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Tesla Comments Preliminary TE Demand Forecast Workshop

Additional submitted attachment is included below.

August 5, 2019

Aniss Bahreinian
Transportation Energy Forecasting Unit, Demand Analysis Office
California Energy Commission
Re: Docket No: 19-IEPR-03
1516 Ninth Street
Sacramento, CA 95814

RE: Post IEPR Workshop Comments on Preliminary Transportation Energy Demand Forecast

Dear Ms. Bahreinian:

Tesla appreciates the opportunity to provide feedback on the California Energy Commission's (CEC) preliminary transportation energy demand forecast that is developed as part of the Integrated Energy Policy Report (IEPR) and was presented at a staff workshop on July 22, 2019. The transportation energy demand forecast serves as an important input for a number of other policy efforts both at the CEC, such as for the charging infrastructure assessment being undertaken per Assembly Bill (AB) 2127), and the California Public Utilities Commission (CPUC). It is, therefore, necessary to ensure that the inputs and assumptions utilized to inform the forecast strike a balance between conservative and optimistic assumptions for electric vehicle (EV) deployment and growth. For instance, consistently underestimating the EV growth potential can facilitate a perpetuating cycle that could lead to an underbuilding of the necessary charging infrastructure and insufficient grid capacity that is needed to provide the energy to support these vehicles as a mobility option. Tesla recognizes the challenge staff faces when striking this balance and appreciates the level of input and feedback staff has sought thus far to ensure the forecast is as accurate as possible. The comments provided by Tesla herein specifically focus on two areas discussed during the workshop: 1) vehicle attributes including the battery costs outlook and 2) the commercial electrification potential for heavy-duty EVs.

Vehicle Attributes and Battery Costs

During the workshop, one of the presentations focused on the Vehicle Attributes Forecast, which includes light, medium and heavy-duty vehicles, and is utilized as one of the projected inputs for 2018-2030 in the forecast.

Light-Duty

For light-duty vehicles, the Vehicle Attributes Forecast presentation states that:

- *While press reports suggest current (battery?) costs of ~$170/kWh, analysis of Tesla financials suggest costs of ~$210/kWh. Cost reductions of 40 to 50 percent may be possible by 2030. Future cost decline rates are handled on a scenario basis.*[1]
- *Many financial houses (e.g. Bloomberg, UBS) are reporting battery costs from financial analysis and teardown analysis. Our review suggests 2018 costs of about $180 +/- $10 per kWh are reported for Tesla-Panasonic which is the most efficient producer.*[2]
- *Tesla's net cost in the vehicle may be around $210/ kWh.*[3]

[1] Vehicle Attributes Forecast, Slide 6, available at https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php
[2] Vehicle Attributes Forecast, Slide 7, available at https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php
[3] *Id.*

Tesla has not provided public data regarding its battery costs for its vehicles, whether at the cell, pack or vehicle level. In general, however, and as recognized in the assumptions for the forecast, we agree that cost for EV technology continues to decrease rapidly while performance increases. For instance, today's Tesla Model 3 vehicle has a battery with volume manufacturing cost around a quarter of the Tesla Roadster, Tesla's first production vehicle released in 2008.[4] Coinciding with dramatic price decrease, the performance of Tesla's batteries has also improved significantly. For example, the battery peak power density of the Model 3 has improved 77% over that of the Tesla Roadster.[5]

In 2010, EV battery pack prices averaged $1,000/kWh. By 2019, just seven years later, average prices dropped almost 80%. At the end of 2017, Merrill Lynch analysts predicted EVs would be cheaper than their counterparts (ICE) by 2024 and just the year prior estimated that it would take until 2030.[6] At present, Bloomberg predicts EVs may be cheaper than their petroleum counterparts by 2025 as the cost of batteries continues to fall. Bloomberg New Energy Finance's Electric Vehicle Outlook 2019 predicts continued decreasing battery pack price from $176/kWh pack today to $87/kWh in 2025 to $62/kWh in 2030.[7]

Recommendations:

- Staff should continue to focus on the higher ZEV scenario for forecasting purposes that incorporates a lower battery pack price closer to $70/kWh.[8]

Heavy-Duty

The Vehicle Attributes Forecast presentation also touches on attributes for heavy-duty vehicles including a reference to Tesla's Semi truck, a class 8 heavy-duty electric truck, which is expected to enter production in 2020.[9] Tesla generally supports the inclusion of the "heavy heavy" truck as a new addition to the forecast and appreciates staff's incorporation of this element. However, the unreasonably high cost estimates for electric heavy-duty trucks remains as an assumption. Slide 17 of the presentation indicates that battery electric trucks have a starting price of around $340,000 in 2020.[10] This price estimate is more than twice the base price for battery-electric Class 8 trucks that has been publicly announced. For example, Tesla has announced a price of $150,000 for the 300-mile range version of its HD truck and $180,000 for the 500-mile version.[11]

The source of the error seems apparent from the slide labeled "Cost comparison of Class 8B Day Cab Trucks in 2020 – Low Volume Production."[12] The table in that presentation correctly identifies the retail price of a battery electric (200+ mile range) truck as $150,000, but then it inexplicably adds the cost of components (estimated at $190,000) to retail price for a total price of $340,000. This is incorrect. The retail price as listed by a manufacturer represents the final price paid by the customer, and it includes the cost of all components and any mark-up (profit margin). The cost of components should not be added to the manufacturer's stated retail price.

[4] https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0827-9201
[5] https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0827-9201
[6] https://www.marketwatch.com/story/the-death-of-the-gas-powered-car-in-one-chart-2017-10-17
[7] Bloomberg New Energy Finance, Electric Vehicle Outlook 2019 (May 15, 2019)
[8] Light-Duty Vehicle Demand Forecast, Slide 8, available at https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php
[9] Vehicle Attributes Forecast, Slide 15, available at https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php
[10] Vehicle Attributes Forecast, Slide 17, available at https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php
[11] https://www.tesla.com/semi
[12] Vehicle Attributes Forecast, Slide 17, available at https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php

Recommendations:

- Staff should update vehicle price input for heavy-duty class 8 electric trucks to remove the additional costs of components.

Commercial Electrification Potential – Heavy-Duty Trucks

The Preliminary Medium and Heavy-Duty Vehicle Forecast presented during the workshop provides several assumptions regarding the electrification potential for heavy-duty electric trucks. One of the slides in the presentation breaks down the fuel types applied to truck classes and for Class 8 Combination (California) assumes that battery electric vehicles are in pilot production.[13] While Tesla has not begun production of the Tesla Semi-truck, we do not consider the truck as a pilot product.

Failure to adequately forecast market adoption is especially problematic for heavy-duty trucks, given that they will charge at high power factors and likely require construction of new generation and transmission capacity at even modest adoption levels. Tesla, therefore, appreciates staff's revision of the initial "mid-case" and "high-case" scenarios of zero electric Class 8 trucks sold in California by 2030. The revised scenarios presented during the workshop now include an estimate of ~5% market share of new truck sales for Class 8 electric trucks and a high case scenario of ~12% market share.[14] Given the significant development work of more than a half-dozen manufacturers to bring these vehicles to market, the default assumption that manufacturers will not sell a single Class 8 battery electric truck in California by 2030 was not realistic and we support the recognition of this within the new scenarios.

Staff's adoption forecast, however, continues to fall short of the state's own goals for adoption of zero-emission heavy-duty trucks and regulations currently under development that would mandate a zero-emission trucks as a certain percentage of sales between 2024 and 2030 model years.

At a workshop on April 2, California Air Resources Board (CARB) staff presented a proposal that would require manufactures to ensure that 9% of Class 7-8 tractor trailers sold in CA have a zero-emissions powertrain by 2027, scaling up to 15% by 2030.[15] CARB's proposed minimum requirements are higher that then revised scenarios that CEC staff has presented.

Even If the current revised forecast for heavy-duty electric trucks were adopted in the IEPR report, it is still likely that electricity regulators and utility planners would not be fully prepared to develop the infrastructure necessary to support charging of the quantity of electric vehicles CARB is preparing to mandate, potentially leading to electricity supply shortages. Adequately planning electricity investments for market adoption is especially critical for heavy-duty trucks, which are capable of charging at much higher power levels than light-duty vehicles.

Recommendations*:*

- Staff should adopt a mid-case scenario for heavy-duty electric trucks that matches the Class 7-8 tractor targets in the CARB's proposed rule: 9% in 2027, 11% in 2028, 13% in 2029 and 15% in 2030. This will allow electricity regulators and utilities to plan the grid investments necessary to achieve the mandate.
- Staff should adopt a high case scenario derived through an adoption model using retail cost estimates for HD trucks that have been publicly announced by the companies planning to sell those products.

[13] Preliminary Medium and Heavy-duty Vehicle Forecast, Slide 18, available at: https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php
[14] Preliminary Medium and Heavy-duty Vehicle Forecast, Slide 21, available at: https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-07-22_workshop/2019-07-22_presentations.php
[15] California Air Resources Board, "Advanced Clean Trucks Regulatory Workshop" presentation, April 2, 2019, at p. 31, available at: https://ww2.arb.ca.gov/sites/default/files/2019-03/190402actpres.pdf.

- Staff should adopt a low-case scenario derived through an adoption model using retail cost estimates that are higher than those publicly announced, based on staff's analysis.

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Tesla appreciates staff's consideration in updating the mid and high case scenarios for heavy-duty Class 8 electric trucks. The additional comments provided above reflect additional considerations for why the forecasted scenarios should continue to be revised. We look forward to continuing to work with staff and provide additional input as the final transportation energy demand forecast is developed for the 2019 IEPR.

Sincerely,

Francesca Wahl
Senior Policy Advisor, Business Development and Policy

Damon Franz
Managing Policy Advisor, Business Development and Policy