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Via cleancars@arb.ca.gov

California Air Resources Board
Sustainable Transportation and Community Division
1001 I Street
Sacramento, CA 95814

Re: Comments from Environmental Defense Fund on Advanced Clean Cars (ACC) II

Environmental Defense Fund (EDF) respectfully submits the following comments on the development of the Advanced Clean Cars (ACC) II standards for passenger vehicles in California. The Air Resources Board (ARB) held a Public Workshop on May 6, 2021 providing information on the development of the ACC II program and asking for input. EDF supports a rigorous and transformative ACC II program that ensures all new passenger vehicle sales are zero-emission vehicles (ZEVs) by 2035. Our comments highlight the urgent need for a transition to ZEVs and make recommendations for how ARB staff can strengthen the forthcoming proposed rulemaking.

EDF supports and thanks ARB for its leadership in moving forward with these next generation multipollutant standards for passenger vehicles. California standards that achieve 100 percent sales of ZEVs by 2035 will mark a historic and important step in responding to the dual crises of climate change and air pollution and will likewise help to support the development of protective national standards. We cannot afford any delay in these standards and EDF therefore urges ARB to accelerate the hearing schedule by several months to adopt the final rule by June 2022.

As staff highlighted at the workshop, California suffers from some of the worst air quality in the nation and faces significant challenges from climate and health-harming air pollution. More than 20,000 Americans die prematurely every year as a result of the motor vehicle pollution on our roads and highways, including many Californians.[1] A recent study by researchers at George Washington University and EDF found that, in the Bay Area alone, more than 2,500 lives are lost, and 5,200 children develop asthma every year due to traffic-related air pollution exposure.[2]

[1] Kenneth F Davidson et al. 2020. The recent and future health burden of the U.S. mobile sector apportioned by source. *Environ. Res. Lett.* 15 (7). https://iopscience.iop.org/article/10.1088/1748-9326/ab83a8/pdf Estimate of "over 20,000" derived using the medians of the upper bound of Krewski and Lepeule's 2011 and 2025 onroad health burden estimates in Table 3 and 4 and assuming a linear reduction over time.

[2] Veronica Southerland et. al. 2021. Assessing the Distribution of Air Pollution Health Risks within Cities: A Neighborhood-Scale Analysis Leveraging High-Resolution Data Sets in the Bay Area, California. *Env. Health Persp.* 129 (3). https://ehp.niehs.nih.gov/doi/10.1289/EHP7679

The pollution from these highway vehicles does not impact communities equally.[3] As a result of housing discrimination and other unjust policies, communities of color and low-income communities constitute a higher percentage of the population near our roads and highways, ports, distribution centers and other places where vehicle emissions are higher, causing them to suffer disproportionately from the health harms of this pollution.[4] A recent report by the Moving Forward Network found that, on average, Asian and Black Americans bear a PM2.5 pollution burden from cars, trucks and buses that is 56 and 44 percent higher, respectively, than white Americans.[5] The EDF analysis of the Bay Area study data referenced above found that neighborhoods with higher percentages of residents of color experienced double the rate of asthma from NO_2 – a pollutant used as a marker for transportation-related pollution.[6] We encourage ARB to work closely with environmental justice communities to design a regulatory program that promotes equity.

California's light-duty vehicles are responsible for 13 percent of the state's ozone-forming nitrogen oxide (NOx) pollution and 28 percent of the state's carbon dioxide (CO2) pollution.[7] EDF agrees with ARB that deep reductions from the light-duty fleet are required to address the serious health harms from vehicles operating in communities across California. EDF also agrees that the path to achieving the needed long-term reductions in climate and air pollution is a full transition to ZEVs. A recent EDF analysis found that if all new cars, SUVs, and passenger trucks sold in California are zero-emitting starting by 2035, the state could:[8]

- Prevent up to 7,406 premature deaths in total by 2050
- Eliminate more than 1.2 billion tons of climate pollution by 2050
- Significantly reduce the smog-forming and particulate pollution that disproportionately burdens communities of color and low-income communities
- Save Californians who buy a new ZEV in 2035 more than $13,000 over the life of the vehicle, compared to a gas-powered car
- Save the state of California $194 billion cumulatively by 2050 in health and economic benefits

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[3] Sinnamon, H. 2020. Accelerating to 100% Clean: Zero emitting vehicles save lives, advance justice, create jobs. Environmental Defense Fund. https://www.edf.org/sites/default/files/documents/TransportationWhitePaper.pdf

[4] Gregory M. Rowangould. 2013. A census of the US near-roadway population: Public health and environmental justice considerations. *Transportation Research Part D 25*, 59–67. https://www.sciencedirect.com/science/article/pii/S1361920913001107.

[5] Jimmy O'dea. 2020. *Zero-Emissions Technology for Freight: Heavy-Duty Trucks, Tools to Advocate for Zero-Emissions Technology.* Moving Forward Network. http://www.movingforwardnetwork.com/wp-content/uploads/2020/10/MFN_ZeroEmissionToolkit-1.pdf

[6] EDF. 2021. Air pollution's unequal impacts in the Bay Area. https://www.edf.org/airqualitymaps/oakland/health-disparities

[7] California Air Resources Board, "Advanced Clean Cars (ACC) II Workshop," September 16, 2020. https://ww2.arb.ca.gov/sites/default/files/2020-09/ACC%20II%20Sept%202020%20Workshop%20Presentation%20%28Updated%29.pdf

[8] EDF. 2021. California: 100% new zero-emission vehicles sales by 2035 will deliver extensive health, environmental and economic benefits. http://blogs.edf.org/climate411/files/2021/05/Final-Combined-CA-ZEV-Report-5.4.21.pdf

This report further substantiates the need for an urgent transition to zero-emitting passenger vehicles. We encourage the Board to consider this analysis and the following recommendations in the development of a comprehensive ACC II program that addresses the serious health burden faced by Californians, especially those living and working near roads and highways.

EDF has joined separate comments submitted on behalf of several health and environmental organizations, which address a broader range of issues and include references to analyses completed by several of those signatory organizations. These comments offer EDF's specific recommendations on key aspects of the technical proposals contained in the slides presented by ARB staff on May 6th, including references to analytics supporting these recommendations.

Low Emission Vehicle Criteria Pollutant Standard Proposals

EDF strongly supports the staff recommendation that ZEVs be removed from the NMOG+NOx fleet average and the proposed changes to the certification bins. Removing ZEVs from the fleet average for these standards will prevent backsliding within the internal combustion engine (ICE) fleet as the deployment of ZEVs accelerates. Eliminating the highest bins and adding additional lower bins will also help transition the fleet to ZEVs. We also support the staff's proposals to further minimize in-use exhaust and evaporative emissions from combustion engines.

Zero Emission Vehicle Regulation Proposals

EDF supports a regulatory trajectory that transitions the real vehicle fleet to all new ZEV sales by 2035 and that addresses manufacturer credit banks and credit generation in a way that does not substantially dilute the standard stringency and sales of real ZEVs.

Cost Assumptions

While we recognize that the slides presented at the May 6 workshop represent only a sample of the assumptions informing ARB's ZEV cost projections and none of the data underlying those assumptions, EDF is concerned that the cost estimates presented are too high and may not reflect the latest information regarding cost. EDF would like to highlight several areas of concern that we believe, if addressed, will show that the total incremental cost of purchasing a ZEV is lower than ARB's current estimates. Additionally, EDF urges ARB to present the total cost of ownership of each category of ZEV in its forthcoming proposal. Numerous studies have shown that total cost of ownership of many ZEVs will reach parity with conventional vehicles in the next few years.[9]

Battery pack costs

[9] Nic Lutsey and Michael Nicholas (April 2019). Update on Electric Vehicle Costs in the United States through 2030, *The International Council on Clean Transportation*. See https://www.theicct.org/publications/update-US-2030-electric-vehicle-cost; M.J. Bradley & Associates, an ERM Group Company. 2021. *Electric Vehicle Market Status – Update*. https://www.mjbradley.com/sites/default/files/EDF_EV_Market_Report_April_2021_Update.pdf

The battery pack costs shown on slide 61 of the ARB workshop presentation appear to be high. ICCT conducted an extensive international survey of battery costs in early 2019.[10] They projected battery pack costs of $64/kW-hr in 2030 for an SUV-sized battery. ARB's projection of $81/kW-hr is 20 percent higher than ICCT's and does not reflect the fact that reductions in battery costs since 2019 have exceeded expectations. EDF recommends that ARB reevaluate its projected battery pack costs to ensure they represent the latest projections available.

Battery costs

EDF evaluated the BEV cost projections for medium and large SUVs provided on slide 64 of the ARB workshop presentation. Assuming that the decreases in the cost of an SUV BEV300 and BEV400 between 2026 and 2030 and 2030 and 2035 are entirely due to reduced battery costs, and using ARB's battery pack costs of $100, $81 and $63 per kW-hr in 2026, 2030 and 2035, that produces battery capacities of 105-110 kW-hr for the BEV300 and 145-150 kW-hr for the BEV400.[11] These battery capacities imply electricity consumptions of 0.32-0.33 kW-hr per mile, which is reasonable for the average car, but not for a medium to large SUV. This suggests that other aspects of BEV costs are increasing over time and partially offset the impact of lower cost batteries. We are not aware of any EV cost component that is projected to increase in cost over time. Thus, we believe that the reduction in total BEV300 and BEV400 cost should be greater than that shown on slide 64. We urge ARB to review its BEV cost methodology and we look forward to the publication of ARB's detailed methodology for projecting ZEV costs.

Electric powertrain costs

ARB has not yet presented these costs. EDF notes that the ICCT study referenced above projected that these costs are expected to decrease over time and powertrain efficiency is projected to increase. We recommend that ARB incorporate these findings into its projected ZEV costs.

ICE and transmission delete cost

On slide 70 of the workshop presentation, ARB only presented a single $5300 credit for cars and small SUVs and a single $7500 credit for medium/large SUVs and pickups. The above cited ICCT study estimated much higher costs for ICE powertrains and emission controls: $7500-7800 for cars and crossovers and $11,000-$11,600 for SUVs and pickups. Also, these delete costs should increase over time due to existing GHG and criteria pollutant standards plus the additional ARB standards discussed at the workshop for ICEs. Such an increase was not apparent from the single point estimates provided during the workshop. We recommend ARB consider the delete cost estimates developed by ICCT, as well as considering the cost of expected future emission controls on ICE powertrain and emission control costs.

Effect of colder temperatures and towing on BEV costs

The bar charts on slides 67-68 of the ARB workshop presentation indicate that ARB projects that equipping BEVs for colder temperature operation in 2030 and 2035 will cost an additional

[10] "Update on electric vehicle costs in the United States through 2030," Nic Lutsey and Michael Nicholas, International Council on Clean Transportation, April 2, 2019. https://theicct.org/publications/update-US-2030-electric-vehicle-cost.

[11] We also assumed that 90% of the battery capacity was usable before needing to be recharged.

approximately $500-$1000 per vehicle. This cost seems excessive, and it is unclear what this cold temperature equipment entails. Many BEVs already include heat pumps as standard equipment, or utilize less expensive, but technically elegant techniques to provide heat to the cabin without resorting to large amounts of resistive heat (e.g., the Tesla Model S).[12] Heat pumps and other thermal management techniques can also be used to improve battery performance and thus, vehicle range.[13] We recommend that ARB consider all of the technologies being developed to manage heat generated by BEVs in its estimate of the cost, if any, of supplying cabin heat in colder climates.

Similarly, ARB assumes very high additional costs for BEV towing packages in both 2030 and 2035 (slide 67 and 68). It is not clear why these packages are estimated to be so costly, and we urge ARB to provide detailed technology and cost assumptions in the forthcoming proposal.

In summary, EDF believes that ARB's current ZEV cost projections are too high for the medium and large SUV categories. As an example, the up-front purchase price of the forthcoming all-electric Ford F-150 Lightning is already cost competitive with its gasoline counterparts. The base model 2022 Lightning Pro will start at an estimated $41,669, compared with a conventional F-150 with similar specifications that starts at $42,500 and a similar Chevy Silverado at $42,710 – both within a few hundred dollars of the ZEV.[14] Additionally, the Ford Lightning will offer substantial fuel and maintenance savings over time. EDF urges ARB to reconsider many of the assumptions and estimates that went into the staff's ZEV cost projections.

Sales Assumptions

Based on manufacturer reported values, slide 38 from the workshop shows that 25 percent of all vehicles sold in MY2023 will be ZEVs and PHEVs. Three years later in 2026, the first year of ACC II, staff suggests real vehicle ZEV sales will be only one percentage point higher. It seems unreasonable that essentially no growth in ZEV sales would occur over this three-year period. Many automakers are committing to significantly higher ZEV sales in 2025 and 2030.[15] EDF encourages ARB to consider a real vehicle sales trajectory that sets a regulatory sales requirement in 2026 that reflects a careful assessment of future ZEV market developments, manufacturer commitments and the best available data on future ZEV sales projections.

Credit Use

Moving away from the use of credits will accelerate the transition toward ZEVs and help meet the 100 percent new ZEV sales by 2035 target. EDF supports ARB's proposed cap on the use of ACC I credits and their sunset after 5 years, which will help boost actual ZEV sales in 2026

[12] https://enrg.io/electric-cars-heat-pumps/#:~:text=Some%20electric%20vehicles%20have%20a%20heat%20pump%20as,the%20optimal%20temperature%2C%20you%20increase%20its%20overall%20performance.
[13] https://www.autocar.co.uk/car-news/technology/under-skin-how-heat-pumps-improve-electric-cars
[14] Nick Yekikian, "How Much Ford's F-150 Lightning Electric Truck Costs vs. Regular F-150, Chevy, Ram" Motortrend (May 20, 2021). https://www.motortrend.com/news/2022-ford-f-150-lightning-electric-truck-price-msrp/
[15] M.J. Bradley & Associates, an ERM Group Company. 2021. *Electric Vehicle Market Status – Update*. https://www.mjbradley.com/sites/default/files/EDF_EV_Market_Report_April_2021_Update.pdf

through 2030. We also encourage ARB to consider a similar cap on the use of ACC II credits to prevent credit surpluses that can reduce actual ZEV sales through 2035. Credits should be structured to help individual manufacturers smooth their transition to an all-electric future by 2035, not to extend it further into the future.

PHEV Qualifications

EDF supports ARB's proposed adjustments to the features of PHEVs that would allow such vehicles to qualify as ZEVs for purposes of the fleetwide standard. EDF urges ARB to require manufacturer demonstrations of their PHEVs' in-use fraction of electric battery mileage over the life of the vehicle. Periodic tracking will be necessary to incentivize minimizing the use of the vehicle's internal combustion engine and will provide a valuable opportunity for data collection on the true emissions benefits of PHEVs, which in the future could be tied to the credit value provided for a PHEV.

We also recommend that ARB evaluate the frequency that light trucks are used to tow large trailers and factor this into the feasibility for BEVs to fulfill this application.

Inclusion of Class 2b and 3 Vehicles

EDF encourages ARB to consider inclusion of class 2b and 3 vehicles in the light-duty ZEV regulation. These vehicles are among the fastest growing classes of vehicles and are a growing contributor to harmful emissions. As well, the technology is available to accelerate their transition to ZEVs in the same timeframe as passenger vehicles. ARB's ACT regulation requires only 55 percent of sales of class 2b/3 trucks be ZEVs in 2035. Including these vehicles to ACC II will result in twice the number of zero-emission pick-ups, vans and delivery vehicles on the road by 2035 than would otherwise occur if they remain subject to the ACT regulation.

Despite the regulatory split between light-duty trucks and 2b and 3 trucks, they are very similar in use patterns as well as engine and transmission configurations. In fact, many 2b trucks are simply larger versions of a manufacturer's 2a model with engines and transmissions that can be nearly identical in configuration. EPA regulates criteria emissions from 2b and 3 vehicles under the light-duty Tier 3 rulemakings because "Most are built by companies with even larger light-duty truck markets, and as such they frequently share major design characteristics and potential emissions control technologies with their LDT counterparts."[16] Moreover, 2b and 3 vehicles are currently chassis certified by EPA in the same way as light-duty vehicles so integrating them into the light-duty ZEV program would not be difficult from a compliance standpoint. [17]

Their similarities to light-duty trucks make 2b and 3 vehicles prime candidates for ZEV technology. Indeed, Ford, the world's largest manufacturer of cargo vans, announced a model

[16] 79 Fed. Reg. 23414, Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards (April 28, 2014).

[17] Class 2b and 3 diesel pickup trucks and vans have an option to certify using the chassis dynamometer test procedure. As an alternative, some engines used in 2b and 3 diesel trucks are certified as engines on an engine dynamometer. Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards. 2014. Final RIA, Page 1-9.

year 2022 all electric cargo van for "last-mile" urban deliveries backed with a multi-billion dollar investment.[18] And General Motors recently launched BrightDrop, a new business that will produce the EV600, a zero-emitting advanced freight vehicle for last mile delivery.[19] As operation of class 3 last mile delivery vehicles is rapidly increasing, it is vital that these vehicles be prioritized for the transition to zero-emission.

We strongly urge ARB to include 2b and 3 vehicles in the ACC II program. Doing so could double the number of zero-emission pick-ups, vans and delivery vehicles on the road by 2035 than would otherwise occur if they remain subject to the ACT regulation.

Conclusion

We appreciate ARB's consideration of these comments and look forward to our continued participation in this rulemaking process.

Respectfully submitted,

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[18] Ford Media Center, "Leading the Charge: All-Electric Ford E-Transit Powers the Future of Business with Next-Level Software, Services and Capability," (Nov. 12, 2020).
https://media.ford.com/content/fordmedia/fna/us/en/news/2020/11/12/all-electric-ford-e-transit.html
[19] Jamie LaReau, "GM startup to make new electric truck for FedEx, other delivery services," *Detroit Free Press* (Jan. 12, 2021).
https://www.freep.com/story/money/cars/general-motors/2021/01/12/gm-bright-drop-delivery-ev-delivery/6625884002/