



Zero-Emission Fleet Rule Workshop Advanced Clean Truck Fleets

Diamond Bar, California
February 12, 2020

Today's Outline

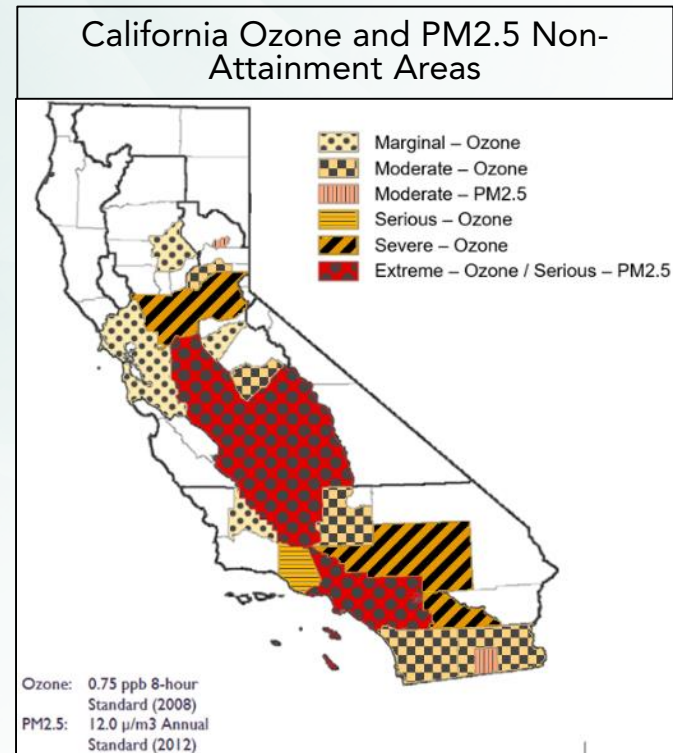
- Introduction and background
- Proposed Advanced Clean Truck regulation
- Zero-emission (ZE) truck market overview
- General truck characteristics
- ZE fleet rule concepts
- Market segments discussion
- Timeline and next steps

Discussion Overview

- How to achieve a zero-emission truck and bus fleet by 2045 everywhere feasible
 - Earlier transition for certain market segments
 - Initial focus on larger fleets and large entities that hire them
- Scope includes wide range of stakeholders
 - Owners of vehicles with a GVWR >8,500 lb (or Class 2b and up)
 - Entities that hire truck and bus fleets
 - Government, private business, and others
- Build on other supporting zero-emission vehicle policies

Major NO_x and PM_{2.5} Emission Reductions Needed

- California has the worst air quality in the nation
- Key challenges
 - San Joaquin Valley – PM_{2.5}
 - South Coast - ozone
- Heavy-duty trucks and federal sources remain largest contributors
- Action beyond current programs needed by 2031
 - Nearly all heavy trucks to have 2010 model year engines by 2023



Disadvantaged Community (DAC) Focus

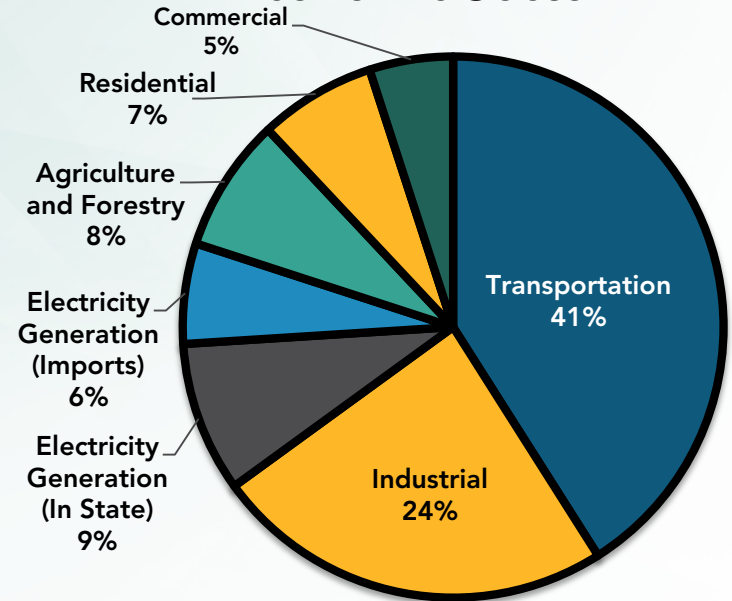
- Assembly Bill 617 directs CARB to identify community level strategies
- Communities seek action on transportation and freight emissions
- Seek rapid transition to ZE technology



Transportation Is Largest Source of Greenhouse Gases (GHGs)

- California's climate change targets
 - Achieve 1990 GHG levels by 2020
 - 40% below 1990 levels by 2030
 - 80% below 1990 levels by 2050
 - Carbon neutrality by 2045
- Clean electricity
 - 33% renewable by 2020
 - 60% renewable by 2030
 - Zero-carbon by 2045

2017 CA GHG Emissions By Economic Sector



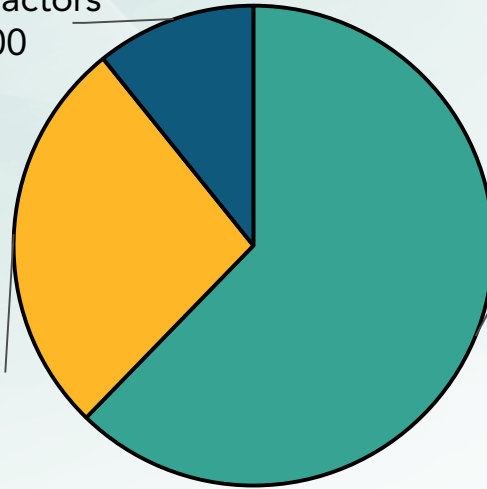
Note: Mobile sources represent ~50% of GHG inventory when including emissions from fuel production

California Vehicle Populations



Class 7-8 Tractors
180,000

Class 2b-3 Trucks
and Vans
1,040,000



Class 4-8 Straight
Trucks and Buses
450,000

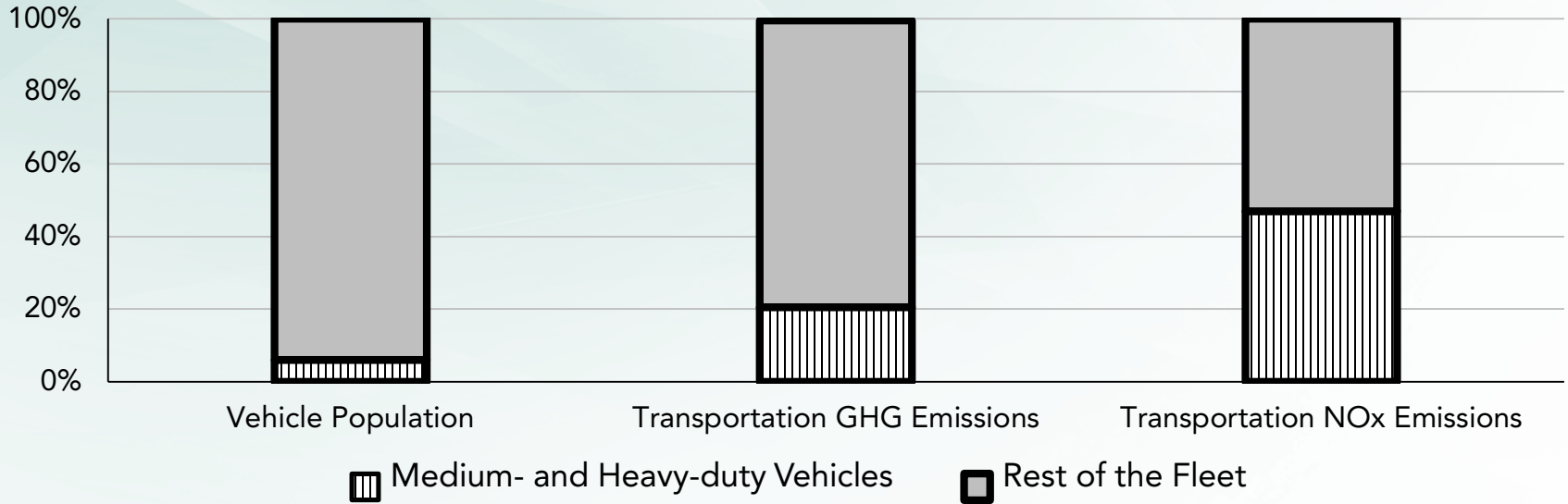


The Importance of Addressing Truck Emissions

Trucks only make up 6% of the state's fleet...

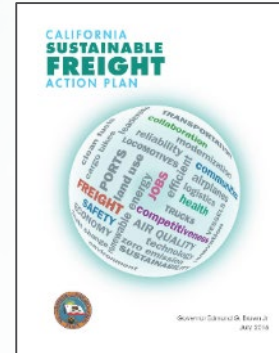
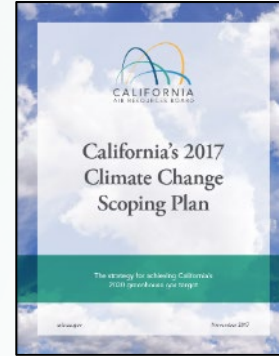
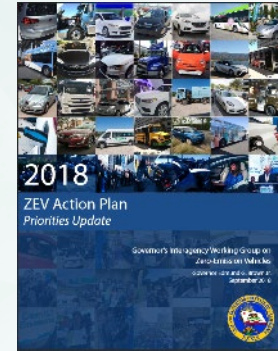
...but represent 21% of transportation GHG emissions...

...and near half of transportation NOx emissions



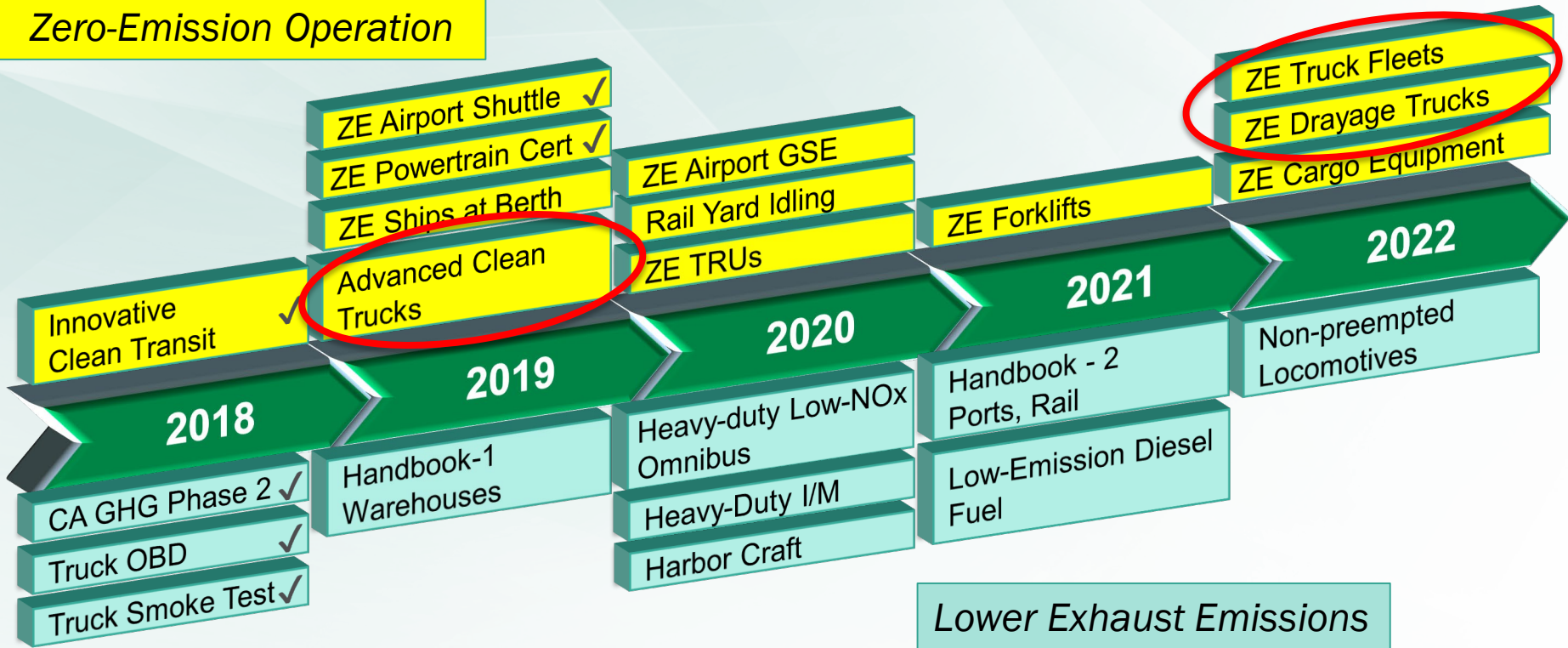
Zero-Emission Key to California's Future

- Multiple NOx and GHG reduction plans
- Core to CARB and the state's strategies
 - Zero-emissions everywhere feasible
 - Cleaner fuels and cleaner combustion everywhere else



Suite of Mobile Source ZE Measures

Zero-Emission Operation



Benefits of ZEVs

- Health benefits, especially in disadvantaged communities
- Climate benefits
- Expanded green jobs and workforce
- Reduce energy use and petroleum dependence
- Fuel cost savings and price stability
- Maintenance cost reductions
- Low noise and other societal benefits



Comments, Questions, Clarifications?

Email questions to zevfleet@arb.ca.gov



Proposed Advanced Clean Truck Sales Regulation

As proposed on December 12, 2019

Advanced Clean Trucks Sales Summary

- First Board hearing
 - December 2019
- Next Workshop
 - Proposed changes
 - February 20, 2020
- Final hearing
 - May 2020

Manufacturer ZEV Sales

Must sell ZEVs
as a percentage
of annual sales

Large Entity Reporting

One time
reporting in 2021

Vehicles, facilities,
contracted vehicle
services

Proposed ZEV Sales Requirements

- Manufacturers with California sales
 - Exemption for <500 annual sales
- Zero-emission Powertrain Certification required starting 2024 MY
- Credit for near-zero-emission vehicles
 - Minimum all-electric range
 - Up to 75% of a ZEV credit
- Credits tradable across weight classes
- Minimum tractor sales required

Model Year (MY)	Class 2b-3 ¹	Class 4-8	Class 7-8 Tractors
2024	3%	7%	3%
2025	5%	9%	5%
2026	7%	11%	7%
2027	9%	13%	9%
2028	11%	24%	11%
2029	13%	37%	13%
2030 ²	15%	50%	15%

1. Excludes pickups until 2027 MY
 2. 2030 MY requirements continue after 2030

Proposed Large Entity Reporting

Who would need to report (one-time)?

Businesses >\$50 Million in Revenue

- With facilities in California (may not own vehicles)

Large Fleets Own 100+ Vehicles¹

- With facilities in California

Brokers Directing 100+ Vehicles¹

- To or from California

Government All Levels

- Municipalities, State, Federal Agencies

Why do we need reporting?

Support ZE regulatory frameworks

- Fleet standards, purchasing requirements, must contract with ZE fleets, ZE zones

Ensure level playing field

- Large fleets vs. small fleets
- Owned trucks vs. contracted services

Assessing infrastructure needs

- Energy demand, barriers, build-out planning

Match technology with duty cycles

- Understanding spectrum of existing use cases

Fleet Questions for ZEV Feasibility

- Group by vehicle body type fuel type and assigned facility
- Onsite fueling infrastructure
- Daily and total annual miles
- Variable or predictable use
- Portion that returns-to-base
- How long are vehicles kept
- How many have GPS tracking
- How many stay close to base
- How many tow trailers >100 mi.
- How many are at a weight limit
- How many are registered in CA
- How many at facility for >8 hrs.
- How many used for emergency
- How many have all-wheel drive

Board Direction from First Hearing

- Increase the number of zero-emission trucks sold and deployed
- Accelerate benefits in disadvantaged communities
- Evaluate the EMA proposal of 100% ZEV sales by market segment
- Work with industry to streamline the reporting requirement
- Expedite complementary zero-emission fleet rules
- Establish pathway to 2045 carbon neutrality
- Additional considerations

Comments, Questions, Clarifications?

Email questions to zevfleet@arb.ca.gov



Zero-Emission Truck Market Overview

ZE Truck and Bus Market Highlights

- Transit buses and airport shuttles lead the way
 - ZE buses already available in nearly all configurations
- Early ZEV market supported with early funding programs
- Wide range of ZE trucks commercially available today
- All established manufacturers announced ZE truck sales
- Truck market benefiting from technology transfer and experience from ZE passenger cars and buses
- Costs declining rapidly and innovative designs expanding markets

Role of Incentive Funding

- Early demonstration and commercialization
- Current CARB funding sources
 - Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP)
 - Volkswagen Environmental Mitigation Trust
 - Carl Moyer Memorial Air Quality Standards Attainment Program
 - Truck Loan Assistance Program
- Primarily targets early actors ahead of regulatory requirements

ZANZEFF Pilot Projects

- \$205 million awarded across California (2018)
- Manufacturers include Ballard, BYD, Hydrogenics, Kenworth, Meritor, Peterbilt, Tesla, Toyota, TransPower, Volvo, XOS and others
- Most projects within disadvantaged communities (DAC)
- Collecting data on all vehicles deployed
- <https://content.govdelivery.com/accounts/CARB/bulletins/21027cf>

Battery Electric Trucks	Battery Electric Off-Road	Fuel Cell and Low-NOx	Other Off-Road
43 Yard Goats	48 Forklifts	19 FCEV Delivery Vans	9 Electric Gantry Cranes
46 Class 8 Trucks	2 Top-Handlers	10 FCEV Class 8 Tractors	7 Electric Transport Refrig. Units
37 Class 8 Tractors	1 Side-Loader	2 FCEV Yard Trucks	2 Hybrid Gantry Cranes
5 Class 7 Tractors	1 Locomotive	38 Low-NOx Engine Trucks	2 Tier 3 Ocean-Going Vessels
29 Medium-Duty Trucks	29 Freight Equipment		1 Hybrid Tugboat
160 Total	81 Total	69 Total	21 Total

Commercially Available ZEVs Today

Commercial Vehicles Today

<p>2B-3 (8,501 – 14,000 lbs.)</p>	<p>4-5 (14,001 – 19,500 lbs.)</p>	<p>6-7 (19,501 – 33,000 lbs.)</p>	<p>8 (33,000 lbs. and over)</p>
			

Note: Transit buses not shown

Major Manufacturers Entering Market

- Many major manufacturers have plans to enter the ZEV market prior to 2024
 - Cummins, Ford, Freightliner, Mack, Navistar, Mitsubishi Fuso, Peterbilt, Tesla, Volvo have announced plans for commercial products



Major Suppliers and Service Providers Entering Market

- Established suppliers entering ZE truck supply chain
 - Partnering with existing ZE vehicle/drivetrain manufacturers
 - Numerous demonstrations underway
- Established companies servicing, distributing, training, leasing ZE trucks

Electric Powertrain Providers



BOSCH



MERITOR



ROUSH

Service, Support, Training

PENSKE

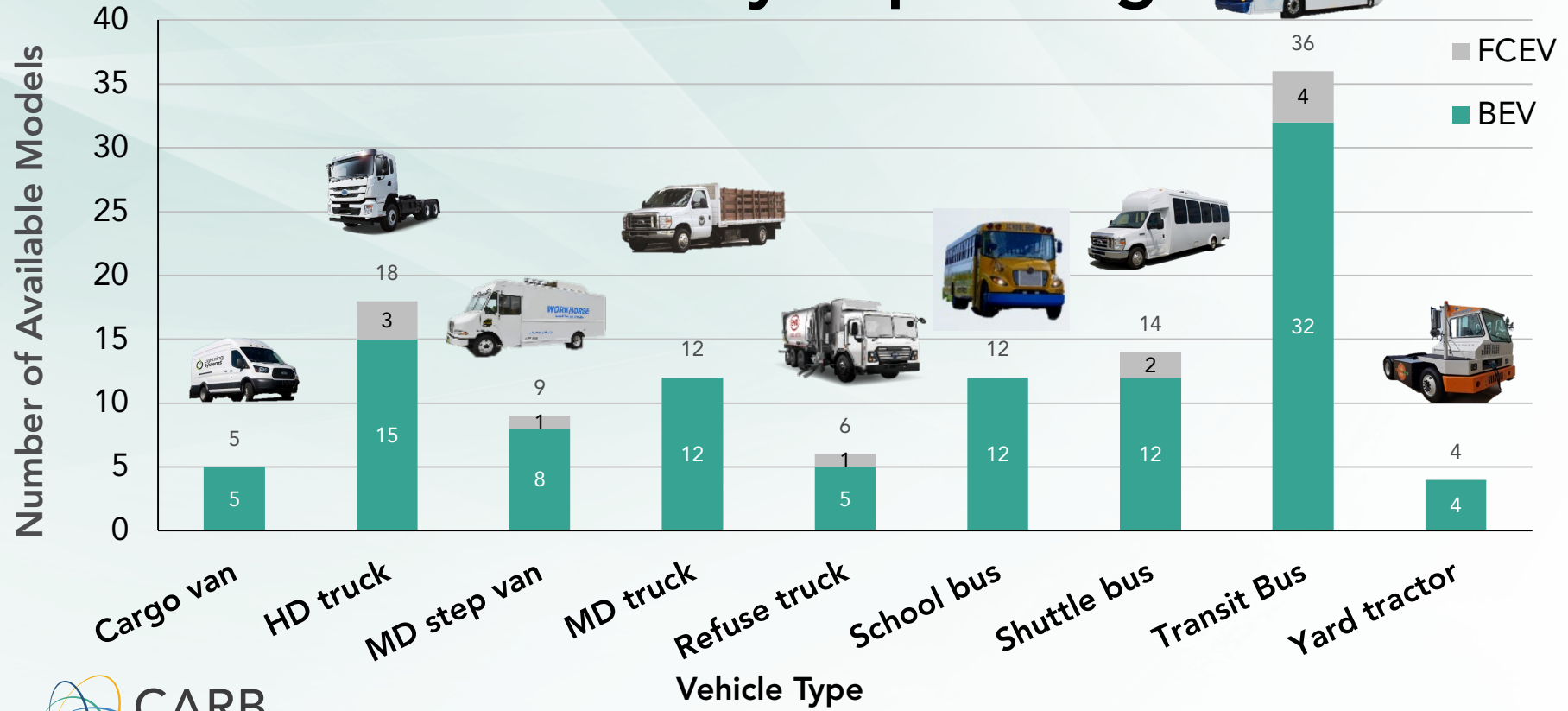
Ryder
Ever better.™

Technology Outlook for the Future

- ZE truck demonstrations for types previously assessed as challenging
- Battery density and cost reductions expected to continue
 - Decreases weight or enables greater range
- Innovative designs create other advantages
 - Skate board platforms, composite bodies, e-axles
 - Some with better payload and lower weight than diesel today
- Fueling/charging network development to expand market potential



Medium- and Heavy-Duty ZEV Model Availability Expanding

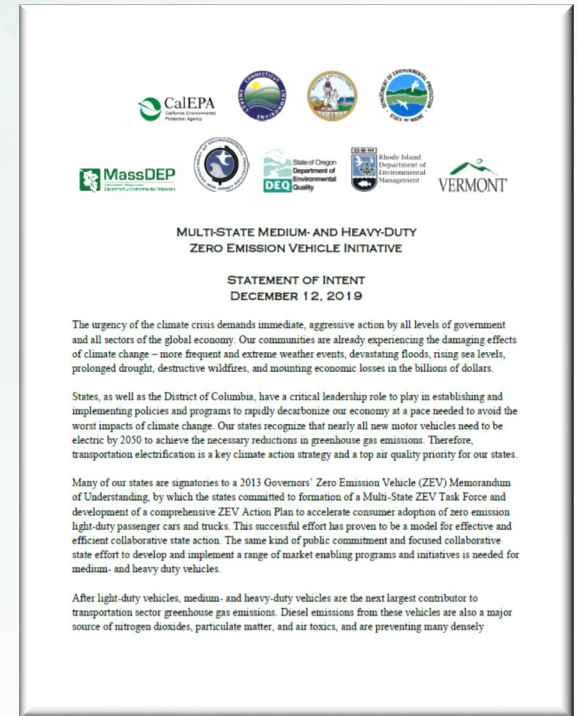


City, State and Port Policies Enacted

- Law requires Class 6-8 ZEV purchases by state fleets (AB 739)
 - 15% starting in 2025
 - 30% starting in 2030
- San Pedro Bay Port's Clean Air Action Plan goals
 - 100% ZE drayage trucks by 2035
 - 100% ZE cargo-handling equipment by 2030
- Los Angeles's Green New Deal
 - "Zero-emission first" policy for all city vehicle procurement
 - Taxis, drayage, urban delivery, cargo handling equipment & more
- Municipal plans from cities of Sacramento, San Francisco, & others

Multistate MD/HD ZEV Statement of Intent

- Multiple states* seek to support rapid expansion of the ZEV truck market
- Goal to formalize an agreement for a multi-state ZEV Action Plan
- NESCAUM is reaching out to more states



Zero-Emission Charging/Fueling Standards

- Existing standards
 - J1772 CCS – Charging up to 19 kW AC and 350 kW DC
 - J3068 – Charging up to 166 kW AC
 - J2601 – Hydrogen fueling up to 10 kg
- High-powered conductive charging in development
 - Fast charging above 1 MW
 - CharIN (Multiple manufacturers and charging station providers)
- Hydrogen refueling protocol in development for heavy-duty trucks
 - Air Liquide, Hyundai, Nel Hydrogen, Nikola, Shell, and Toyota

Low Carbon Fuel Standard (LCFS)

- Regulation to reduce carbon Intensity of transportation fuels
 - 20% reduction by 2030
- Fleets can earn credits
 - Charging equipment owners
 - Hydrogen station operators
- LCFS credit sales offset fuel costs



Battery Electric Fuel Cost Saving with LCFS



EV: 0.6 kWh/mi.
Diesel: 22 mpg



EV: 1.0 kWh/mi.
Diesel: 10 mpg

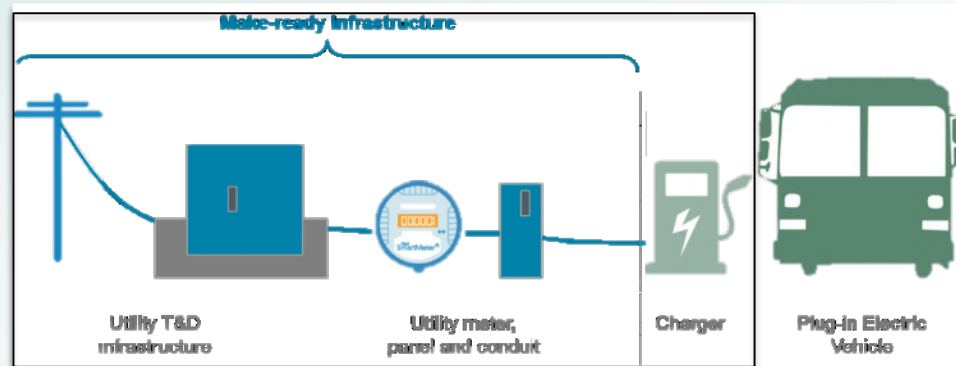


EV: 2.1 kWh/mi.
Diesel: 6 mpg

Electric vs Diesel	Airport Shuttle	Package Delivery	Local Drayage
Fuel Savings	40%	50%	40%
Fuel Savings with LCFS	75%	100%	100%

SB350 Transportation Electrification

- California utilities supporting battery electric truck and bus deployments
- \$686 million approved through 2023 for three largest utilities
 - Pay for design and electrical service upgrades on customer property
 - Support charging 18,000 trucks, buses, and off-road vehicles through 2023
 - Rebates for chargers in DACs
- Publicly-owned utilities developing own programs
- New electricity rates to encourage electric vehicles



Infrastructure Forecasting and Planning

- Biennial statewide charging infrastructure assessment (AB 2127)
 - California Energy Commission
 - Light-duty, heavy-duty, off-road
 - Spatially model future infrastructure and energy demand
- Transportation Electrification Framework
 - California Public Utility Commission
 - Support SB 350 and other transportation electrification goals
 - Provide guidance and direction to investor-owned utilities

Comments, Questions, Clarifications?

Email questions to zevfleet@arb.ca.gov

MD/HD Infrastructure Discussion

Hannah Goldsmith

Governor's Office of Business Development (GO-BIZ)





General Truck Characteristics

ZE Truck Technology Assessment

- Most single-unit trucks average less than 100 miles per day
- Most in-state tractors travel less than 200 miles per day
- ZE technology improvements and cost reductions continue
- Larger fleets have ability to manage small ZE deployments
 - Variable routes met by conventional trucks
- Weight limit concerns
 - Some ZEV designs lighter than diesel vehicles
 - AB 2061 (2018) increases the upper weight limit by 2,000 lb.
 - Could impact CDL requirements at Class 6/7 split

Example of Available and Announced ZEVs



Heavy-duty Pickup*
Range: 250-500 miles



Conventional Chassis
Range: 100-230 miles
Battery: 106-325 kWh



Step Van
Range: 90-120 miles
Battery: 96-128 kWh



Tractor*
Range: 500-1,000 miles
Battery: 250 kWh+100 kg H2



Cargo/Passenger Van
60-120 mi. range
Battery: 43-86 kWh



Cabover Chassis
Range: 100 miles
Battery: 136 kWh

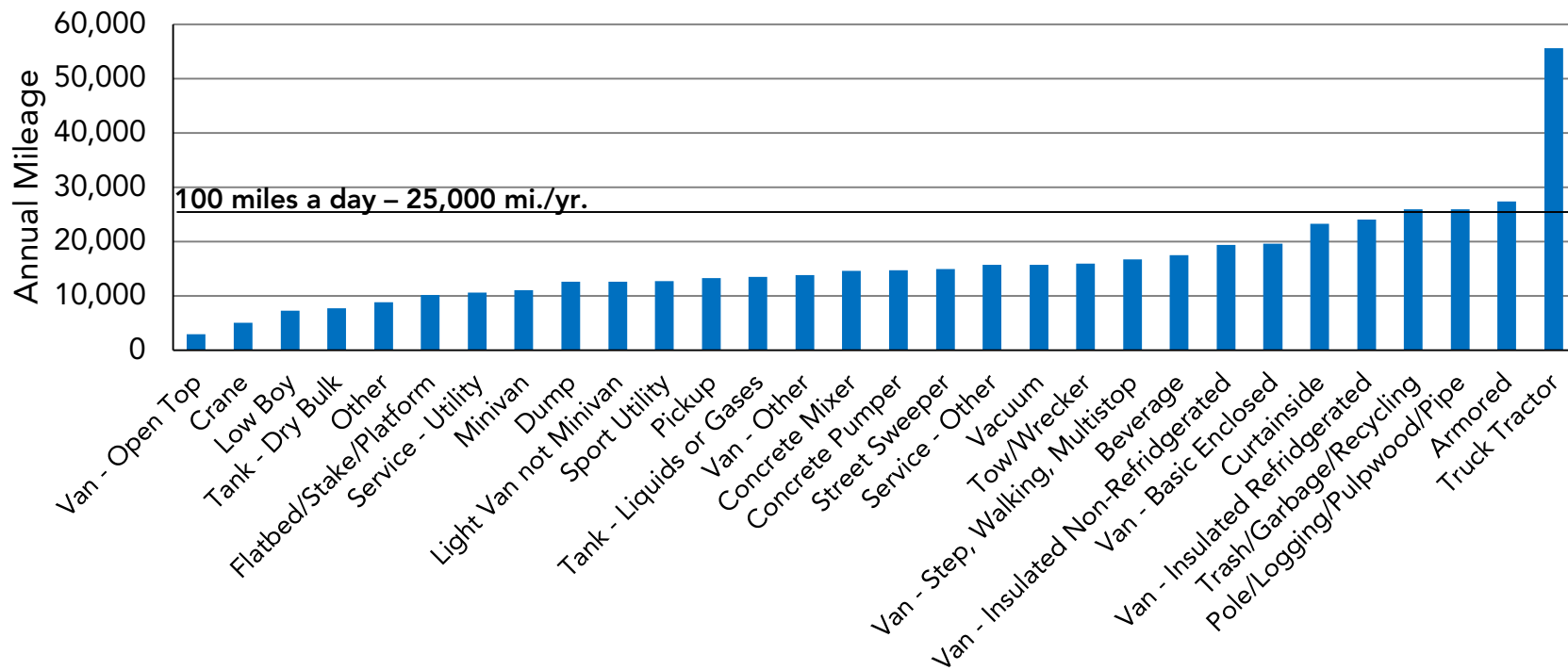


Refuse Truck
Range: 80 miles
Battery: 352 kWh



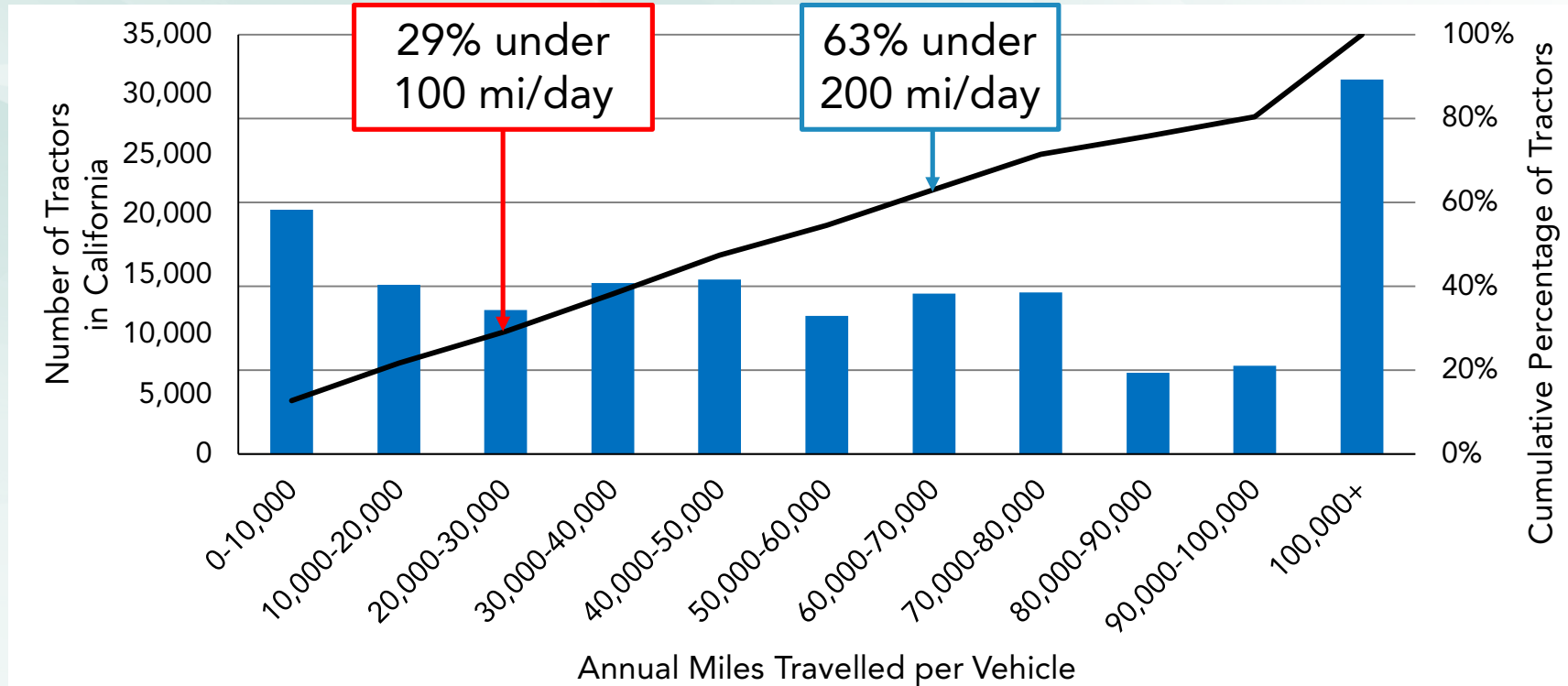
Tractor*
Range: 100-500 miles

Most Trucks Average Below 100 Miles/day



Variety in Class 7-8 Tractor Annual Mileage

All California Tractors



Class 2b-3

- Pickups have higher towing and payload capabilities than light-duty versions
 - Commonly purchased by small fleets and individuals
- Vans often used for last-mile delivery, and services (shuttle, repair, maintenance, sales, other)
- Chassis cabs based on pickup or van platforms and equipped with utility bodies, box trucks, flat beds...



Class 4-8 Straight Trucks

- Start as chassis cab or incomplete vehicle
- Wide range of bodies
 - Box/Van, reefer, flat bed, utility, vocational
- Most likely category to return to base and travel shorter distances
- Commonly used for first/last mile and worksite operation



Same Chassis for Multiple Bodies



=



=



Class 7-8 Tractors

- High concentrations at ports, warehouses, DACs
- Highest total emissions of all truck categories
- Long-haul, regional, drayage, yard, local delivery, vocational uses
- Day cab, sleeper cab, city tractor, yard truck, heavy haul, vocational



Comments, Questions, Clarifications?

Email questions to zevfleet@arb.ca.gov



Zero-Emission Fleet Rule Concepts

Regulatory Strategy Overview

- One rulemaking to address all truck and bus types
- Expect differing requirements by vehicle type or market segment
 - (ie. drayage, step van, last mile delivery, box truck, other)
- Initial focus on larger fleets in most suitable markets for ZEVs
- Expand ZEV market in all segments as quickly as possible
 - Support a robust secondary market
 - Encourage early action before 2023
 - No plans for accelerated replacements
- Complement other ZEV regulations and policies
- Rule implementation 2024 through 2045

Minimum Useful Life Criteria

- Road Repair and Accountability Act of 2017 (SB1) establishes minimum useful life criteria for commercial vehicles
 - Based on date of first engine emissions certification date
 - 18 years if vehicle has less than 800,000 miles
 - 13 years if vehicle exceeds 800,000 miles
- Applies to new CARB regulations or amendments

Principles for Developing ZE Fleet Rules

- Expand ZE vehicle use to meet air quality and GHG goals
- Maximize the total number of ZEVs deployed
- Focused action in disadvantaged communities
- Simple and streamlined compliance and enforcement
- Match vehicle capabilities with fleet operational needs
- Expand infrastructure access to enable new markets
- Support and enable workforce training
- Ensure level playing field
- Avoid unintended consequences



Scope of ZEV Technology Options

- Zero-emission vehicles
 - Battery electric, fuel cell electric, catenary electric
- Near-zero-emission vehicles
 - Plug-in hybrid electric with a minimum all-electric range
- Other zero-emission cargo vehicles
 - Light-duty vans and trucks
 - Cargo bikes (zero-emission)

ZEV Suitability Today Varies by Vehicle Type and Use Case



Lower

ZEV Operational Suitability

Higher

Factors Affecting Suitability for ZEVs

- Fleet vehicle operational characteristics
- ZEV availability and characteristics
 - Fueling time, range/ability to do work
 - Compatibility with final body configuration
- Access to infrastructure
 - On-site fueling/charging initially
 - Retail/public charging network as market develops
- All are subject to change over next decade

Zero-Emission Regulatory Concepts

- Phase-in ZEV purchases
- EMA Proposal - 100% ZEV purchases by truck segment
- ZE fleet standards
- Green contracting
- ZE zones
- Facility requirements
- ZE miles standard

Approved Phase-in of ZE Bus Purchases

- Innovative Clean Transit approved 2018
- Phase-in ZE transit bus purchases
 - 25% starting 2023
 - 50% starting 2026
 - 100% starting 2029
- Small transit fleets start 2026
- Off-ramps for certain circumstances
- 100% ZE bus fleet around 2040



Phase-in ZEV Purchases

- Ramp up ZEVs as a percent of normal purchases by calendar year
 - No accelerated replacements
- Questions to consider
 - How to maximize ZEVs for different vehicle/fleet types
 - Level playing field, match fleet needs, infrastructure
 - When/how to set 100% ZEV purchase requirement for simplicity
 - How to benefit DACs
 - How to guard against pre-buys or delayed purchases

Model Year Requirements - EMA Proposal

- Require 100% ZE sales/purchases in market segments by model year
 - 2023 – School buses and municipal stepvans
 - 2024 – Public utility vehicles and yard tractors
 - 2025 – All stepvans, airport service vehicles, non-airport shuttle buses
 - 2026 – All refuse trucks
 - 2027 – Concept continues for other segments
- Questions to consider
 - How do you maximize ZEV deployments
 - How do you address segments not yet ready for 100% sales
 - How do you ensure benefits in DACs (tractors or other)
 - How to guard against pre-buys or delayed purchases

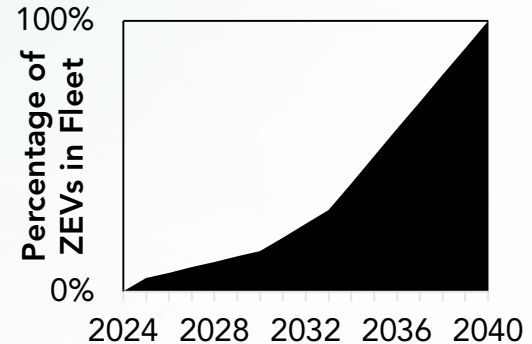
Approved ZE Fleet Standard

- ZE Airport Shuttle Bus approved 2019
- Public and private airport shuttle bus fleets
- Buses, cutaway shuttles, passenger vans
 - 33% of fleet ZE by 2027
 - 66% of fleet ZE by 2031
 - 100% of fleet ZE by 2035



ZE Fleet Standard

- ZEVs must make up percentage of fleet by milestone dates
 - Report body type and fuel type annually
- Questions to consider
 - How to set goals to maximize ZEVs for different fleets, vehicle types or market segments
 - What fleet definition for level playing field
 - How to ensure benefits in DACs
 - Any unintended consequences



Approved Green Truck Contracting

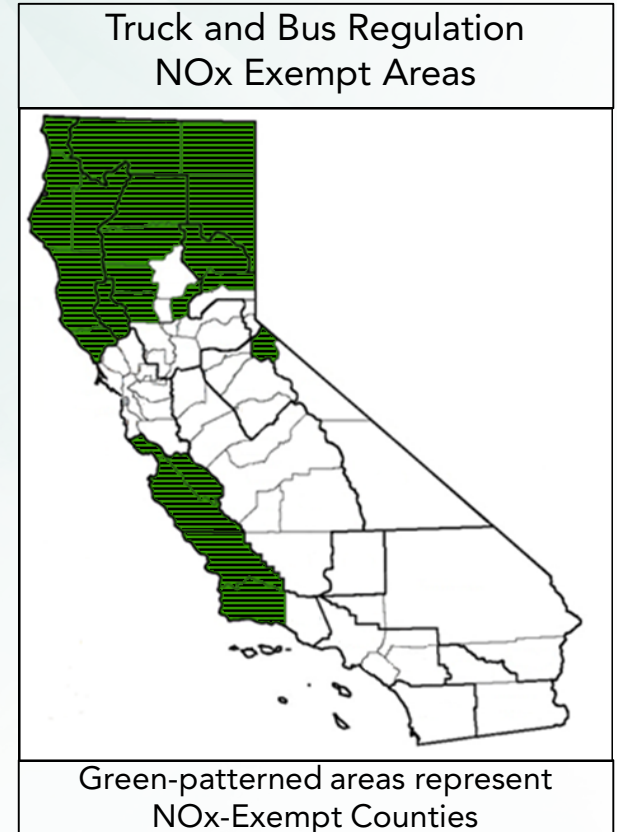
- Broker and hiring entities must hire compliant fleets
 - Truck and Bus regulation
 - Tractor Trailer GHG regulation
 - Off-Road Vehicle regulation

Green Truck Contracting

- Requires large entities to hire fleets that meet a voluntary ZE Fleet Standard
 - May include retailers, wholesalers, public agencies, brokers, terminal operators, motor carriers...
 - Certified fleets would be listed on CARB webpage
- Questions to consider
 - Will demand for ZE fleets maximize ZEV deployments
 - How do you achieve benefit in DACs
 - How to track and audit contract agreements for enforcement
 - Leaves door open for funding fleets if needed
 - Are there unintended consequences

Approved Lower-Emission Zone Requirements

- Drayage Truck regulation
 - Clean trucks to enter ports & railyards
- Truck and Bus regulation
 - NOx exempt area provisions
- Public Agency and Utility Regulation
 - Low population county extension



Zero-Emission Zones

- Geographic boundaries surrounding targeted areas
- Only ZEVs or fleets meeting the ZE Fleet Standard may enter ZE zone
 - Ports, rail yards, warehouse hubs, city boundaries, disadvantaged communities, air basin, or other
- Questions to consider
 - How and when to transition to a pure ZE zone
 - How to determine locations and boundaries to benefit DACs
 - How to ensure feasibility for all fleets (small and large)
 - How to address differences for drayage vs long-haul tractors
 - How to ensure compliance and enforcement during transition
 - Any unintended consequences

Facility Requirement: Proposed TRU Regulation

Starting in 2022:

- All newly manufactured TRU units built to use refrigerant with a global warming potential $\leq 2,200$

Starting in 2024:

- Applicable facilities complete installation of electric charging or fueling infrastructure to support zero-emission operation of TRUs

Starting in 2025:

- Trailer TRUs - Zero-emission operation when parked or stationary for >15 minutes at an applicable facility
- Meet U.S. EPA Tier 4 final emission standards for 25-50 hp engines
- Truck TRU fleets phase in full zero-emission at 15% per year (over 7 years)



Facility Requirements

- Facilities that receive trucks must install infrastructure for ZEVs
 - Install H2 stations or chargers at stores, ports, railyards, warehouses, or other hubs with sufficient dwell time
 - Workplace charging
- Questions to consider
 - Can this complement other strategies to maximize ZEVs
 - How to determine which sites appropriate for infrastructure
 - Are there other ways facilities can attract ZEV trucks into DACs



Proposed Light-Duty Clean Miles Standard (SB 1014)



- 1) GHG Target:
grams CO₂ per
passenger mile
traveled (PMT)
- 2) Electric Miles
Driven Target:
%eVMT

Applicable to:
Passenger
service on
TNC platforms

Key Goals:

- Promote electrification
- Reduce VMT

Align with:

- SB 375
- SB 350
- ZEV Action Plan

For more information, please visit the Clean Miles Standard website:

<https://ww2.arb.ca.gov/our-work/programs/clean-miles-standard>

ZE Miles Standard

- Set fleet ZE mile targets based on metrics
 - Energy use, miles travelled, ton-miles
- Questions to consider:
 - How to maximize ZEVs and benefits in DACs
 - How to match fleet needs and maintain level playing field
 - Can the same metric work for all truck types and uses
 - Is there simple way to track and report data
 - How to address fluctuations in truck use
 - Contracts, economy, or other issues beyond fleet's control

Other Issues to Discuss

- How to define fleets
 - Companies who contract services with truck and driver
 - Brokers directing trucks
 - Motor carriers and subhaulers
 - Subsidiaries, partners, franchisee and other
- How to define large entities (may or may not own vehicles)
 - Already required to hire compliant fleets
 - May be required to hire ZEV fleets
- How to treat other delivery vehicle types
 - Light-duty vehicles
 - E-cargo bikes used for moving freight



Comments, Questions, Clarifications?

Email questions to zevfleet@arb.ca.gov



Market Segments Discussion

Early Market Segments for Focus

- Drayage and intermodal
- First/last mile delivery
- Private bus/shuttle operators
- Refuse services
- Public agencies
- Utility providers
- Others to be identified

Drayage & Intermodal Fleets

- Goal to achieve 100% ZE fleet by 2035
- Trucks that service ports, inland ports, railyards (23,000 statewide)
- Major emission sources in disadvantaged communities
- Opportunities for shared, centralized infrastructure
- Significant number of owner-operators



First and Last Mile Delivery/Services

- Goal to achieve 100% ZE fleet by 2040
- Parcel, food, beverage, linen services, home/residential delivery, other
 - Initial population estimate – 80,000
- Return to base, predictable routes
- Large ZEV purchases from UPS, FedEx, and Amazon



Buses and Shuttle Buses

- Goal to achieve 100% ZE fleet by 2040
- Employee shuttles, motor coaches, other buses
- About 25,000 beyond transit and ASB
- Wide range of ZE buses commercially available
- Long distance motor coaches requires further study



Refuse Services

- Goal to achieve 100% ZE fleet by 2040
- Garbage, recycling, compactor and roll-off trucks, and other
 - About 16,000 vehicles (mostly Class 7-8)
 - Transfer trucks require further study
- Owned by or under contract with municipalities
- Return to base, predictable routes, operate in neighborhoods
- City of Los Angeles committed to 100% ZE refuse by 2035



Public Fleet Vehicles

- Goal to achieve 100% ZE capable fleet by 2040 including NZEVs
- Public fleets to lead the way for work trucks
- Diverse vehicle weight classes and body types
 - About 100,000 in Class 2b-8
 - Mostly variable use, low miles, and operate locally
- Different budget and funding issues than private
- Specialized vehicles and emergency use considerations
- No plans to require ZEV school buses



Private Utility Fleets

- Goal to achieve 100% ZE capable fleet by 2040 including NZEVs
- Electricity, water, sanitation, telecommunications
- Diverse fleet of weight classes and body types
 - Some specialized equipment
- Operate regionally, some vehicles have long dwell times at jobsites
- Occasional long distance, or rapid response/emergency operation



What About ZEVs in Other Segments

- Need to include other truck types and market segments to meet 100% ZEV goal by 2045
 - Role for NZEVs with all-electric range
 - Requires substantial on infrastructure build-out
- Work trucks, service trucks, vans and other
- Short haul, regional, long-haul tractors
 - Largest heavy-duty emissions category
- Considerations for specialized equipment and uses
- How/when to bring in smaller fleets

Timeline and Next Steps

- Summer workshops
 - Establish workgroups as needed
 - Begin cost discussions
- Continue interagency infrastructure coordination
- Meetings and site visits with fleets
- Receive fleet reported data April 2021
- Fleet rule recommendation to Board in 2021/2022
 - Implementation starts 2024

CARB Contacts

- Craig Duehring, Manager
craig.duehring@arb.ca.gov (916)-323-2927
- Paul Arneja, Lead Staff
paul.arneja@arb.ca.gov (916)-322-5616

Web Page: <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets>

List Serve: https://public.govdelivery.com/accounts/CARB/subscriber/new?topic_id=zevfleet