



December 8, 2019

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

Subject: Environmental Defense Fund Comments on the Advanced Clean Truck (ACT) Rulemaking "Staff Report: Initial Statement of Reasons," Board Item #: act2019

Dear Chair Nichols and California Air Resource Board Members:

Environmental Defense Fund (EDF) thanks you for taking up the locally, nationally and globally relevant issue of medium and heavy duty zero-emission vehicles (ZEV trucks) in your forward-thinking Advanced Clean Transportation (ACT) rulemaking. The transition to ZEV trucks is absolutely necessary to if we want to continue to have a transportation-lead economy, breathe clean air, and have a sustainable climate.

Nationally, medium and heavy-duty vehicles are responsible for more than 466 million metric tons of greenhouse gas (GHG) emissions – more than a quarter of all transportation related GHG emissions.¹ And roughly half of the ozone-forming oxides of nitrogen (NOx) emissions from the nation's highway vehicles is from heavy-duty vehicles.² It is imperative that we address the harmful pollution from this sector in the near to midterm.

Given the magnitude of the local and global problem of truck emissions, and the very real need to get ZEV trucks on the ground, the California Air Resources Board (CARB) should do everything within reason to promote these trucks now and into the future. In this rulemaking, CARB should set a strong standard now that is replicable, effective, and successful. Only with California's efforts will the ZEV trucks that are necessary for a national transition be available for other states and our global greenhouse gas and local air pollution goals be met.

¹ U.S. Energy Information Association, *Annual Energy Outlook*, 2019, Table 19, based on 2017 numbers, https://www.eia.gov/outlooks/aeo/tables_ref.php

² U.S Environmental Protection Agency, *National Emissions Inventory Report*, 2014, https://edap.epa.gov/public/extensions/nei_report_2014/dashboard.html#sector-db

For these reasons, EDF recommends that CARB find ways to strengthen the rule. We completely understand and support the need to balance competing issues, but at the same time we see opportunities being left of the table that will improve the rollout of ZEV trucks for years to come. Specifically, EDF recommends that CARB:

1. Include in the adoption Resolution direction to staff to develop and share with the Board its analysis of a pathway for increasing sales of ZEV trucks beyond 2030 that will enable California to achieve its climate and air quality goals; and
2. Consider where the percentages of ZEV trucks to be sold can be strengthened in each medium and heavy duty class and adopt those higher percentages. One particular opportunity is requiring pickup trucks in Class 2b/3 to be available in 2024, along the same timeline as all of the other classes of trucks, by eliminating their 3-year exemption.

These steps are necessary to enable local communities to have clean air and meet their Clean Air Act requirements. Once strengthened, CARB should supercharge the heavy duty ZEV truck market by adopting the ACT regulation now and moving forward with development of the Fleet Rule as quickly expeditiously as possible.

Despite efforts to reduce harmful criteria and greenhouse gas emissions, California still has some of the worst air quality in the nation and much of this pollution comes from medium and heavy-duty vehicles (MHDV). The South Coast Air Basin has the highest ozone levels in the nation and the San Joaquin Valley has the highest particulate levels in the country.³ Unlike traditional trucks, “Zero-emission technologies have fuel efficiency two to five times as much as conventional internal combustion engines and are one of the most effective technologies to lead the transportation sector in reducing energy consumption and combustion related emissions.”⁴

ZEV truck regulations will also be good for our economy. According to the Staff Report, “The growing zero-emission truck industry will likely increase high quality employment opportunities in California. There are multiple zero-emission truck manufacturers with plants located in California. As production of zero-emission medium- and heavy-duty trucks increases, so would the number of zero-emission truck manufacturing and related industry jobs in DACs”⁵ (disadvantaged communities).

The rationale for EDF’s recommendations regarding the proposed rule follow.

RECOMMENDATION 1: The Board in the Resolution should direct the staff to develop and share with the Board its analysis of a pathway for increasing sales of ZEV trucks beyond 2030 that is consistent with achieving California’s climate and air quality goals.

³ CARB, *Proposed Advanced Clean Trucks Regulation Staff Report Initial Statement of Reasons*, October 22, 2019, <https://ww3.arb.ca.gov/regact/2019/act2019/isor.pdf> (hereinafter, “CARB ACT ISOR”), page II-3

⁴ CARB ACT ISOR, page VIII-2

⁵ CARB ACT ISOR, page V-9

In July, ARB staff presented to the Board an updated analysis titled “Critical Need for Actions to Accelerate the Transition to a Zero Emission Future.” The presentation clearly showed the need to increase the rate of passenger vehicle sales of ZEVs to near 100 percent by 2035, in order to achieve an 80 percent reduction in GHG emissions by 2050, one of California’s climate goals. This type of analysis has had the important effect of increasing the understanding of the public and regulated industry of the challenges that lie ahead if we are to meet our air quality and climate goals, and the important role zero emission vehicles must play.

A similar plan will be necessary for trucks. To be consistent with IPCC <2C sustainable development scenarios, the vast majority of the global fleet must be made up of ZEVs by 2050.⁶ This requires that virtually all new sales of MHDVs must be zero-emissions by 2040, given the lifetime of these vehicles. Additionally, as discussed below, transitioning from primarily fossil-fuel powered trucks to ZEV ones is critical to addressing many of the serious air pollution problems California faces today.

Yet, the July presentation did not present a similar forecast of the need to accelerate the transition to zero emission on-road trucks needed to meet climate and air quality goals, nor does the ISOR. Adoption of the ACT regulation CARB is considering will establish the beginning of the transition, through 2030. We believe it is also necessary to inform all interested parties of specifically what further emission reductions from on-road trucks will be needed beyond 2030 to meet climate and air quality goals, just as CARB did for passenger vehicles. This analysis should identify the sales implications for zero emission trucks, as well as establish the complementary role of USEPA in requiring emission reductions from interstate trucks that are not sold in California but frequently travel our roads.

For these reasons, EDF respectfully requests that the Board include in its Resolution for the ACT rule the following:

“WHEREAS the state must meet the federal ambient air quality standard for ozone by the 2030s, and

WHEREAS the state has established a goal of economy-wide carbon neutrality by 2045, and

WHEREAS the state has set a goal of 80 percent reduction in GHG emissions from transportation by 2050, and

WHEREAS as shown in staff’s presentation to the Board in July, 2019, nearly all new light duty vehicles sold in 2035 and thereafter need to be zero or near-zero emission vehicles in order to meet California’s GHG goals.

THEREFORE BE IT RESOLVED that the ARB staff shall present to the Board within 6 months of finalization of this ACT rule an analysis illustrating the fraction of new zero-emitting medium- and heavy-duty vehicles that will need to be sold in California each year to achieve the afore mentioned goals. The analysis presented shall also include identification of the role of the federal government necessary to reduce GHG emissions

⁶ de Coninck, H. et al., *IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response*, October 2018

from heavy-duty trucks not originally sold in our state that operate full or part time in California.

RECOMMENDATION 2: Consider where the percentages of ZEV trucks to be sold can be strengthened in each medium and heavy duty class and adopt those higher percentages. One particular opportunity is requiring pickup trucks in Class 2b/3 to be available in 2024, along the same timeline as all of the other classes of trucks, by eliminating their 3-year exemption.

To maximize the uptake of ZEV trucks, as CARB needs to do, EDF recommends including class 2b/3 pickup trucks in the zero emission truck requirements beginning in 2024, by deleting the staff proposed 3-year exemption for these vehicles.

According to ARB staff, “Stakeholders have indicated payload and towing needs are significant for many fleets that purchase Class 2b-3 vehicles, especially those that purchase heavy duty pickup trucks. ZEVs may not be suitable for periodic towing of heavy loads which could be a problem for a vehicle with limited range capability...”⁷

EDF believes the assumption that all battery electric pickups will have limited range and towing capacity is not supported by the facts. The recently introduced Tesla Cybertruck can be ordered with driving ranges from 250 to 500 miles and tow over 14,000 pounds. The Rivian R1T electric truck will have a range of up to 400 miles and is capable of towing more than 11,000 pounds.⁸ Both of these trucks are planned to go into production in 2021. Bollinger plans introduction of a 200 mile range Class 3 pickup in late 2020.⁹ Even if the range of these vehicles is substantially decreased when carrying heavy weight or towing trailers, their range would be sufficient to support operation within regional areas for many operators and private owners, especially considering the relatively low numbers of pickups that would be required by the rule.

While the number of pickups required to be zero emission would still be relatively small in 2024-2026, these vehicles would serve the important role of being visible to the public and fleet operators, thus demonstrating that zero emission pickups can meet work requirements in many cases. This is an important first step to accelerating market acceptance, as we learned with light duty zero emission vehicles.

Including pickups in the regulation in 2024 to 2026 would increase the number of zero emission pickups required by only 800 to 1900 vehicles a year over the 3 year period.¹⁰ This would be split between 3 major truck manufacturers, so the initial sales requirement over these first three years would be modest. If any manufacturer subject to the regulation lags in zero emission truck development, two options are available. Manufacturers could sell additional delivery vehicles in the 2b/3 class in lieu of pickups, or purchase credits from the zero emission-only manufacturers mentioned above who are expected to have some pickups in the 2b/3 class.

⁷ CARB ACT ISOR, page I-9

⁸ Car and Driver, “2021 Rivian R1T: Review, Pricing, and Specs,” <https://www.caranddriver.com/rivian/r1t>

⁹ Car and Driver, “Every Electric Pickup Truck Currently on the Horizon: Tesla's Cybertruck isn't the only EV with a cargo bed that's coming soon,” <https://caranddriver.com/news/a29890843/full-electric-pickup-trucks/>

¹⁰ Sales of class 2b/3 pickups are a major fraction of the sales of all trucks in Class 2b/3. In the absence of precise class 2b/3 pickup sales information, we have assumed for this calculation that pickup trucks account for half of all class 2b/3 truck sales.

We also expect that the major manufacturers could start selling Class 2b-3 pickups in 2024, because companies like Ford and GM have already announced production of zero emission light-duty pickup trucks by 2022. Ford, in fact, is moving forward with innovative new designs that prioritize power¹¹ and has already dedicated plant capacity to make its F-150 truck.¹² These same manufacturers produce most of the heavier class 2b/3 pickups, which are similar in design and often precede their light duty counterparts. Much of the learning from designing and producing zero emission light duty pickups will be transferable to the heavier 2b/3 trucks, and the ACT regulation would provide 2 additional years of lead time before its requirements go into place. This supports the feasibility of beginning the zero emission requirements for class 2b/3 pickups in 2024 rather than the staff proposal of 2027.

EDF believes that other opportunities to strengthen the rule exist across other classes as well and urges CARB to consider them for adoption. For example, CARB staff considered and revised an earlier workshop proposal and now proposes that sales of zero emission Class 7-8 regional tractors begin in 2024, rather than 2027. We appreciate this step and believe that others should be taken as well. This is because multiple classes of ZEV trucks are starting to be commercialized over the next few years (see table below), ahead of the rule implementation. ARB has also funded several programs involving about 50 tractors to demonstrate their use in drayage and regional delivery. Lastly, Tesla and Nikola have shown zero emission tractors designed for longer regional operation, and purchase commitments of these tractors by several fleets have been made. In addition, truck manufacturers that may be pressed to comply by 2024 will have the flexibility of buying credits from other zero emission tractor manufacturers. It is important that CARB maximize all doable ZEV truck opportunities.

Sample Class of ZEV Trucks in Multiple Classes Becoming Commercialized In Next Few Years					
<i>Manufacturer</i>	<i>Truck Model</i>	<i>Photo</i>	<i>Duty Cycle</i>	<i>Fleet Piloting</i>	<i>Production</i>
Freightliner	eCascadia		Regional Haul	Penske Truck Leasing and NFI	2021
Volvo	VNR		Regional Haul	NFI	Late 2020
Peterbilt	579EV		Regional Haul		Low-volume late 2020

¹¹ Motor Trend, "Electric Ford F-150 (and More?) Secrets Detailed in Patent: It seems Ford has size, strength, and power in mind with its future electric trucks," <https://www.motortrend.com/news/electric-ford-f-150-detailed-patent/>

¹² Electrek, "Ford union deal confirms EV plans, electric F-150 will be built in Dearborn," <https://electrek.co/2019/11/04/ford-union-plans-electric-f-150-built-in-dearborn/>

Xos	ET-One		Regional Haul		
Nikola	Nikola One		Long Haul	AB InBev	2022

Once strengthened, CARB should supercharge the medium heavy duty ZEV truck market by adopting the ACT regulation now and moving forward with development of the Fleet Rule as expeditiously as possible

In some of the workshops and work group meetings, several truck and engine manufacturers stated that the ACT rule should be delayed until the demand side fleet rule is adopted, and until the reporting required of fleets also required by the rule you are considering has been received and assessed. The rationale offered was that the truck/engine manufacturers would not know what truck models to design until there is a final demand side rule facing the fleet operators.

The overlap between the ability of zero emission technology and the requirements of medium and heavy-duty duty cycles has been thoroughly examined by ARB during this process. Manufacture investments and demonstration projects show that a significant and diverse segment of the sector is well matched with zero emission technology. Also, as discussed in the ISOR, engine and truck manufacturers are already selling zero emission medium and heavy duty trucks today, four years before the ACT rule goes into effect, and as indicated by the strong demand for incentives, the market is growing.

To further grow the market, EDF strongly recommends that CARB continue to expeditiously move forward with development of the fleet regulation, with the goal to simultaneously broaden infrastructure and financing options in addition to the current rule's increased ZEV truck choices.

Below we provide additional comments on why the move from diesel-based trucks to zero emission trucks is critical to our health, and good for our economy.

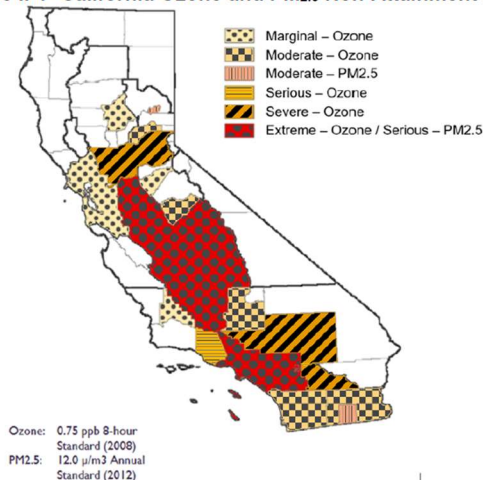
California's Local Air Quality and Ability to Enforce its SIP Depend on ZEVs in the medium and heavy duty sector

Heavy-duty highway trucks and buses emit harmful air pollution that contributes to our state and nation's continuing air quality problems. Mobile sources and the fossil fuels that power them are the largest contributors to the formation of ozone, GHG emissions, fine particulate matter (PM2.5), and toxic diesel particulate matter in California. Substantial progress has been achieved in reducing harmful air emissions from heavy-duty vehicles through implementation of CARB's existing mobile source programs. However, a number of areas in California are still struggling to meet the ambient air quality standards for ozone and particulate matter and

substantial reductions from the heavy-duty fleet are crucial.

Statewide, about 12 million Californians live in communities that exceed the federal ozone and PM_{2.5} standards.¹³ In fact, the South Coast and San Joaquin Valley are the only two areas in the nation designated as “extreme” nonattainment.¹⁴ According to the Staff Report, “The San Joaquin Valley has the highest PM_{2.5} levels in the nation. Despite regulations [on diesel trucks], HD on-road vehicles still account for over 25 percent of statewide diesel PM emissions while making up only a small proportion of California’s on-road vehicle fleet.”¹⁵

Figure II-1- California Ozone and PM_{2.5} Non-Attainment Areas



To meet the 2023 and 2031 ambient air quality standards for ozone, the South Coast Air Basin will require an approximate 80 percent NO_x reduction by 2031.¹⁶ Instead, from 2010 to 2017, Southern California has seen a 10% increase in deaths attributable to ozone pollution.¹⁷ Because local air quality boards have no direct control over mobile sources, they will not be able to meet air quality standards without strong leadership from CARB on electric vehicles. For this reason, the West Oakland Community Action Plan -- the first community-led plan aimed at reducing local air pollution following the directive of Assembly Bill 617 -- proposes that “CARB develops a new Advanced Clean Truck Regulation and amendments to the existing drayage truck regulations to increase the number of zero-emission trucks operating in West Oakland.”¹⁸ This rule represents an important mechanism by which these communities will achieve their emission reduction goals.

Medium and heavy-duty vehicles make up a significant proportion of harmful air pollution in California, despite making up just 7 percent of vehicles on the road. According to the Staff Report, MHDVs release 35% of total statewide NO_x and 25% of statewide diesel PM emissions,¹⁹ often “... located around more densely populated urban areas, including in low-income and disadvantaged communities.”²⁰

¹³ CARB, “Heavy-duty Low NO_x Program, Public Workshop,” Sacramento, January 23, 2019, https://ww3.arb.ca.gov/msprog/hdlownox/files/workgroup_20190123/00-background_&_timing_ws01232019.pdf?_ga=2.124115660.717209197.1572561203-1119335516.1567614494

¹⁴ CARB, *Mobile Source Strategy*, May 2016 (hereinafter, “CARB Mobile Source Strategy 2016”), <https://ww3.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf>, page 21

¹⁵ CARB ACT ISOR, page II-4

¹⁶ CARB *Mobile Source Strategy* 2016, page 21

¹⁷ L.A. Times, “Must Reads: The war on Southern California Smog is Slipping. Fixing It is a \$14-billion problem,” <https://www.latimes.com/local/lanow/la-me-smog-southern-california-20190701-story.html>

¹⁸ Bay Area Air Quality Management District and West Oakland Environmental Indicators Project, *Owning Our Air: The West Oakland Community Action Plan, Volume 1: The Plan*, <http://www.baaqmd.gov/~media/files/ab617-community-health/west-oakland/100219-files/final-plan-vol-1-100219-pdf.pdf?la=en> Page 6-24, Strategy #29

¹⁹ CARB ACT ISOR, page II-4

²⁰ CARB ACT ISOR VIII-1

CARB estimates that port air pollution creates cancer risks exceeding 500 in 1 million for tens of thousands of residents. Research EDF conducted near the Port of Oakland²¹ has shown that living in areas with the most elevated levels of pollution increases heart attack risk in the elderly by 40 percent, similar to a history of smoking.²² As those trucks line up and often idle along the nearby roads and freeways, they also emit pollutants including black carbon. In Oakland, the sensors we deployed on the busy Maritime Street along the Port boundary measured black carbon concentrations that averaged 200 percent higher than sensors placed upwind.²³

The vulnerable communities living amongst the approximately 30 to 45 percent of the urban population in North America living "next to a busy road"²⁴ are susceptible to further harm. For example, children who live or go to school near major roadways are at considerable additional risk for substantial deficits in lung function, even in areas with low regional pollution.²⁵ Nano-sized particular matter (PM 2.5) induce neuroinflammation and oxidative stress leading to neurodevelopment disorder in infants, children, and young adults in Metropolitan Los Angeles.²⁶ Emerging research is linking particulate matter to changes in the brain linked with Alzheimer's disease in people with a genetic predisposition, which includes a majority of patients that developed the most common form of sporadic Alzheimer's disease.²⁷

Despite these statistics, using current data, the Staff Report estimates that all Class 4-8 trucks are diesel, while 57% of class 2b-3 trucks are diesel-powered and 43% are gasoline-powered.²⁸ ZEV trucks will enable California to break this cycle. According to the staff report, "Heavy-duty ZEV adoptions in low-income and disadvantaged communities will be an important part of the solution ... in maximizing NOx and PM reductions needed to meet SIP requirements."²⁹ Importantly, "only actions that are enforceable can be included in the SIP. The Proposed ACT Regulation would make ZEV sales enforceable."³⁰

ZEV Rules Are Good for California's Economy

According to a recent article in Forbes, in 2018, "EVs were the state's 8th most valuable export, worth almost \$3 billion in revenue—more than phones, pistachios, and even oil... California's industrial and manufacturing sectors are often underestimated, but electrified transportation has become a significant economic engine, creating a booming export industry and high-quality

²¹ Environmental Defense Fund (EDF), "How pollution impacts human health"

<https://www.edf.org/airqualitymaps/oakland/how-pollution-impacts-human-health>

²² EDF, "Understanding air pollution in Oakland," <https://www.edf.org/airqualitymaps/oakland>

²³ EDF, "Study shows how pollution changes over space and time," <https://www.edf.org/airqualitymaps/oakland/study-shows-how-pollution-changes-over-space-and-time>

²⁴ American Lung Association, "Living Near Highways and Air Pollution," <https://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/highways.html>

²⁵ EPA and NIH, *NIEHS/EPA Children's Environmental Health and Disease Prevention Research Centers Impact Report*, 2017, https://www.epa.gov/sites/production/files/2017-10/documents/niehs_epa_childrens_centers_impact_report_2017_0.pdf

²⁶ Keith L. Black, MD, Chair and Professor, Department of Neurosurgery, Cedars-Sinai Medical Center, Los Angeles, CA, "Activation of Pro-Inflammatory factors in the Brain after chronic exposure to Air Pollutants," Power Point, November 2019 (hereinafter, "Keith L. Black, MD, 'Activation of Pro-Inflammatory factors in the Brain after chronic exposure to Air Pollutants'")

²⁷ Keith L. Black, MD, "Activation of Pro-Inflammatory factors in the Brain after chronic exposure to Air Pollutants"

²⁸ CARB ACT ISOR, page IX-4

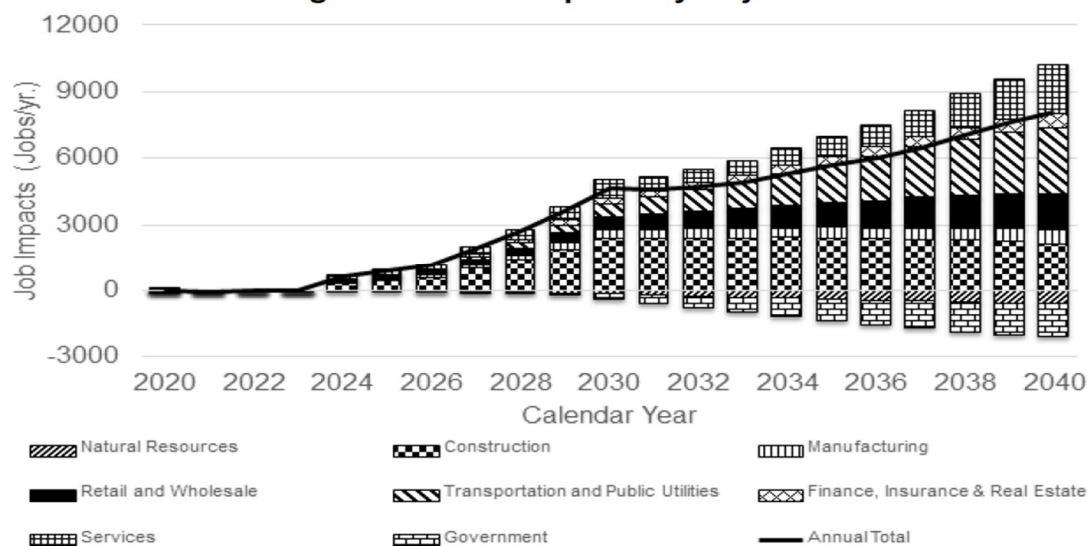
²⁹ CARB ACT ISOR, page VIII-2

³⁰ CARB ACT ISOR, page IX 2

jobs in a growing global market.” It notes that “California’s EV exports are poised to grow further.”³¹ Regulations like this one will help.

According to the Staff Report, one of the eight ZEV trucks manufacturers located in California, “BYD, located in Lancaster, California, has a community benefits agreement (CBA) with Jobs to Move America (JMA), which will support the creation of a robust U.S. jobs program through deep investments in pre-apprenticeship and training programs. This CBA has a goal of recruiting and hiring 40 percent of its workers from populations facing significant barriers to employment [and] populations that have historically been excluded from the manufacturing industry, such as women and African Americans are also expected to be recruited and placed.”³²

Figure IX-8: Job Impacts by Major Sector



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In addition, with “fuel efficiency two to five times as much as conventional internal combustion engines,”³³ this regulation has the potential to provide drivers and fleet owners with significant fuel cost savings. For example, for a fleet of 20 Class 4 vehicles, Battery-Electric trucks can save \$1,074,706 over 12 years.³⁴ Moreover, the higher initial prices are expected to go down as the market expands.³⁵

Adopting the ACT rulemaking also stands to benefit smaller businesses. Indeed, the staff report notes that “there is no expected direct cost on small businesses ...[and] small businesses who operate trucks will not be required to purchase zero-emission trucks, but may independently decide to do so.”³⁶ This may enable cost savings for small businesses due to electric trucks’ lower cost of operation.”

³¹ Forbes, “California Electric Vehicle Exports, Already Valued At \$3 Billion In 2018, Expected To Hit \$3.4 Billion In 2019,” Sept. 23, 2019, available at <https://www.forbes.com/sites/energyinnovation/2019/09/23/california-electric-vehicle-exports-already-valued-at-3-billion-in-2018-expected-to-hit-35-billion-in-2019/#231fafd44e27>

³² CARB ACT ISOR, page VIII-2

³³ CARB ACT ISOR, page VIII-2

³⁴ CARB ACT ISOR, page IX-31, Table IX-24 “Fleet Cost Example”

³⁵ CARB ACT ISOR, page IX-9

³⁶ CARB ACT ISOR, page IX-33

Thanks you for your consideration of these comments. Please feel free to contact me with any questions you have.

Sincerely,

A handwritten signature in black ink, reading "Lauren Navarro" in a cursive script, followed by a long horizontal flourish.

Lauren Navarro

Senior Manager, California Energy