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May 19, 2021

The Honorable David S. Kim
Secretary
California State Transportation Agency
Submitted electronically to: CAPTI@calsta.ca.gov

**Subject: Comments on the Draft 2021 Climate Action Plan for Transportation Infrastructure**

Dear Secretary Kim,

Southern California Gas Company (SoCalGas) appreciates the opportunity to comment on the California State Transportation Agency (CalSTA) Draft 2021 Climate Action Plan for Transportation Infrastructure (Draft 2021 CAPTI). California has made substantial progress in transforming the transportation sector, the largest source of emissions in the State, and improve public health. Additionally, continued decarbonization of the transportation sector will be key to meeting the State's 2030 emissions goals and will set us on the trajectory to achieve carbon neutrality by 2045. CalSTA's technology neutral/portfolio policy approach will become more critical as California's transportation sector faces further challenges due to extreme weather events and other climate-related factors that are sure to yield substantial economic, environmental, and societal impacts. The Draft 2021 CAPTI can foster public benefits that include creating more livable communities for all Californians.

SoCalGas' comments focus on the advantages of hydrogen for heavy-duty applications and considerations about the relative costs and benefits of an exclusive public battery-electric vehicle charging network.

**Advantages of Hydrogen for Heavy-Duty Applications**

A portfolio approach to zero emission vehicles that includes both hydrogen and plug-in technologies provides drivers and fleet owners with zero emission options, and is inclusive of the only viable zero emission option in the heavy-duty sector. The heavy-duty sector consists of a variety of vehicle types and duty cycles. Plug-in technologies currently do not meet the performance and operational requirements of many heavy weight and long-range applications. Although still a developing technology, hydrogen provides inherent advantages that are more suitable for hard-to-electrify applications including, but not limited to range, weight, and refueling time.

**Range.** Hydrogen fuel cell vehicles have similar ranges to their diesel counter parts, as fuel is stored on the vehicles. This allows hydrogen trucks to travel long distances and refuel as needed because the per tank range is limited only to the tank size. Future hydrogen offerings are expected to have a variety of ranges available to fit the needs of the end users. The table below provides examples of the ranges of hydrogen trucks that will be offered by manufacturers as well as the anticipated release year. By comparison, a current model, comparable Class 8 plug-in electric truck only has a range of 124 miles per charge at full load. For reference, the average daily mileage for a drayage application is 238 miles and the maximum daily mileage is 800 miles.[1] Similar range allows a hydrogen fuel cell truck to operate like a convention diesel truck.

| Hydrogen Truck Manufacturer & Model | Anticipated Release Year | Range on Single Tank (miles) |
|---|---|---|
| Hyundai XCIENT | 2022 | 248[2] |
| Kenworth T680 | TBD | 350[3] |
| Nikola Two | 2024 | 900[4] |

**Refueling time.** One of the barriers of plug-in electric trucks is the slow charging time, which often takes several hours. However, hydrogen-powered trucks can refuel in similar times as a gasoline car[5] or diesel truck, depending on the tank size. Comparable fueling times allows for continual use of the truck, with minimal downtime.

**Weight.** Plug-in electric trucks are significantly heavier than conventional diesel trucks. The additional batteries and components result in more than 12,000 pounds of incremental weight. The excess weight then limits the amount of payload a truck can carry because of weight limits on roads and highways. Therefore, this will require more trucks to do the same job, which significantly reduces efficiency and profitability. In comparison, the

[1] San Pedro Bay Ports, *Clean Air Action Plan: 2018 Feasibility Assessment for Drayage Trucks*, March 2019. Available at https://cleanairactionplan.org/documents/final-drayage-truck-feasibility-assessment.pdf/.

[2] John Hitch, *Hyundai plans to introduce HD hydrogen truck to U.S. by 2022,* Fleet Owner, 28 September 2020. Available at https://www.fleetowner.com/equipment/trucks/article/21143080/hyundai-plans-to-introduce-hd-hydrogen-truck-to-us-by-2022#:~:text=Hyundai%20will%20have%2050%20fuel,starting%20in%20California%20next%20year.&text=The%20first%20fleet%20customers%20are%20expected%20to%20have%203%2C000%20to%205%2C000%20trucks.

[3] https://www.kenworth.com/about-us/news/pikes-peak-video/

[4] Nikola, *Nikola Details North American Fuel-Cell Vehicle Program: Zero-Emission Vehicle Portfolio Lineup Includes a Re-Engineered Cabover and a Projected 900-Mile Range Sleeper,* 23 February 2021. Available at https://nikolamotor.com/press_releases/nikola-details-north-american-fuel-cell-vehicle-program-112#:~:text=The%20Nikola%20Two%20FCEV%20Sleeper,haul%20zero%2Demission%20commercial%20transportation.

[5] U.S. Department of Energy Office of Energy Efficiency & Renewable Energy, *5 Things to Know When Filling Up Your Fuel Cell Electric Vehicle,* 19 July 2016. Available at https://www.energy.gov/eere/articles/5-things-know-when-filling-your-fuel-cell-electric-vehicle.

Kenworth T680 fuel cell electric truck for example, has an incremental weight or 3,000 to 4,000 pounds.[6]

**Plug-in Technologies May Not Replace Vehicles at a One-to-One Ratio**

Because of the limitations of plug-in electric trucks mentioned above about a quarter of the range, hours of being out of service to charge and a significantly reduced payload these trucks simply do not replicate the replace a diesel truck .

When planning for a zero-emission transportation infrastructure, CalSTA must consider that plug-in electric trucks may not replace diesel trucks on a one-to-one basis. Several studies have shown that, with the state of the current plug-in electric trucks, it will likely take more than one plug-in electric vehicle to replace an existing vehicle. For instance, a 2020 University of California, Davis study found that, because of several factors limiting performance of plug-in electric truck such as range, refueling time, and payload capacity, a fleet of 19 diesel drayage tucks would have to be replaced by 36 zero-emission drayage trucks – a one-to-1.7 replacement ratio.[7] Additionally, a Los Angeles County Metropolitan Transportation Authority (LA Metro) study concluded that LA Metro would require replacement at a one-to-1.17 ratio.[8]

When planning for infrastructure, it should be noted that that replacing diesel trucks with plug-in electric technologies will require more trucks on the road necessitating more infrastructure to accommodate a larger overall fleet. Additional infrastructure may be in the form of more or larger charging stations to prevent queuing. Furthermore, plug-in electric trucks are expected to cost approximately $350,000[9], which is almost $200,000 more than a new diesel truck. If 1.7 trucks are needed to replace one diesel truck, then the plug-in electric truck is almost three times as expensive at $595,000. By comparison, a hydrogen fuel cell truck is estimated to cost $539,000 in 2024.[10] Fuel cell trucks are about 4 times as expensive as their diesel counterparts but can replace them closer to a one-to-one ratio and therefore are actually the less expensive zero emission alternative for diesel replacements.

**The Cost of Public Charging Infrastructure for Heavy-Duty Vehicles Is Unknown**

Large scale heavy-duty vehicle charging is a developing market. There has yet to be an assessment of the business model and the cost of public charging for heavy-duty vehicles. This is critically needed because heavy-duty trucks today rely heavily on the vast public fueling network. The business model for depot charging is relatively predictable; however, there remain significant questions about public charging for heavy-duty vehicles. For instance, for depot charging, the

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[6] Alex Crissey, *Kenworth Talks Hydrogen Fuel Cells, Battery Electric Trucks And Where Both Fit In,* Fleet Equipment, 26 October 2020. Available at https://www.fleetequipmentmag.com/kenworth-electric-hydrogen-fuel-cell/#:~:text=With%20hydrogen%2C%20the%20amount%20of,like%203%2C000%20to%204%2C000%20lbs.

[7] Genevieve Giulliano, Maged Dessouky, et al., *Developing Markets for ZEVs in Short Haul Goods Movement,* UC Davis: National Center for Sustainable Transportation, 2020. Available at https://escholarship.org/uc/item/0nw4q530.

[8] James T. Gallagher, *Report Prepared for Los Angeles County Metropolitan Transportation Authority: Zero Emissions Bus Options: Analysis of 2015-2055 Fleet Costs and Emissions*, Ramboll Environmental, 14 September 2016. Available at https://media.metro.net/board/Items/2016/09_september/20160914atvcitem4.pdf.

[9] San Pedro Bay Ports, *Clean Air Action Plan: 2018 Feasibility Assessment for Drayage Trucks*, March 2019. Available at https://cleanairactionplan.org/documents/final-drayage-truck-feasibility-assessment.pdf/.

[10] Advanced Clean Trucks Total Cost of Ownership Discussion Document, CARB 2018

California Air Resources Board assumes a cost of 10 to 20 cents per kilowatt hour for vehicle charging, depending on the utility provider.[11] In addition to the per kilowatt hour cost, a public charging station owner would have to pass on the overhead costs to the public. These overhead costs include a land lease, infrastructure, and charging equipment, as well as a margin for profit. With these variables, the ultimate cost per kilowatt hour to the end user is currently unknown. By comparison, hydrogen refueling can be added to existing fuel stations and/or can slowly replace diesel stations entirely using the same footprint and fueling model.

Thank you again for the opportunity to comment on the Draft 2021 CAPTI. SoCalGas offers these comments in the spirit of collaboration and looks forward to working with CalSTA in implementing the actions included in the CAPTI.

Respectfully,

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[11] California Air Resource Board, Advanced Clean Trucks Total Cost of Ownership Discussion Document, 2019. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-06/190225tco_ADA.pdf