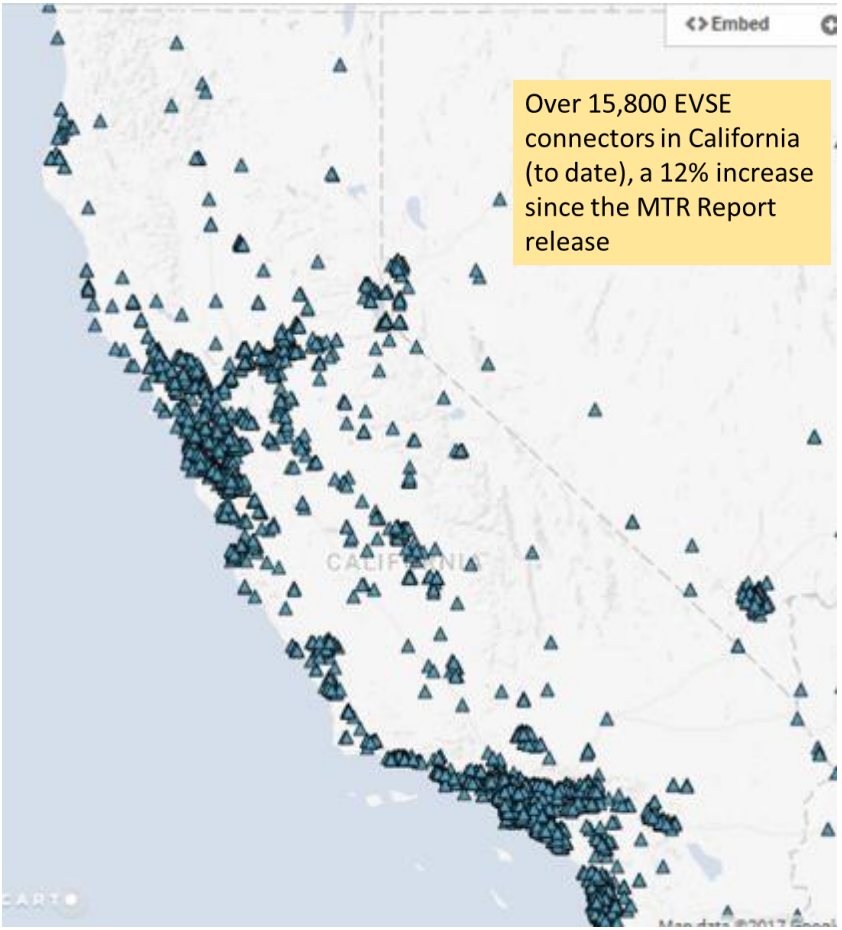
ZEV Fueling Infrastructure Today and in 2025

- Today in California:
  - Over 15,000 public EV chargers
  - 35 retail-open hydrogen stations
- Current programs project ~100,000 EV chargers and 100 hydrogen stations by 2025
- New EO B-48-18 sets 2025 targets:
  - 250,000 EV chargers
  - 10,000 DC Fast Chargers
  - 200 hydrogen stations

EV Chargers



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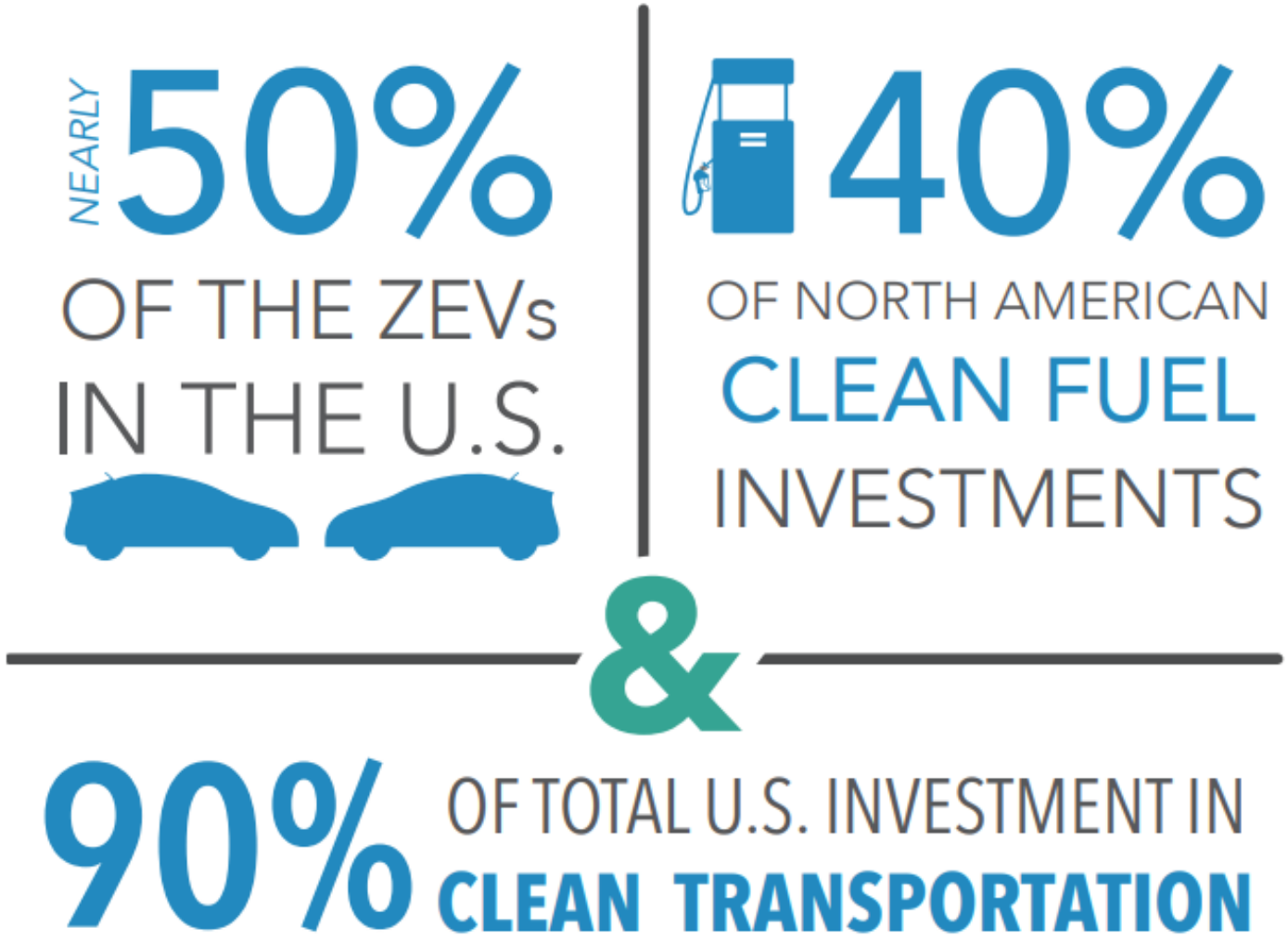
Progress in California



Light-Duty ZEV Models On-Road Today and Coming Soon

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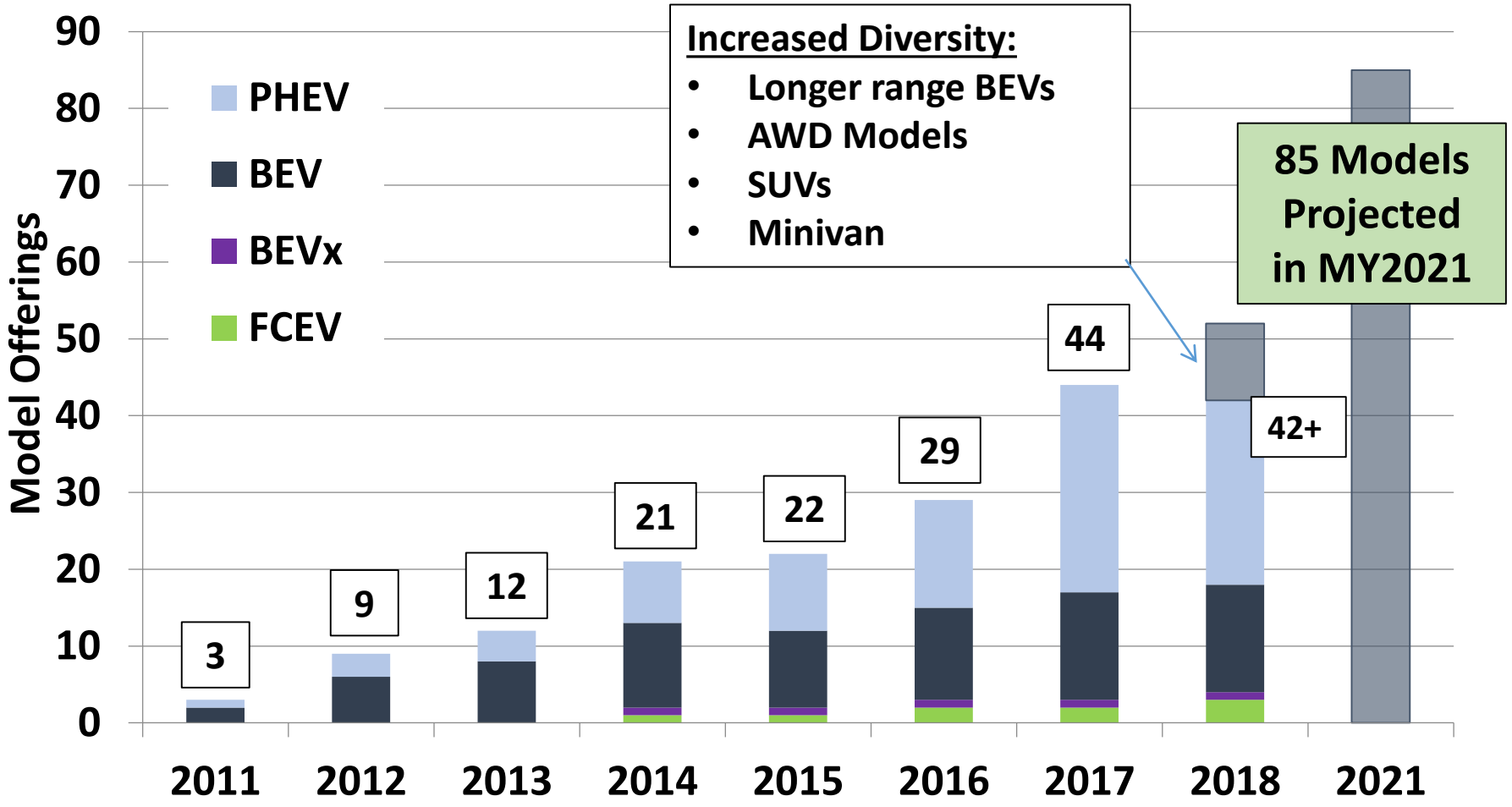
ZEV/PHEV Sales in CA
(Cumulative to July 2018)

420,000

ZEV/PHEV Market Share in CA
(2018 ave to date)

6%



Source: IHS Automotive Registrations and Assorted trade press reports

What Might the LDV Sector Need to do to Achieve the Emissions Targets?

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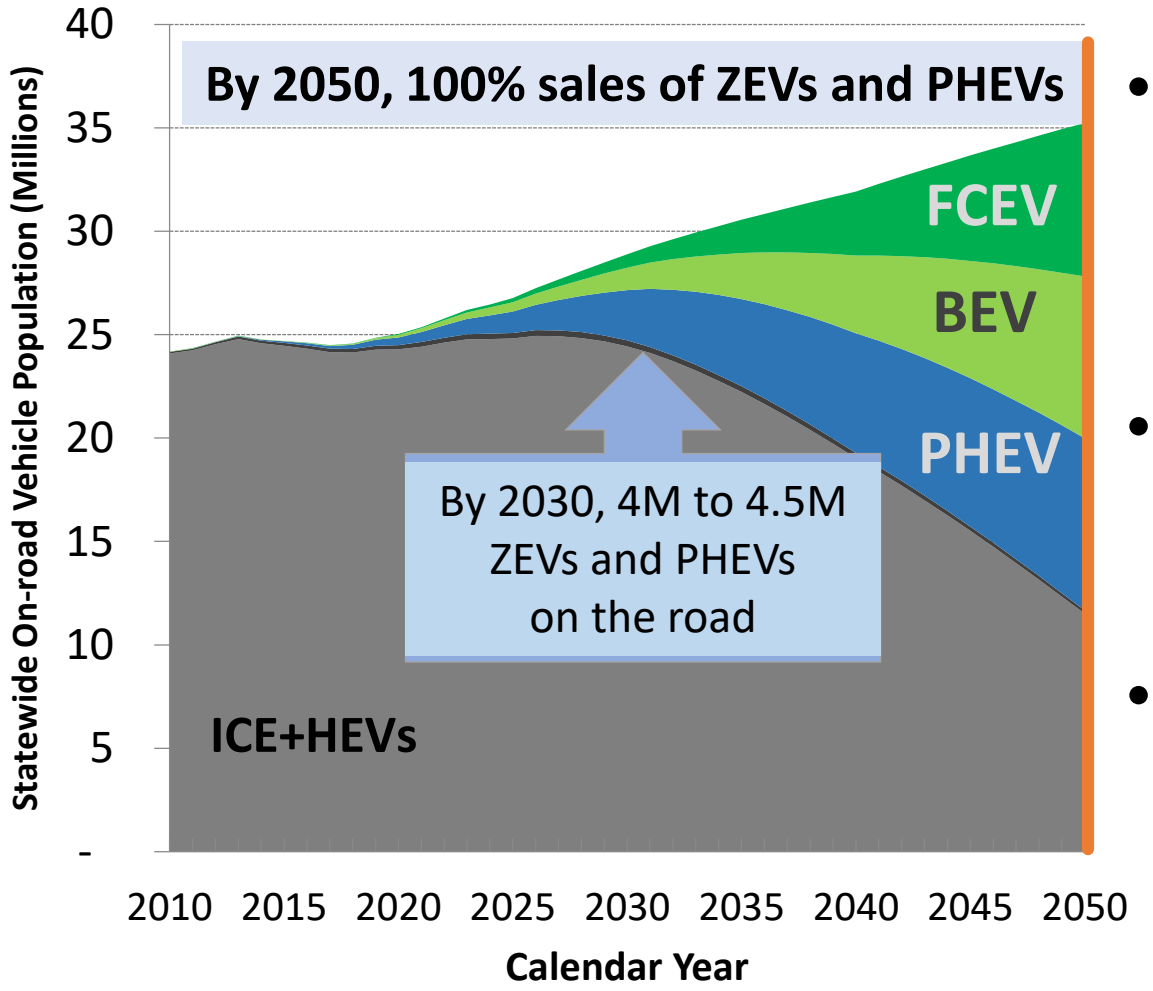

- Compared to MY2025 vehicles, MY2035 vehicle emissions would be:
  - ~50% lower GHGs (emission rate declines 5-7% year-over-year)
- Significant increases in renewable fuel feed stocks and energy generation
- Slower growth of vehicle miles traveled (VMT) from light-duty vehicles

Currently Developing Advanced Clean Cars 2

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- Working on 2026 and subsequent model year standards for further emission reductions and ZEVs, based these guiding principles:
  - Real-world emission reductions
  - Increased certainty of future ZEV volumes
  - Similar or lower system-wide emissions from new mobility options
  - Implementation feasibility (costs, jobs, infrastructure, consumers)
- Tentative 2020 Rulemaking for 2026 and beyond model years

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Existing Fleet Actions and Efforts to Leverage

- Department of General Services
  - The Governor's Executive Order, B-16-12, specifically directs DGS and state departments to increase the share of ZEVs in their own fleets
- Pacific Coast Collaborative
  - West Coast Electric Fleet – Joint initiative of California, Oregon, Washington, and British Columbia to expand ZEVs in public and private fleets
- U.S. Department of Energy
  - Clean Cities – National Clean Fleets Partnership work with large private fleets to implement transportation projects
- City of Sacramento
  - Fleet Sustainability Policy – Requires the city to purchase 50% zero-emission vehicles for all light-duty replacements

Medium and Heavy Duty Vehicle Programs and Actions

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Zero-Emission Truck Strategy

- Accelerate the development of self-sustaining market
- Early zero-emission trucks suitable in certain operations:
  - Urban, stop-and-go driving, return to base, centrally-fueled
  - Pickup and delivery, short haul operations, vocational
- Continued data collection and education needed
- Gather information on costs and benefits
  - Potential for operational savings to offset incremental costs

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Major Policies for HDV Emission Reductions

Clean Vehicles/Engines:

Rules: Engine and Vehicle Stds, In-Use Controls

Incentives: ZE Demos. and Pilots, HVIP, and other

Clean, Efficient Freight System:

Sustainable Freight Action Plan, Ports' Clean Air Action Plan, SCAQMD ISR, SB 375

Fuels and Infrastructure:

Rules: Low Carbon Fuel Standard, Fuel Stds

Incentives: LCFS, SB 350, HVIP

CALIFORNIA HVIP

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Heavy Duty Zero Emission Incentive Programs

- Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)
  - Point-of-sale voucher
  - Zero-emission & advanced technology
  - Offset incremental cost
  - Varies by technology/vehicle type
  - Higher for operating within a disadvantaged community (DAC)

Funding Table for Zero-Emission Trucks

GVWR (lbs)	Base Voucher Incentive	
	1-100 vehicles	
	Outside DAC	Inside DAC
5,001-8,500	$20,000	$25,000
8,501-10,000	$25,000	$30,000
10,001-14,000	$50,000	$55,000
14,001-19,500	$80,000	$90,000
19,501-26,000	$90,000	$100,000
26,001-33,000	$95,000	$110,000
>33,001	$150,000	$165,000
Hydrogen FC	$300,000	$315,000

Multiple Zero-Emission Trucks Available

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	2B-3	4-5	6-7	8
Commercial				
Demonstrations				










*Not all vehicles pictured, excludes transit buses

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Proposed HD Zero-Emission Rules

- Innovative Clean Transit
  - Transit fleet transition to zero-emission by 2040
  - September 2018
- Zero-Emission Airport Shuttle Bus
  - Public and private fixed-route airport shuttle buses
  - All zero-emission by 2036
  - Board consideration December 2018
- Zero-Emission Powertrain Certification
  - Ensure reliability and performance for ZE trucks and buses
  - Board consideration December 2018

Innovative Clean Transit: https://www.arb.ca.gov/msprog/ict/ict.htm
Zero-Emission Airport Shuttle Bus: https://www.arb.ca.gov/msprog/asb/asb.htm
ZE HD Powertrain Certification: https://ww2.arb.ca.gov/our-work/programs/zero-emission-powertrain-certification

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Proposed HD Zero-Emission Rules (Cont'd)

- Advanced Clean Trucks
  - Manufacturer sales requirement
  - Portion of California sales as zero-emission
  - Start with model year 2024 (Class 2B+)
  - Board consideration mid-2019
- Zero-Emission Drayage Truck Rule
  - Implementation 2026+
  - Board consideration in 2022

Advanced Clean Trucks: https://www.arb.ca.gov/msprog/actruck/actruck.htm

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Existing Fleet Actions and Efforts to Leverage

- State agency zero emission purchase requirements (AB 739, 2017)
  - 15% of Class 6-8 purchases starting 2025
  - 30% of Class 6-8 purchases starting 2030
- South Coast Air Quality Management District
  - Indirect Source Rule development
  - Reduces emissions from vehicles associated with a facility rather than the facility itself
- San Pedro Bay Ports Clean Air Action Plan (Los Angeles, Long Beach)
  - 2020 – Trucks entering port must be near-zero emission or pay a fee
  - 2035 – Trucks entering the port must be zero emission or pay a fee
- Climate Mayor's Electric Vehicle Initiative
  - Demonstrating leadership on climate change including electrifying their fleets
  - 407 mayors across the nation

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BEV Fuel Cost Saving Opportunities

EV: 0.56 kWh/mi. Diesel: 22 mpg

Airport Shuttle

EV: 1.04 kWh/mi. Diesel: 10 mpg

Package Delivery

EV: 2.1 kWh/mi. Diesel: 3.5 mpg

Local Drayage

	Airport Shuttle	Package Delivery	Local Drayage
vs Diesel	15%	35%	50%
with LCFS	45%	75%*	80%*

Data from CARB Paper. Assuming $3.00/gal., $0.17/kWh plus a 15% charging loss, LCFS Credits at $100
*Under proposed amendments

ZEV Fuel Infrastructure and Incentive Policies

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SB 350 – Transportation Electrification

- California Public Utility Commission directing investor-owned utilities to implement programs to accelerate widespread transportation electrification

- Recently approved infrastructure programs for the next five years
  - 15 shovel-ready projects totaling $42 million in 2017
  - Southern California Edison for $343 million – medium-duty and heavy-duty
  - Pacific Gas and Electric for $236 million – medium-duty and heavy-duty
  - San Diego Gas and Electric (SDG&E) $137 million – light-duty

- SDG&E proposing $151 million for medium-duty and heavy-duty
  - Decision expected 2019

SB 350 Transportation Electrification Press Release:
http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M215/K467/215467739.PDF

Low Carbon Fuel Standard

- Lower the carbon intensity (CI) of California transportation fuels 10% by 2020
- Proposed amendments (September 2018)
  - Lower CI target to 20% by 2030
  - Recognize higher efficiency of battery electric trucks
    - Class 1-3 vehicles can earn about $0.08/kWh at $100/credit
    - Class 4-8 vehicles can earn about $0.13/kWh
  - Clarify credit recipient for hydrogen fuel
  - Adds capacity credits for new hydrogen stations

LCFS program: https://www.arb.ca.gov/fuels/lcfs/lcfs.htm

Zero Emission Vehicle Fleets Considerations

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Key Benefits of ZEVs

Benefits to California:

- Emission benefits
  - GHG, NOx, PM
  - Greater in higher mileage vehicles
- Accelerate sales
- Consumer awareness from users

Benefits to fleet operator:

- Two to six times more efficient
- Reduced maintenance
- Fuel cost savings and price stability
- Noise reduction

Challenges for ZEV Fleet Adoption

- Incremental costs that affect fleet purchase decisions
- Level playing field between types of fleet operators
- Customers lacking familiarity with ZEV technology
- Emerging disruptive fleet business models
- Infrastructure planning and availability
- Range limitations/refueling time
- Access to EV incentives
- Workforce training

Potential Areas of Analysis

- Identifying business case applications
- Estimating size of each type of fleet, and impact on emissions
- Identify and capture costs to fleets
  - Technology, fuel, maintenance, infrastructure, etc.
- Technology assessment of vehicles
- Evaluate unique fueling infrastructure needs
- Data collection efforts and evaluation for public policy

Discussion

With comments, specify fleet type

- Medium/Heavy Duty vs. Light Duty
- Public vs. private
- New mobility fleets
- Large vs. small employer fleets
- Rental fleets
- Delivery fleets

Next Steps

- Request preliminary comments to CARB by October 1, 2018
- 2-3 workgroups to be formed by fleet type

ARB Staff Contact Information

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Comments from the CPUC and CEC