California wants large percentages of New Trucks to be Zero Emissions by 2035 - Is it possible?

Yes, but the state needs to follow through on Infrastructure, Grants and Coordination Commitments.

California truckers were already worried: Changes in state environmental and employment regulations, long hours, low pay and the recent global pandemic have seen thousands of drivers retire early or leave the industry[(1)], which has led to trucker shortages[(2)] and calls for self-driving big rigs.[(3)] Higher fuel prices have also added to truckers' woes and to inflation statewide. This is a problem for California's economy where 77% of communities rely solely on trucking for the movement of their goods.[(4)]

Recently, the California Air Resources Board (CARB) created more waves in these troubled waters with its new federally approved rule that requires 40 to 75% of new truck sales (vehicle weight dependent) to be zero emissions by 2035.[(5)] And CARB is not finished there. Its Advanced Clean Fleets (ACF) regulation, slated for adoption on April 28, 2023, seeks to require approximately 532,000 (142,000 Class 2b – 3, 225,000 Class 4 – 8 and 164,000 class 7-8) of the estimated 1.8 million trucks operating in California daily, to go zero emission between 2024 and 2045.[(6)]

These regulations are not "nice-to-haves" for California – they are air quality, climate and equity must-haves! Trucks emit roughly 35% of total nitrogen oxide (NOx) and 9% of total greenhouse gases (GHG) statewide annually. [(7)] They also emit approximately 23% of fine particulate matter (PM2.5) from California's mobile sources on an annual basis[(7)]. For decades, NOx emissions have resulted in the Ozone that creates unhealthy breathing environments for large portions of the state, especially the San Joaquin Valley and Los Angeles. Tail pipe greenhouse gases are contributing to what appears to be an increasingly bleak future in a "business-as-usual" scenario (soaring temperatures, worse air quality, more frequent wildfires, sea level rise, etc.) Fine particulate matter - PM2.5 - especially from truck engines, can infiltrate the lungs and cause multiple adverse health effects including cancer.

And the risk from this air pollution is not uniformly distributed across California's residents! CARB studies have shown that Black, Latino and disadvantaged communities are subject to significantly greater impacts from PM2.5 from mobile sources than White populations. [(8)] Much of this exposure is due to historic redlining policies which placed these communities adjacent to industrial areas, such as at the San Pedro Bay Ports and the Port of Oakland. *To address these issues, California simply had to act.* But are the state's goals attainable?

Medium and heavy duty zero emissions truck deployment is in its infancy in California. The California Energy Commission (CEC) estimated in Q2, 2022, that fewer than 2,000 medium and heavy duty zero emissions vehicles were operating in California; only approximately 25% of

those being trucks and vans.[9] The good news for truckers, is that the vehicles currently in service are highly functional across multiple duty cycles and weight classes – and they are being offered by major manufacturers: Renault, Volvo, Daimler Benz, Tesla (Battery Electric), Hyundai and Toyota (hydrogen). While initial cost and weight to cargo capacity ratios are currently issues, industry observers and academic institutions like UC Davis see them as being short lived.[10] Also, the total cost of ownership of these vehicles should be at parity or even less than a diesel truck.

CARB's ACF regulation mostly targets vehicles doing 100 to 200 miles daily - duty cycles for which zero emissions trucks (ZETs) make sense. Government, Federal and High Priority fleets (over 50 vehicles or over $50 million in revenues) make up a large portion of those trucks subject to the rule. Those fleets: 1) are most likely well capitalized, 2) have professional staff who can manage grants and compliance deadline juggling, 3) are already making ZET purchases for internal GHG reduction goals, and 4) may already have power capacity for truck charging.

The rule also targets drayage truck fleets because of their location, mostly next to black, latino and disadvantaged communities. Joe Rajkovacz, Western States Transport Association, Environmental Affairs and Communications Director, estimates over 90% of those trucks are owned in fleets of 20 or fewer. He believes these fleets will struggle to comply with the rule given the early requirements for drayage trucks (starting in 2024), the complexity of applying for incentives and the current lack of fueling infrastructure at their parking locations.

Superfast charging or hydrogen fueling may ease these concerns but not in the first years of the rule. There is also less flexibility for drayage trucks in the ACF when compared to other fleets and this may already be having unintended consequences. Anecdotally, I have heard that many fleets are buying new diesel trucks now, to get ahead of the ACF's registration deadline. This will allow them to take maximum advantage of the useful life of those vehicles (800,000 miles or 18 years old) and will prolong, not shorten exposure to diesel emissions in the state. If this proves to be true, it is a lost opportunity and the opposite of what the ACF intends.

A big question is does the technology work? To check, I went to see Bill Aboudi, the owner of Oakland Maritime Support Services (OMSS) at the Port of Oakland, who has operated two Orange ZETs since 2018. These trucks move containers and chassis in the OMSS yard and were purchased using state and local grants. This halved their initial cost, making them in Bill's words, "cheaper than a diesel!" Charging infrastructure for the two trucks wasn't an issue either. The OMSS site had surplus power and only needed a 60-amp breaker circuit to install a single charging plug. Bill and his mechanic love these trucks. They are quiet, powerful and maintenance free – neither needing anything other than new tires and a manufacturer recommended hydric compressor upgrade since entering service. They operate 24/7 at the site, only charging when not in use. Bill isn't sure but believes his total cost of ownership is less than diesel, factoring in zero maintenance and some funds from the low carbon fuel standard (LCFS) credit.

Sounds ideal but here is where the success story begins to falter. In 2022, Bill was awarded grants for two additional electric drayage trucks but has spent almost 6 months trying to get infrastructure grants and a power installation plan from PG&E!

For California to succeed in its ZET transition, availability of Infrastructure and access to Incentives are crucial. ZET **i**nfrastructure has three critical components: 1) availability of sufficient grid power and hydrogen fuel; 2) the ability to get that fuel to the trucks that need it; and 3) trained technicians to service those vehicles. At its October 27, 2022, hearing on the AFR, the CARB Board received assurances from both the CEC and the California Public Utilities Commission (CPUC) that the grid and hydrogen fueling infrastructure will be ready to handle the additional fueling required.

CEC stated that the load on California's grid from the adoption of the AFR would be 2.6% of total electrical consumption and 1.2% of peak electric demand in 2035. It noted that it was working with CPUC, Investor-Owned Utilities (IOUs), and California's Independent Systems Operator (CASIO), to ensure sufficient grid power is available for the ACF and other CARB regulations. Similarly, it is looking at hydrogen as required by Senate Bill 643[(11)], to ensure vehicle fueling infrastructure and fuel production support the adoption of zero emission trucks, buses, and off-road vehicles.

This should comfort those worried about grid brown outs and hydrogen fuel shortages. We all hope the state, CASIO and the IOUs have learned enough from the power emergencies of 2021 and 2022[(12)] to ensure that there is surplus grid energy available for ZETs when demand is highest. Otherwise, when electrical demand gets tight, the state may just be exchanging one form of diesel pollution (truck exhaust) for another (ship and backup diesel engines).

CPUC stated that it has been working on site energization issues (getting power from the grid to chargers). As a result of Assembly Bill 841,[(13)] the Commission now requires that IOUs pass the costs of energizing sites "before the meter" to rate payers.[(14)] CPUC also recently established a 125 day average connection time requirement for IOUs to bring power to new charging sites.[(15)] Again, all good news, but look at the fine print. The IOUs have multiple options to stop the clock, and this may be the major stumbling block for ACF implementation, especially for small fleets and drayage truckers. California is already short on truck parking[(4)] and what is available for example, at the Port of Oakland, is underserved by electricity and hydrogen infrastructure.

I spoke to Dr. Matt Miyasato, Vice President for Strategic Growth and Government Affairs at First Element Fuel, Inc. regarding the roll out of hydrogen truck fueling. Matt was confident about hydrogen's ability to meet trucker's duty cycle needs but did identify two key challenges: 1) local permitting of hydrogen stations is slow; and 2) station builders must have confidence that there will be enough demand to make an infrastructure investment. A real "chicken and the egg" conundrum.

This conundrum is also reflected in the third leg of the infrastructure stool where not enough technicians are currently available to support the full breath of the ACF. However, I expect that

this challenge will be short lived, as manufacturers will have no choice but to support their customer's new trucks.

Infrastructure or technology edge cases should not be held up as reasons the ACF will not work, but the state needs to be aware of how the use of exemptions will be perceived. The ACF has allowances for fleets not to comply if infrastructure or technology is not there. However, this will likely create friction with environmentalists who already think the scope and speed of rule implementation are too narrow and too slow. Truckers who have spent money to comply, may also cry foul. This will create an unprecedented communications challenge for CARB and its state partners, who will have to explain why one fleet must comply versus another.

On incentives, the state has put together an impressive portfolio which includes a $10 billion commitment from the current Governor over the next five years towards the transition of California's fleet and grid to carbon neutrality. These dollars are backed by additional Federal and local grant funding, tax rebates and credits from the low carbon fuel standard. While all this funding is certainly necessary, it is spread across multiple agencies: CARB, CEC, CPUC, local air districts, community choice aggregators and the federal government. This matrix is so convoluted that it has spawned a cottage industry of consultants who, for a portion of the grant or credit funding received, do the applications and reporting for those too bewildered to navigate the options. Certainly something not envisioned by the state!

Conclusions

While CARB, CEC and CPUC have all committed to providing technical support to fleets regarding incentives, installation of infrastructure and technology selection, **the agencies should also commit to changing the current grant's structure to simplify it**. Stakeholders (state agencies, air districts, legislative staff, lobbyists, environmentalists, and industry) have long avoided cleaning up and simplifying the laws providing grants for fear of upsetting the funding apple cart. However, this is flawed thinking. Many of these programs have decades of excellent performance, but stakeholders should not be afraid of proposing changes to them, especially if those changes help end users. CARB needs to be considering this, unless of course it believes that the fight over this rule won't spill over into the California Courts and Legislature?

Finally, at the October 2022 ACF meeting, CARB staff talked about a joint statement on coordination between it, CEC and CPUC. This may be unprecedented and a welcome acknowledgement of the mammoth task ahead. But does anyone understand what exactly is being committed to or if it will get the job done?

In my time at the Bay Area Air Quality Management District (BAAQMD), we adopted many technology forcing rules. As those leaps became larger, we understood that real dialogue with and input from impacted stakeholders and communities, was the key to successful rule implementation. BAAQMD's latest rule, requiring a future phaseout of water and space heaters

that use natural gas, has a provision for an Implementation Working Group. This group is tasked with ensuring the rule is working, and if not, proposing amendments to it.[16]

BAAQMD is not the only place where such models are working. I spoke to Ms. Margaret Gordon, Co-Founder and Director of the West Oakland Environmental Indicators Project (WOEIP) about the Port of Oakland's (Port) Sustainability Collaborative. She explained that in pushing for the elimination of diesel use at the Port - community, industry, environmental justice and local government (air district, City, Port and transportation agency) representatives were working together as equals under a formal agreement. The parties share information on zero emissions technologies and infrastructure, work on grants to support their deployment and learn together about what will or will not work in various duty cycles. Ms. Margaret firmly believes that this example could be used as a model for ACF implementation. Her message was simple "You need to come, sit, and learn at our table!"

CARB and its state partners should convene a "rule implementation working group" as part of the ACF's roll out. This group should be structured as an equal partnership between stakeholders with the power to request rule changes from the CARB Board when things are not working. Such a body would provide the transparency that will be needed in the ACF's roll out. BAAQMD's implementation working group "may include community-based organizations, environmental justice groups, advocacy, and subject matter expert organizations, ….technology experts, ….local and state government staff, funding and financing agencies, equipment manufacturers and distributors, …..representation organizations and labor organizations." Not a bad list - CARB, CEC and CPUC - if you are reading this!

(1) Trucker Shortages
- https://www.nytimes.com/2022/02/09/business/truck-driver-shortage.html
- https://www.cnbc.com/2022/07/05/why-driving-big-rig-trucks-isnt-a-job-americans-want-to-do-anymore.html
- https://www.forbes.com/sites/jackkelly/2022/01/12/there-is-a-massive-trucker-shortage-causing-supply-chain-disruptions-and-high-inflation/?sh=203b0675ec44
- https://www.npr.org/sections/money/2021/05/25/999784202/is-there-really-a-truck-driver-shortage
- https://www.cbsnews.com/news/truck-driver-shortage-biden-administration/

(2) ATA Trucker shortage report
- https://trucking.org/news-insights/ata-chief-economist-pegs-driver-shortage-historic-high

(3) California Legislature battle looming on self-driving big rigs:
- https://www.latimes.com/business/story/2023-01-31/self-driving-semis-california-rules-legislation

(4) Percentage of California communities solely dependent on trucking for goods movement:
- https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/freight-planning/plan-accordion/catrkpkgstdy-finalreport-a11y.pdf

(5) Advanced Clean Truck Regulation approved by USEPA
- https://www.gov.ca.gov/2023/03/31/with-biden-administration-approval-california-ushers-in-new-era-of-clean-trucks/

(6) Proposed Advanced Clean Fleets Rule Requirements
- ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-summary

(7) California Emissions Summaries:
- https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/isor.pdf
- https://ww2.arb.ca.gov/ghg-inventory-graphs
- https://ww2.arb.ca.gov/applications/mobile-source-emissions

(8) Exposure disparities for Black, Latino and Disadvantaged Communities
- Page 25 - https://ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf

(9) Numbers of Zero Emissions Vehicles deployed in California
- https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/medium-and-heavy

(10) UC Davis outlook on Zero Emissions Trucks
- https://www.ucdavis.edu/climate/news/5-questions-answered-about-electrifying-trucks

(11) Senate Bill 643
- https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB643

(12) Governor's 2021 and 2022 emergency declarations:
- https://www.gov.ca.gov/2021/07/30/governor-newsom-signs-emergency-proclamation-to-expedite-clean-energy-projects-and-relieve-demand-on-the-electrical-grid-during-extreme-weather-events-this-summer-as-climate-crisis-threatens-western-s/

- https://www.gov.ca.gov/2022/08/31/as-heat-wave-grips-western-u-s-governor-newsom-takes-action-to-increase-energy-supplies-and-reduce-demand/

(13) Assembly Bill 841
- https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB841

(14) Rule requiring utilities to charge rate payers for energization cost "before the meter"
- https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M413/K061/413061495.PDF

(15) Energization time clock requirement
- https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-takes-action-to-support-transportation-electrification

(16) BAAQMD Rule Implementation Working Group
- Page 47 - https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces/2021-amendments/documents/20230307_fsr_rules0904and0906-pdf.pdf?la=en

About the Author:

Damian Breen is the founder of Environmental Communication Strategies and former Deputy Executive Officer of the Bay Area Air Quality Management District. He played a pivotal role in the implementation and enforcement of the CARB's original drayage truck rule at the Port of Oakland in the early 2000's. He has worked at the crossroads of the technological future, people, business and the environment for over 29 years. For more information on this article: damian@ecs-ca.com