



December 8, 2019.

Mary Nichols, Chair California Air Resources Board
1001 I Street Sacramento, CA 95814

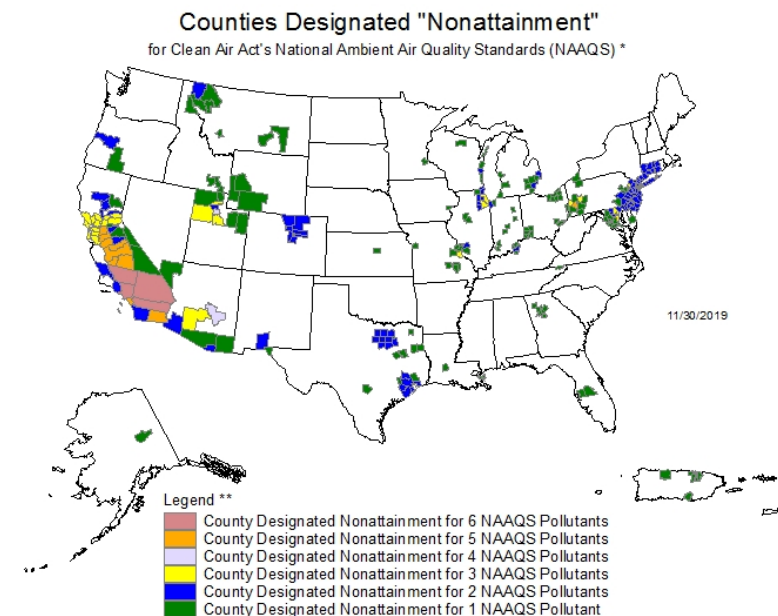
RE: Supplementary Comments in Support of a Stronger Advanced Clean Trucks Rule

Dear Chair Nichols and Members of the Board,

CEERT (The Center for Energy Efficiency and Renewable Technologies) appreciates the opportunity to offer these supplementary comments on the proposed Advanced Clean Trucks (ACT) regulation and

commends CARB for initiating this critically important rulemaking process that should catalyze a large-scale transition to zero-emission technology in trucks. These comments are supplementary to other comments that CEERT has jointly submitted with the **Advanced Clean Trucks Coalition** and separately with the **Central Valley Air Quality Coalition**.¹

California consistently suffers from the worst air quality in the nation with over 90 percent of its residents living in unhealthy air.² Significant portions of the state are in violation (aka: in non-attainment) with what are deemed to be the ozone and particulate matter standards for safe air under the federal Clean Air Act. Nationally, the list of regions in violation is also growing.³



Guam - Piti and Tanguisson power stations are designated nonattainment for the SO2 (1971) NAAQS
Piti and Cabras power stations are designated nonattainment for the SO2 (2010) NAAQS

* The National Ambient Air Quality Standards (NAAQS) are health standards for Carbon Monoxide, Lead (1978 and 2008), Nitrogen Dioxide, 8-hour Ozone (2008), Particulate Matter (PM-10 and PM-2.5 (1997, 2006 and 2012), and Sulfur Dioxide.(1971 and 2010)

** Included in the counts are counties designated for NAAQS and revised NAAQS pollutants. Revoked 1-hour (1979) and 8-hour Ozone (1997) are excluded. Partial counties, those with part of the county designated nonattainment and part attainment, are shown as full counties on the map.

¹ <https://www.arb.ca.gov/lists/com-attach/46-act2019-AGFQNVciWFQHYgNs.zip>,
<https://www.arb.ca.gov/lists/com-attach/28-act2019-VTRVMF0oBQkLbI9.pdf>

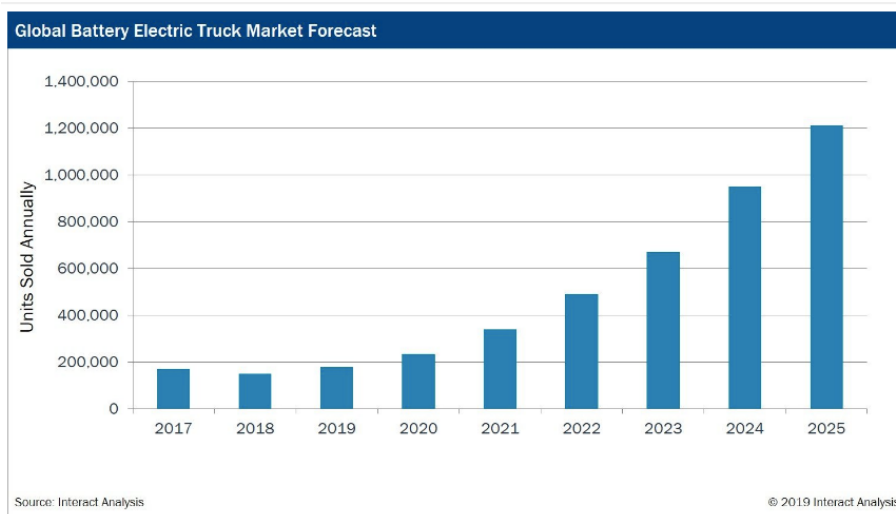
² American Lung Association's State of the Air Reports for 2019 and prior years, eg See: American Lung Association. State of the Air. April 2019. www.stateoftheair.org

³ <https://www3.epa.gov/airquality/greenbook/mapnpoll.html>

The majority of the fuel used to run trucks in California is derived from petroleum with diesel being dominant. Trucks account for the largest source of NOx emissions (a precursor to ozone and secondary particulate matter) and account for a significant portion of the State’s global warming pollution. (Transportation is the largest source of climate pollution at roughly 50% of the state’s total emissions.) The latest “Emissions Gap Report” of the UN Environment Program⁴ paints a bleak picture of the world’s progress on addressing global warming pollution since the Paris Accords of 2015. If the world is to keep global warming below 2°C it will need to make cuts in pollution that are both deeper and at a faster rate than ever before. (According to the Report the emissions of global greenhouse gases have grown by 1.5 percent every year during the last decade. In order to remain within relatively safe climate limits, GHG pollution emissions must decline sharply, by 7.6 percent every year, between 2020 and 2030.) This recommends that CARB strive to establish a strong Advanced Clean Trucks Rule that can ensure that no fewer than 15 percent of trucks on the road by 2030 are zero-emission.

Current Snapshot of Zero Emissions Truck Sales and the Importance of Setting Clear and Stringent Targets

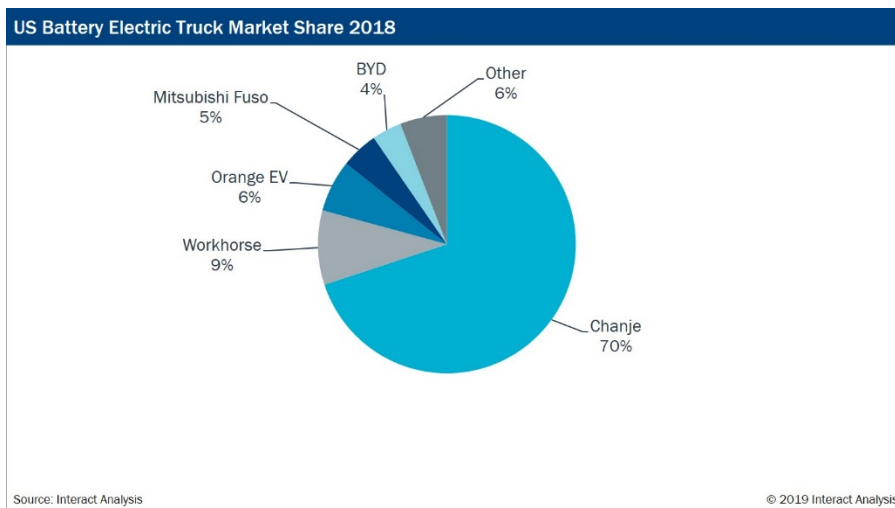
Zero-emission (ZE) battery electric trucks are technically and economically feasible in many applications today and by the initiation of this proposed rule in 2024, will be feasible for the majority of truck applications in the state. (Zero-emission Fuel Cell electric trucks are not far behind.) But it will be essential that truck makers are manufacturing sufficient volumes of vehicles to meet the growing demands of truck operators to put zero-emission vehicles in service and to take advantage of their many benefits needed to also meet the state’s climate and air quality goals. This requires establishing clear stringent targets for future truck sales.



The research firm Interact Analysis has predicted that starting this year the global electric truck market will experience a multiyear run of double-digit growth. This more than six-fold growth – from 180,000 units in 2019 to 1.2 million units in 2025 – is expected to be led largely by sales in China. Electric truck sales are expected to account for

less than 1 percent of new US domestic truck sales in 2025, contrasted against about 5 percent sales, globally.

⁴ <https://www.unenvironment.org/interactive/emissions-gap-report/>



Interact Analysis noted that the market is currently dominated by smaller independent specialists that are delivering medium and heavy-duty electric truck models to market. However, Interact Analysis expects the larger established manufacturers to play an increasingly significant role in future market growth. Interact Analysis expects **US**

domestic market growth to be slower than in Europe or Asia because of lower diesel prices and the lack of any significant regulatory push domestically. The more stringent emissions regulations in Asia and Europe are expected to play a major role in driving non-domestic sales.^{5, 6} This speaks loudly to the need for California to establish stringent targets for the Advanced Clean Trucks Rule in order to further foster and accelerate the development of the market for Zero Emission Trucks.

The TCO of Fuel Cell Electric Trucks Will Continue to Improve With Time

As noted in the most recent ACT Coalition comment letter, the cost of batteries is the largest contributor to the incrementally higher cost of battery electric trucks compared to diesels. But battery costs are declining rapidly. Fuel cells and hydrogen fuel tanks similarly contribute the largest cost to the price of a vehicle. OEMs have already realized considerable reductions in the costs of these components⁷ and there is a concerted effort to continue to reduce these costs.⁸ The vehicle classes under consideration in this rulemaking have vast differences in operating patterns, power, duty cycles, and business models. In the world of fuel cell electric vehicles all applications are needed and complimentary to one another – helping the broader market reach economies of scale and therefore sustainability in a shorter timeframe than if a singular deployment of one or the other. A limited example of this is that light-duty fuel cell vehicles will help drive down component costs for heavy duty⁹ and heavy duty fuel cell vehicles will help drive down hydrogen fuel and infrastructure costs for light duty. We emphasize this point because the core power-plant, the fuel cell, has been demonstrated to integrate into both light- and heavy-duty

⁵ <https://www.trucks.com/2019/01/15/electric-truck-market-fast-growth/>, <https://cv-export.com/news/2019-electric-trucks.html>, <https://www.interactanalysis.com/hybrid-electric-trucks-and-buses-2019/>, <https://www.interactanalysis.com/battery-electric-truck-market/>

⁶ <https://www.ccidigital.com/meritor-electric-was-underestimated-batteries-legislation-driving-growth/>

⁷ <https://www.energy.gov/eere/fuelcells/fact-month-april-2018-fuel-cell-cost-decreased-60-2006>

⁸ https://www.hydrogen.energy.gov/pdfs/review19/plenary_fuel_cell_papageorgopoulos_2019.pdf, https://www.hydrogen.energy.gov/pdfs/review19/plenary_overview_satyapal_2019.pdf, <https://www.osti.gov/pages/servlets/purl/1489250>, <https://www.mdpi.com/2075-1702/7/4/66/htm>

⁹ The Kenworth/Toyota Class 8 fuel cell electric truck uses 2 of the same fuel cell stacks that equip the Toyota Mirai FCEV. <https://blog.toyota.co.uk/toyota-mirais-hydrogen-fuel-cell-trucks>, <https://publications.anl.gov/anlpubs/2018/06/144774.pdf>

applications. The light-duty vehicle market represents potential for scaling up production volumes of fuel cells, illustrated by increased production of automobiles, and the heavy-duty market represents potential for scaling up production volume of hydrogen, due to a significantly larger per-vehicle fuel uptake. Allowing both markets to scale simultaneously, should decrease the total cost of ownership of a hydrogen fuel cell powered vehicle in all vehicle classes through the enabling of aggregate economies of scale.

Fueling Infrastructure Can be Available for Fuel Cell Trucks

While a program similar to the SB 350 Transportation Electrification program at the CPUC¹⁰ does not exist for fuel cell electric vehicles (including trucks) using hydrogen, global standards have been set in support of light-duty fuel cell electric vehicles – and 43 retail hydrogen fueling stations have now been deployed in California with a further 19 due to come online during 2020. Additionally a group of automotive and industrial companies – and also including the standards setting organizations SAE International, the Industry Standards Organization and the Canadian Standards Organization – have begun working in earnest to develop a consensus on standards for hydrogen-fueling components (fueling nozzles, vehicle receptacles, dispenser hoses and other components, etc.) that could allow fuel-cell electric trucks to become mainstream sooner rather than later¹¹ and all with an eye towards establishing the foundations of a fueling network for hydrogen that can support the regional and long-haul travel of MD/HD vehicles.¹² This effort will also help with cost reduction because it allows for industry-wide equipment standardization, component supply network development, and scaled-up manufacturing.¹³ LCFS credits and the other financial incentives previously mentioned in the ACT Coalition letter should also be made available to help pay for fuel cell electric trucks and hydrogen fueling infrastructure including the HVIP program, CEC Clean Transportation Program, AB 617 grants, local AQMD grants, and others.¹⁴

A Stronger Rule Will Stimulate California’s Economy While Clearing the Air

As noted in the Advanced Clean Trucks Coalition letter, by requiring the production of higher volumes of ZE trucks, a stronger rule will reduce truck costs sooner by increasing economies of scale and sending a signal to the markets that will incentivize the investments needed to risk accelerating technical innovation; thereby lowering battery, fuel cell stack and other costs associated with the successful commercialization of ZE transportation technologies. Moreover, CARB by establishing stringent targets under the ACT rule can act on a historic opportunity to further significantly reduce a major source category of climate and toxic air pollution.

We would greatly appreciate your consideration of strengthening this rule now.

Sincerely

John Shears

Consultant on Climate, Clean Transportation and Alternative Fuels

CEERT (The Center for Energy Efficiency and Renewable Technologies)

¹⁰ SB 350 (De León, Chapter 547, Statutes of 2015), <https://www.cpuc.ca.gov/sb350te/>

¹¹ <https://www.trucks.com/2019/02/21/toyota-nikola-hydrogen-truck-fueling/>

¹² <https://www.trucks.com/2019/11/12/hyundai-nikola-toyota-build-hydrogen-highway/>

¹³ <https://cafcg.org/sites/default/files/MDHD-action-plan-2016.pdf>

¹⁴ https://gspp.berkeley.edu/assets/uploads/page/Funding_Programs_Summary_final_August_29.pdf