Advanced Clean Trucks Workshop

August 21, 2019
Today's Overview

• Background
• Manufacturer sales requirement
• Large entity reporting
• Next steps
• CPUC meeting update
Major NOx Reductions Needed

- Nearly all trucks to have 2010 model year engines by 2023
- Action beyond current programs needed by 2031
  - Mobile source emissions reduced more than 50%
  - Truck and bus emissions reduced by nearly 70%
- Heavy-duty trucks and federal sources remain largest contributors
California’s Climate Change Targets – Transportation Remains Largest GHG Source

- Achieve 1990 GHG levels by 2020
- 40% below 1990 levels by 2030
- 80% below 1990 levels by 2050

- Cleaner electricity targets (SB 100)
  - 60% renewable by 2030
  - Zero carbon by 2045
- Carbon neutrality by 2045

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

Zero-Emission (ZE) Operation
  - Innovative Clean Transit

ZE Airport Shuttle ✓
  - ZE Powertrain Cert ✓
  - Advanced Clean Trucks
  - ZE Ships at Berth

ZE Airport GSE
  - Rail Yard Idling
  - ZE TRUs

ZE Forklifts

2018
  - CA GHG Phase 2 ✓
  - Truck OBD ✓
  - Truck Smoke Tests ✓

2019
  - Handbook-1 Warehouses

2020
  - Heavy-duty Low-NOx Omnibus
  - Heavy-Duty I/M Harbor Craft

2021
  - Handbook-2 Ports, Rail
  - Low-Emission Diesel Fuel

2022
  - ZE Truck Fleets
  - ZE Drayage Trucks
  - ZE Cargo Equipment
  - Non-preempted Locomotives

Lower Emissions
## Incentives Support Early Markets

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
<th>FY 18-19</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HVIP</strong></td>
<td>Low NO\textsubscript{x} engines, ZEVs plus infrastructure, advanced technology</td>
<td></td>
<td>$125 M</td>
</tr>
<tr>
<td><strong>VW</strong></td>
<td>Zero-emission truck and bus replacements</td>
<td>$423 M</td>
<td></td>
</tr>
<tr>
<td><strong>Carl Moyer</strong></td>
<td>Cleaner engines &amp; ZEVs plus fueling infrastructure</td>
<td>FY 18-19</td>
<td>$79 M</td>
</tr>
<tr>
<td><strong>AB 617</strong></td>
<td>Engine replacement &amp; infrastructure in DAC</td>
<td>FY 18-19</td>
<td>$245 M</td>
</tr>
</tbody>
</table>

### Truck Loans
- Helps small businesses with 10 or fewer trucks upgrade to newer trucks

### Utility Programs
- Charging infrastructure service upgrades and electricity rates (SB350)
- Offsets Most/All Electricity Costs for Trucks and Buses
- Total: $>579 M

### LCFS
- Credits for using low carbon transportation fuels

**Table Notes:**
- ZEV: Zero-Emission Vehicle
- DAC: Disadvantaged Community
- LCFS: Low Carbon Fuel Standard
Medium- and Heavy-Duty ZEV Model Availability Expanding
SB350 Transportation Electrification for Medium and Heavy Duty

- California utilities supporting site upgrades and design
  - $686 million approved through 2023 (PG&E, SCE, SDG&E)
    - Can fund charging of 18,000 ZE MD, HD, and off-road vehicles
- Publicly-owned utilities developing programs
- New rates being designed to encourage electric vehicles
Total Cost of Ownership (TCO)¹
Comparable in Right Duty Cycles

• By 2024, battery electric vehicles have favorable TCO versus diesel vehicles in many local or vocational applications without rebates
• By 2030, fuel cell electric vehicles could approach TCO parity with diesel

Example: Stepvan TCO over 12 Years

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2024</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel</td>
<td>$150,000</td>
<td>$300,000</td>
<td>$450,000</td>
</tr>
<tr>
<td>Battery Electric</td>
<td>$300,000</td>
<td>$600,000</td>
<td>$750,000</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>$450,000</td>
<td>$600,000</td>
<td>$750,000</td>
</tr>
</tbody>
</table>

¹ EV Infrastructure Cost
ZE Truck and Bus Purchases Required

- Innovative Clean Transit (adopted)
  - Transit buses, cutaway shuttles
  - Mobility with lighter ZE vehicles
- Zero-Emission Airport Shuttle Bus (adopted)
  - Transit buses, cutaway shuttles, passenger vans
- Port’s Clean Air Action Plan (adopted)
  - Class 7 and 8 tractors
- AB 739 (signed)
  - Class 6-8 vocational trucks
Summary of Advanced Clean Trucks Proposed Regulation
Regulatory Strategy

- Goal is to align interests of all parties
Advanced Clean Trucks Summary

- Manufacturer sales requirement
  - ZEVs as a percentage of sales
  - 2024-2030 model year
  - Revisit in 2025 for post-2030 action
- Large company and fleet reporting requirement
  - Information about vehicles and contracted services
  - Reporting in 2021
  - Future fleet rules, ZE truck standard, and/or other
Manufacturer ZEV Sales Requirement
Manufacturer Requirements

- Applicability
- ZEV sales percentage
- Deficit/credit tracking for compliance
- Banking and trading
- Reporting
Applicability

• Large manufacturers
  • >500 average annual sales volume
• Small manufacturer exemption
  • Cannot exceed 500 average annual sales volume
• Average annual sales volume
  • All vehicles with GVWR over 8500 lbs. including ZEVs/PHEVs
  • Average of prior 3 MY sales
Manufacturer ZEV Sales Requirement

- Percent of California chassis/vehicle sales must be zero-emission
- Use new Zero-Emission Powertrain Certification procedure starting 2024 MY
  - Does not apply to PHEVs
  - Excludes complete vehicles below 14,001 lb. GVWR

<table>
<thead>
<tr>
<th>Model Year (MY)</th>
<th>Class 2B-3¹</th>
<th>Class 4-8</th>
<th>Class 7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2024</td>
<td>3%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>2025</td>
<td>5%</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>2026</td>
<td>7%</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>2027</td>
<td>9%</td>
<td>13%</td>
<td>9%</td>
</tr>
<tr>
<td>2028</td>
<td>11%</td>
<td>24%</td>
<td>11%</td>
</tr>
<tr>
<td>2029</td>
<td>13%</td>
<td>37%</td>
<td>13%</td>
</tr>
<tr>
<td>2030²</td>
<td>15%</td>
<td>50%</td>
<td>15%</td>
</tr>
</tbody>
</table>

1. Excludes pickups until 2027 MY
2. 2030 MY requirements continue after 2030
Deficit/Credits System for Flexibility

- Allows for more ZEVs in one weight class and fewer in another
  - Based on emissions differences
- Deficits accrue based on sales and must be offset with credits
- Credits generated with ZEV sales, partial credits for PHEV
- Weight Class Modifier accounts for emission differences among weight classes for credit and deficits

<table>
<thead>
<tr>
<th>Weight Class Modifier</th>
<th>Class 2B to 3</th>
<th>Class 4 to 5</th>
<th>Class 6 to 7*</th>
<th>Class 8*</th>
<th>Class 7 to 8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.6</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

- Credit banking and trading
Additional Deficit/Credit Provisions

- Tractor deficits must be met with tractor credits
- Deficits may be carried forward up to 1 year
- Deficit fulfillment sequence
- PHEV credits limited to 50% of total deficits in each of non-tractor and tractor categories
- Limited credit lifetimes
  - 2021-2023 MY credits expire end of 2030 MY
  - Credits generated 2024 MY+ have 5 year life
  - PHEV credits can be earned until end of 2030 MY
## 2025 ZEV Credit Example

<table>
<thead>
<tr>
<th>Deficit Pool</th>
<th>Average Annual Sales</th>
<th>ZEV % Required</th>
<th>Weight Class Modifier</th>
<th>Total Deficits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 5 (Non-Tractor)</td>
<td>500</td>
<td>9%</td>
<td>1</td>
<td>-45</td>
</tr>
<tr>
<td>Class 7 Tractor</td>
<td>300</td>
<td>5%</td>
<td>2</td>
<td>-30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Year</th>
<th>Class 2B-3</th>
<th>Class 4-8</th>
<th>Class 7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2024</td>
<td>3%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>2025</td>
<td>5%</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>2026</td>
<td>7%</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>2027</td>
<td>9%</td>
<td>13%</td>
<td>9%</td>
</tr>
<tr>
<td>2028</td>
<td>11%</td>
<td>24%</td>
<td>11%</td>
</tr>
<tr>
<td>2029</td>
<td>13%</td>
<td>37%</td>
<td>13%</td>
</tr>
<tr>
<td>2030</td>
<td>15%</td>
<td>50%</td>
<td>15%</td>
</tr>
</tbody>
</table>

1. Excludes pickups until 2027 MY
2. Except Class 2B-3 tractors

### ZEV % Required by Weight Class

<table>
<thead>
<tr>
<th>Model Year</th>
<th>Class 2B-3</th>
<th>Class 4-5</th>
<th>Class 6-7**</th>
<th>Class 7 Tractors, All Class 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2024</td>
<td>0.6</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>2025</td>
<td>1.5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2026</td>
<td>2.5</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2027</td>
<td>3.5</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2028</td>
<td>4.5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2029</td>
<td>5.5</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2030</td>
<td>6.5</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

** Excluding Tractors
## 2025 ZEV Credit Example

### 2025 MY ZEVs Sold

<table>
<thead>
<tr>
<th>Weight Class Modifier</th>
<th>2025 ZEV Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 5 (Non-Tractor)</td>
<td>10</td>
</tr>
<tr>
<td>Class 7 Tractor</td>
<td>50</td>
</tr>
</tbody>
</table>

### Deficits

<table>
<thead>
<tr>
<th>Deficits</th>
<th>ZEV Credits</th>
<th>Remaining ZEV Credits</th>
<th>Remaining ZEV Credits to Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Tractors</td>
<td>-45</td>
<td>10</td>
<td>-35</td>
</tr>
<tr>
<td>Tractors</td>
<td>-30</td>
<td>100</td>
<td>70</td>
</tr>
</tbody>
</table>
PHEV Credits

• Minimum All-Electric Range same as CA Phase 2 GHG criteria to earn PHEV credit

• PHEV Credits = # PHEVs Sold x Weight Class Modifier x PHEV Factor

\[
PHEV\ \text{Factor} = 0.01 \times \text{Usable Battery Energy Capacity (kWh)}
\]

Weight Class Modifier*

Not to exceed .75
## 2025 PHEV Credit Example

### Class 3

<table>
<thead>
<tr>
<th>Class Category</th>
<th>Constant</th>
<th>Usable Energy (kWhr)</th>
<th>Weight Class Modifier</th>
<th>PHEV Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 3</td>
<td>0.01</td>
<td>10</td>
<td>0.6</td>
<td>0.17</td>
</tr>
<tr>
<td>Class 3</td>
<td>0.01</td>
<td>35</td>
<td>0.6</td>
<td>0.58</td>
</tr>
<tr>
<td>Class 3</td>
<td>0.01</td>
<td>45</td>
<td>0.6</td>
<td>0.75*</td>
</tr>
<tr>
<td>Class 3</td>
<td>0.01</td>
<td>75</td>
<td>0.6</td>
<td>0.75*</td>
</tr>
</tbody>
</table>
Manufacturer Reporting

- Must report annually starting March 31, 2022
- Sales volumes in California
  - Total sales by weight class and powertrain technology
  - Tractor, non-tractor, pickup (Class 2B-3)
- Credit trades/transfers
- Statement how much of Class 2B – 3 ZEV sales will be used for Advanced Clean Cars regulation
- Retain records 8 years
Large Entity Reporting Requirement
Zero Emission Fleet Directive

• Governor issued directive to assess viability of ZEV fleet requirements - August 2018

• Consider opportunities in a broad range of fleets:
  • Public and private
  • New mobility fleets
  • Large employer fleets
  • Rental fleets
  • Delivery fleets
  • Transportation Network Companies (TNCs)
Principles for Developing Future Rules

• Match ZEV availability with individual fleet operational needs
  • Initial focus on urban, short-haul, return to base
• Provide benefits in disadvantaged communities
• Expand infrastructure availability to enable new markets
• Ensure level playing field between types of fleet operators
• Maximize use of ZEVs where suitable
• Explore alternative concepts
  • Point of regulation of entities that hire truck fleets
  • Fleet rules or ZE truck standard
  • Targeting emission hot spots
Large Entity Reporting Applicability

- Entities with gross annual revenues greater than $50 million in 2019 tax year
  - Subsidiaries, subdivisions, or branches
- Fleets with more than 100 vehicles operated in California in 2019
- Any person, broker or entity that dispatched more than 100 vehicles in California in 2019
- Government agencies including state, local, & federal
- Exemptions
  - School districts, school bus fleets, transit agencies, and passenger car transportation network companies
Reporting Summary

• All regulated entities, including the corporate parent and each subsidiary, subdivision, or branch under the control of the corporate parent
  • Complete Forms A and B
• All regulated entities with truck/vans domiciled in California
  • Complete Form C
• Reporting deadline April 2021
  • For facility contracts and operation in 2020
  • For fleet operated in 2020 as it exists on January 1, 2021
General Entity Information

- All regulation entities
- Name, mailing address, contact information, corporate parent name,
- Business category description  
  - Select: Construction, Farming, Financial, Hauling freight (for hire), Government, Non-profit, Passenger/Bus service, Retail/Wholesale, Other
- Six digit NAICS code
- Tax ID
- Total annual revenue for prior year (except government)  
  - Select: (millions <$10, $10-$49, $50-$99, $100-$499, $500-$999, >1,000)
- # of subhauler or subcontractor trucks dispatched/directed prior year
- Percent of subhaulers/subcontractors that operated under your authority
- Motor carrier ID numbers
- Transportation charter permit
California Facility Type Categories

- Store
- Restaurant
- Distribution center/warehouse
- Manufacturer/factory/plant
- Multi-building campus/base
- Service center
- Hotel, motels, and resort
- Medical/hospital/care
- Administrative/office building
- Truck/equipment yard
Grouped Facility Characteristics

For questions 1-12, enter the number of facilities in each category in response to each question.

1. How many facilities for each category type do you operate in California?
2. How many of these facilities have dock-height loading bays?
3. How many of these facilities have cold storage rooms?
4. How many of these facilities have EV charging available to the public?
5. How many of these facilities have EV charging for employees?
6. How many of these facilities are on properties shared with other tenants?
7. How many of these facilities do you own?
8. At how many of these facilities do you provide shuttle van or bus service to or from the facility?
9. At how many of these facilities do your own/lease cars or pickups as part of the operation?
10. At how many of these facilities do you own/lease vans or trucks as part of the operation?
11. How many of these facilities have cars or light pickups domiciled there?
12. How many of these facilities have vans/trucks/buses domiciled there?
Grouped Transportation Needs

Describe how you meet your ground transportation needs (excluding rail)
Select (With Own Vehicles, >1 Yr Contract, Both, NA)

13. How do you ship your items out of these facilities to out of state locations?
14. How do you ship your items into these facilities from out of state locations?
15. How do you ship your items out of these facilities to California port or rail locations?
16. How do you ship your items into these facilities from California port or rail locations?
17. How do you ship your items into these facilities from other California warehouses you operate?
18. How do you ship your items into these facilities from other California (non-warehouse) facilities you operate?
19. How do you ship goods you sell from these facilities to residential homes?
20. How do you ship goods you sell from these facilities to non-residential locations?
21. How do you transport your intermediate products from these facilities to residential homes?
22. How do you transport your intermediate products from these facilities to non-residential locations by truck?
Grouped Contracting Practices

Answer how you enter into year or greater contracts for any of the following.

Select (By Facility, Company Wide, Both, NA)

24. For linen/uniform delivery to/from these facilities
25. For parcel delivery to/from these facilities
26. For maintenance and repair of the facilities
27. For passenger shuttle bus service to/from the facilities
28. For armored cash transport service to/from the facilities
29. With suppliers to deliver food items (non-refrigerated) to the facilities
30. With suppliers to deliver food items (refrigerated) to the facilities
31. With suppliers to deliver non-food items to your facilities
Representative Facility Characteristics

Select a single facility from each category and respond to the following:

1. What is the location of the representative facility for each category? Enter (City, Zip code)
2. What is the total building square footage?
   Select (NA, <10,000, 10,000 to 100,000, 100,000 to 500,000, more)
3. How many dock-height loading bays at this facility?
4. What is the square footage of cold storage rooms?
   Select (NA, <10,000, 10,000 to 100,000, 100,000 to 500,000, more)
5. How many pickups <8,500 lbs. GVWR do you own/lease that are associated with the operation at this facility?
6. How many cars do you own/lease that are associated with the operation at this facility?
Representative Facility Trips

Estimate number of trips to the facility in a typical week based on pickup and deliveries?
Select bins (<1, 1-10, 11-20, 20-99, 100-500, >500)

7. Linen/uniform cleaning service trucks
8. Parcel delivery vans/trucks
9. Armored cash transport trucks
10. Beverage/water delivery trucks
11. Food delivery (non-refrigerated) - Straight truck
12. Food delivery (refrigerated) - Straight truck
13. Goods delivery (non-food) - Straight Truck
14. Food delivery (non-refrigerated) - Tractor Trailer
15. Food delivery (refrigerated) - Tractor Trailer
16. Goods delivery (non-food) - Tractor Trailer
17. All other truck or van deliveries
Representative Facility Suppliers

How many different suppliers shipped items to your facility last year?
Select bins (1, 2-10, 11-20, >20)

18. Food delivery
19. Beverage delivery
20. Linen/uniform cleaning service
21. Goods delivery (non-food)
22. All other supplies, tools, equipment (non-goods)
Vehicles and Usage by Facility

- Complete Form C if vans and trucks domiciled or assigned at locations in California
  - Facility Address
  - Facility Type Category
  - Contact Name
  - Email Address
  - Do you own or lease this facility?
  - How many cars/SUVs are assigned to this facility?
  - How many light pickup trucks (GVWR <8500 lbs.) are assigned to this facility?
  - If you have tractors or truck and trailer combinations select what types of trailers you pull?
    
    Select all that apply (Van – Dry, Van – Reefer, Dump, Tanker, Flat bed, Garbage, Lowbed, Curtain side, Container*, Other)
# Vehicles and Usage by Facility Table

<table>
<thead>
<tr>
<th>Vehicle body type</th>
<th>Weight class bin (2B-3, 4-6, 7-8)</th>
<th>Number of vehicles of each body type and weight class bin</th>
<th>What percent of the fleet operates within these daily mileage bins? (round estimates to nearest 10%)</th>
<th>Select the best estimate on what percent of vehicles of each group fit the description (&lt;25%, 25-50%, 50-75%, &gt;75%)</th>
<th>What percent are registered out of state?</th>
<th>How many years are vehicles kept in the fleet?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body type 1</td>
<td></td>
<td></td>
<td>&lt;50</td>
<td>Regularly fuel on-site</td>
<td>Return to base daily</td>
<td>Stay within 50 miles of this site on a given day</td>
</tr>
<tr>
<td>Body type 2</td>
<td></td>
<td></td>
<td>51-100</td>
<td>101-200</td>
<td>&gt;200</td>
<td></td>
</tr>
<tr>
<td>Body type 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor Day Cab</td>
<td>7-8</td>
<td>100</td>
<td>0</td>
<td>20%</td>
<td>20%</td>
<td>60%</td>
</tr>
<tr>
<td>Box Dry Van</td>
<td>4-6</td>
<td>20</td>
<td>0</td>
<td>70%</td>
<td>30%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Tractor Body Type: Tractor Day Cab, Tractor Sleeper Cab  
Truck Body Type: Beverage, Boom/Bucket, Box Reefer, Box Dry Van, Bus, Bus School, Bus Shuttle, Car Carrier, Concrete Mixer, Concrete Pump, Crane, Drill Rig, Dump, Farm Truck, Flatbed/Stakebed, Garbage Packer, Garbage Rolloff, Pickup Bed, Service Body, Sweeper, Tank, Tow, Vacuum, Water, Van - Cargo, Van - Step, Van - Passenger, Yard Goat

What percent are at facility > 8 hr daily?*
Next Steps

• Submit informal comments by September 21, 2019 at: https://www.arb.ca.gov/lispub/comm2/bcsuffixform.php?listname=cleantrucks-ws&comm_period=1

• Staff report available October 2019
  • 45 day formal comment period

• First of two board hearings in December 2019
  • Final decision at second hearing mid-2020
Additional Information

• Advanced Clean Trucks website
  • [link](ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks)

• Contacts
  • Craig Duehring - [craig.duehring@arb.ca.gov](mailto:craig.duehring@arb.ca.gov)
  • Paul Arneja - [paul.arneja@arb.ca.gov](mailto:paul.arneja@arb.ca.gov)
New Vehicle to Grid (VGI) Working Group
New VGI Working Group

- In December 2018, the California Public Utilities Commission launched a new rulemaking (R.18-12-006), directing a new interagency VGI working group to:
  1. Identify what VGI use cases can provide value now, and how that value can be captured, scaled, and distributed to those providing grid services
  2. Evaluate how the value of VGI use cases compare to other storage or distributed energy resources
  3. Provide policy recommendations to the CPUC if any changes are to allow additional use cases to be deployed in the future
- Costs and benefits of V1G and V2G use cases will be evaluated

  More input is needed from medium- and heavy-duty stakeholders
More Information and How to Participate in the VGI Working Group

- All information from the August 19, 2019 launch meeting is available at https://gridworks.org/initiatives/vehicle-grid-integrationwg/
- The next VGI Working Group workshop is on September 26, 2019 in the Bay Area (location TBD)
- Email aspreen@gridworks.org to be added to the email list
- Contact Carrie Sisto at the CPUC with any questions about the working group scope (cs8@cpuc.ca.gov or 415-703-2872)