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CEC IEPR Comments

Additional submitted attachment is included below.

California Energy Commission
Docket Office, MS-4
Re: Docket No. 19-IEPR-03
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Re: CALSTART's Comments on the California Energy Commission Docket No. 19-IEPR-03: IEPR Workshop on Preliminary Transportation Energy Demand Forecast

Introduction

CALSTART appreciates the opportunity to comment on the IEPR forecast for transportation electrification. Our comments cover both the presentations on the "Overview of Transportation Demand Forecasting: Methods & Scenarios", as well as the "Forecast Development for Medium & Heavy-Duty Vehicle (M-HDV) electrification" presentation.

On the overall methods, the diagram on slide 3 implies that "Commercial Vehicles" are all Light-Duty-Vehicles, and shouldn't be informed by the MD/HD stock forecast. CALSTART would disagree with this characterization as many commercial vehicles chosen will be Class 2 and above. WE appreciate that the methods are informed by over 2,000 commercial responses to the statewide vehicle survey.

Regarding assumptions for MD/HD vehicle attributes, slide 7 seems to suggest, that incentives are only available for *trucks* and only for on-road vehicles. We wish to note that HVIP incentivizes many vehicle classes other than trucks, including buses and large vans. We also wish to note that CARB has recently launched a new off-road vehicle incentive, the Clean Off-Road Equipment (CORE) program.

Slide 8 discusses key assumptions, including that "all vehicles drive the same number of miles regardless of their fuel type." While miles driven variation may not depend heavily on fuel type for commercial vehicles, we would encourage CEC to reconsider this assumption for M-HDVs, because the number of miles driven is in direct correlation to the present likelihood that the type of vehicle will be electrified in the near future. Therefore, miles driven should be a key input for Commercial vehicles.

CEC's Forecast Development for Medium & Heavy-Duty Vehicle (M-HDV) electrification

CALSTART wishes to comment on the following aspects of the CEC's Forecast Development for Medium & Heavy-Duty Vehicle (M-HDV) electrification, and poses a few questions for CEC Staff to consider:

A. Fuel cost per mile

How did the CEC arrive at the % Fuel efficiency increase for 2017-2030 (Diesel) on slide 16 and, what about ZEV incremental costs? We observe that usually there is an increase in Diesel (base vehicles) fuel efficiency over time but it is gradual and differ from vehicle to another. Did you consider that or assume it is the same over every vehicle? Also, we

agree that ZEV incremental costs decrease overtime, but due to the added range, more battery capacity is installed which then would likely impact the final incremental cost. So, even if the $/kWh improves, the final cost might decline but at slow rate.

B. Market share of incentivized trucks (under HVIP) in key truck classes

The High electricity demand case has full HVIP voucher amount through to 2030. Given ongoing budget constraints, and the phase-in of regulatory requirements, CALSTART does not envision an HVIP scenario where funding remains the same for all vehicle classes through 2030. Therefore, we would suggest revising this scenario.

Mid case: CEC lowered to 90% of full voucher amount from 2023 to 2030. CALSTART recommends that this should be amended to 70% since CARB is considering cutting HVIP voucher amounts immediately by 30% due to budget insufficiency for fiscal year 2019/2020.

Low electricity demand case has HVIP voucher curtailed to zero from 2023 on. While CALSTART finds that this represents a "worst case scenario", we agree that this is a worthwhile scenario to model.

For each of these cases, we would appreciate the ability to review the projections of the number of vehicles that results.

C. Battery electric bus stock projections

We note that the factor that seems to most directly affect the adoption of battery-electric buses is CARB's regulatory requirements, namely, the Innovative Clean Transit (ICT) Rule, which is actually a fleet purchase requirement requiring all transit bus purchases to be ZEVs by 2030. We also suggest that the CEC's projections should include shuttle buses as well, as CARB also recently adopted a rule covering airport shuttle buses and requiring ZEV procurement. We also observe that many transit districts are now using smaller shuttle buses and offering "new mobility" options to their customers using smaller vehicles (class 2-4 shuttles).

CALSTART would also like to raise: what are the CEC's assumptions about BEV vs. Hydrogen Fuel Cell (FCEV) bus adoption? Hydrogen-FCEVs are becoming increasingly considered by transit districts who are planning their ICT compliance, often because the infrastructure costs to support a full battery-electric bus fleet are staggering (estimates of $1 billion for the larger urban transit fleets). Therefore, we urge that infrastructure costs must be weighed into all projections, but bus projections in particular.

D. Incentivized truck acquisitions and stock

Regarding the truck data and projections presented, we observe that Class 3-8 vehicle purchases (for trucks and buses) are not linear or steady from year to year, unlike the representation in the presentation. Fleet owners add/replace vehicles with new vehicles in waves, due to many factors including available funds, life of the vehicle, and regulation.

CALSTART plans to reach out to CEC Staff to directly share the data we have at hand on how quickly certain truck classes are expected to electrify. We have new sales and vehicle stock projections that we believe could be very valuable for this investment. We are following the same MD/HD Vehicle classes outlined in slide 3, but we have more

segments within each class to represent with much more detail the variation within these classes based on the vehicle types and their operating profiles.

E. Regulatory Requirements

We found it surprising that the presentation does not mention the Airport Shuttle Rule, or the Advanced Clean Trucks rule, which is underway at CARB. We would recommend reviewing the CARB materials for their upcoming Advanced Clean Trucks workshop (August 21st), as well as the presentations from April and June. The CARB proposal calls for fairly robust requirements for OEMs to sell a certain % of vehicles in each class by 2030. *See table below as proposed in April 2019.* State Low NOx requirements, as well as federal requirements that may be introduced in the next year may change purchase decisions for ZEVs by pushing purchasers to ZEVs as the cost differential decreases between a diesel model and a BEV for certain vehicle classes.

We also recommend that CEC consider how fleet purchasing behavior might change when a regulatory deadline is looming. Once fleets become are aware of regulatory deadlines, they might change their plans and buy vehicles earlier (for example, to avoid the 100% purchase requirement for new buses in 2030—they might buy a lot of non ZEVs in earlier years).

Model Year	Class 2B-3*	Class 4-8 Vocational	Class 7-8 Tractors
2024	3%	7%	0%
2025	5%	9%	0%
2026	7%	11%	0%
2027	9%	13%	9%
2028	11%	24%	11%
2029	13%	37%	13%
2030	15%	50%	15%
*Excludes pickups until 2027 MY			

- State Low NOx requirements, as well as federal requirements that may be introduced in the next year may change purchase decisions for ZEVs by pushing purchasers to ZEVs as the cost differential decreases between a diesel model and a BEV for certain vehicle classes.
- We suggest similarly robust analysis for transit buses as was presented for school buses.

Additional Factors Recommended for Consideration in M-HDV Forecast:

CALSTART also suggests the CEC include the following factors in the IEPR Forecast for Transportation Electrification, which do not appear to factor into the current calculations, but which we find significantly impact the pace and quantity of BEV adoption for M-HDV:

1. Vehicle efficiency: we find that assumptions regarding increased battery efficiency will significantly impact vehicle cost effectiveness, in turn affecting vehicle adoption.

2. Vehicle use-cases: The presentation suggests that CEC assumptions use a fixed # of miles traveled per day/ per year. CALSTART observes that how many miles the

vehicle drives per day is a huge factor affecting conversion to ZEVs in different M-HDV classes. Therefore, we suggest these need to go beyond what is captured in the CA vehicle survey referenced in slide 12.

- The VMT numbers on slide 17 only represent the average miles traveled of each class and not individual vehicles within the class for classes 3-7: VMT differ per vehicle vocation and type. After cross-referencing the values in the CA Vehicle Inventory and Use Survey (done by Cambridge Systematics for Caltrans, Sept 2018), we are having difficulty matching the numbers CEC reports for average annual mileage and MD – HD vehicles stock. We would be happy to review this with CEC Staff further.
  - For example: based on CALSTART'S analysis there is a variation of between 24,000-65,000 in annual miles travel of vehicles within Class 3, the same in Class 4 and 5. As you know, the benefit of ZEV will occur (shorter payback period) when the vehicle is driven more.

3. Total Cost of Ownership (TCO). *TCO varies broadly within vehicle classes because of the various use cases. CALSTART could help CEC to develop TCO ranges for different vehicle segments to use in forecasting.* CALSTART is in process of completing our own proprietary TCO calculator that will allow analysis by vocation and class size. We would be glad to share our "beta" tool with CEC Staff. We also encourage *CEC to consider various additional factors that impact the TCO.* TCO is one important factor among many, it helps us to understand which ZEVs are the most attractive to buyers today and in the future. After this is analyzed, additional steps need to be followed to get an estimate on the adoption rate for each vehicle type and use.

4. Availability & Cost of Charging Stations CALSTART finds that challenges associated with infrastructure development will likely continue to be a major factor in fleet adoption of M-HD-EVs. Assuming the desired vehicle is available as a BEV, and the initial purchase cost with incentives is comparable to similar Diesel vehicle, the second step for fleet owners to evaluate their purchase decision is the vehicle is range and refueling costs, which all feed into the Total Cost of Ownership. The third consideration for fleets after costs is reliability. We suggest evaluating the projection under varying scenarios of infrastructure costs for both the charging units and the "make-ready", including the cost with and without incentives and with/ without utilities covering the make-ready costs. Whether make-ready is paid for by utilities varies depending on whether you are served by an IOU or a municipal utility.

In conclusion, assumptions regarding infrastructure cost and barriers, as well as infrastructure incentives (utility make-ready and CEC incentives) should weigh heavily into the CEC's projections. We also suggest that the classes the CEC appears to be considering are too broad, and we suggest further segmentation in the analysis. At a minimum, we suggest that CEC Staff review CARB's "Three-year Investment Plan for MD-HD, which discusses the overall "beach-head" strategy by vehicle segment. This analysis may prove helpful in developing more specific assumptions about daily and annual vehicle miles traveled for different classes and use-cases as well. CALSTART would be happy to meet with CEC staff to review the beach-head strategy and segmentation. We commend CEC Staff for digging into this challenging and complex analysis, and encourage

CEC Staff to further collaborate with colleagues at CARB and CalTrans on the various assumptions contained in the IEPR forecasting process.

Dated: August 15, 2019

Respectfully submitted,

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