

Advanced Clean Trucks Workgroup Summary
Monday, February 25th, 2019
 EPA Headquarters, Sacramento, California

[Attendees](#)

Following is the list of workgroup members who participated in the meeting in person or identified themselves via telephone during the meeting.

First Name	Last Name	Affiliation
Michael	Tunnell	American Trucking Association
Hannah	Goldsmith	California Electric Transportation Coalition (CaETC)
Kim	Ho	California Energy Commission (CEC)
Nico	Bouwkamp	California Fuel Cell Partnership
Chris	Shimoda	California Trucking Association (CTA)
Tony	Brasil	California Air Resources Board (CARB)
Craig	Duehring	CARB
Paul	Arneja	CARB
Wente	Yin	CARB
Chris	Franceschi	CARB
Maggie	Gudino	CARB
James P.	Halloran	Caterpillar Inc.
Wendell	Krell	CEC
Bill	Magavern	Coalition for Clean Air
Paul	Cort	Earthjustice
Sasan	Saadat	Earthjustice
Timothy A.	Blubaugh	Truck and Engine Manufacturers Association (EMA)
Lauren	Navarro	Environmental Defense Fund
Tom	Cackette	Environmental Defense Fund
Ken	Degroot	Fiat Chrysler Automobiles (FCA)
Erik	Maroney	FedEx
Alison	Bird	FedEx
Gregory D.	Martin	Ford
Jamie	Hall	General Motors
Patrick J.	Smith	Harris Ranch Beef Company
Kaitlyn	Jaeck	Isuzu
Steve	Yarosz	Isuzu
Matthew	Forrest	Mercedes-Benz
Michael	Coates	Mightycomm
Matt	Smith	Navistar

Daniel A.	Musgrove	Opnock
Dan R.	Kieffer	PACCAR
Chelsea	Jenkins	Roush CleanTech
Nicholas	Blair	Southern California Public Power Authority (SCPPA)
Jaron	Weston	San Diego Gas and Electric (SDGE)
Patricia	Kwon	South Coast AQMD
Ian	MacMillan	South Coast AQMD
Vasken	Kassakhian	Southern California Edison
Sarah	Van Cleve	Tesla
Glenn	Choe	Toyota
Stephanie	Ly	TransPower
Marshall	Miller	UCDavis
Andrew F.	Burke	UCDavis
Jimmy	O'Dea	Union of Concerned Scientists
Matt	Schrap	Vehicle Velocity Group
Marc	Miller	Volvo
Vincent	Wiraatmadja	Weideman Group

This was the fourth workgroup meeting to continue the discussion about the zero-emission (ZE) truck and bus market segment analysis, the assumptions and methodology on estimating the total cost of ownership for fleets, and potential barriers to charging or hydrogen fueling infrastructure. The meeting agenda, materials, presentations, and webcast recordings are available at <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-truck/act-meetings-workshops>. The primary discussion topics were as follows:

- Electric Truck Market Segment Analysis
- Initial Total Cost of Ownership
- Infrastructure Update
- General Discussion and Next Steps

The following is a brief meeting summary that highlights the major items discussed, comments made, and agreed upon action items.

Electric Truck Market Segment Analysis

CARB staff used a presentation to discuss background on the initial market segment analysis prepared by EMA and explained CARB's adjustments to the analysis used to determine potential ZE truck suitability for each segment. In summary, CARB staff showed that, based on available data and the new California weight law AB2061, range and weight issues were less of a barrier for electrification than initially assessed. Even without AB2061, to mitigate weight issues, fleet owners can move up a class of vehicle, while recognizing certain licensing issues exist when moving from Class 6 to 7 or above. Some of the segments assumed higher daily miles than typical. CARB staff removed some duplicates of barriers noted. Additionally, CARB staff added an analysis for fuel cell electric vehicles, where range would not be a concern. However, access to publicly available hydrogen fueling infrastructure would still be limited. Based on CARB staff's assessment, about 10,000 annual truck sales would be good opportunities for electrification based on the highest suited market segments, primarily in Class 4 through 7 vehicle categories, with some additional opportunities in 2B to 3 and Class 8. CARB staff's analysis is available for comment at: <https://ww2.arb.ca.gov/sites/default/files/2019-02/190225actmarketanalysis.xlsx>. The following comments were made or discussion topics raised on this topic:

- AB2061 requires a federal provision to be effective; however, another stakeholder pointed out that the federal provision had passed recently.
- Going from Class 6 to Class 7 presents a licensing issue with needing a commercial license to go over Class 6.
- Other issues may prevent going up in weight class, including turning radius.
- A question was asked if matrix represents sales numbers including manufacturers that the original CARB rule proposal would have left out due to the 1000 annual vehicle sale threshold; CARB and EMA responded that this included all manufacturer sales in CA.
- ZE truck weight may present issues with gross axle weight ratings, regardless of shifting classes, requiring heavier duty axles that could increase the cost of the vehicle that fleets may be sensitive to.
- Any shipping weight lost to ZE drivetrains can cost fleets.

Total Cost of Ownership

CARB staff presented a summary of a total cost of ownership (TCO) which walked through an initial assessment of the TCO for three truck types including battery electric, fuel cell electric, and diesel in 2018, 2024, and 2030. CARB staff walked through all assumptions used for capital costs, vehicle life, assessment period, vehicle mileage, fuel use and cost, maintenance costs, etc. CARB staff continues to seek feedback from stakeholders, however based on data that is available, the total cost of ownership appears to approach parity by the 2024 timeframe in which the first purchase requirement take effect. The document is available for comment at: https://ww2.arb.ca.gov/sites/default/files/2019-02/190225tco_0.pdf. The following comments were made or discussion topics raised on this topic:

- CARB staff should use emission factors (EFMAC) weighted by the number of vehicle miles traveled (VMT) over vehicle life versus a linear interpolation to assess changing fuel use over time as engines degrade.
- Battery replacements should be modelled at different replacement intervals
- The value of older trucks may go up disproportionately due to the Low NOx rulemaking.
- LCFS credit values should be higher than the \$125 per credit used in CARB analysis due to current market rates
- Truck useful life should be increased
- Residual value of electric trucks should be increased as market penetration increases.
- CARB should model dilution of Low Carbon Fuel Standard (LCFS) credits as market penetration increases.
- Manufacturer relayed that the 10% profit margin assumption is overstated and needs to be revisited with manufacturers individually, and that price increases year over year for platform improvements need to be accounted for.
- For electricity rates CARB needs to reflect the 5 year relaxed demand charges falling off over time
- CARB should model a high-low range of electricity costs, as some customers have direct access that have much more favorable rates.
- Some expressed concerns about the residual value assumptions used.

Infrastructure

CARB staff initiated a discussion on infrastructure. Southern California Edison, San Diego Gas and Electric, and Pacific Gas and Electric, Los Angeles Department of Water and Power gave presentations with overview of utility's current plans to support HD ZEV infrastructure and for implementing Senate Bill 350's Transportation Electrification requirements. Air Products also gave a presentation with an overview of hydrogen infrastructure options for a centrally fueled operation. Many of the utilities will pay for utility owned infrastructure upgrades up to the charger "post", with various options for customers to own that infrastructure, and some utilities are providing electric vehicle supply equipment (EVSE) rebates. Additionally, some utilities are implementing favorable charging rates, including limiting demand charges for a period of time, smoothing rate costs, and offering a subscription based rate for anticipated energy needs.

- Utilities pointed out that the forecasted number of HD ZEVs in the utility plans adopted by the CPUC for SB350 is not the same as the number of HD ZEVs required to be served, which resulted in a disparity between

- Charger rebates for some utility programs would not go to companies on the Fortune 1000 list.
- SCE SB350 funds will be recovered through rate base, affecting all customers.
- SCE clarified that their plans are “behind the fence”, so not applicable for public charging stations.
- Utilities clarified that upstream upgrades, including substation or off property transformers, would be covered by general rate cases not the individual customer.
- Fleets often have lease contract periods shorter than the utility program requirements to take advantage of the funding. There are issues with landlords taking on additional risk on the fleet’s behalf.
- Utilities clarified that the utilities would not own EVSE nor any LCFS credits generated from use of electricity as fuel.
- Implementation timelines for approved SB350 infrastructure upgrade projects can range from a few months to 24 months or more depending on needed capacity. Utilities will need to know as far in advance as possible.

General Discussion and Next Steps

- EMA believes fleets are not engaged and that CARB needs to get fleets involved in a much bigger way.
- CARB staff will update SCE rate calculation to account for relaxed demand charges falling off after 5 years.
- CARB/SCE staff will look into issues arising from fleets leasing property for periods shorter than the utility program requirements to see how property owners can be brought into the decision process to mitigate risk to utility assets and fleet risk exposure.
- CARB staff will outreach to fleets for more engagement at next workshops/workgroup meetings.
- Group members will review and provide comment on the updated Market Segment analysis and TCO discussion document.