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October 22, 2021

Submitted electronically via the comment submittal form: sp22-inputs-ws.

California Air Resources Board
1001 I Street, Sacramento, CA 95814

RE: 2022 Scoping Plan Update - Scenario Inputs Technical Workshop

To the California Air Resources Board,

The Center for Biological Diversity appreciates this opportunity to provide input regarding the analysis of scenarios in the development of the 2022 Scoping Plan Update to Achieve Carbon Neutrality by 2045. We offer these comments following the September 30 technical workshop on the development of scoping plan scenarios. These comments seek to respond to specific questions raised in the workshop presentations, and to provide our perspective, background information, and citations to key scientific publications relevant to components of the proposed analysis.

The Center for Biological Diversity supports the comments submitted by the California Environmental Justice Alliance, and the recommendations of the Environmental Justice Advisory Committee. In particular, we support the recommendation that the emission reduction mandate to cut greenhouse gases 40 percent below 1990 levels by 2030 must be achieved *first*, through direct emissions reductions across all sectors, as a goal distinct from the carbon neutrality target.

Similarly, we strongly agree with the recommendation that the scenario analysis must expect similar levels of innovation and investment in each alternative, lest the analysis be designed to ensure the failure of the most aggressive alternative, currently Alternative 1. For example, the current draft assumes substantial advancements in CCS technologies but does not assume similar advances in clean energy resources and direct fuel substitutions.

I. Carbon Neutrality by 2035

We strongly support an accelerated timeline for carbon neutrality, as reflected in Alternatives 1 and 2, to achieve carbon neutrality by 2035, and the associated interim goals for 2030. As we stated in our previous comment letters, the current scientific evidence indicates that anything but pathways with immediate and drastic greenhouse gas emissions reductions—including a rapid phase-out of fossil fuel production and a just transition to a renewable economy—is fundamentally inadequate.

This conclusion was most recently reinforced by the IPCC *Climate Change 2021* report, which the UN Secretary-General aptly stated is "a code red for humanity…[G]reenhouse gas emissions

from fossil fuel burning and deforestation are choking our planet and putting billions of people at immediate risk," and further that "[t]his report must sound a death knell for coal and fossil fuels, before they destroy our planet…Countries should also end all new fossil fuel exploration and production."[1] Indeed, we are perilously close to crossing the 1.5°C global warming threshold established by the Paris Agreement, beyond which we can expect catastrophic climate harms.

II. Natural and Working Lands

We look forward to working with CARB on the separate and distinct modeling process that will be used to estimate carbon sequestration potential for Natural and Working Lands. We support land protection as a key policy option across all the NWL land types, which will promote carbon storage and sequestration while protecting ecological functions and their many co-benefits. For forest ecosystems, CARB should model forest protection—meaning no logging, thinning, or forest biomass energy—as a discrete policy option, as well as modeling reduced logging levels on private lands**.**

We strongly support the inclusion of alternatives with greatly reduced use of synthetic pesticides in agricultural lands. As we detailed in previous letters, pesticide use in California is a significant, yet overlooked, factor in greenhouse gas emissions in agricultural lands and have substantial negative impacts on soil carbon sequestration.

III. Carbon Capture and Sequestration

We strongly support the inclusion of alternatives that do not rely on engineered carbon dioxide removal (CDR) such as CCS and bioenergy with carbon capture and storage (BECCS), as reflected in Alternative 1.

The attached comment letter dated August 16, 2021 (Comments on Engineered Carbon Removal Technical Workshop) details why CARB should not include CCS as part of the state's emissions reduction strategy. CCS delays the needed transition away from fossil fuels and other combustible energy sources, and poses serious environmental, health, and safety risks, particularly to communities already overburdened by industrial pollution. The widespread opposition to CCS from hundreds of organizations—recognizing that CCS is a false climate solution that undermines environmental justice and climate goals—should alert CARB that CCS should not be part of a just, equitable, effective climate strategy.

To the extent that any alternatives do include CCS, we recommend that ARB hold a workshop dedicated to this topic and establish a transparent methodology to develop a realistic assessment of the size, certainty, timing, and costs of the carbon benefits of CCS technologies, with special attention given to the risks associated with CCS, the assumptions inherent to the estimates, as well as the uncertainties regarding the state of the science and application of CCS.

[1] United Nations Secretary-General, Secretary-General's statement on IPCC Working Group 1 Report on the Physical Science Basis of the Sixth Assessment (August 9, 2021), https://www.un.org/sg/en/content/secretary-generals-statement-the-ipcc-working-group-1-report-the-physical-science-basis-of-the-sixth-assessment.

IV. Fossil Fuel Extraction and Refining

The draft proposal includes three alternatives for in-state oil and gas extraction: phase out operations by 2035, phase out operations by 2045, and phase out operations in line with petroleum demand. We recommend including alternatives that involve phasing out in-state oil and gas extraction by 2025 and 2030. Similarly, the analysis should identify the effects of phasing out in-state oil refining by 2030.

In addition to analyzing options for phasing out fossil fuel production, the analysis should consider specific policy options. Specifically, the analysis should estimate the emissions implications of halting the approval of new drilling permits, a halt to new permits within 3200 feet of sensitive receptors, a halt to existing well operations within 3200 feet of sensitive receptors, and a differential ramp down of oil fields based on the carbon intensity of their particular crude production. Considering the high carbon intensity of crude oil production is crucial to understanding both the differences among oil fields in California, and the carbon benefits to accelerating in-state crude production. Furthermore, the analysis of phase-out in line with demand should explicitly incorporate the various options for VMT reductions and ZEV adoption.

The report by the Center for Biological Diversity, titled "Killer Crude: How California Produces Some of the Dirtiest, Most Dangerous Oil in the World," dated June 2021, details the high GHG emissions and environmental impacts associated with crude oil production in California. On average, California oil emits more carbon dioxide per barrel than the rest of the global supply refined in the state. It's now even more climate-heating than the notorious Canada tar sands oil refined in California.[2]

V. Non-Combustion Methane Emissions (Landfills, Dairies, and Fossil Fuels)

We strongly support the consideration of options for accelerating maximal reductions of methane emissions from landfills, dairies, and the oil and gas sector, as reflected in Alternatives 1 and 2. In particular, we strongly support the inclusion of an alternative that does not include any dairy digester methane. In fact, we expect that fully accounting for all of the emissions from the system will show that dairy digesters do not provide net carbon benefits. In addition, financial incentives for dairy digesters could extend or increase the concentration of dairies in the Central Valley without substantially decreasing the overall pollution from those operations in the state's most polluted air basins.

Animal agriculture plays a key role in methane pollution in California. The analysis should consider the full costs and impacts of digesters not just in terms of construction and ongoing operation, but also the implications of extending the lifespan of large operations. That is, while some reduction measures might show benefits at the individual operation level, they often don't provide reductions from the industry as a whole. Other environmental implications include water quality and air quality, from ammonia in particular, but also hydrogen sulfide, PM, and nitrous oxide.

[2] *See* https://biologicaldiversity.org/w/news/press-releases/report-california-oil-among-the-most-climate-damaging-on-earth-2021-06-28/.

The scenarios analysis should look beyond digesters to more comprehensive solutions, including a just transition to sustainable non-animal based farming practices. For example, the analysis could identify the potential benefits of transitioning away from dairy enterprises and into sustainable, plant-based farming practices, considering options for reducing emissions at the sector level rather than at the level of individual operations.

VI. Industry (Manufacturing and Construction Products)

We strongly support the goal of 100% electrification of industrial boilers on the shortest possible timeline. We would like to see a comparison of benefits in achieving 100% electrification by 2030 rather than 2035.

The draft proposal contains only two alternatives for facilities that produce stone, clay, glass or cement: in Alternative 1 these facilities close because non-combustion alternatives are not available; the other alternatives all would require CCS on large facilities by 2030 and on all facilities by 2045. This analysis would be more informative if it provided a greater variety of alternatives, such as requiring CCS for all facilities by 2030, or a 2025 requirement for large facilities.

We also urge CARB to analyze options other than CCS for the industrial sector. Applying CCS to high-emitting industrial activities like steel and cement manufacturing is not economical; renewable sources for electricity and heat can substantially reduce industrial emissions; and reduction, reuse and recycling can play a significant role in lowering industrial emissions. More importantly, there are significant questions about the feasibility of CCS as a mitigation measure, both with respect to the climate benefits of CCS in general, and the application to the industrial sector.

VII. Vehicle Miles Traveled (VMT)

We support the inclusion of Alternative 1—VMT per capita reduced 15% below 2019 levels by 2030 and 20% by 2035. We recommend including an alternative of 20% below 2020 levels by 2030 to assess the benefits of accelerating these policies.

VMT estimates and calculations in this analysis should use the more comprehensive tour-based VMT approach, as defined in the 2018 Technical Advisory from the California Office of Planning and Research.[3] Providing a direct comparison to current per capita averages is particularly informative in assessing the relative value of reduction measures. Also, the analysis should consider the benefits of ensuring that mitigation for projects with significant VMT impacts under CEQA contribute to reductions in the overall city and regional per capita VMT at a level needed to meet aggressive reduction targets.

VIII. Vehicle Fleet Electrification

We strongly support the inclusion of options that consider accelerating the transition to zero-emission vehicles. The value of this analysis will come not from simply estimating the comparative difficulty of achieving 100% ZEV sales before 2035, but from identifying the

[3] State of California, Governor's Office of Planning and Research: Technical Advisory on Evaluating Transportation Impacts in CEQA (December 2018), https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

potential benefits associated with an accelerated transition to ZEVs and the achievement of incremental reductions in the interim. As such, we strongly support the inclusion of alternatives requiring 100% ZEV sales by 2030. In its analysis, we urge CARB to consider the full range of benefits that would come from this expedited timeline, including climate-related economic benefits from reducing GHG emissions, reduced rates of particulate matter-related health problems, consumer fuel savings, and increased EV market penetration and opportunities for job growth in that sector.

The attached comment letter submitted to CalEPA on January 15, 2020, details our position on achieving carbon neutrality with respect to transportation fossil fuel demand and emissions. In this letter we recommend setting a goal of 100% ZEV sales by 2030, with a focus on accessibility and availability for different income groups.

The attached comment letter submitted to the Air Resources Board on June 11, 2021, regarding the Advanced Clean Cars II rule, recommends a standard of 100% ZEV sales by 2030 and a minimum of 7% annual reductions in GHG emissions.

IX. Biomass and Biofuels

Alternative 1 of the draft proposal proposes no biofuels consumption by 2035, while other alternatives propose that "biomass supply [is] used to produce conventional and advanced biofuels as well as hydrogen." We recommend including an alternative that immediately ends the consumption of biofuels sourced from woody biomass as well as excluding woody biomass as a source for biofuels in other alternatives. It is important that the analysis use a scientifically based estimate of the carbon implications of biomass energy, one that takes into account the full range of emissions from the sourcing of biomass feedstock. These emissions may be most significant with respect to forest woody biomass.

At the smokestack, biomass power plants release more carbon pollution than coal for the same amount of electricity produced.[4] Woody biomass energy generation in California emits more than one-and-a-half times the carbon pollution of coal-fired power per unit of electricity—and almost four times the carbon pollution of gas-generated power.[5]

While biomass proponents claim that cutting and incinerating forests is inherently carbon neutral, the reality is that biomass energy worsens carbon pollution. To claim that biomass energy is carbon neutral, biomass proponents try to discount the carbon released by biomass power plants by taking credit for the carbon absorbed by future tree growth. However, there is no guarantee that the biomass removed from the forest is actually replaced by subsequent growth, nor do such assumptions account for the timing of emissions compared to sequestration. In fact, numerous studies show that it takes many decades to more than a century, if ever, for new trees

[4] *See* Searchinger, Timothy D. et al., Europe's renewable energy directive poised to harm global forests, 9 Nature Communications 3741 (2018); Sterman, John D. et al., Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, 13 Environmental Research Letters 015007 (2018).

[5] Overall average GHG Intensity of electricity generation in California comes from California Air Resources Board, 2000-2018 Emissions Trends Repot Data (2020 Edition); Average CO2 emissions per MWh for gas and coal in the United States in 2019 are from U.S. Energy Information Administration, How much carbon dioxide is produced per kilowatt hour of U.S. electricity generation?

to grow large enough to capture the carbon that was released.[6] One study concluded that the increase in atmospheric greenhouse gases may be permanent.[7]7

X. Carbon Free Electricity Grid

We strongly support the inclusion of alternatives with accelerated timelines for achieving a carbon-free electricity grid, as reflected in Alternatives 1 and 2. Consistent with the goal of a carbon-free electricity grid, the analysis should include an alternative that excludes biomass and any other combustion technologies. The current draft presumes that eligibility for the Renewable Portfolio Standard (RPS) is an indicator of a carbon-free electricity source. In fact, eligibility for the RPS does not imply carbon-neutrality, is not intended to, and cannot be used as a proxy for such.

XI. Residential and Commercial Building Decarbonization

We support the inclusion of Alternative, in which 80% of appliance sales are electric by 2025 and 100% are electric by 2030, for both residential and commercial buildings. We would like other alternatives to similarly reflect this symmetry between residential and commercial buildings. Also, to get a better sense of the distribution of emissions and the potential for reductions in commercial buildings, we recommend including an alternative that would require the top 80% of commercial buildings by fossil fuel use to be electric by 2030, as compared to requiring 80% sales to be electric by 2030. The analysis should also include specific principles for addressing barriers and burdens on low-income renters and communities.

We would be pleased to provide any scientific publications cited in these comment letters. Please let me know if you have any questions on any of these comments.

We look forward to working with the Air Resources Board and other stakeholders in developing the Scoping Plan Update over the coming months.

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[6] *See* Searchinger, T.D. et al., Fixing a critical climate accounting error, 326 Science 527 (2009); Gunn, J., et al., Manomet Center for Conservation Sciences, Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources (2010); Hudiburg, T.W. et al., Regional carbon dioxide implications of forest bioenergy production, 1 Nature Climate Change 419 (2011); Law, B.E. and M.E. Harmon, Forest sector carbon management, measurement and verification, and discussion of policy related to climate change, 2 Carbon Management 73 (2011); Campbell, J.L. et al., Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions? 10 Frontiers in Ecology and Environment 83 (2012); Holtsmark, Bjart, The outcome is in the assumptions: Analyzing the effects on atmospheric CO2 levels of increased use of bioenergy from forest biomass, 5 GCB Bioenergy 467 (2012); Mitchell, S.R. et al., Carbon debt and carbon sequestration parity in forest bioenergy production, 4 Global Change Biology Bioenergy 818 (2012); Schulze, E.-D. et al., Large-scale bioenergy from additional harvest of forest biomass is neither sustainable nor greenhouse gas neutral, 4 Global Change Biology Bioenergy 611 (2012); Booth, Mary S., Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, 13 Environmental Research Letters 035001 (2018); Sterman, John D. et al., Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, 13 Environmental Research Letters 015007 (2018)

[7] *See* Holtsmark, Bjart, The outcome is in the assumptions: Analyzing the effects on atmospheric CO2 levels of increased use of bioenergy from forest biomass, 5 GCB Bioenergy 467 (2012)

Sincerely,

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August 16, 2021

California Air Resources Board
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Sacramento, CA 95814
Submitted via Online Comment Submittal Form[1]

Re: Comments on the 2022 Scoping Plan Update – Engineered Carbon Removal Technical Workshop

The Center for Biological Diversity (the "Center") appreciates the opportunity to comment on the California Air Resources Board's ("CARB") August 2, 2021 Engineered Carbon Removal Technical Workshop (hereinafter, "the workshop"). The Center was disappointed that the workshop primarily featured speakers who assumed carbon capture and storage ("CCS") by the State of California is necessary to achieve carbon neutrality, and who asserted that CCS is safe and minimally disruptive to frontline communities. The Center vehemently disagrees with these assumptions.

As CARB "consider[s]" engineered carbon removal, it is essential that the agency take into account that according to the Intergovernmental Panel on Climate Change ("IPCC"), CCS is not necessary to achieve emissions reductions, nor is its effectiveness or safety proven. Moreover, the types of dirty energy CCS may prolong, and the infrastructure and energy required for CCS, will cause additional pollution in communities already suffering from unhealthy air and water quality.

We urge CARB to reevaluate its approach to CCS in its upcoming greenhouse gas emissions Scoping Plan update. CARB should focus on a rapid phase out of fossil fuels rather than seeking to entrench technologies that prolong the life of climate-damaging activities and harm frontline communities. In doing so, CARB must ensure meaningful community participation and input from the Environmental Justice Advisory Council ("EJAC"), who, as we understand, has been urging CARB throughout the Scoping Plan process to give greater weight to its recommendations.

I. Carbon Capture and Storage Is Not Necessary to Achieve Senate Bill 32 2030's Target, and Instead Enables Dirty Energy

In order to meet Senate Bill 32's ("SB32") carbon neutrality target and avoid exacerbating the climate crisis, California must immediately eliminate fossil fuel extraction and use, as well as deforestation and biomass energy. CCS is a distraction from these necessary steps and instead helps prop up the dirty fossil fuel and biomass industries, leaving the State—and the climate crisis at large—in a dire state.

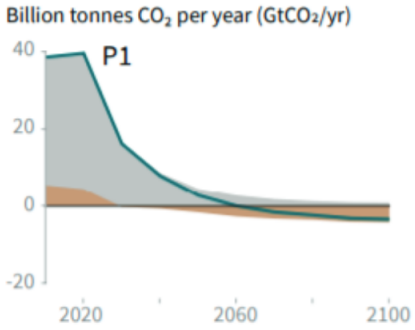
[1] CARB, https://www.arb.ca.gov/lispub/comm2/bcsubform.php?listname=sp22-co2-removal-ws&comm_period=1.

a) The Intergovernmental Panel on Climate Change ("IPCC") sets forth a pathway to avoid climate catastrophe that does not involve CCS

Numerous times during the workshop, panelists asserted that CCS is necessary to avert climate catastrophe, or that there is "scientific consensus" that CCS is required as part of efforts to limit global warming. This is simply not true.

The IPCC-recommended pathway with the best chance of keeping warming at or below 1.5°C makes limited to no use of engineered carbon removal technologies.[2] Instead, this pathway requires a rapid phaseout of fossil fuels along with limited carbon dioxide removal ("CDR") by natural sources such as reforestation and enhanced soil remediation. *See* Figure 1.[3]

FIGURE 1
IPCC 1.5°C Pathway 1



P1: A scenario in which social, business, and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A down-sized energy system enables rapid decarbonisation of energy supply. Afforestation is the only CDR option considered; neither fossil fuels with CCS nor BECCS are used.

Graphic Source: IPCC

[2] IPCC, Summary for Policymakers in IPCC, Global Warming of 1.5°C: An 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 to the threat of climate change, sustainable development, and efforts to eradicate poverty (2018) [hereinafter IPCC SR1.5] at 14, Section C.1.1., Figure SPM 3b (Pathway 1); *see also* IPCC SR1.5, at Ch. 2.3.3 and Table 2.SM.12.
[3] *Id.*; *see also* Center for International Environmental Law, "Confronting the Myth of Carbon Free Fossil Fuels" at 2 https://www.ciel.org/wp-content/uploads/2021/07/Confronting-the-Myth-of-Carbon-Free-Fossil-Fuels.pdf ("CIEL CCS Report").

CARB must recognize that there are options to achieve SB32 that do not depend on CCS. The 2022 Scoping Plan must take the IPCC's recommendation into account and focus on phasing out fossil fuels and natural carbon sinks rather than CCS.

b) Reliance on CCS is likely to prolong the use of fossil fuels and dirty energy sources such as biomass

California needs to rapidly end its permitting, incentivizing, and use of fossil fuels and other dirty energy sources such as woody biomass. Contrary to these goals, CCS is likely to extend the life of fossil fuels and biomass, both of which add large amounts of dangerous pollution to the environment and communities. Moreover, tacking CCS onto these dying industries is economically unsound, meaning that the public will pay for health-harming pollution.

The fossil fuel industry is enthusiastic about CCS as a strategy to maintain business as usual because by design, CCS enables an underlying emissions-generating activity to continue. Yet fossil fuel activities release large amounts of GHGs and harmful pollutants throughout their lifecycle, from extraction, refining, transport, use, and disposal.[4] CCS does nothing to eliminate this pollution, much of which falls on overburdened communities.

One Stanford study confirmed that the lifecycle pollution and social harms from fossil fuels plus CCS result in more harm done than good. The study examined the net CO2 reduction and total lifecycle cost of carbon capture from a coal plus CCS power plant, and a plant that removes carbon directly from the air.[5] The study "account[ed] for the electricity needed to run the carbon capture equipment, the combustion and upstream emissions resulting from that electricity, and, in the case of the coal plant, its upstream emissions," with the upstream component including leaks and combustion, mining, and fuel transportation. The study found that CCS "reduces only a small fraction of carbon emissions, and it usually increases air pollution."[6] Because of the lifecycle pollution and the harms arising from that, the study recommended replacing fossil fuels with renewables such as wind or solar, rather than encouraging and investing in CCS.[7]

Critically, more than 80% of all CCS capacity deployed is accompanied by enhanced oil recovery ("EOR"), meaning "CO2 waste products from a fossil fuel-burning activity are used to generate more fossil fuels."[8] The promotion and enabling of CCS thus helps perpetuate the fossil fuel era, thereby negating any possible climate benefits from carbon capture. This is entirely the wrong direction for California.

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[4] CIEL CCS Report at 7 (citing, for example, a Harvard study finding that fine particulate matter emitted with fossil fuel burning is responsible for millions of deaths worldwide).
[5] Taylor Kubota, "Stanford Study casts Doubt on Carbon Capture," Stanford News (Oct. 25, 2019), https://news.stanford.edu/2019/10/25/study-casts-doubt-carbon-capture/, citing Mark Z. Jacobson, *The health and climate impacts of carbon capture and direct air capture*, 12 Energy Envt. Sci. (Aug. 24, 2019), https://pubs.rsc.org/en/content/articlelanding/2019/ee/c9ee02709b/unauth#!divAbstract ("Stanford Report Summary").
[6] *Id.*
[7] *Id.* ("There is a lot of reliance on carbon capture in theoretical modeling, and by focusing on that as even a possibility, that diverts resources away from real solutions. It gives people hope that you can keep fossil fuel power plants alive. It delays action. In fact, carbon capture and direct air capture are always opportunity costs.").
[8] CIEL CCS Report at 8.

Another dirty and GHG emissions-intensive industry that stands to benefit from growing acceptance and incentivization of CCS is woody biomass power. Electricity made from woody biomass is more climate polluting out of the smokestack than coal-fired power, and should be on the decline, much like fossil fuels.[9] *See* Chart 1 below.[10] Moreover, biomass power generation emits large amounts of harmful air pollutants, and in California, the majority of biomass plants are in communities suffering from harmful cumulative impacts of pollution.[11] In other words, biomass plants should be shutting down in order to protect public health and the environment, not encouraged to stay online through bioenergy with carbon capture and storage (or "BECCS").

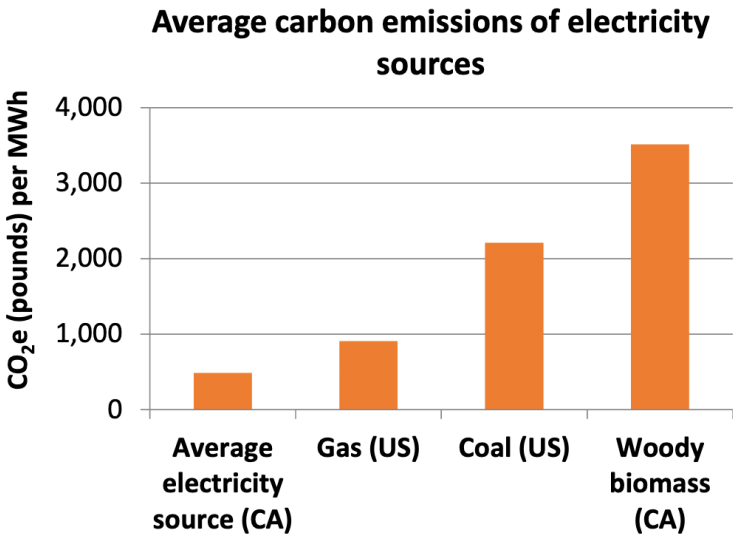

Chart 1: Woody biomass energy generation in California emits more than one-and-a-half times the carbon pollution of coal-fired power per unit of electricity—and almost four times the carbon pollution of gas-generated power.

Despite these harms, the lure of BECCS is leading to the reopening of idle biomass plants in environmental justice communities. In March 2021, the companies Clean Energy Systems, Chevron, and others announced that they would purchase the idle Covanta Mendota biomass powerplant and bring it back online to burn biomass and capture the carbon while likely using the captured carbon to extract fossil fuels through EOR.[12] This runs directly counter to what the

[9] Searchinger, Timothy D. et al., *Europe's renewable energy directive poised to harm global forests*, 9 Nature Comms. 3741 (2018); Sterman, John D. et al., *Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy*, 13 Envtl. Research Letters 015007 (2018).
[10] Center for Biological Diversity, Forest Bioenergy Briefing Book at 4 (March 2021), https://www.biologicaldiversity.org/campaigns/debunking_the_biomass_myth/pdfs/Forest-Bioenergy-Briefing-Book-March-2021.pdf.
[11] *Id.* at 8-9.
[12] *See* "Schlumberger New Energy, Chevron, and Microsoft Collaborate on Carbon Negative Bioenergy" (March 4, 2021), https://www.cleanenergysystems.com/schlumberger-new-energy-chevron-and-microsoft-collaborate-on-carbon-negative-bioenergy.

State is seeking to achieve through SB32 and other climate initiatives, and further promotion of BECCS and other forms of CCS could attract similar kinds of climate- and health-damaging projects.

Instead of wasting taxpayer dollars on risky and dangerous CCS, in order to decarbonize electricity and heavy industry, CARB should instead do everything to help shift the State to renewable sources like wind and solar, which one report agrees is "the surest, most direct, and likely most cost-effective pathway to significant emission reductions."[13]

c) CCS has failed to live up to its promises

Reality has shown that powerplants with carbon capture have had drastically failed to meet their CO_2 capture targets. CARB and the public should not be endorsing and supporting a strategy that is unproven and could entrench the State in a false solution, rather than making real progress through investments in genuinely clean and renewable technologies, such as wind and solar.

A Stanford study calculated the lifecycle emissions associated with CCS projects used with energy production from fossil fuels and found that "the equipment captured the equivalent of only 10-11 percent of the emissions they produced, averaged over 20 years."[14] This research also considered the social cost of carbon capture—in other words, the resulting air pollution, potential health problems, economic costs and overall contributions to climate change—and concluded that these costs are similar to or higher than a fossil fuel plant *without* carbon capture, meaning "it is always better to use the renewable electricity instead to replace coal or natural gas electricity or to do nothing."[15]

Even when the lifecycle of a project is not taken into account, real-world CCS projects are repeatedly failing their carbon capture promises. July 2021, Chevron, operator of Australia's only commercial-scale CCS project, admitted that its self-described "world's biggest CCS project" failed to meet its five-year capture target of 80% CO_2, and is now seeking a deal with regulators on how to make up for millions of tons of CO_2 it failed to store.[16] Estimates are that the Liquified Natural Gas facility captured only 30% of its CO_2 emissions.[17] In the US, the Petra Nova coal-fired powerplant in Texas achieved only a 50% CO_2 capture rate, when the fossil fuels needed to capture and store the carbon were taken into account.[18]

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[13] *See* Int'l Aluminium Inst., Aluminum Sector Greenhouse Gas Pathways to 2050 at 10 & Figure 10 (Mar. 2021), https://www.world-aluminium.org/media/filer_public/2021/03/16/iai_ghg_pathways_position_paper.pdf.
[14] Stanford Report Summary.
[15] *Id.* (noting that the social cost of coal with carbon capture powered by natural gas was about 24 percent higher, over 20 years, than the coal without carbon capture, and only when wind replaced the fossil fuel did the social cost decrease).
[16] IEFFA, "Chevron admits failure of $3 billion CCS facility in Western Australia" (July 19, 2021), https://ieefa.org/chevron-admits-failure-of-3-billion-ccs-facility-in-western-australia/.
[17] Adam Morton, "'A shocking failure': Chevron criticised for missing carbon capture target at WA gas project," The Guardian (July 19, 2021), https://www.theguardian.com/environment/2021/jul/20/a-shocking-failure-chevron-criticised-for-missing-carbon-capture-target-at-wa-gas-project.
[18] IEEFA, "Reality of carbon capture not even close to proponents' wishful thinking" (Aug. 8, 2019), https://ieefa.org/reality-of-carbon-capture-not-even-close-to-proponents-wishful-thinking/.

d) CCS requires large amounts of energy, leading to further climate and energy demand impacts

As the Institute for Energy Economics and Financial Analysis ("IEEFA") notes, the energy required to capture, transport, and inject carbon underground "materially reduces its net benefit."[19] For example, coal-fired power plants with carbon capture have an energy penalty of 25% or more, with the efficiency penalty as high as 15%.[20] These "penalties" mean more fuel has to be burned to produce the same amount of power, which means higher energy costs, greater emissions of non-CO_2 air pollutants, and increased demand on the grid.[21]

CARB must take these additional energy demands into account when considering CCS, especially given the grid demands in recent years that have led to blackouts.[22] For example, CARB should require a full lifecycle analysis of GHG emission output—taking into account the energy used to capture, store, and transport the carbon, as well as the emissions of the project itself—and refuse to green-light any project that produces a net GHG output.

Moreover, CCS with energy production is likely to increase the cost of energy to Californians. A recent study concluded that for a new-build gas-fired plant, CCS could increase the cost of energy produced by up to 61 percent.[23] Instead of encouraging and incentivizing CCS and, by extension, more expensive energy, CARB should instead do everything it can to accelerate the transition to truly renewable and clean energy sources such as solar and wind.

II. CCS Creates Environmental, Public Health, and Safety Risks

CARB's workshop failed to adequately inform decisionmakers and the public about the wide array and serious nature of environmental, public health, and safety risks CCS poses. This failure was especially egregious because in California as is the case elsewhere, it is those communities that have already suffered the worst impacts of fossil fuel and heavy industry pollution and environmental racism that will likely face the biggest risks from CCS. We urge CARB to consider these risks, along with the regulatory shortfalls, when preparing its Scoping Plan, and to reject CCS proposals that endanger communities and the environment.

[19] IEEFA, Carbon Capture and Storage Is About Reputation, Not Economics at 4 (2020), https://ieefa.org/wp-content/uploads/2020/07/CCS-Is-About-Reputation-Not-Economics_July-2020.pdf.
[20] CAN Position: Carbon Capture, Storage, and Utilization, Climate Action Network Int'l at 9 (2021), https://climatenetwork.org/resource/can-position-carbon-capture-storage-and-utilisation/.
[21] *Id.*
[22] Alicia Victoria Lozano, "California warned to brace for another summer of energy blackouts," NBC News (May 27, 2021), https://www.nbcnews.com/news/us-news/california-warned-brace-another-summer-energy-blackouts-n1268879.
[23] P. Psarras et al., *Cost analysis of carbon capture and sequestration from U.S. natural gas fired power plants*, 54 Envtl. Sci. Tech. 6272, 6274 (2020), https://users.wpi.edu/~jlwilcox/documents/Part%201_NG.pdf.

a) The risks and harms of transporting and storing CO_2 will be borne by already overburdened communities, which is unacceptable

The Central Valley has long been touted as an area ripe for storage of captured CO_2.[24] Having already suffered the harms of environmental racism resulting from the fossil fuel industry and large-scale agriculture, it would be unconscionable to then relegate the safety hazards and environmental risks of CO_2 storage to these Central Valley communities.

One such health and safety risk arises from transporting CO_2 via pipelines. CO_2 leaks from pipelines pose a potential hazard for people and other animals, as "CO_2 is denser than air and can therefore accumulate to potentially dangerous concentrations in low lying areas," and "any leak transfers CO_2 to the atmosphere."[25] These risks became reality in February 2020, when a CO_2 pipeline ruptured in Yazoo County, Mississippi, requiring the evacuation of hundreds and hospitalization of dozens,[26] with harms including extreme disorientation, unconsciousness, and seizures.[27] CARB's workshop featured a speaker who proposed CO_2 pipelines near communities in the Central Valley and Bay Area without acknowledging the hazards CO_2.[28]

CARB must also *genuinely* consult with and consider the concerns, perspectives, and preferences of environmental justice communities. For example, while the workshop provided time for members of the State's Environmental Justice Advisory Council ("EJAC") to speak before public comment, one speaker aptly observed that the workshop treated CCS deployment as a foregone conclusion, thereby calling into question CARB's consultation process with environmental justice groups. CARB must do better in developing its Scoping Plan than it did with the workshop. CARB must also consider that the White House Environmental Justice Advisory Council ("WHEJAC") called CCS projects a "type[] of project that will <u>not</u> benefit a community," noting in the report that "it would be unreasonable to have any climate investment working against historically harmed communities."[29]

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[24] *See, e.g.*, California Energy Commission, "California Energy Commission's R&D Activities in CCS for California" at 6 (Feb. 12, 2016), https://www.arb.ca.gov/cc/ccs/meetings/cec_presentation_2-12-16.pdf.

[25] IPCC, Special Report on Carbon Dioxide Capture and Storage, Chapter 4: Transport of CO2 (2005), at 188 (noting that CCS ""will require a large network of pipelines.").

[26] "Pipeline Ruptures in Yazoo County, Dozens Rushed to the Hospital," Miss. Emergency Mgmt. Agency (Feb. 23, 2020), https://www.msema.org/news/pipe-ruptures-in-yazoo-county-dozens-hospitalized/.

[27] "'Foaming at the mouth': First responders describe scene after pipeline rupture, gas leak," Clarion Ledger (Feb. 27, 2020), https://www.clarionledger.com/story/news/local/2020/02/27/yazoo-county-pipe-rupture-co-2-gas-leak-first-responders-rescues/4871726002/.

[28] *See* Stanford Center for Carbon Storage, "An Action Plan for Carbon Capture and Storage in California: Opportunities, Challenges, and Solutions" at 18 (Oct. 22, 2020) (featuring slides used during the workshop to suggest CO2 pipelines and geologic storage in the Bay Area and Central Valley), https://static1.squarespace.com/static/58ec123cb3db2bd94e057628/t/5f9739146a54d17debd6808f/1603746076400/EFI-Stanford-CA-CCS-Slides-ForWeb-10.26.20vF.pdf.

[29] WHEJAC, Interim Final Recommendations at 55, 58 (May 13, 2021), https://www.epa.gov/sites/default/files/2021-05/documents/whejac_interim_final_recommendations_0.pdf (emphasis original).

b) State and federal law do not require, or hold industry accountable for, permanent storage of CO2

The "permanence" requirements under California and federal law are inadequate to ensure that CCS projects aren't just kicking the climate problem down the road and onto future generations. Under EPA's regulations for Class VI injection wells for CO_2, for example, a permit applicant need only show that they can store CO_2 for 50 years in order to qualify for subsidies.[30] California's Low Carbon Fuel Standards doesn't fare much better, requiring only 100 years of storage.[31] These decades-long time requirements are simply inadequate to be considered part of a real climate solution.

During the workshop, several presenters asserted that the regulations governing CCS are rigorous and protective. As the example above shows, clearly the existing regulations at the federal and state levels do not rise to the challenge of ensuring a long-term climate solution. CARB's Scoping Plan must examine the permanence requirements and their implications for the State's long-term climate goals in detail, and not accept CCS as part of the State's climate strategy given regulatory deficiencies such as these permanence definitions.

c) Leakage of stored CO_2 is likely and could set back climate goals

Even though speakers in the workshop laid out criteria for selecting underground storage locations in California that would reduce the risk of CO_2 leakage, history has shown that GHG leaks can happen even with permitting and planning, and on devastating scales. The 2015-16 Aliso Canyon natural gas blowout released over 97,000 metric tons of methane, effectively doubling the Los Angeles basin's methane emission rate.[32] Such single-point failures can set back progress on emissions reductions, and simply aren't worth the risk. Researchers estimate that a minor leakage of stored CO2 could reduce the benefit of CCS by up to 35%.[33] The IPCC also called out the "non-negligible risk of carbon dioxide leakage from geological storage and the carbon dioxide transport infrastructure" when recommending an emissions-reduction pathway that doesn't require CCS.[34]

CARB must also note that industry has a terrible track record of capping and monitoring abandoned gas wells, which has led to mass amounts of underreported methane leakage.[35] CARB must consider and weigh the inevitable risk that stored CO_2 will escape to the atmosphere through abandoned oil and gas wells, especially given the woefully inadequate State and federal

[30] 40 CFR § 146.93.
[31] CARB, Accounting and Permanence Protocol for Carbon Capture and Geologic Sequestration under Low Carbon Fuel Standard (Aug. 13, 2018), https://ww2.arb.ca.gov/sites/default/files/2020-03/CCS_Protocol_Under_LCFS_8-13-18_ada.pdf ("'Permanent sequestration' or 'permanence' means the state where sequestered CO2 will remain within the sequestration zone for at least 100 years.").
[32] Conley. S. et al., *Methane emissions from the 2015 Aliso Canyon blowout in Los Angeles, CA*, Science (March 18, 2016), https://science.sciencemag.org/content/351/6279/1317.
[33] Frontiers in Energy Research, Bearing the Cost of Stored Carbon Leakage (May 15, 2018), https://www.frontiersin.org/articles/10.3389/fenrg.2018.00040/full.
[34] IPCC SR1.5, Ch. 5, Section 5.4.1.2.
[35] IEEFA, "Carbon Capture and Storage Is About Reputation, Not Economics" at 5 (2020), https://ieefa.org/wp-content/uploads/2020/07/CCS-Is-About-Reputation-Not-Economics_July-2020.pdf.

definitions of permanent CO_2 sequestration and storage. In addition, the injection of CO2 carries the substantial risk of triggering earthquakes that can result in the leakage of the stored CO2.[36]

d) Building out CCS infrastructure will harm the environment

CARB's workshop did not give any airtime to the likely harms to air and water quality, biodiversity, and other environmental values due to the infrastructure build-out required by CCS. The likely negative impacts to the environment are not worth the spurious promises posed by CCS.

One fact that CARB must account for is the amount of infrastructure required for CCS will be massive. One study estimates that to scale, the CCS build-out—including the pipelines and infrastructure required to capture, compress, transport, and store CO_2—will need to be 2 to 4 times larger than the current global oil industry.[37] And while the workshop noted areas in California that are suitable for underground CO_2 storage, very little was made of the pipelines that would need to be built to achieve this storage,[38] and the environmental impacts of constructing and operating those pipelines.

III. There Is Widespread and Growing Recognition that CCS Is a False Solution

The widespread and growing recognition that CCS is a false solution—from community groups, analysts, environmental groups, and more—should alert CARB that it ought not to take CCS deployment as a necessary component of the State's emissions reduction goals.

As examples of the groundswell of opposition to CCS:

- In January 2021, the 1,500 member-organizations of Climate Action Network (CAN) International adopted a shared position statement stating that the members "do[] not consider currently envisioned CCS applications as proven sustainable climate solutions."[39] The organizations warned that CCS "risks distracting from the need to take concerted action across multiple sectors in the near-term to dramatically reduce emissions."[40] Accordingly, CAN urged that "[a]ll government subsidies, loans, grants, tax credit, incentives, and financial support for fossil fuels and technologies that use or otherwise support the continued use of fossil fuels, including CCS, should be phased out as soon as possible."[41]

[36] Zoback, Mark D. and Steven M. Gorelick, *Earthquake triggering and large-scale geologic storage of carbon dioxide*, 109 PNAS 10164 (2012); Gan, Wei and Cliff Frohlich, *Gas injection may have triggered earthquakes in the Cogdell oil field, Texa*s, 110 PNAS 18786 (2013).
[37] N. Mac Dowell et al., *The role of CO2 capture and utilization in mitigating climate change*, 7 Nature Climate Change 243 (2017), https://www.nature.com/articles/nclimate3231.
[38] IPCC, Special Report on Carbon Dioxide Capture and Storage, Chapter 4: Transport of CO2 (2005), at 181 (noting that CCS ""will require a large network of pipelines.").
[39] CAN Position: Carbon Capture, Storage, and Utilization, Climate Action Network Int'l at 6 (2021), https://climatenetwork.org/resource/can-position-carbon-capture-storage-and-utilisation/.
[40] *Id.*
[41] *Id.*

- In July 2021, over 500 international, U.S., and Canadian organizations sent an open letter to lawmakers calling on them to reject CCS.[42] The letter referred to CCS as a "dangerous distraction" that "delays the needed transition away from fossil fuels and other combustible energy sources, and poses significant new environmental, health, and safety risks, particularly to Black, Brown, and Indigenous communities already overburdened by industrial pollution, dispossession, and the impacts of climate change."[43]

IV. Conclusion

This is a critical moment in history for the State of California and CARB to pave the way for genuine, lasting, and equitable emissions reductions in order to avert the worst impacts of the climate crisis. Accordingly, the State has no time to waste on unproven and dangerous false climate solutions such as CCS. In its Scoping Plan and in future activities, CARB must reject CCS as a way to achieve SB32 goals, and recognize that CCS stands to harm public health and the environment, especially in already overburdened communities.

Please reach out if you have any questions. Please also find a list of references at the end of this letter, along with the full text of references in a combined PDF attached to this comment for your consideration.

Respectfully,

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[42] Center for International Environmental Law, "Carbon capture is not a climate solution" (July 19, 2021), https://www.ciel.org/wp-content/uploads/2021/07/CCS-Letter_FINAL_US-1.pdf.
[43] Center for International Environmental Law, "Carbon capture is not a climate solution" at 1 (July 19, 2021), https://www.ciel.org/wp-content/uploads/2021/07/CCS-Letter_FINAL_US-1.pdf.

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January 15, 2020

Submitted electronically at: climatechange@calepa.ca.gov

Secretary Jared Blumenfeld
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Re: CalEPA Carbon Neutrality Study 1 (Transportation Fuels) Draft Scope of Study.

Dear Secretary Blumenfeld,

The Center for Biological Diversity is pleased to provide these comments to the draft scope of work for CalEPA's Carbon Neutrality Study 1: Reducing Transportation Fossil Fuel Demand and Emissions. We commend Governor Newsom and the California Legislature for prioritizing the decarbonization of the transportation sector by appropriating funds for a statewide study to identify strategies to significantly reduce vehicles emissions in order to achieve carbon neutrality in the sector.

These comments build upon the previous comments submitted by the Center for Biological Diversity in October 2019, in which we recommended a scope of study, research priorities, and relevant references for this this study. We reattach those comments here, for your reference.

We appreciate that the proposed scope of study appears to be sufficiently broad to incorporate a wide range of issues and policy options. However, it is crucial that the study provide a basis of comparison for the findings, for the purpose of highlighting and prioritizing actions and policy options for the state to pursue. To that end, we recommend including in the scope of study language that explicitly provides for a comparison among the various policy options in a way that will allow decision-makers and the public to understand which policies would provide the greatest reductions in greenhouse gas emissions over the shortest periods of time, and fully understand the environmental justice implications of those choices.

Specifically, the scope of study identifies "a roadmap to achieve carbon neutrality by 2045" as the overarching benchmark, and states that "indicative milestones or targets, e.g., for fleet composition, transit ridership, and other influential indicators; where possible, these should be benchmarked against existing policies and goals." However, neither the 2045 goal nor existing policies related to fossil fuel vehicles provide the context necessary to identify policies that could achieve steeper reductions in shorter timeframes. In this way, the draft scope of study seems unnecessarily and unacceptably hindered by existing policy decisions, where it should instead explicitly direct consideration of more ambitious scenarios.

CalEPA should set a goal of 100% ZEV Sales by 2030

CalEPA should set a goal of 100% zero emissions vehicle ("ZEV") sales by no later than 2030 because this is necessary for California to achieve carbon neutrality by 2045. A light-duty internal combustion engine vehicle (ICEV) can last about 15 years before being retired from the vehicle fleet.[i] So, if the last ICEVs were sold in 2030 in California, it is estimated that ICEVs would be effectively filtered out of the fleet by 2045, right when carbon neutrality is to be reached. With passenger vehicles accounting for 70%

of the state's transportation emissions and nearly 30% of the state's total emissions,[ii] such a fleet turnover will be foundational to decarbonizing California's transport sector in line with the 2045 mandate. These facts provide a clear focus for the study. It is not enough to simply analyze a laundry list of topics; instead the study must provide rigorous analysis and a set of actionable recommendations for achieving 100% ZEV sales by no later than 2030.

Moreover, globally, continued reliance on fossil fuel infrastructure such as ICEVs even until 2030 considerably reduces the chances of keeping global temperature rise to 1.5 degrees Celsius.[iii] To increase the probability of remaining below 1.5 degrees, 100% ZEV new vehicle sales should be achieved before 2030, and as soon as humanly possible. Stated another way, phasing out all new ICEV sales by 2030 is the floor, not the ceiling, for responsible climate action. Setting and meeting interim short-term targets for much greater ZEV sales is also essential. Because the necessary transition has been so long delayed, the state must now implement strong, science-based targets and greatly scale up its investment to make zero carbon transportation options available to all Californians.

Affordability and Access to ZEVs
In addition, CalEPA must identify and evaluate policies that *ensure* affordability of ZEVs for different income groups, such as charging infrastructure, tax rebates and subsidies, carpool lane benefits, parking benefits, and other incentives, with a specific emphasis on sliding-scale benefits dependent on income level to ensure that ZEV ownership can be embraced by all Californians.

We also hope that CalEPA will launch consumer and dealer education programs, to ensure that these groups are aware of the benefits of ZEVs. A key barrier to ZEV deployment is the lack of both consumer and auto dealer education.

Charging and Grid Infrastructure
In order to truly reduce emissions, CalEPA should deliberately embrace the goal of achieving carbon neutrality through a clean grid. In order to reach that goal, CalEPA should include as part of Study 1 efforts to:

- Evaluate the grid infrastructure that is required to support 100% ZEV sales by 2030 and beyond.
- Evaluate the current grid infrastructure in place and/or planned and assess the gap to ensuring system readiness by 2030.
- Identify and assess the suite of policies that can address the gap.

Climate, Environmental, Health, and Environmental Justice Benefits
Furthermore, in order to fully analyze the benefits that come with a clean grid, and make informed policy decisions, we urge CalEPA to conduct in-depth studies regarding the following: avoided CO2 and other emissions; health benefits (including reduced risks for those in close proximity to highways and high-traffic zones, avoided criteria pollutants, avoided morbidity, mortality, and medical costs, as well as the health implications for environmental justice communities); grid resilience and stabilization benefits; as well as benefits to species and the environment.

Stakeholder Engagement
Lastly, we urge CalEPA to outline a specific and robust process for stakeholder engagement that includes environmental justice communities and that prioritizes hearing from these communities to inform CalEPA's further studies and policies. In addition to identifying the suite of policies necessary to provide the steepest possible reductions in greenhouse gas emissions and a transition to a clean transportation and energy sector, the study must also examine strategies and provide mechanisms to ensure the transition is

fair, equitable, and just to low-income communities that are affected first and worst by transportation's fossil fuel pollution.

As stated above, please find attached our in-depth recommendations. We would be happy to speak with you further about any of the policy proposals herein. We look forward to working with CalEPA on this important study.

Sincerely,

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[i] Keith, D.R. et al., Vehicle fleet turnover and the future of fuel economy, 14 Environ. Res. Lett. (2019); Consumer Reports, Making Your Car Last 200,000 Miles: How to go the distance and save tens of thousands of dollars, Consumer Reports (2018), https://www.consumerreports.org/car-repair-maintenance/make-your-car-last-200-000-miles/

[ii] Taylor, M., Assessing California's Climate Policies—Transportation, Legislative Analyst's Office (2018); importantly, any electrification of passenger vehicles must be coupled with the deployment of clean and renewable energy sources to fuel the electricity supply.

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Attachment

Letter submitted on October 28, 2019

In regard to: California Vehicles Study

By: Center for Biological Diversity

October 28, 2019

Secretary Jared Blumenfeld
California Environmental Protection Agency
1001 I Street
Sacramento, CA 95812-2815

Dear Secretary Blumenfeld,

The Center for Biological Diversity commends Governor Newsom and the California Legislature for prioritizing the decarbonization of the transportation sector by appropriating funds for a statewide study to "identify strategies to significantly reduce vehicles emissions in order to achieve carbon neutrality in the sector," as described in the 2019-2020 budget.

As the Newsom administration begins to define the study's scope, we are pleased to provide suggested research priorities with respect to electric vehicle adoption. Specifically, we urge Governor Newsom and the California Environmental Protection Agency to ensure that the study identifies the suite of policies necessary to provide the steepest possible reductions in greenhouse gas emissions, including a transition away from fossil fuel vehicles such **that 100% of California's new passenger vehicle sales will be zero emissions vehicles ("ZEVs") by no later than 2030.** This transition must be achieved in a way that is fair, equitable, and just to low-income communities that are the first and worst affected by transportation's fossil fuel pollution.

Amidst tragic wildfires, record heat waves, devastating sea level rise, and the recent power grid failures, there is no question that Californians are in the midst of the climate emergency. Combatting the climate crisis requires slashing carbon emissions in California's transportation sector—the state's leading source of greenhouse gas emissions—as soon as possible to meet the Paris Agreement goals of limiting warming to 1.5 degrees Celsius. At the same time, the phase-out of fossil fuel cars is necessary to reduce the state's heavy reliance on oil and combat the immense public health consequences of fossil fuel car pollution, which has been disproportionately borne by California's lower income communities and communities of color.

Transitioning away from fossil fuel cars is no longer an issue of technological or economic feasibility, but rather one of political will and government policy. Due to the falling market price of batteries and electric vehicles, ZEVs are projected to reach cost parity with fossil fuel cars as early as 2021. Strong government policy has further driven the expansion of the ZEV market;

fourteen countries, including the UK, France, and Scandinavian nations, and dozens of cities have announced a ban on the sale of fossil fuel cars as early as 2025, signaling to both consumers and automakers that the fleet of the future is fully electric.

Despite international precedent, no state, much less the federal government, has committed to banning fossil fuel cars in the United States. We are eager to work with Governor Newsom to be the first leader in the nation to break this glass ceiling—propelling California into the vanguard of national and global climate leadership by instituting policies to achieve 100% ZEV sales no later than 2030.

We encourage the Newsom administration to incorporate the following research priorities to establish a policy pathway to reaching 100% ZEV sales by 2030. We note that, while the focus of the attached research priorities is on passenger vehicle sales, we see ZEV adoption as just one pillar of the multi-pillared strategy to rapidly decarbonize of the state's entire transportation sector, including the urgently-needed reduction in vehicle miles traveled, the immense expansion of clean public transportation, and the full electrification of heavy-duty vehicles.

We look forward to working with the Newsom administration on this critical study.

Sincerely,

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RESEARCH PRIORITIES FOR THE VEHICLES EMISSIONS REDUCTION STUDY -
Pathway to Ensure that 100% Sale of New Cars are Zero Emissions Vehicles by 2030
Submitted by Center for Biological Diversity

1. EVALUATE POLICIES FOR MANAGING DEMAND-SIDE DYNAMICS SUPPORTING A 100% ZEV SALES MARKET BY 2030.

1.1 Policies to Ensure ZEV Affordability.

a. ***Estimate the projected acquisition costs of ZEVs versus fossil fuel cars from current day over time***. With rapid decreases in battery costs, the cost of acquiring a ZEV will be on par with a fossil fuel car by 2025, and as early as 2021 according to some studies. Factors in this analysis should include, but are not limited to, the availability of ZEVs in different car segments (e.g. compact, mid-size, full-size, luxury, SUV, truck) in current and projected vehicle inventories.

b. ***Estimate the projected ownership and operating cost of ZEVs versus fossil fuel cars from current day over time.*** ZEVs already cost 66 to 75 percent less per mile to drive than fossil fuel cars due to fewer moving parts, greater reliability, lower maintenance costs, and lower fuel costs. The ownership and operating costs of ZEVs are expected to rapidly drop, significantly enlarging the cost of ownership differential between ICEVs and ZEVs.

c. ***Identify and evaluate policies that ensure affordability of ZEVs for different income groups.*** Factoring in both the upfront cost and total cost of ownership of ZEVs v. fossil fuel cars, identify and evaluate policies that enhance affordability of ZEVs by 2030 and evaluate sliding scale policies based on income level. Policies should include existing policies, policies under consideration, and new policies from other jurisdictions, including but not limited to the following: (i) state ZEV rebates, including a sliding scale dependent on income level; (ii) state tax exemptions, including a sliding scale dependent on income level; (iii) VAT rebates, including a sliding scale dependent on income level; (iv) ZEV ownership and leasing financing packages and loans, including a sliding scale dependent on income level.

d. ***Evaluate the current effectiveness of existing policies and assess the gap to ensuring system readiness by 2030.*** Identify and assess the suite of policies that can address the gap.

1.2 Policies to Incentivize ZEV Purchasing from Present Over Time.

a. ***Identify and evaluate policies that incentivize consumers to purchase ZEVs to reach 100% sales in a range of time frames, including 2030.*** Policies should include, but are not limited to, existing policies, policies under consideration, and policies from other jurisdictions. Specifically consider tax rebates and subsidies, carpool lane benefits,

parking benefits, and other incentives, with a specific emphasis on sliding-scale benefits dependent on income level.

b. ***Identify and evaluate policies that disincentivize consumers to purchase fossil fuel cars.*** Policies should include, but are not limited to, existing policies, policies under consideration, and policies from other jurisdictions. Specifically consider congestion fee-pricing and other disincentives.

c. ***Evaluate the current effectiveness of existing policies and assess the gap to ensuring system readiness by 2030.*** Identify and assess the suite of policies that can address the gap.

1.3 <u>Policies to Improve Education Programs on ZEVs</u>. A key barrier to ZEV deployment is the lack of both consumer and auto dealer education about ZEVs, specifically addressing the five major consumer concerns about purchasing ZEVs: cost, driving range, charging infrastructure, charge time, and safety.

a. ***Identify and evaluate consumer and public education programs.*** Policies should include, but are not limited to, existing policies, policies under consideration, and policies from other jurisdictions. Policies should consider and leverage partnerships with non-governmental, private, and community actors.

b. ***Identify and evaluate auto dealer education programs.*** Policies should include, but are not limited to, existing policies, policies under consideration, and policies from other jurisdictions. Policies should consider and leverage partnerships with non-governmental, private, and community actors.

c. ***Evaluate the current effectiveness of existing policies and assess the gap to ensuring system readiness by 2030.*** Identify and assess the suite of policies that can address the gap.

2. <u>Evaluate Policies for Infrastructure Design that Supports the 100% ZEV Sales Market by 2030.</u>

2.1 <u>Policies regarding Charging Infrastructure</u>.

a. ***Evaluate the charging infrastructure system required to support 100% ZEV sales by 2030***. Factors for consideration include, but are not limited to: (i) number of charging stations; (ii) location and placement (residential/multi-use dwelling, commercial and office, public spaces, off-highways, etc.), with particular attention to accessibility for low-income communities; (iii) charging speed (DCFC v. Level 2), including projected technology improvements in charging infrastructure (beyond current DCFC and Level 2 chargers).

a. ***Evaluate the current amount of charging infrastructure in place and/or planned and assess the gap to ensuring system readiness by 2030.***

b. ***Identify and assess the suite of policies that can address the gap.*** This should include evaluating the several barriers to charging infrastructure deployment, including but not limited to financing and ownership policies, location of charging stations with an emphasis on deploying charging infrastructure in areas with multi-unit dwellings and other living conditions where communities do not own single-family homes. Discussion should also include the role of utility v. private v. public ownership and financing of charging stations depending on type and appropriate model.

2.2 <u>Grid Infrastructure</u>.

a. ***Evaluate the grid infrastructure that is required to support 100% ZEV sales by 2030 and beyond).*** Factors for consideration include, but are not limited to: (i) electricity throughput (kWh); (ii) weekday charging load (kW) to support the estimated number of ZEVs under the 2030 scenario; (iii) assumptions about charging behavior and charger utilization rates; (iv) consideration of both increased distributed energy sources and the onboarding of new renewable energy sources; (v) role of ZEV batteries and second-life batteries; and (v) reducing energy demand and avoiding demand spikes on the grid.

b. Evaluate the current grid infrastructure in place and/or planned and assess the gap to ensuring system readiness by 2030.

c. ***Identify and assess the suite of policies that can address the gap.*** This can include evaluating the barriers to grid infrastructure expansion, the role of utilities and power providers, as well as the utility commission and power provider regulators, in infrastructure management, and the financing options for grid infrastructure build-out with sliding-scale financing options based on income levels.

3. <u>ASSESS THE CLIMATE, ENVIRONMENTAL, HEALTH, GRID RESILIENCY, AND ECONOMIC BENEFITS OF A 100% ZEV SALES TARGET BY 2030</u>. These include but are not restricted to the following:

3.1 <u>Climate Impacts</u>: Avoided CO2 and other GHG emissions, factoring (i) phased-out fossil fuel combustion from fossil fuel cars and (ii) electricity sector emissions, which includes the projected decarbonization of the electricity sector in line with CA's 2040 carbon neutrality policies.

a. We emphasize the importance of reducing oil consumption and oil extraction in tandem. Synergies between this vehicles study and the oil extraction phase-out study should be considered.

b. Importantly, the electrification of vehicles needs to be fueled by electricity that is clean and renewable. In order to meet the Paris Agreement goals of reducing warming to 1.5°C, California should seek 100% renewable energy power generation as soon as possible.

3.2 <u>Air Quality</u>: Avoided criteria pollutant emissions (including nitrogen oxides (NO_x), particulate matter (PM), and sulfur oxides (SO_x)).

3.3 <u>Health Benefits</u>: Public health benefits accrued from phase-out of fossil fuel cars, including, e.g. reduced risks for those in close proximity to highways and high-traffic zones, morbidity, mortality, and medical costs avoided.

3.4 <u>Environmental Justice Implications</u>*:* Identifying where supply-side policies could reduce the disproportionate burdens from fossil fuel car pollution on environmental justice communities, and the related health benefits in those communities. In addition, positive economic implications, whereby ZEVs could represent added job creation benefits, e.g., building ZEVs and maintaining ZEVs.

3.5 <u>Grid Resilience and Stabilization Benefits:</u> Stabilization of grid benefits due to added battery storage capacity as well as second-life battery capacity.

3.6 <u>Other Benefits</u>*:* Avoided harm to species and environment due to avoided pollution from fossil fuel cars.

4. <u>ASSESS POTENTIAL IMPACTS TO, AND OPPORTUNITIES FOR, DISADVANTAGED AND LOW-INCOME COMMUNITIES AND STRATEGIES TO ADDRESS THOSE IMPACTS.</u>

4.1 <u>Conduct stakeholder engagement with communities dependent on fossil fuel cars and jobs related to the industry</u> (e.g., fossil fuel car mechanics) to identify the types of transition support communities desire. Process should include a community advisory group, clear timeline, and benchmarks. Note that there is no one-size fits all approach to a "just transition," and impacts of fossil fuel car phase-out could be felt widely. Identify alternative job opportunities for those impacted by the transition, which should include assessing jobs projected to be created in the ZEV industry.

4.2 <u>Conduct stakeholder engagement with disadvantaged and low-income communities</u> to ensure that ZEV policies are designed in tandem with reducing vehicles miles traveled and strengthening mass public transportation to be clean and renewable and to be accessible and affordable to low-income communities. Discussion in the stakeholder engagement group should include the transportation needs of disadvantaged and low-income communities. To the extent individual car ownership is identified as a need and desired, the engagement group should discuss ways to ensure that: ZEVs are affordable to those communities, including the implementation of a sliding-scale subsidy plan based on income level; charging and grid infrastructure are available in low-income communities, including multi-unit buildings, single-unit residences, and public areas; education program is a widely accessible; and policies are designed to adequately respond to the needs of low-income communities.

5. DEVELOP INTEGRATED FINDINGS AND RECOMMENDATIONS FOR ENSURING THE 2030 100% ZEV SALES TARGET.

5.1 Provide an integrated plan for reaching 100% ZEV sales by 2030, including milestones for ramping up the percentage of sales of ZEVs from present to 2030 and associated demand-side market and infrastructure policies, and associated transition plans.

5.2 These plans should consider and discuss the following factors:

- **a.** The decline in passenger vehicles demand due to parallel improvements in public transportation, reduction in vehicle mile traveled, expansion of shared riding and autonomous vehicles, and increased use of alternative modes of transport;
- **b.** The baseline of California's existing policies including ZEV targets and the 2045 carbon neutrality goal, and how the new suite of policies build upon those existing targets;

June 11, 2021

Liane Randolph
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814
Comments and cited references emailed to: cleancars@arb.ca.gov

Dear Chair Randolph:

On behalf of the Center for Biological Diversity (the "Center") and our more than 200,000 members and supporters in California, the Center submits this letter in reference to the upcoming Advanced Clean Cars II ("ACC II" or "Clean Cars") Rule. Specifically, this letter responds to staff's invitation for comments following the public workshop on May 6, 2021.

As the California Air Resources Board ("CARB") embarks on a new effort to strengthen the light duty fleet regulations, the Center urges CARB to take rapid and decisive action to curb emissions by implementing a proactive, robust ACC II Rule. While we acknowledge that you have stated you intend to adopt a greenhouse gas emissions rule separately and later, we ask you to reconsider that decision to avoid additional emissions in the interim. We urge you to adopt a rule now that mandates 100% Zero Emission Vehicle (ZEV) sales by 2030 and a minimum 7% annual increase in efficiency until then.

The cascading effects of climate change continue to spiral higher: last month scientists recorded the highest level of carbon dioxide in the atmosphere in human history.[1] There is now an Administration willing to support California's efforts to fight the climate crisis. While California has always led the way in that fight, CARB's currently proposed standards are in danger of dropping the ball. CARB has a duty to safeguard the health and welfare of California residents by recommitting the state to a clean air agenda.

I. The Reaffirmation of California's Waiver by the EPA Should Empower CARB to Set Aggressive Targets That Will Achieve the State's Climate Goals

The world looks very different than it did six months ago. There is a new Administration in Washington that looks set to repeal SAFE I and reaffirm California's right to set its own stringent emissions standards.[2] This massive shift in policy comes alongside ongoing litigation

[1] Plumer, Brad, Carbon Dioxide in Atmosphere Hits Record High Despite Pandemic Dip, N.Y. TIMES, Jun. 7, 2021.
[2] U.S. Environmental Protection Agency, California State Motor Vehicle Pollution Control Standards; Advanced Clean Car Program; Reconsideration of a Previous Withdrawal of a Waiver of Preemption; Opportunity for Public Hearing and Public Comment, 86 Fed. Reg. 22,421-30 (Apr. 28, 2021).

by 23 states, the District of Columbia, and many advocates to compel that change.[3] If and when California's waiver is reaffirmed, which looks likely, CARB should use that authority for its intended purpose: to set aggressive standards that raise the bar for the federal government and other forward-looking Section 177 states.

CARB has an historic role in setting the strongest emissions standards in the country. The agency has rightfully prided itself on promulgating standards that are "technology forcing," which spur the auto industry to innovate and improve, even in the absence of complete information about the future.[4] CARB's standards have the dual effect of both allowing other Section 177 states to assent and improve their own air quality, while also motivating the EPA to regulate more expansively for the rest of the country. While CARB was forced to compromise with several automakers under less-than-ideal circumstances during the previous Administration, the time is ripe for CARB to reclaim its duty to lead the country on this issue.

Spurred by the acute worsening of the climate crisis over recent years and months, state leaders have been asking CARB to take an increasingly aggressive stance. In 2006, the California Global Warming Solutions Act (AB 32, Nunez & Pavley, 2006) codified into state law the requirement to reduce emissions to 1990 levels by 2020.[5] In 2015, after announcing a goal of reducing current petroleum use in cars and trucks by 50 percent, Governor Brown signed E.O. B-30-15, which establishes a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030.[6] That E.O. was codified in SB 32, which required CARB to ensure that statewide greenhouse gas (GHG) emissions are reduced to at least 40% below the 1990 level by 2030.[7]

In addition, E.O. B-55-18, issued by former Governor Brown in 2018, sets the goal of achieving carbon neutrality by no later than 2045, and reaching and maintaining net negative emissions thereafter. Further, E.O. B-16-12, codified through SB 1275 (DeLeon, 2014),[8] sets an objective of 1.5 million zero emission vehicles by 2025. Governor Brown's E.O. B-48-18 augmented these target ZEV numbers, setting a goal of 5 million ZEVs on the road by 2030 and mandating the installation of 250,000 charging stations.[9]

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[3] *See Union of Concerned Scientists v. National Highway Traffic Safety Administration*, Case No. 19-1230 (D.C. Cir. filed Oct. 28, 2019); *Competitive Enterprise Institute v. National Highway Traffic Safety Administration*, Case No. 20-1145 (D.C. Cir. filed May 1, 2020).

[4] California Air Resources Board, Advanced Clean Cars Program: About, https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/about (last visited June 10, 2021).

[5] Assem. Bill 32, 2005-2006 Reg. Sess. (Cal. 2006), https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=200520060AB32.

[6] Office of Governor Edmund G. Brown Jr., Press Release: Governor Brown Establishes Most Ambitious Greenhouse Gas Reduction Target in North America (April 29, 2015), https://www.ca.gov/archive/gov39/2015/04/29/news18938/index.html.

[7] Sen. Bill 32, 2015-2016 Reg. Sess. (Cal. 2016), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32.

[8] Sen. Bill 1275, Ch. 530, 2013-2014 Reg. Sess. (Cal. 2014), http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201320140SB1275.

[9] Office of Governor Edmund G. Brown Jr., Press Release: Governor Brown Takes Action to Increase Zero-

Governor Newsom has upped the ante: after stating that we're in a "climate damn emergency,"[10] and recognizing that the state is not moving fast enough towards its climate goals,[11] he recently issued Executive Order N 79-20,[12] which set a target of 100% ZEV sales by 2035.

As California experiences the worsening effects of climate change year after year, state leaders will continue to intensify the state's carbon reduction goals and accelerate the timeline to carbon neutrality. The potential danger in CARB adopting a rule now that will chart the path for the next 10-15 years[13] is that future leaders will likely demand even swifter action than we can currently imagine. An overly conservative ACC II program could limit the ability of future political leaders to chart an even swifter path to carbon neutrality.

Due to the long timeline of ACC II, and the fact that its effects will last many years into the future, the evidence warrants strong emissions standards now, with no loopholes (as discussed below). If changes do become necessary down the road, it is far easier to loosen regulations than tighten them, due to reliance interests and legal notice requirements. CARB will have more room to maneuver down the road if the agency starts from a strong baseline rule.

II. The Next Clean Cars Rule Must Require 100% ZEV Sales by 2030 and a Minimum of 7% Annual Reductions in GHG Emissions Until Then

CARB's proposed requirement of 100% ZEV sales by 2035 is inadequate to control climate change and meet state, federal, and international emissions goals. Instead, the agency should require that the 100% ZEV benchmark be reached by 2030, and in the interim, ICEVs should be required to meet 7% annual reductions in emissions.

State, federal, and international goals all commit to reducing net carbon emissions to zero by 2050 or sooner. The IPCC recently stated the Paris Agreement's target of limiting warming to under 1.5°C would require "rapid and far-reaching transitions" across all sectors in order to cut

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Emission Vehicles, Fund New Climate Investment (Jan. 26, 2018), https://www.ca.gov/archive/gov39/2018/01/26/governor-brown-takes-action-to-increase-zero-emission-vehicles-fund-new-climate-investments/index.html.

[10] Willon, Phil & Tony Barboza, *Newsom orders 2035 phaseout of gas-powered vehicles, calls for fracking ban*, L.A. TIMES, Sept. 23, 2020, https://www.latimes.com/california/story/2020-09-23/gavin-newsom-fracking-ban-california-zero-emissions-cars.

[11] "The state's ambitious goal of using 100% clean energy by 2045 'is inadequate,' Newsom argued. 'We're going to have to be more aggressive in terms of meeting our goals much sooner.'" Thompson, Don, *Amid ashes, California governor fires away on climate change*, AP NEWS, Sept. 11, 2020, https://apnews.com/article/climate-california-fires-climate-change-archive-e86452cefd1462375439abea273f7d87.

[12] Newsom, Gavin, Exec. Order No. N 79-20, Executive Department State of California (Sept. 23, 2020), *available at* https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.

[13] In reality, ACC II will have even longer-term consequences, since some cars sold in 2030 will still be on the road in 2050 (*see infra*, section III).

global CO_2 emissions in half by 2030 and to zero by 2050.[14] President Biden, who immediately recommitted the United States to the Paris Agreement,[15] recently established a target of 50-52% emissions reductions below 2005 levels by 2030 to reach net zero by 2050.[16] Similarly, California Governor Brown set a state emissions reduction target of 40% below 1990 levels by 2030[17] and later established the target of carbon neutrality by 2045.[18]

A 2035 goal for 100% ZEV sales endangers these goals. A 2019 study concluded that immediately phasing out all fossil fuel technology at the end of its design lifetime would preserve only a 64% chance of limiting global temperature rise below 1.5°C.[19] Delaying the 100% ZEV mandate until 2030, let alone 2035, could render the 1.5°C goal unattainable.

The U.S. and California need to make significant progress. California is already experiencing rising temperatures, declining snowpack, increasing heavy precipitation events, intensifying drought, worsening wildfires, and rising seas.[20] Many of the state's most extreme weather events have occurred in the last decade, including a severe drought from 2012-2016, an almost non-existent Sierra Nevada winter snowpack in 2014-2015, three of the five deadliest wildfires in state history, and back-to-back years of the warmest average temperatures on record.[21] These

[14] Intergovernmental Panel on Climate Change, Summary for Policymakers, Global Warming of 1.5°C, An 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 to the threat of climate change, sustainable development, and efforts to eradicate poverty (2018) at 12, 15, *available at* https://www.ipcc.ch/sr15/.
[15] The White House, Paris Climate Agreement: Acceptance on Behalf of the United States of America, Press Release (Jan. 20, 2021), *available at* https://www.whitehouse.gov/briefing-room/statements-releases/2021/01/20/paris-climate-agreement/.
[16] The White House, FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, Press Release (Apr. 22, 2021), *available at* https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/.
[17] Office of Governor Edmund G. Brown Jr., Press Release: Governor Brown Establishes Most Ambitious Greenhouse Gas Reduction Target in North America (April 29, 2015), https://www.ca.gov/archive/gov39/2015/04/29/news18938/index.html; Sen. Bill 32, 2015-2016 Reg. Sess. (Cal. 2016), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32.
[18] Brown, Edmund, Executive Order B-55-18 To Achieve Carbon Neutrality, Executive Department, State of California (2018) ("EO B-55-18") *available at* https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf.
[19] Smith, Christopher J. et al., Current fossil fuel infrastructure does not yet commit us to 1.5°C warming, 10 Nature Communications 101 (2019) at 1, *available at* https://www.nature.com/articles/s41467-018-07999-w.
[20] Thorne, James et al., California's Changing Climate 2018, California Natural Resources Agency (2018) at 4, https://www.energy.ca.gov/sites/default/files/2019-11/20180827_Summary_Brochure_ADA.pdf.
[21] Thorne, James et al., California's Changing Climate 2018, California Natural Resources Agency (2018) at 3, https://www.energy.ca.gov/sites/default/files/2019-11/20180827_Summary_Brochure_ADA.pdf; California Department of Forestry and Fire Protection, Top 20 Deadliest California Wildfires (2021), *available at* https://www.fire.ca.gov/media/lbfd0m2f/top20_deadliest.pdf.

ongoing disasters demonstrate California's status as "one of the most 'climate-challenged' regions of North America,"[22] as well as the need for prompt action to halt these trends.

The average vehicle lifetime and the sheer number of ICEVs that could be sold between 2030 and 2035 demonstrate the need to end ICEV sales no later than 2030. A 2019 study found if new vehicle technology is immediately adopted and incorporated into 100% of all new vehicle sales, in 20 years it will still only be present in 90% of the on-road vehicle fleet.[23] This means that under a 2035 100% ZEV sale requirement, 10% of California's fleet would still be ICEVs in 2055, continuing to emit carbon pollution and undermining the state's emission targets. That portion is highly significant: it means that roughly 2 million additional ICEVs will be sold between 2030 and 2034, emitting an estimated 69 mmt CO_2 over their lifetimes.[24]

The 2030 100% ZEV mandate is feasible. Cost parity between ICEVs and ZEVs has already been reached without the use of incentives,[25] and experts have concluded that EVs are already cheaper to own and maintain over their lifetimes.[26] In fact, experts predict that ZEV sticker prices will match their ICEV counterparts as early as 2023 to 2025, primarily due to declining battery costs.[27] In light of these facts, it is clear that delaying the mandate until 2035 is unnecessary and risks bringing warming above 1.5°C.

Furthermore, CARB should require automakers to reduce fleet emissions by 7% annually as ICEVs are completely phased out. Under the Obama-era EPA standards, manufacturers were committed to only a 4.7% annual reduction, while the 2019 California framework held automakers to a 3.7% annual reduction (and various loopholes make the effective reduction even less significant).[28] At this point, simply reverting to the Obama-era standard is inadequate to

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[22] Bedsworth, Louise et al., Statewide Summary Report, California's Fourth Climate Change Assessment, California Governor's Office of Planning and Research, Scripps Institution of Oceanography, California Energy Commission, California Public Utilities Commission (2018) at 13, https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.

[23] Keith, David R. et al., Vehicle fleet turnover and the future of fuel economy, 14 Environmental Research Letters (2019) at 2, https://iopscience.iop.org/article/10.1088/1748-9326/aaf4d2/pdf ("Keith et al.").

[24] Data analyzed by Center for Biological Diversity, attached as Appendix A.

[25] *See e.g.*, Lutsey, Nic & Michael Nicholas, Update on electric vehicle costs in the United States through 2030, The International Council on Clean Transportation (Apr. 2, 2019) at 11, https://theicct.org/sites/default/files/publications/EV_cost_2020_2030_20190401.pdf; *see also* Fulton, Lew & Dan Sperling, Zero cost for zero-carbon transportation?, UC Davis Institute of Transportation Studies (July 14, 2020), https://its.ucdavis.edu/blog-post/zero-cost-for-zero-carbon-transportation/ (finding that, after 2030, the costs of owning and operating electric vehicles will be lower than for gasoline and diesel cars and trucks).

[26] Harto, Chris, Electric Vehicle Ownership Costs: Today's Electric Vehicles Offer Big Savings for Consumers, Consumer Reports (Oct. 2020), https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf.

[27] Gearino, Dan, Inside Clean Energy: How Soon Will An EV Cost the Same as a Gasoline Vehicle? Sooner Than You Think., INSIDE CLIMATE NEWS, July 30, 2020, https://insideclimatenews.org/news/29072020/inside-clean-energy-electric-vehicle-agriculture-truck-costs.

[28] Union of Concerned Scientists, Rolling Back the Rollback: Strong Near-Term Standards To Set Up A Cleaner Future, https://ucs-documents.s3.amazonaws.com/clean-vehicles/ucs-memo-rolling-back-the-rollback-2021-04-09.pdf (last visited June 10, 2021).

meet the state's emission targets, given the time lost over the past several years and that will continue to be lost until ACC II takes effect. Instead, requiring a 7% annual reduction, starting in 2024, would reduce cumulative emissions from passenger vehicles between 2020 and 2045[29] by nearly 40 mmt CO_2 over the Obama-era standards, an amount roughly equivalent to the annual emissions of Hong Kong.[30] If the 7% annual reduction were also paired with 100% ZEV sales by 2030 rather than 2035, emissions from passenger vehicles between 2020 and 2045 would decrease by 320 mmt CO_2, or roughly the annual emissions of France.[31]

A 7% annual reduction is also feasible. Recent EPA Fuel Economy Trends Reports show wide disparities among automakers in the adoption of existing technologies that reduce emissions, such as continuously variable transmissions (which allow the vehicle to run more cleanly, reducing pollution) and cylinder deactivation (which allows a vehicle to use part, rather than all, of the engine when less power is called for, thus reducing emissions).[32] Indeed, not only do these and other technologies exist, but manufacturers already use them in many vehicles they produce for overseas markets (but often not yet in their domestic equivalents).[33]

Thus, the agency should require automakers to meet a 7% annual emissions reduction rather than reinstating the Obama-era standards or maintaining the framework agreement. Immediate emissions reductions are necessary to keep global emission trends on course to limit global warming to 1.5°C, and automakers already have many of the tools to comply with more stringent requirements.

III. The New Rule Must Take Effect by MY 2024

Effective ZEV mandates and emission standards start early to capture the maximum possible benefits from their implementation. There is no legal or technical argument for delaying new standards until model year 2027 vehicles. The Clean Air Act simply requires consideration of adequate lead time necessary to "permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance,"[34] and EPCA, while not

[29] We estimated emissions out to 2045 because California has committed to reaching carbon neutrality by 2045. EO B-55-18.
[30] Data analyzed by Center for Biological Diversity, attached as Appendix A. Ritchie, H. and Roser, M., CO2 emissions, Our World in Data, https://ourworldindata.org/co2-emissions (last visited June 8, 2021).
[31] *Id.*
[32] U.S. Environmental Protection Agency, The 2019 EPA Automotive Trends Report (March 2020) at 38, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100YVFS.pdf.
[33] Cooke, Dave, Automakers Can Build Better Cars, But We Need Strong Standards to Make Them, Union of Concerned Scientists Blog (Nov. 25, 2019), https://blog.ucsusa.org/dave-cooke/automakers-can-build-better-cars-but-we-need-strong-standards-to-make-them.
[34] EPA must grant California's waiver if the EPA Administrator finds that California's proposed regulations and enforcement procedures are not inconsistent with 42 U.S.C. § 7521(a). *See* 42 U.S.C. § 7543(b)(1)(C). Section 7521(a)(2) provides that "Any regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and

legally relevant to CARB's waiver, requires only an 18-month lead time.[35] Given the maturity of ZEV and ICEV light duty fleet technology, manufacturers do not need significant lead time to comply with more stringent standards.[36] In fact, with an earlier implementation date, manufacturers would face a gentler slope of improvement to reach 100% ZEV sales by 2030 than if the rule started later, which would require steeper annual improvements to reach the target.

Furthermore, in order to comply with the Obama standards, manufacturers had already built into their business plans an increase in fleet-average mileage and a decrease in emissions. CARB's own Midterm Review in 2017 showed that they were already "overcomplying" with GHG standards and had offered models that were already able to comply with the standards for later years.[37] Now, they have put the brakes on improvements in response to the previous administration's rollbacks. Given the automakers' behavior, it would be outrageous to foist higher greenhouse and other pollution emissions and billions of dollars in climate- and health-related costs upon Californians just because automakers broke their word and seized the opportunity to roll back standards under the previous administration. They should not be rewarded for their successful delaying tactic.

The climate and health crises demand that CARB instead regulate with new, aggressive standards that truly reflect and respond to the reality of the climate emergency. CARB should accelerate work on ACC II now, complete it expeditiously in 2021, and have it take effect beginning with model year 2024 vehicles. Any delay beyond what is required by regulation or statute is not warranted given the scale of the crisis.

IV. ACC II Should Strictly Limit the Number, Use, and Lifetime of Credits

In addition to the ZEV mandate and annual emissions reductions, it is crucial that CARB restrict the number and lifetime of credits that allow automakers to avoid complying with the emissions cuts CARB intended. While this system gives manufacturers a cushion of protection to handle unexpected events, credits slow the introduction of cleaner technology. By the end of the 2015 model year, manufacturers had accumulated credits worth between $12 to $18 billion, which

application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."

[35] 49 U.S.C. § 32902(a).

[36] *See e.g.*, German, John, Technology Leapfrog: Or, all recent auto technology forecasts underestimate how fast innovation is happening, International Council on Clean Transportation Blog (Sept. 25, 2017), https://theicct.org/blog/staff/technology-leapfrogging. *See also*, Lipshaw, Jeremy, What is Lightweighting and How Does it Improve Fuel Economy in Vehicles, Union of Concerned Scientists (Aug. 24, 2020), https://blog.ucsusa.org/science-blogger/lightweighting-and-fuel-economy-in-vehicles?_ga=2.137492341.437148802.1598470463-789117557.1592936422

[37] California Air Resources Board, California's Advanced Clean Cars Midterm Review Summary Report for the Technical Analysis of the Light Duty Vehicle Standards (2017) at ES-2, https://ww2.arb.ca.gov/resources/documents/2017-midterm-review-report.

they then used to slow the introduction of cleaner technology by under-complying in 2015 and 2016.[38] The 2019 EPA Trends Report similarly showed that all but three manufacturers relied on credits to make up for shortfalls in emissions standards from light duty trucks.[39] The result is that credits significantly reduce the use and development of emissions reducing technology, which in turn results in more pollution.[40]

To limit the delay in adopting cleaner technologies, CARB should impose several limits on the accumulation and use of credits. First, the agency should impose an annual cap on the use of both ACC I and ACC II credits to ensure that manufacturers cannot completely avoid their obligation to adopt cleaner technology in a given year. The cap should decrease each year, ensuring that fewer credits are used to offset emissions in the years leading up to 2030. Alternatively, the agency could adopt a "backstop" policy that would bar any manufacturer from emitting more than a specified amount of total carbon emissions in a given year. Like the credit cap, the backstop should be designed to become tighter each year leading up to 2030.

Second, CARB must sharply limit the ICEVs that are sold under the credit system after 2025 by limiting the ACC I credit lifetime to 5 years (thus expiring by 2030), while limiting the ACC II credit lifetime to 2 years (thus expiring in 2032). Otherwise, the agency risks allowing ICEVs to persist in the vehicle fleet well after the state's 2045 net-zero emissions goal.

Research shows that achieving 100% ZEV sales by 2035 is insufficient for California to reach carbon neutrality by 2045.[41] California can only meet its climate targets if all new cars and light-duty trucks sold in the state beyond 2030 produce zero emissions. CARB has a responsibility to live up to its reputation as the strongest air quality regulatory body in the nation. The health and well-being of millions of California residents depend on the strength of the ACC II rule.

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[39] U.S. Environmental Protection Agency, The 2019 EPA Automotive Trends Report (March 2020) at 112-13, 123, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100YVFS.pdf.

[40] Lutsey, Nic & Aaron Isenstadt, How will off-cycle credits impact U.S. 2025 efficiency standards?, The International Council on Clean Transportation (Mar. 27, 2018) at iv, https://theicct.org/publications/US-2025-off-cycle.

[41] *See* Fleming, John, All-Electric Drive: How California's Climate Success Depends on Zero-Emission Vehicles, Center for Biological Diversity (2020), https://www.biologicaldiversity.org/programs/climate_law_institute/pdfs/All-Electric-Drive-California-zero-emissions-vehicles-report.pdf.

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encl. Appendix A

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Appendix A: California Vehicle Emissions Estimates Under Various Scenarios

We estimated CO_2 emissions through 2045 under three scenarios of zero-emission vehicle (ZEV) adoption and fuel efficiency improvements. These are three paths that California could take to curb passenger vehicle emissions following the expected repeal of SAFE I which would reaffirm California's right to set its own stringent emissions standards.

Scenario 1: After 2020, fuel economy improves by 4.7% annually through 2035 following the previous Obama car standard. California reaches 100% ZEV sales in 2035.
Scenario 2: The Obama standard of 4.7% improvement applies for 2021-2023 followed by 7% improvement from 2024 (when CARB could start a new fuel economy rule) through 2035. California reaches 100% ZEV sales in 2035.
Scenario 3: The Obama standard of 4.7% improvement applies for 2021-2023 followed by 7% improvement from 2024 to 2030, the point at which 100% ZEV sales is reached.

ZEV Sales Trajectories

Below are the two potential sales trajectories for passenger vehicles between 2020 and 2035 corresponding to the above scenarios. Table 1 shows the sales trajectories for zero-emission vehicles (ZEVs) and internal combustion engine vehicles (ICEVs) between 2020 and 2035 assuming 100% ZEV sales by 2030, with a linear increase in ZEV sales percentage between 2020 and 2030. Table 2 shows the sales trajectory based on estimates by the California Air Resources Board (CARB), with 100% ZEV sales by 2035.[1] Based on California passenger vehicle sales trends, an assumption is made that annual passenger vehicle sales are about 2 million.[2] It is also assumed that ZEV sales are battery-electric vehicle (BEV) sales.

Year	% ZEV sales	Total ZEV sales	Total ICEV sales
2020	10	200,000	1,800,000
2021	19	380,000	1,620,000
2022	28	560,000	1,440,000
2023	37	740,000	1,260,000
2024	46	920,000	1,080,000
2025	55	1,100,000	900,000
2026	64	1,280,000	720,000
2027	73	1,460,000	540,000
2028	82	1,640,000	360,000
2029	91	1,820,000	180,000
2030	100	2,000,000	0
2031	100	2,000,000	0
2032	100	2,000,000	0
2033	100	2,000,000	0
2034	100	2,000,000	0
2035	100	2,000,000	0

Table 1: ZEV and ICEV sales trajectories with 100% ZEV sales by 2030. It is assumed that annual passenger vehicle sales are 2 million and that there is a linear increase in percent ZEV sales between 2020 and 2030.

[1] California Air Resources Board, Advanced Clean Cars (ACC) II Workshop Presentation, Slides 43-44 (May 6, 2021), https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2_workshop_slides_may062021_ac.pdf.
[2] California New Car Dealers Association, California Auto Outlook (February 2021), https://www.cncda.org/wp-content/uploads/Cal-Covering-4Q-20.pdf.

Year	% ZEV sales	Total ZEV sales	Total ICEV sales
2020	10	200,000	1,800,000
2021	13	254,014	1,745,986
2022	15	307,348	1,692,652
2023	18	360,682	1,639,318
2024	21	414,016	1,585,984
2025	23	467,350	1,532,650
2026	26	520,000	1,480,000
2027	34	680,000	1,320,000
2028	43	860,000	1,140,000
2029	51	1,020,000	980,000
2030	60	1,200,000	800,000
2031	76	1,520,000	480,000
2032	82	1,640,000	360,000
2033	88	1,760,000	240,000
2034	94	1,880,000	120,000
2035	100	2,000,000	0

Table 2: ZEV and ICEV sales trajectories with 100% ZEV sales by 2035. It is assumed that annual passenger vehicle sales are 2 million. The increase in percent ZEV sales between 2020 and 2035 is based on a CARB projection.

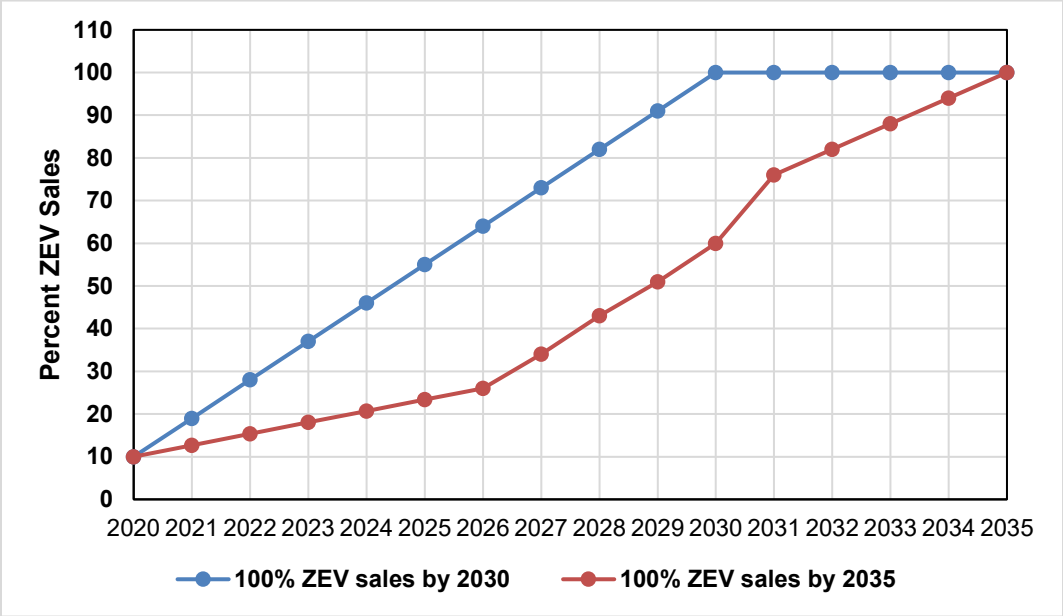

Figure 1: Sales trajectories for ZEVs under "100% ZEV sales by 2030" and "100% ZEV sales by 2035" scenarios.

Estimates of CO_2 emitted between 2020 and 2045 from all cars sold between 2020 and 2035

According to the 2020 EPA Automotive Trends Report, real-world CO_2 (tailpipe) emissions from passenger vehicles in 2020 averaged 344 g/mi, with a fuel economy of 25.7 mpg.[3] This represents sedan/wagon, car SUV, truck SUV, minivan/van, and pickup categories. Taking 2020 as the base year for estimates of improvements in fuel economy, Table 3 shows the expected emissions per mile under our three scenarios for ICEV passenger vehicles between 2020 and 2035.

Year Car Sold (MY)	Scenario 1 (g CO_2/mi)	Scenarios 2 and 3 (g CO_2/mi)
2020	344	344
2021	328	328
2022	312	312
2023	298	298
2024	284	277
2025	270	258
2026	258	239
2027	246	223
2028	234	207
2029	223	193
2030	213	179
2031	203	167
2032	193	155
2033	184	144
2034	175	134
2035	167	125

Table 3: Real-world CO_2 emissions (g/mi) from passenger vehicles based on model year (MY), assuming three scenarios of increasing fuel economy. Because Scenario 3 calls for 100% ZEV sales by 2030, the fuel economy numbers from 2030 to 2035 are not relevant for Scenario 3.

Because 2045 is a benchmark year for numerous climate goals, including California's goal of carbon neutrality by 2045, we also looked at total emissions from cars sold between 2020 and 2035 out to 2045, assuming that vehicles sold between 2020 and 2035 have a 16-year lifetime,[4] and they emit the same amount annually from their year of sale. We estimated the emissions for the above scenarios incorporating the different ZEV sales and fuel economy trajectories.

First, we estimated the emissions from new ICEVs in their first sales year using the following equation (Table 4):

Metric tons CO_2 (mt)
$$= \#\ of\ cars \times average\ annual\ vehicle\ miles \times (g\ CO_2/mi) \times (1\ mt\ CO_2/1{,}000{,}000\ g)$$

Where "average annual vehicle miles" is assumed to be 11,623.[5]

[3] U.S. Environmental Protection Agency, The 2020 EPA Automotive Trends Report (2021), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1010U68.pdf.
[4] Keith, D.R. et al., Vehicle fleet turnover and the future of fuel economy, 14 Environ. Res. Lett. (2019).
[5] U.S. Department of Energy, Alternative Fuels Data Center (AFDC), Average Annual Vehicle Miles Traveled by Major Vehicle Categories (Accessed June 8, 2021), https://afdc.energy.gov/data/10309. Average annual vehicle

Year Car Sold (MY)	Years on Road 2020 to 2045	Scenario 1	Scenarios 2	Scenario 3
2020	16	7,196,962	7,196,962	7,196,962
2021	16	6,652,890	6,652,890	6,172,834
2022	16	6,146,532	6,146,532	5,229,076
2023	16	5,673,076	5,673,076	4,360,396
2024	16	5,230,547	5,104,311	3,475,858
2025	16	4,817,083	4,587,375	2,693,790
2026	16	4,432,980	4,119,703	2,004,180
2027	16	3,767,913	3,417,127	1,397,916
2028	16	3,101,164	2,744,574	866,708
2029	16	2,540,615	2,194,215	403,019
2030	16	1,976,495	1,665,812	0
2031	15	1,130,160	929,523	0
2032	14	807,782	648,342	0
2033	13	513,211	401,972	0
2034	12	244,545	186,917	0
2035	11	0	0	0

Table 4: Emissions (metric tons CO_2) from ICEVs in their first sales year for Scenario 1 - Obama standard with 100% ZEV sales by 2035; Scenario 2 – Obama standard 2021-2023 followed by 7% annual improvement with 100% ZEV sales by 2035; Scenario 3 – Obama standard 2021-2023 followed by 7% annual improvement with 100% ZEV sales by 2030. The number of years between 2020 and 2045 that a given model year is expected to be on the road assuming a 16-year lifetime is also included.

To determine the total emissions from cars of a model year 2020 to 2035 out to 2045, the emissions from ICEVs in their first sales year were multiplied by the number of years they are expected to be on the road between 2020 and 2045 (Table 5). Essentially, column 2 in Table 4 was multiplied by the scenario columns. For example, under Scenario 1, the emissions from MY 2020 cars were calculated to have been 7 million metric tons in the year 2020. Multiplying this value by the vehicle lifetime of 16 years gives the total emissions from MY 2020 vehicles between 2020 and 2045, assuming that vehicles emit the same amount annually from their year of sale.

miles were determined as the average for the categories car, light-duty vehicle, and light truck in AFDC mileage data.

Year Car Sold (MY)	Scenario 1	Scenarios 2	Scenario 3
2020	115,151,386	115,151,386	115,151,386
2021	106,446,239	106,446,239	98,765,343
2022	98,344,515	98,344,515	83,665,220
2023	90,769,214	90,769,214	69,766,335
2024	83,688,747	81,668,977	55,613,736
2025	77,073,336	73,398,004	43,100,645
2026	70,927,685	65,915,253	32,066,880
2027	60,286,615	54,674,030	22,366,649
2028	49,618,624	43,913,187	13,867,322
2029	40,649,840	35,107,438	6,448,305
2030	31,623,917	26,652,993	0
2031	16,952,396	13,942,847	0
2032	11,308,943	9,076,794	0
2033	6,671,738	5,225,640	0
2034	2,934,538	2,243,005	0
2035	0	0	0
Total	862,447,732	822,529,522	540,811,821

Table 5: Comparison of total emissions out to 2045 under Scenario 1 - Obama standard with 100% ZEV sales by 2035; Scenario 2 – Obama standard 2021-2023 followed by 7% annual improvement with 100% ZEV sales by 2035; Scenario 3 – Obama standard 2021-2023 followed by 7% annual improvement with 100% ZEV sales by 2030. Column 1 can be considered the model year, whereas the remaining columns show the CO_2 emissions out to 2045 from a given model year.

Under Scenario 1 with the Obama standard through 2035 and 100% ZEV sales by 2035, cars sold between 2020 and 2035 will produce 862 mmt CO_2 by 2045. With a rule starting in 2024 for 7% annual improvement (Scenario 2), emissions by 2045 are 823 mmt CO_2. So, the difference between implementing the Obama standard through 2035 vs. implementing a rule for 7% annual improvement from 2024 to 2035 is nearly 40 mmt CO_2, an amount near the annual emissions of Hong Kong. [6]

Meanwhile, under a scenario with 7% annual improvement starting in 2024 and 100% sales by 2030, the emissions by 2045 would be 541 mmt CO_2. This is about 320 mmt CO_2 less than Scenario 1 with the Obama standard through 2035 and 100% ZEV sales by 2035. The difference is near equal to the annual CO_2 emissions from France. [7]

[6] Ritchie, H. and Roser, M., CO_2 emissions, Our World in Data (Accessed June 8, 2021), https://ourworldindata.org/co2-emissions.

[7] Ritchie, H. and Roser, M., CO_2 emissions, Our World in Data (Accessed June 8, 2021), https://ourworldindata.org/co2-emissions.