



Why Lowering the ACF Tractor Fleet Threshold to 10 is Necessary and Feasible

White Paper 1-6-23

At the CARB Board Hearing on October 27 2022 to consider the ACF rule, there was considerable discussion on whether to adopt Alternative II and the recommendation in the letter from over 30 state legislators to lower the tractor fleet size from to 10¹. This document seeks to address the questions raised in this discussion.

Executive Summary

Reducing the fleet size threshold for tractors to 10 in the high priority portion of the proposed ACF rule will

- Reduce NO_x and PM 2.5 emissions by 16% and GHG emissions by 13% for tractors.²
- Significantly reduce driver misclassification for fleets from 10-50 by being protected by the “common ownership and control” language in the rule.

¹ [365-acf2022-AWcHaARrADJXPQVa.pdf \(ca.gov\)](#)

² [133-acf2022-WjsFYARjWFQBc1U9.pdf \(ca.gov\)](#)

While several Board members at the first hearing indicated they favored this change, two of the most significant questions expressed by other members seemed to be

1. Would this be an unfair burden on smaller fleets?
2. Would this cause too much additional administrative workload for staff?

Impact on smaller tractor fleets

The scope of what tractor fleets from 10 – 50 will need to do to comply with the rule is quite modest. For tractors, the earliest compliance milestone is in 2027 when 10% of a fleet must be ZEV trucks. A fleet of 50 trucks only needs to have 5 ZEVS and will only require no more than 5 depot chargers. (In some situations, chargers can be shared or public chargers can be used.) A fleet of 10 trucks only needs one ZEV with no more than one charger. The next milestone is not until 2030 at which time the fleets will need to have 25% of their trucks as ZEVs. For a fleet of 50 trucks that will only be an additional 8 by then.

These fleets will have until 2027 before they need to have ZEV trucks on the road because of the ACF. Over the next 4 years, they can take 2 years to plan and then 2 years to implement their plan to be in compliance by 2027.

These fleets will realize significant total cost of ownership (TCO) savings going to electrics. To take a more extreme case as an example, the results of a recent study, though counter intuitive, showed that in 2025 the TCO of a new battery electric class 8 day cab costing \$205,000 is significantly less costly than a used diesel costing \$35,000. **The electric day cab will save \$170,893 or 30% over the TCO cost of the used diesel** when including the new \$40,000 Federal Tax Credit provided through the Inflation Reduction Act (IRA).³

Another option requiring essentially no capital would be to lease the vehicles from a truck-as-a-service (TaaS) vendor which would provide the trucks, charging infrastructure, maintenance and other services for a monthly fee. Some of these companies are welcoming and targeting smaller fleets to meet their unique needs such as Zeem Solutions and Forum Mobility. Forum has stated, “We are committed to helping the smallest of fleets convert to electric zero emission economically.”

Fleets of tractors 10 to 50 would continue to qualify for state and federal financial support programs for infrastructure including the CEC’s **EnergIIZE Commercial Fleets** “Jump Start” program, utility programs that were initially approved for \$740 million through 2024 and now are approved for an additional \$700 million for 2025-2030⁴, for the federal purchase incentive of up to \$40,000 per vehicles and infrastructure incentives of 30% of up to \$100,000 per charger through 2032 provided by the Inflation Reduction Act and many others. Starting in January 2024, only fleets of 50 or less will be eligible for HVIP grants greatly increasing available funding for these smaller fleets. Should CARB adopt our recommendation to include tractor fleets of 10 – 50, current HVIP policy would allow these fleets to access HVIP incentive funds so long as the ZEVs are acquired before the ACF rule milestone year of e.g. 2027 or 2030 or

³ <https://www.arb.ca.gov/lists/com-attach/108-acf2022-BWZRPVEuAjkKaM0D.pdf>

⁴ [CPUC Adopts Transportation Electrification Program To Help Accelerate Electric Vehicle Adoption](#)

would exceed the milestone requirements.⁵ CARB's new Innovative Small eFleets (ISEF) program can also help fleets of 20 or less also so long as the tractors are acquired before a milestone year.

Impact on CARB Staffing of lowering fleet size to 10 for Tractors

CARB staff has indicated that they believe lowering the fleet size from 50 to 10 would increase their workload of administering the rule by two to three times. Their staffing plan from the ISOR calls for 33 additional FTE's to administer the new rule.

Our research indicates that the number of regulated fleets for tractors would increase from 315 to 1,548 for an increase of 1,233.⁶ However, CARB will be directly regulating 1,700 high priority fleets, 4,100 drayage fleets in addition to an unknown number of public fleets for a total of at least 5,800 fleets. So an increase of 1,233 fleets against 5,800 is no more than a 21% increase and not two to three times.

Further, the number of trucks would increase from 121,403 to 146,030 (after excluding the 29,000 drayage trucks) for an increase of about 25,000 trucks or only a 21% increase.⁷

If CARB had to increase staffing by 21% or 7 FTEs, we believe the ROI on that in terms of cost per unit of emission reductions would be very good.

Other issues such as availability of trucks and chargers for these additional fleets among others are addressed in more detail in the full report following.

Our conclusion is that the benefits of lowering the fleet threshold to 10 are significant, will help the state better attain its Federal and state clean air and climate objectives and will not cause an unmanageable impact on CARB staffing. Further, this move will likely assist these smaller fleets in migrating to ZEVs to realize superior performing and more reliable vehicles, very meaningful TCO, immediate operational expense savings and enhance their ability to hire and retain drivers.

Full Report

Why are we advocating to reduce the size of tractor fleets to 10 from 50?

- 1. To gain the maximum feasible reduction of emissions. Reducing the threshold to 10 for tractors would reduce emissions by an additional 16% for NOx and PM 2.5 and**

⁵ Confirmed in e-mail communication with Andrea Morgan, CARB Air Pollution Engineer, that current HVIP policy allows for eligible fleets to access HVIP funds so long as the purchase is either in advance of regulatory requirements or would exceed regulatory requirements. Ms. Morgan noted that changes to HVIP policy may occur in the future to respond to legislative or Board direction or to address market conditions.

⁶ Analysis of Sam Wilson, Senior Vehicles Analyst at Union of Concerned Scientists and based in part on data provided by CARB staff.

⁷ Ibid

13% for GHG emissions.⁸ Tractors only account for 12% of MHD vehicles but nearly 50% of NOx. These reductions would benefit everyone, but especially people living near high diesel traffic zones such as ports, highways and warehouses. Unless the fleet size is lowered in the ACF rule, there is no planned definitive regulation that would otherwise require these fleets to transition to ZEVs and stop disgorging toxic emissions into communities for years to come. By doing this now, we will make additional progress on reducing health harms, mitigate climate change and further stimulate the economy due to the creation of many new jobs and savings from reduced total cost of ownership (TCO) for these fleets.

2. Help mitigate misclassification of drivers and increase emissions reduction

compliance. A lower threshold for tractors is also critical to help addressing continued misclassification of drivers in fleets from 10-50 that are not protected by the “ownership and controlling interest” language in the proposed ACF rule. AB 5 and existing law are not enough. An initial analysis of The Division of Labor Standards Enforcement actions produced a list of fourteen companies in the fleet size range of 10 – 50 vehicles that had Order, Determination or Award (ODA) actions representing \$6,380,414 in stolen wages and illegal deductions. Lowering the fleet threshold to 10 will have fleets assume responsibility for transitioning their diesel trucks to ZEVs instead of placing this responsibility on misclassified drivers. This change will increase real-world compliance and emission reductions.

How did we pick a tractor fleet size of 10?

We sought to lower the tractor fleet size threshold included in the rule as much as possible to reduce emissions, reduce the misclassification of drivers and the non-compliance with CARB rules that can often occur with misclassified drivers. At the same time we wanted to avoid regulating truly small fleets operated by legally compliant independent owner-operators.

In a recent study from the American Transportation Research Institute, 92% of true (under their own operating authority) owner-operators or independent contractors have fleets of 5 or fewer trucks.⁹ Thus lowering the fleet size threshold to 10 would continue to exempt small fleets of any type from the rule.

According to a letter sent to Chair Randolph from the BlueGreen Alliance, California Teamsters PAC, California Labor Federation, Los Angeles Alliance for a New Economy and IBEW Local 569, a small fleet is one which can be operated by independent owner operators with less than 5 vehicles.¹⁰ Further,

“By definition, independent contractors cannot own and operate more than a handful of trucks (4-5) before effectively scaling up into the territory of a “fleet” that engages additional individuals to operate multiple trucks. Fleets of 10 or more trucks, therefore,

⁸ [133-acf2022-WjsFYARjWFQbc1U9.pdf \(ca.gov\)](#)

⁹ [Owner-Operators / Independent Contractors in the Supply Chain – TruckingResearch.org](#)

¹⁰ [296-acf2022-Uz9cO1c0ADwCdIUK.pdf \(ca.gov\)](#)

are categorically different in nature from independent contractor businesses which control 1-5 active trucks.

... fleets of 10 or more trucks are not independent contractors. These are companies, whether they misclassify their drivers or not, that should be treated with the same assumptions about financial capacity, access to capital, planning abilities, and other business strategy as any other small to medium sized company with a significant line of business, multiple employees, and millions of dollars in capital investment.”

These businesses stand to benefit from the overall beneficial TCO of ZE trucks that all other trucking companies stand to benefit from..”

We are only recommending lowering the threshold to 10 for tractors and not the remaining 88% of MHD vehicles. When we look at the potential emission reductions from a fleet of 10 delivery vans vs 10 massive Class 8 diesel tractors trailer trucks for example, the difference is staggering. Using CARB’s vehicle emissions modeling tool, the fleet of Class 8 tractor trucks would emit 14 times as much NOx compared to a fleet of gas-powered Class 2b delivery vans.¹¹ More of these tractors need to be captured by the rule.

Will these fleets between 10-50 vehicles be financially disadvantaged in complying with the rule?

Access to Financing - As CARB’s and many other studies have already shown, the TCO for ZEV tractors compared to diesels is very good and most of these studies did not include the financial benefits of the up to \$40,000 purchase incentive per truck from the Inflation Reduction Act (IRA) and the up to \$100,000 per charger incentive which will make the TCOs even more favorable. But you have to be able to get financing to realize these benefits. A fleet of 10 or more tractors is large enough to likely have the ability to demonstrate adequate financial resources, and a good credit rating over a few years in order to be able to obtain financing. Most fleets of 10 or more tractors should be able to get financing offered through the OEMs, truck leasing companies and/or be able to contract with a truck-as-a service company.

Some small fleets down to 10 vehicles rarely purchase new trucks and typically buy used diesels at lower cost. How could they afford to buy a new electric class 8 semi-truck to comply with the ACF?

To answer this question, we did an analysis using CARB’s TCO model, tables and assumptions published on September 9, 2021 but used updated assumptions from CARB’s August ISOR report. We posted this TCO study on the CARB docket here: <https://www.arb.ca.gov/lists/com-attach/108-acf2022-BWZRPVEuAjxKaM0D.pdf>

Though counter intuitive, the results of the study showed that the TCO of a new battery electric class 8 day cab costing \$205,000 is significantly less costly than a used diesel

¹¹ [California Needs to Focus on Electrifying Big Rigs - Union of Concerned Scientists \(ucsusa.org\)](https://www.ucsusa.org/california-needs-to-focus-on-electrifying-big-rigs)

costing \$35,000. **The electric day cab will save \$170,893 or 30% over the TCO cost of the used diesel** when including the new \$40,000 Federal Tax Credit provided through the Inflation Reduction Act (IRA).

We believe that fleets of 10-50 vehicles that may be accustomed to only buying used diesel vehicles, will be better off buying new electric trucks and that the ACF rule instead of creating new financial obstacles for them will actually help lower their costs. In a few years, they can save even more by buying used electric trucks as they become available.

Funding Support for fleets from 10-50

In addition to all the financial incentives and support programs available to all MHD vehicles, here are some examples of programs that can be especially helpful for fleets from 10-50 vehicles.

- **HVIP** - Beginning January 1, 2024, the HVIP program is limiting eligible fleets to those of 50 vehicles or less. This will have the effect of freeing up significantly more funds to be available to these smaller fleets. The fleets would still be able to access HVIP incentive funds so long as the ZEVs are acquired before the ACF rule milestone year of e.g. 2027 or 2030 or would exceed the milestone requirements.¹² In combination with the new up to \$40,000 federal tax incentive per vehicle from the Inflation Reduction Act, the balance of funding that needs to be financed is much lower than it otherwise would be.
- **CARB's new Innovative Small eFleet Pilot program (ISEF)**. This is funded as part of the HVIP program. (\$35 million for FY 2023-24). Fleets up to 20 vehicles are eligible. so long as the fleets are requesting funding in advance of regulatory requirements e.g. a milestone year, or that would exceed regulatory requirements.¹³

ISEF incentive funding will allow small fleet owner/operators to utilize flexible financing, lease, rental, and truck-as-a-service options, as well as offset infrastructure/charger costs, insurance, and fuel costs. Fleets must work with an approved provider to apply for vouchers; these providers will work with eligible equipment dealers to request vouchers on the individual fleet's behalf. For example, battery electric and hydrogen fuel cell class 8 drayage trucks are eligible for close to \$300,000 per vehicle, drastically reducing upfront costs for California's port truckers and others to move to zero-emissions. The program initiated accepting loan applications on August 31, 2022. While this program has been very popular and fully subscribed in its first year, we believe that especially after 1/1/2024, CARB would be well advised and probably will increase the allocation of funding it has available to this program as another key vehicle to comprehensively assist small fleets. Further, the legislature via AB 372 has directed CARB to develop new innovative financing options for fleets including the special needs of small fleets.¹⁴

¹² Confirmed in e-mail communication with Andrea Morgan, CARB Air Pollution Engineer; This is with respect to program requirements as currently defined.

¹³ Ibid

¹⁴ [Bill Text - SB-372 Medium- and heavy-duty fleet purchasing assistance program: zero-emission vehicles. \(ca.gov\)](#)

- SB 372 (Leyva, Medium- and heavy-duty fleet purchasing assistance program: zero-emission vehicles) – SB 372 added more tools to CARB’s toolbox to be creative in offering financing programs to fleets. It suggests ways to bring more private capital into the California ZEV truck market, freeing up more public capital for small fleets while equipping them with additional programs. SB 372 programs are still being developed, and could include things like residual value insurance, prepaid cards to pay for charging, and low interest loans. Programs are also being developed to share considerably more technical support on how to apply for all of the funding programs that are offered by CARB with fleets. Importantly, it directs 75% of projects to disadvantaged and other underserved communities.
- **Charging Infrastructure financial support**
The CEC’s EnergiIZE program is designed to make funding available to MHD fleets to help pay for their charging infrastructure. One of the 4 component programs is called “Jump start” and is designed to provide personalized assistance in planning and grant application completion to small fleets, independent owner operators, minority owned enterprises and non-profit fleets and can cover up to 75% of the hardware and software costs to a project max of up to \$750,000.

Impact on CARB Staffing and Budget of lowering fleet size to 10 for Tractors

CARB staff has indicated that they believe lowering the fleet size from 50 to 10 would increase their workload of administering the rule by two to three times. Their current staffing plan calls for 33 FTEs.

Our research indicates that lowering the fleet size threshold from 50 to 10 for tractors would increase the total number of fleets subject to regulation by 1,233 and the number of tractors by 25,000. Compared to the staff proposed 50 fleet size threshold, the number of fleets subject to the regulation would increase by no more than 21% and the number of trucks would also increase by only 21%.¹⁵ This is far less than the staff suggested workload increase of 2 to 3 times.

Assuming all 33 FTE staff is involved in supporting implementation and not other regulation related activities, a 21% increase in the number of fleets subject to the regulation would require an additional 7 FTE of staff support. This would appear to be a good investment of staff time in that the additional reductions in emissions are certain, timely in reducing exposure of those living in the most vulnerable communities exposed to truck pollution and would avoid the staffing needed for a future effort to develop additional programs to address the shortfall in emission reductions needed to achieve ambient air quality standards and the Governor’s climate targets.

Truck availability – this has three aspects to it including:

- 1. Are there commercial trucks available today to meet a given need for tractors?**

¹⁵ Analysis of Sam Wilson, Senior Vehicles Analyst at Union of Concerned Scientists and based in part on data provided by CARB staff.

CARB's HVIP program has certified 7 different Class 8 Electric tractors from 7 different OEMs.¹⁶ Two of these are market share leaders for North America – Daimler and Volvo and both companies are delivering vehicles today in some cases for orders of hundreds of trucks. Daimler just delivered its first commercial trucks to Sysco and Penske. Tesla has also just delivered its first electric Semi-trucks to PepsiCo / Frito-Lay with a 500-mile range and utilizing ultra-high speed megawatt charging.¹⁷

2. Will they meet duty cycle needs?

According to CARB¹⁸ 65% of Class 7 & 8 day cabs have daily routes less than 200 miles and 78% have routes less than 300 miles. Today Tesla's semi at a range of 500 miles and Nikola's Tre at 330 miles can accommodate nearly 80% of these applications.

3. Will there be a sufficient supply to meet demand? If there is an insufficient supply, will smaller fleets be deprived?

It is estimated that there are 121,403 tractors under the High Priority part of the ACF rule that need to be migrated to 100% ZEVs by 2045. Including fleets of 10 – 50 vehicles, will add about 25,000 more ZE tractors through 2045, or 21% more.¹⁹

Under the staff proposed high-priority rule, 10% or about 12,100 of these tractors would need to be ZEVs beginning in 2027, which the ARB staff has concluded is feasible.

Lowering the fleet size to 10 vehicles would only add an additional 2,500 ZE tractors by 2027 for a total need of about 14,600 trucks. This small increase in tractors subject to the rule is unlikely to invalidate the staff conclusion of feasibility.

Some examples of the approximate annual US production capacity of Class 7 & 8 tractors are:

From Legacy OEMs currently for diesels²⁰

- Daimler -100,000 / year
- Volvo - 25,000 / year.

From All-Electric OEMs:

- Tesla - has announced its intention to produce 50,000 semi's a year beginning in 2024.²¹
- Nikola – is currently manufacturing the Tre and will have the capacity to make 20,000 electric and fuel cell trucks / year²²

Even a low percentage of ZEVs of total production from just the two legacy OEMs above combined with the even a small amount of 100% ZEV production of the all-electric OEMs should provide more than a sufficient level of vehicles for California. Therefore, there should not be any problem meeting needs for a very modest number of 14,600

¹⁶ [Tractor - Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project | California HVIP](#)

¹⁷ [SEMI Delivery Event Keynote v31 for PDF export \(thron.com\)](#); [Charged EVs | Tesla delivers “badass” Semi, teases megawatt charging for Cybertruck - Charged EVs](#)

¹⁸ [Proposed ACF Regulation Workshop - State and Local Government Fleets](#)

¹⁹ Analysis of Sam Wilson, Senior Vehicles Analyst at Union of Concerned Scientists and based in part on data provided by CARB staff.

²⁰ [Class 8 trucks - sales by brand 2020 | Statista](#) e.g. in 2019

²¹ [Tesla plans to build 50,000 Class 8 Semi trucks in Nevada - FreightWaves](#)

²² [Nikola Corporation Reports Third Quarter 2022 Results \(nikolamotor.com\)](#)

ZEVs by 2027 including the fleets down to 10. Keep in mind that the 14,600 is not an annual number but a number to be achieved by 2027. The trucks could have been made e.g. over the prior 2-3 years to reach this number and it does not need to be increased until 2030.

Charging Infrastructure availability for Tractors - Will there be enough chargers and especially publicly accessible chargers?

First, as we have shown above there is only a need to have enough chargers to support about 14,600 tractors regulated by the High Priority Fleets section of the rule by 2027 including the additional 2,500 tractors if the fleet size is lowered to 10.

There are fundamentally, two major types of charging applications.

- **Depot Charging** where the trucks are charged overnight in a depot and return to base each night will meet most needs of short and medium regional haul routes including most day cab tractors. Fleet owners are responsible for initiating the process of obtaining needed chargers and will work with their utilities and potentially other companies in designing and installing their chargers in a scheduled way to be available when their electric trucks arrive.

As can be seen in the funding section below, there is sufficient funding available from many sources to pay for the majority of costs. Because of AB 841(Ting 2020), fleets are not responsible for costs on the utility side of the meter. So, for example, if a fleet will be putting in a large charging hub with many high-power chargers requiring e.g. new distribution lines or substation upgrades, these costs are paid for through the utilities (rate payer based.) and not the fleet.

For the infrastructure costs on the customer side of the meter, incentive programs such as from the utilities and from the CEC's Energize program can cover the majority of these expenses. According to CARB in its SRIA,

“... programs developed by the electric utilities due to SB 350 from CPUC Decisions of 2018 and 2019, for which \$740 million has been authorized, promote the deployment of medium- and heavy- duty ZEVs through incentivizing infrastructure upgrade projects that offset most or all the costs for electrical service upgrades.”

Several OEMs and truck leasing companies offer leasing packages that can not only cover the trucks but also the infrastructure for any remaining uncovered charger costs.

While there is still room for improvement in the timeliness of installs in the near term as discussed below, we believe that a large portion of fleets, especially in the early years, will primarily only need depot charging and that when properly planned in advance, there are no significant obstacles to infrastructure funding and installation

- **Public Charging** – Publicly accessible charging is needed to support long regional, long-range haul routes and opportunity charging for some day cabs. Public chargers will be developed by private companies but funded with private, public or a combination of funding. Some key examples include the following:

Private Funding and Projects

- A \$650 million private investment for a publicly accessible national network of chargers for MHD vehicles has been announced by a partnership of Daimler Trucks of North America, Blackrock and NextEra. They have targeted completing the first phases of this network by 2026 which includes the West Coast, East Coast and the Texas Triangle.²³
- Pilot Company and Volvo Group have just signed a letter of intent to co-develop a national charging network across Pilot and Flying J travel centers, catered specifically toward medium- and heavy-duty EVs. Pilot is the largest travel center company in North America with more than 750 travel center / truck stop locations.²⁴
- TeraWatt Infrastructure has obtained over \$1 billion of funding and just announced it is building a MHD charging network along the Interstate 10 (I-10) highway corridor from Long Beach to El Paso, Texas. The TeraWatt Charging Centers are located approximately 150 miles apart to support the mileage range of commercially available electric trucks. They are located less than one mile from the nearest highway and range in size between four to 100 acres.²⁵
- Volvo started building its publicly accessible “California Electrified Charging Corridor Project” for MHD electric trucks this year and expects it to be complete by end of 2023 extending from Southern California to Sacramento and Oakland²⁶
- EV Truck-as-a-service (TaaS) companies – these companies can make their chargers publicly available to MHD vehicles.
 - WattEV is building four locations in Southern California with a vision for a national network. Its first site in Bakersfield is scheduled to open Q1 2023 and is planned to have 64 240kW DC fast charge connectors, an additional 16 Megawatt Charging System (MCS) chargers when they become available and be largely powered by locally installed solar generation and on-site battery storage. The next sites will open in Port of Long Beach, Gardena and San Bernadino. As part of its TaaS model, it will make DC fast changers and MCS chargers available for public use by truck fleets.²⁷
 - Zeem Solutions - Zeem vehicles use a return-to-depot model at the 3.1-acre site near LAX that will be capable of charging 220 vehicles overnight. Zeem currently has 77 EVs at its first depot, with room to grow to 220 vehicles. Its fast-charging ports could charge 500 to 600 commercial vehicles during the day. By April of next year, they are

²³ [Daimler Truck North America, NextEra Energy Resources and BlackRock Renewable Power Announce Plans To Accelerate Public Charging Infrastructure For Commercial Vehicles Across The U.S. | Daimler](#)

²⁴ [Volvo and Pilot Company partner to Build a National Public Heavy-Duty Charging Network | Volvo Trucks USA](#)

²⁵ [terawatt Developing I-10 Electric Corridor, the First Network of Electric Heavy-Duty Charging Centers | Terawatt Infrastructure](#)

²⁶ [Volvo Trucks to construct charging network throughout California \(electrek.co\)](#)

²⁷ [Charged EVs | WattEV aims to operate 12,000 electric Trucks-as-a-Service and a charging network to support them by 2030 - Charged EVs; WattEV to Provide 20 Zero-Emission Trucks to Major Shipping and Logistics Partner](#)

- planning to have 77 DC fast-charge ports, and then as many as 60 AC ports.²⁸
- Forum Mobility just completed a deal for five class-8 battery electric trucks, on-site fast-chargers and all the electricity they need for zero-emission drayage, for its first customer, [Hight Logistics, Inc.](#) in Long Beach, CA.²⁹ Hight Logistics, Inc. is a family run business and has been providing drayage services to the Port of Long Beach and Port of Los Angeles. Forum is building a network of charging depots around the Oakland and Los Angeles/Long Beach ports, and along common trucking routes to warehouse destinations, offering a one-stop solution that makes it easy for small independent operators and large fleets alike.
 - Charging-as-a-service (CaaS) - Turnkey system vendors that offer charging or electricity-as-a-service. These companies can execute an agreement whereby the EV truck or fleet owner pays only for the cost based on the use of electricity. The vendor takes full responsibility for system design and installation, permitting, smart charging management, selecting the best utility tariff, harvesting LCFS credits, project and operational management, maximizing incentive programs, and providing the capital. They typically charge their customer a simple all-inclusive fee per kWh consumed by the EVs.³⁰

One example is Prologis³¹. Logistics real estate specialist Prologis has unveiled two upcoming electric truck charging installations as part of its Prologis Mobility platform. The two charging sites will enable Performance Team, a Maersk national logistics company, to simultaneously charge up to 38 of its Volvo VNR Electric Class 8 battery-electric trucks.

Prologis and Performance Team are already working together to install EV charging infrastructure in Southern California, where two large installations are up and running, energizing a total of 38 new electric trucks. The projects—one in Santa Fe Springs and one in Commerce—provide more than 4 megawatts of total installed charging capacity.

- Truck Stop Companies – “There’s no question that the convenience store/gas station industry sees public EV charging as a major new business opportunity—a 2022 survey by Boston Consulting Group found that 95% of US fuel retailers said they’re currently offering or planning to offer EV charging stations³².
 - The National Truck Stop Operators Association (NATSO) signed a Memorandum of Understanding with ChargePoint to invest \$1 billion of public and private capital to install chargers at 4,000 truck stop locations nationally by 2030.³³

²⁸ [Small fleets turn to fleet-as-a-service provider to begin electric journey | FleetOwner](#)

²⁹ [Forum Mobility |](#)

³⁰ <https://chargedevs.com/newswire/montgomery-county-maryland-deploys-microgrid-to-support-electric-bus-charging/>

³¹ [Charged EVs | Prologis to build two electric truck charging hubs in Southern California - Charged EVs](#)

³² [Charged EVs | Price Waterhouse predicts electric trucks will take over by 2035 - Charged EVs](#)

³³ [ChargePoint and NATSO Progress Toward 2030 Fast Charging Commitment Across the United States | ChargePoint](#)

- Several large National Truck Stop Companies have begun their own programs of charger installation including Travel Center of America (TA)³⁴, Love’s Travel Stops³⁵ and Pilot Flying J Travel Centers.
- Truck Leasing and Rental Companies – Penske Truck Leasing, for example, recently purchased 750 GM Brightdrop electric delivery vans for lease or rent. To support these vehicles, Penske and Shell Recharge Solutions announced a new joint initiative to support light-duty electric vehicle (EV) charging at Penske locations. The president of Penske Truck Leasing, stated, "We continue to invest in growing our electric fleet and charging infrastructure to provide more options to customers seeking sustainable fleet solutions." Penske just took delivery of 2 commercial Freightliner eCascadia Semis³⁶. Penske Truck Leasing operates more than 372,000 vehicles and serves customers from more than 1,300 locations in North America, South America, Europe, Australia, and Asia.

Additional funding for MHD Charging

Utility Funding (Rate Payer Based)

- The CPUC recently announced a major **“Decision on Transportation Electrification Policy and Investment”**³⁷ which includes additional funding of \$700 million dedicated to accelerating chargers for MHD vehicles over a five-year period running from 2025 – 2030. This will build upon and extend, for another five years, CPUC’s previously approved funding for the IOUs of about \$740 million that is available through 2024. “It’s the highest priority,” Commissioner Clifford Rechtschaffen said. “We have very stringent state goals established by the Air Resources Board to electrify medium- and heavy-duty trucks and they need charging infrastructure in order to electrify their fleets.”³⁸ The decision also provides guidance to the IOUs to use “Creativity in addressing the needs of small fleet customers, potentially providing higher rebates”

Public Funding

- **State**
 - \$623 million over three years for electric MHD truck charging infrastructure in the Zero Emission Vehicle (ZEV) Package was approved by the California Budget Act of 2021.

³⁴ <https://www.ta-petro.com/newsroom/travelcenters-of-america-enhances-commitment--to-sustainability-and-alternative-energy>

³⁵ <https://www.loves.com/en/news/2020/august/electrify-america-announces-collaboration-with-loves-travel-stops>

³⁶ [Penske Truck Leasing and Daimler Truck Commemorate Delivery of Freightliner eCascadias \(prnewswire.com\)](https://www.penske.com/newsroom/press-releases/2020/08/20/penske-truck-leasing-and-daimler-truck-commemorate-delivery-of-freightliner-e-cascadias)

³⁷ [CPUC Adopts Transportation Electrification Program To Help Accelerate Electric Vehicle Adoption](https://www.cpuc.ca.gov/Newsroom/Press-Releases/2020/08/20/cpuc-adopts-transportation-electrification-program-to-help-accelerate-electric-vehicle-adoption)

³⁸ [California regulators OK \\$1 billion for EV charging - Los Angeles Times \(latimes.com\)](https://www.latimes.com/california/story/2020-08-20/california-regulators-ok-1-billion-for-ev-charging)

- \$1.7 billion has been approved for infrastructure for medium- and heavy-duty vehicles over four years including over \$700 million for 2022-23 alone.³⁹
- **Federal**
 - Federal Tax credits of 30% of the purchasing and installation costs of up to \$100,000 per charger installation over the next 10 years is now available from the Inflation Reduction Act (IRA).
 - A 30% investment tax credit (ITC) for standalone energy storage is now available from the IRA. Previously, storage was only allowed a tax credit if it was tied to a renewables project. Storage can provide many benefits for a commercial EV charging hub, including managing high demand and energy charges from the local utility, mitigating peak demand on the regional grid and providing resilience for critical transportation operations in the event of a grid outage.
 - \$384 million for light-duty and commercial vehicle charging infrastructure in California from the National Electric Vehicle Infrastructure Program (NEVI) included in the Infrastructure Investment and Jobs Act. (IIJA)
 - Eligibility for California stakeholders to apply for a portion of the \$2.5 billion of federal discretionary IIJA charging infrastructure grant program.

Additional Charging Infrastructure Support projects and programs

- Two significant regional multi-state programs to support infrastructure development will help create the national network.
 - Seventeen states with the District of Columbia and supported by northerly neighbor Quebec working under a memorandum of understanding (MOU) just announced the completion of their “Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan” that identifies barriers and proposes solutions to support widespread electrification of medium and HD vehicles. The U.S. jurisdictions in the initiative collectively represent 43 percent of the population, nearly half of the economy, and 36 percent of the nation’s medium- and heavy-duty vehicles.⁴⁰
 - Several Midwest states, including Illinois, Indiana, Minnesota, Michigan, and Wisconsin, signed a Regional Electric Vehicle Midwest MOU to promote HD ZEV infrastructure, manufacturing, and other supportive policies.⁴¹
- The California Transportation Commission (CTC) is working on their California SB 671 Infrastructure Plan along major state and interstate corridors which will also identify

³⁹<https://www.energy.ca.gov/news/2022-12/cec-approves-29-billion-investment-zero-emission-transportation-infrastructure>

⁴⁰ [17 States, D.C., and Quebec Release Action Plan to Rapidly Advance Electric Truck and Bus Adoption \(nescaum.org\)](https://www.nescaum.org)

⁴¹ <https://www.regulations.gov/comment/EPA-HQ-OAR-2019-0055-1186>

where chargers for MHD routes need to be located, potential funding sources and contractors who can install them. They are collaborating with other state agencies such as the CEC on this effort. This report is due to be completed by the end of 2023.⁴²

- The port of Long Beach plans to install 100 charging stations. Roughly 60 are scheduled to be installed by the end of 2023.⁴³ In addition, last year, Electrify America announced a \$25 million investment in the Port of Long Beach and the Wilmington neighborhood of Los Angeles that includes 30 heavy-duty fast chargers.⁴⁴
- Recently approved CALGreen building code requirements for certain new warehouses, retail stores, and commercial stores with off-site loading zones will be required to have additional minimum electrical capacity installed during construction to help ensure the site is prepared for ZE vehicles, which lowers infrastructure costs significantly.⁴⁵
- The South Coast Air Quality Management District's (SCAQMD) Warehouse Indirect Source Rule will incentivize warehouse owners to install EV chargers to support electric delivery trucks at their locations.⁴⁶ This will impact the warehouse operations within the area where nearly half the state's population is located.

In summary given all the available funding, EVSPs and electrical contractors with years of experience in successfully installing large and small charging infrastructure projects and multiple large concurrent initiatives from public and private entities to install EVSE for MHD vehicles, we can have confidence that we will have the charging infrastructure available to both meet the needs of the ACF rule as proposed and as we have recommended it be strengthened.

Timeliness of install

Today, at this early stage of MHD ZEV deployment, charger installations can take 6-18 months to complete, with some larger projects taking longer. While the most important first step for fleets to take is to begin early infrastructure planning with their utilities, a host of public and private actors are already working to accelerate charging infrastructure timelines. The following are two key actions currently underway.

New CPUC Timeline Requirements - The CPUC just released new timeline guidelines directing the IOUs to achieve an average EVSE (charger) service energization timeline target of 125-business days. This includes the 25-business days or less needed for a customer to receive an approved permit, utility preassessment and engineering studies, all utility civil construction work and other steps. Excluded from this requirement are any

⁴² [Senate Bill 671](#) (Gonzalez, Chapter 769, Statutes of 2021)

⁴³ https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB671

⁴⁴ [Port of Long Beach announces step toward zero-emissions trucking - ABC7 Los Angeles](#)

⁴⁴ [Port of Long Beach announces new EV charging partnership \(spectrumnews1.com\)](#)

⁴⁵ [Proposed Advanced Clean Fleets Regulation Staff Report: Initial Statement of Reasons \(ca.gov\)](#)

⁴⁶ [r2305.pdf \(aqmd.gov\)](#)

projects that require additional capacity of more than two megawatts, a substation upgrade or a distribution line extension upgrade.⁴⁷

The CPUC says it will assess how this goes and in the future, may shorten this timeline and may also create additional requirements to address the exception cases listed above.

In addition, the IOUs are required to post their grid maps showing available capacity at a very detailed level on their EV Infrastructure Rule websites. This will aid customers in determining available capacity early in their planning process.

This new rule will have a significant impact on shortening EVSE installation timelines directly for a material portion of MHD chargers and provide more certainty on timeliness. For example, a depot supporting 20 Class 8 Day cabs each requiring a 100 kW charger for overnight charging can be accomplished within 2 MW. The rule will also indirectly have a helpful impact for those projects that are excluded for exceptions listed above because some of the key components of installation including permitting and engineering studies will likely be influenced to move faster for all projects.

Local Grid Capacity – One of the issues that can add time to some larger installations is when there is not adequate local grid capacity to meet charging needs and it will require the utility to do a grid upgrade project. Steps that are being taken to proactively address this include:

The CEC is doing sophisticated, detailed modeling to show where new chargers need to be installed by year for MHD vehicles and calculate the additional power needed. They then use another tool to compare new capacity requirements for the projected chargers to existing power capacity in each local part of the utility's grid to determine if there is a gap. Where there are potential gaps, the utilities can then proactively install upgrades in advance of future needs to make sure that there will be adequate power and avoid delays.

If there is insufficient power, the fleet owner can work with their utility to design a system that can take maximum advantage of currently available power, possibly including the addition of storage, while they work to increase the capacity. In its ISOR, CARB notes that, " ... utilities have indicated that project phasing and temporary service commonly allows fleets to deploy initial ZEVs quickly using existing infrastructure and that transmission upgrades can be made while a fleet expands ZEV deployments over time."

Finally, there are commercial interim solutions such as a mobile chargers and containerized charging depots with 5 chargers that can be installed relatively quickly and cost-effectively either to meet needs sooner and/or until sufficient power is available for the permanent solution.

Time to charge

⁴⁷ [498569937.PDF \(ca.gov\)](#)

Essentially all new MHD electric vehicles utilize the CCS plug standard which is the same one used by EV automobiles today. An international second, much more powerful, standard known as the Megawatt Charging System (MCS) will soon be finalized and will also be backward compatible with CCS.

Daimler's eCascadia Semi with a 230-mile range and using the CCS standard plug can recharge 80 percent of its battery in approximately 90 minutes.⁴⁸ But for many use cases such as a day cab return to base operation, the charging rate can be much slower by using for example a lower power and lower cost 50 – 100 kW charger overnight. When the MCS standard is in commercial use, it will have the capability to charge a 500-mile range fully loaded semi in 30 minutes. Tesla is already demonstrating charging performance close to this with its just delivered 500-mile range Semi. It can recover up to 70 percent of range in 30 minutes using Tesla's megawatt chargers.⁴⁹

How will a fleet of 10-50 manage to start the transition to ZEVs?

What are the resources and services available to smaller fleets to assist them in planning for and implementing their ZEV transition program?

The scope of what tractor fleets from 10 – 50 will need to do to comply with the rule is quite modest. For tractors, the earliest compliance milestone is in 2027 when 10% of a fleet must be ZEV trucks. A fleet of 50 trucks only needs to have 5 ZEVs and will only require no more than 5 depot chargers. (In some situations, chargers can be shared or public chargers can be used.) A fleet of 10 trucks only needs one ZEV with no more than one charger. The next milestone is not until 2030 at which time the fleets will need to have 25% of their trucks as ZEVs. For a fleet of 50 trucks that will only be an additional 8 beyond the 5 they already acquired by 2027.

These fleets will have until 2027 before they need to have ZEV trucks on the road because of the ACF. Over the next 4 years, they can take 2 years to plan and then 2 years to implement their plan to be in compliance by 2027.

- For assistance on truck purchases
 - OEM Dealers –Several major OEMs have dealers that have and/or are rapidly developing their customer support capabilities and can offer consultation in looking at a customer's requirements, using tools such as route and TCO calculators to determine which trucks will best meet their needs and offering suggestions on charging options e.g. Tech Equipment⁵⁰ for Volvo⁵¹, Velocity Vehicle Group⁵² for Daimler⁵³ and Rush Truck Centers⁵⁴ for Peterbilt. Several can also offer internal

⁴⁸ [eCascadia® Specs | Freightliner Trucks](#)

⁴⁹ [Semi | Tesla](#)

⁵⁰ [Electric Semi Trucks | TEC Equipment | Electric Semi Trucks](#)

⁵¹ [Switch to electric master EN—Page 1 \(volvotrucks.com\)](#)

⁵² [Commercial Electric Vehicles - VVG \(vvelectric.com\)](#)

⁵³ [World premiere of the new battery electric Freightliner eCascadia | Daimler \(daimlertruck.com\)](#)

⁵⁴ [Rush Truck Centers | Our Commitment to Electric Vehicles](#)

consultants or referrals to outside consultants who can help at a more detailed level. Many can also finance the purchase of the trucks along with infrastructure costs in leasing and other agreements.

- For fleets of 20 vehicles or less, CARB’s Innovative Small e-Fleet (ISEF) program can offer assistance on truck selection, infrastructure needs and funding support.
- For assistance on charging infrastructure
 - Utilities are an excellent place to start and can give advice on EVSE design, potential installers, provide estimates on time to install, offer many helpful educational resources such as EV Charger Guidebooks and case studies and offer financial support and implementation services through their CPUC approved financial support programs for MHD vehicles that can often cover half or more of the costs.
 - A second major source of advice and financial support is the CEC’s EnergiIZE⁵⁵ “Jump Start” program. In addition to significant financial support, this program is designed to offer assistance through on-line planning tools, webinars, white papers, providers, funding sources, help in completing an application for funding and even a helpline through its Infrastructure Resource Center (IRC).
 - Electric Vehicle Service Providers (EVSP)s – This is what they do so consulting with e.g. ChargePoint, Electrify America, BP Pulse and others can help small fleets understand at a detailed level what they need to do.
 - Charging-as-a-service (CaaS) Turnkey system vendors that offer charging or electricity-as-a-service. These vendors can execute an agreement whereby the EV truck or fleet owner pays only for the cost of electricity through this vendor. The vendor can take full responsibility for system design and installation, permitting, smart charging management, selecting the best utility tariff, harvesting LCFS credits, project and operational management, maximizing incentive programs, and providing the capital. They typically charge their customer a simple all-inclusive fee per kWh consumed by the EVs.⁵⁶ Examples include AlphaStruxure and Enel X. Note that many of these larger charging infrastructure companies offer a portfolio of products and services.
- Opportunities for Small Fleets to gain access to charging infrastructure
 - If the fleet owns property, installing infrastructure in most cases should be fairly straightforward especially in light of the fact that these are smaller fleets and most of the charging depots will not be very large.
 - If the fleet is leasing property, they will need to gain authorization from the property owner to install the chargers. “...staff believes the clear regulatory and policy signals from the proposed ACF regulation, along with other ZEV related policies and executive orders issued by the Governor, would provide assurance to facility owners that site upgrades to support electrification are sound investments.”⁵⁷ In fact, we believe that the property owner would value having their tenant be the catalyst for taking advantage of current incentives to enhance their property to preserve and increase its value both now and in the future.

⁵⁵ [EnergiIZE](#)

⁵⁶ <https://chargedevs.com/newswire/montgomery-county-maryland-deploys-microgrid-to-support-electric-bus-charging/>

⁵⁷ ISOR Pg 77

- Another option would be to lease the vehicles from a truck as a service (TaaS) vendor. In, this model, the TaaS company would provide the trucks, charging infrastructure, maintenance and other services for a monthly fee. Some of these companies are welcoming and targeting smaller fleets to meet their unique needs such as Zeem Solutions⁵⁸ and Forum Mobility⁵⁹. While these new entrants currently just have sites in Southern California, these and others are planning additional sites throughout California and in some cases nationally. This model solves many problems for a small fleet – they don’t have to come up with the capital for the trucks or infrastructure or install/maintain the chargers.
- Finally, as discussed elsewhere in this report, there are many concurrent activities underway to install publicly accessible infrastructure especially along freight corridor but also now, in publicly accessible charging hubs at urban locations and near ports, railyards and airports.

In conclusion, we believe that the emission reduction benefits of lowering the fleet threshold for tractors to 10 in the High Priority Fleets portion of the ACF rule are significant, will help the state better attain its federal and state clean air and climate objectives, will more rapidly mitigate health harming pollution from families living in DAC communities, will not cause an unmanageable impact on CARB staffing and that this is an opportunity that must not be missed or delayed. Further, this move will likely assist these smaller fleets in migrating to ZEVs to realize superior performing and more reliable vehicles, meaningful TCO savings, immediate operational expense savings and enhance their ability to hire and retain drivers.

Signatories

The following organizations endorse this white paper and CARB lowering the fleet size from 50 to 10 in the High Priority and Federal Fleets part of the ACF rule.

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