

September 27, 2021

Mr. Michael Regan, Administrator  
United States Environmental Protection Agency  
EPA Docket Center  
Office of Air and Radiation  
Docket ID No. EPA-HQ-OAR-2021-0208  
Mail Code 28221T  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Via <https://www.regulations.gov/>

Re: Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, Docket ID No. EPA-HQ-OAR-2021-0208

Dear Administrator Regan,

The California Air Resources Board (CARB) welcomes this proposal by the United States Environmental Protection Agency (U.S. EPA) to revise its 2023 and later model year light-duty vehicle greenhouse gas emissions standards. U.S. EPA correctly recognizes that standards more stringent than those currently in place are appropriate, feasible, and necessary to protect public health. It has a legal and policy obligation to require the maximum emission reductions possible.

U.S. EPA has improved its analysis of appropriate greenhouse gas emission standards to propose more stringent standards. CARB offers the following detailed comments and materials in support of U.S. EPA's proposal and urges the agency to adopt the most stringent standards feasible. All the proposed standards – the preferred alternative, the more stringent alternatives, and thus necessarily the less stringent alternative - are technologically feasible. U.S. EPA has a legal obligation to follow the science and the Clean Air Act and cut emissions as deeply as possible. Alternative 2, a return to the National Program standards with an improvement of those standards for model year 2026 by an additional 10 grams of carbon dioxide per mile, would maximize the reduction in emissions. However, CARB recognizes that U.S. EPA may determine additional lead time is appropriate; if so, the best option is to adopt a standard at least as stringent as its preferred alternative for model year 2023 and greater stringency thereafter, along the lines of Alternative 2 for later model years, with additional reductions required in model year 2026 to recoup further lost emission reductions.

We strongly support urgent action to protect public health and stabilize the climate. The wildfires, drought, declining air quality, and extreme heat we face due to the climate crisis are becoming increasingly extreme and frequent. They confirm the assessments of climate scientists that we must act quickly to stave off the worst effects of climate change. Indeed, America's most vulnerable communities – and communities in California in particular – face very serious public health and economic threats without swift action.

The solutions are at hand. The ingenuity of engineers and scientists has improved vehicle emission technology and significantly reduced emissions of greenhouse gases and other pollutants. In many instances these improvements pay for themselves in fuel savings, and in all ways their benefits to public health and welfare far outweigh their costs. Automobile manufacturers are already including in their vehicles the technologies to meet these proposed standards, including in other markets. The proposed standards will ensure they accelerate deployment here.

CARB is continuing its work to ensure clean transportation technology is equitably available in California. CARB appreciates U.S. EPA's proposal that is consistent with CARB's work and is fully supported by the facts concerning the technology, costs, and benefits. We are also encouraged that the law and facts once again matter as reflected in U.S. EPA's pending proposals and look forward to continuing to work together on standards for increasingly cleaner conventional technology and expanded use of zero-emission technology.

Please contact Mr. Craig Segall, Deputy Executive Officer at [Craig.Segall@arb.ca.gov](mailto:Craig.Segall@arb.ca.gov) for any questions you may have about our comments.

Sincerely,



Richard W. Corey, Executive Officer

Enclosures

Cc: See next page.

Mr. Regan  
September 27, 2021  
Page 3

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**Analysis in Support of Comments of the California Air Resources Board on  
Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards  
Docket ID No. EPA-HQ-OAR-2021-0208  
September 27, 2021**

**Table of Contents**

I. Introduction .....	6
II. The Proposal is Urgently Needed to Mitigate a Deteriorating Climate and Protect Public Health - Especially Those Most Exposed to Pollution.....	8
A. Stringent Federal Standards Will Reduce Pollution Nationwide and Lower Costs, Even in California.....	9
B. In the Absence of California’s Standards, More Stringent Standards Would Reduce Greenhouse Gases and Ozone-Forming NOx Pollution in the State .....	9
1. Comprehensive Emissions Estimates Consider the Fuel Lifecycle.....	10
2. The Numbers: Avoided GHG and NOx Emissions in California.....	11
C. The Proposed Standards Will Reduce Harmful Particulate Pollution .....	13
D. Stringent Standards Will Reduce Disparate Pollution Impacts.....	14
1. The Los Angeles Area Illustrates the Importance of Stringent Standards .....	15
2. Stringent Standards Redress Disparate Impacts of Pollution. ....	23
III. The Proposal Meets the Statutory Direction to Protect Public Health by Reducing Pollution.....	28
A. The Alternatives and the Proposal Meet Lead Time Requirements. ....	28
1. Manufacturers have Followed a Trajectory of More Stringent Standards. ....	29
2. Manufacturer Planning Supports Compliance. ....	30
3. The Credit Provisions Support Meeting the Standards in the Given Lead-Time. ....	31
B. ZEV-Only Manufacturers Should be Fully Considered in Credit Modeling. ....	33
C. Zero-Emission and Electrification Technology Supports Alternative 2.....	34
D. The Proposed ZEV Multipliers Should be Reduced.....	36
IV. The Benefits of the Standards Outweigh the Costs and are Likely Greater Than U.S. EPA Estimated. ....	38
A. U.S. EPA Improved its Analysis of the Rebound Effect and Should Revisit the Sales Elasticity Effects. ....	38

B. The Standards Do Not Significantly Affect Highway Fatalities..... 39

C. Stringent Standards Increase Domestic Energy Security. .... 39

V. Conclusion ..... 40

## I. Introduction

The California Air Resources Board (CARB) supports the proposal by the U.S. Environmental Protection Agency (U.S. EPA) to revise its 2023 and later model year light-duty vehicle greenhouse gas emissions standards.

The mandate to protect the environment, climate, and public health has never been stronger. We must not delay any further reducing the pollution of greenhouse gases to maintain a stable climate. The imperatives to meet the health-based National Ambient Air Quality Standards, reduce toxic emissions, and alleviate the disparate impacts of pollution on certain communities are likewise urgent and overdue. Wildfire, drought, harmful air quality, and extreme heat are more extreme and frequent because of a changing climate. The leading climate scientists continue to stress that we must act quickly to avoid the worst effects of climate change. America's most vulnerable communities, especially in California, face very serious public health and economic threats without swift action. The proposed standards are squarely directed at reducing greenhouse gas emissions but contribute to meeting all these needs, as explained in detail below. CARB strongly supports this proposal.

All the proposed standards – the preferred alternative, the more stringent alternatives, and necessarily the less stringent alternative - are technologically feasible considering the cost of compliance and the time provided to apply the requisite technology. Alternative 2, to return to the 2017-2025 Model Year National Program<sup>1</sup> standards and improve those standards for model year 2026 by an additional 10 grams of carbon dioxide (CO<sub>2</sub>) per mile, certainly maximizes emission reductions and should be adopted for all model years for which U.S. EPA determines it is feasible. However, if U.S. EPA believes additional lead time is appropriate in model year 2023, then the best option is to adopt a standard as least as stringent as its preferred alternative for model year 2023 and greater stringency thereafter consistent with Alternative 2, with additional reductions required in model year 2026 to remedy the lost emission reductions if the most stringent alternative is not adopted in model year 2023. CARB offers the following comments in further support of the proposal.

U.S. EPA, by adopting this proposal along these lines, would be correcting serious errors in the current rule, the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (Final SAFE Rule),<sup>2</sup> which improperly sets standards far below emissions levels that have clearly been feasible for many years. As U.S. EPA recognizes in its proposal, the extensive record supporting the National Program standards, the rigorous analyses that have been done since that record was developed, and the increasing pace and declining cost of the technology to reduce and eliminate motor vehicle emissions supports the proposed standards, including the most stringent alternatives. The draft Technical Assessment Report in 2016 and analyses by U.S. EPA in its Midterm Evaluation showed then that the National Program standards were technologically feasible

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<sup>1</sup> 77 Fed. Reg. 62,624 (Oct. 15, 2012).

<sup>2</sup> 85 Fed. Reg. 24,174 (April 30, 2020).

(including with many extant technologies), appropriate, and would have benefits that far outweighed their costs. CARB reached similar conclusions about its greenhouse gas emission standards in its 2017 Midterm Review.

As CARB and many others explained in multiple comments on the SAFE proposal<sup>3</sup> and subsequent briefing in the litigation challenging the Final SAFE standards,<sup>4</sup> U.S. EPA's decisions, actions, and supporting analyses were deficient and fundamentally wrong in many respects. The SAFE rules and actions also failed to meet U.S. EPA's fundamental obligation under the Clean Air Act to protect public health and welfare, as they allowed continuing dangerous emission levels despite U.S. EPA's determination that these emissions threaten public health and welfare and the availability of feasible reductions.

U.S. EPA properly recognizes this here and has weighed the factors relevant to setting emission standards in a manner consistent with Congressional direction. Because the National Program standards have been and continue to be appropriate and feasible, U.S. EPA has grounds to adopt its proposal and any combination of more stringent measures within its proposal. CARB agrees that manufacturers have developed the technology to meet U.S. EPA's more stringent alternative, identified in the proposal as Alternative 2, to return to the National Program standards. The technology exists to extend and improve those standards for model year 2026 by an additional 10 grams of carbon dioxide per mile.

As we elaborate below, the credit-based structure of the rule, the availability of those credits, and the averaging times involved all readily support multiple paths for compliance. The proposal includes several options for credits and flexibilities for meeting these standards. Indeed, some of these flexibilities may be undue: Some should be adopted, but some should not, as we explore in detail in these comments.

Specifically, U.S. EPA:

- should retain its proposed cap on the available advanced technology vehicle production multiplier credits for battery-electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV), and fuel-cell electric vehicles (FCEV);
- but should decrease the per vehicle multipliers for model years 2023 through 2025;
- should not provide any multipliers for model year 2022 because of the relaxed emission standards;
- should not provide any multiplier for natural-gas vehicles (NGVs) for any years;
- should not extend the life of credits; and
- should restore the advanced technology full size pick-up truck credits for model years 2023-2025, but not for model year 2022.

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<sup>3</sup> 83 Fed. Reg. 42,986 (Aug. 24, 2018).

<sup>4</sup> See, e.g., *Competitive Enterprise Institute v. National Highway Traffic Safety Administration*, Proof Brief of State and Local Gov't Petitioners (Docket No. 1880213) (D.C. Cir., Case No. 20-1145, consolidated with case nos. 20-1167, -1168, -1169, -1173, -1174, -1176, -1177).

CARB also offers the comments supporting more stringent standards in the accompanying submittal by the California Attorney General on behalf of CARB, several states and commonwealths, and several cities.<sup>5</sup> For these and the following reasons, oriented to our shared fundamental obligation to protect the climate and public health, U.S. EPA should adopt more stringent standards than the existing requirements, and the most stringent standards feasible.

## **II. The Proposal is Urgently Needed to Mitigate a Deteriorating Climate and Protect Public Health - Especially Those Most Exposed to Pollution**

Transportation is one of the main causes of air pollution that threatens our health and our climate. Climate change brought on by continued emissions of greenhouse gases is an existential threat. As CARB's Chair testified on this proposal, these emission standards are sorely needed. California's skies are darkened by wildfire ash and smoke and our reservoirs are alarmingly low.<sup>6</sup> The recent report from the Intergovernmental Panel on Climate Change on the physical science basis for human-caused climate change underscores the urgency.<sup>7</sup> The extensive drought striking California and other parts of the West, and the resulting wildfires, are likely exacerbated by greenhouse gas emissions from human activities. As U.S. EPA recognized in its proposal, these standards would avoid the release of billions of tons of greenhouse gases.<sup>8</sup>

U.S. EPA's proposed GHG emission standards will also decrease emissions of criteria pollutants, including particulate matter (PM) and the pollutants that form ground-level ozone: volatile organic compounds and oxides of nitrogen (NOx).<sup>9</sup>

Reducing particulate matter pollution and the constituents of smog are especially important in California. The interaction of population, geography, and climate present the most acute challenges in the nation to meeting the health-based standards for this pollution. CARB agrees with U.S. EPA that more stringent greenhouse gas emission standards will reduce criteria pollutants. Reducing this pollution will deliver a range of important public health

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<sup>5</sup> Comments of States and Cities Supporting EPA's Proposal to Strengthen Its Greenhouse Gas Emission Standards for New Light-duty Vehicles, September 27, 2021.

<sup>6</sup> See Smith, California hit by record-breaking fire destruction: 'Climate change is real, it's bad', Los Angeles Times, July 12, 2021, [California wildfires outpacing 2020, the worst on record - Los Angeles Times \(latimes.com\)](#); Cart, Becker, [How unprepared is California for 2021's drought? | CalMatters](#), May 30, 2021.

<sup>7</sup> IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis, pp. SPM-5, 10. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

<sup>8</sup> Proposal, Table 43, 86 Fed. Reg. at 43,778.

<sup>9</sup> See Tables 44 and 45 and related discussion at 86 Fed. Reg. at 43,789-791. Note, it appears the headings for Table 45 were inaccurately copied from Table 44. CARB requests this be clarified.



benefits, especially for communities that have been disproportionately impacted by pollution.

**A. Stringent Federal Standards Will Reduce Pollution Nationwide and Lower Costs, Even in California.**

CARB supports more stringent federal greenhouse gas emission standards independent of and complimentary to its own standards adopted under as an exercise of authority preserved by the federal Clean Air Act. CARB has consistently and vigorously opposed the actions by U.S. EPA to improperly withdraw a waiver of federal preemption for its standards.<sup>10</sup> CARB encourages U.S. EPA to quickly finalize its proposal to restore California's waiver of preemption for its standards.<sup>11</sup> Nevertheless, more stringent federal standards would support greater emission reductions nationwide.

This is even more true where the Alternative 2 proposed standards would return to the National Program standards that are similar to CARB's standards for any model years for which they are adopted; the feasibility of the preferred alternative is also supported by CARB's voluntary agreements with many automakers and would yield significant reductions. Stringent California and federal emission standards can work together to facilitate compliance by manufacturers by creating a broader market to develop cleaner technologies. This is as true for greenhouse gas emission standards as it is for criteria pollutant standards, where U.S. EPA's Tier 3 standards for model years 2017-2025 and CARB's Low-Emission Vehicle III standards both reduce pollution from motor vehicles.<sup>12</sup>

Most importantly, stringent federal GHG emission standards are needed to address the worsening climate crisis.

**B. In the Absence of California's Standards, More Stringent Standards Would Reduce Greenhouse Gases and Ozone-Forming NOx Pollution in the State**

To illustrate the significance of this proposal, CARB staff have estimated its criteria and GHG emissions benefits in California if the state were not able to enforce its own GHG and ZEV standards. Besides the proposed standards, staff also analyzed the impact of the more stringent Alternative 2. The impacts of the preferred alternative, or a hybrid of Alternative 2 and the preferred alternative varying by model year, would be similar – and all would aid significantly in protecting public health and meeting state and federal air quality standards. This analysis, shown in the enclosed *Emission Analysis in Support of Comments on Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards*,

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<sup>10</sup> See *Union of Concerned Scientists v. National Highway Traffic Safety Administration* (D.C. Cir. Case No. 19-1230, consolidated with Nos. 19-1239, 1241, 1242, 1243, 1246, 1249, 1174, and 1178).

<sup>11</sup> See 86 Fed. Reg. 22,421 (April 28, 2021); 86 Fed. Reg. 25,980 (May 12, 2021).

<sup>12</sup> 79 Fed. Reg. 23,414, 23,418 (April 28, 2014).

acknowledges that California currently does not have a waiver of preemption from U.S. EPA for its light-duty vehicle GHG emissions and zero-emission vehicles (ZEV) standards.<sup>13</sup>

U.S. EPA's proposal would revise current federal GHG standards beginning in model year 2023 and increase in stringency year-over-year through model year 2026. The preferred alternative would increase in stringency from model year 2022 to 2023 by 10 percent, followed by a nearly five percent stringency increase in each model year from 2024 through 2026. This is far better than the Final SAFE Rules, which become only 1.5 percent more stringent each year.<sup>14</sup> U.S. EPA is not proposing to revise GHG emissions standards for model year 2021 and model year 2022.

### **1. Comprehensive Emissions Estimates Consider the Fuel Lifecycle.**

The emission estimates of reductions from the standards may be comprehensively described as well-to-wheel, or WTW, emissions that reflect the lifecycle of motor vehicle fuel from the production, distribution, and the use (e.g., combustion) of the fuel. These stages may be divided into two categories: well-to-tank (WTT) and tank-to-wheel (TTW). The WTT emissions are described as "upstream" and are those associated with fuel extraction, processing, production, and distribution to refueling stations for consumers. The TTW emissions are described as "downstream" and are from the vehicle tailpipe and evaporative emissions from the vehicle's fuel system.

These estimates reflect the upstream (WTT), downstream (TTW), and total (WTW) criteria and GHG emission reductions from EPA's GHG emission standards for vehicles of model years 2023 and newer if they applied in California and CARB's greenhouse gas emission and zero-emission vehicle standards did not. These estimates are quantified for the years by when the South Coast air basin must meet the National Ambient Air Quality Standards (NAAQS) for ozone as well as key milestones years for California's GHG emission reduction goals. CARB estimated the emission benefits of U.S. EPA's proposed GHG emission standards for passenger vehicles using the latest version of CARB's emission inventory tool, EMission FACtor 2021 (EMFAC2021).<sup>15</sup>

Figure 1, below, shows fleet average CO<sub>2</sub> emission rate assumptions embedded in EMFAC2021, the U.S. EPA's preferred alternative (identified as the Proposal) and Alternative 2 scenarios, and U.S. EPA's 2012 National Program GHG emission standards that were replaced by the Final SAFE Vehicles Rule. The reduction factors can be calculated by dividing the U.S. EPA proposed standards by the EMFAC2021 standards for model years 2023 and later. Table 1 lists the ratios of GHG standards between U.S. EPA's preferred alternative (proposed) scenarios and default EMFAC2021 estimates. The GHG reduction factors in Table 1 are computed between U.S. EPA's preferred alternative and California's standards and do

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<sup>13</sup> 84 Fed. Reg. 51,310 (Sept. 27, 2019).

<sup>14</sup> 85 Fed. Reg. 24,174 (April 30, 2020).

<sup>15</sup> EMFAC2021 is pending approval by U.S. EPA for planning required to meet the National Ambient Air Quality Standards.

not reflect emission credits for air conditioning systems or “off-cycle” technologies whose emission benefits are not recognized by the federal test procedures.

Figure 1. EMFAC2021 CO2 Emissions Standards Compared to EPA Proposed and Other Programs Representing California Fleet Mix

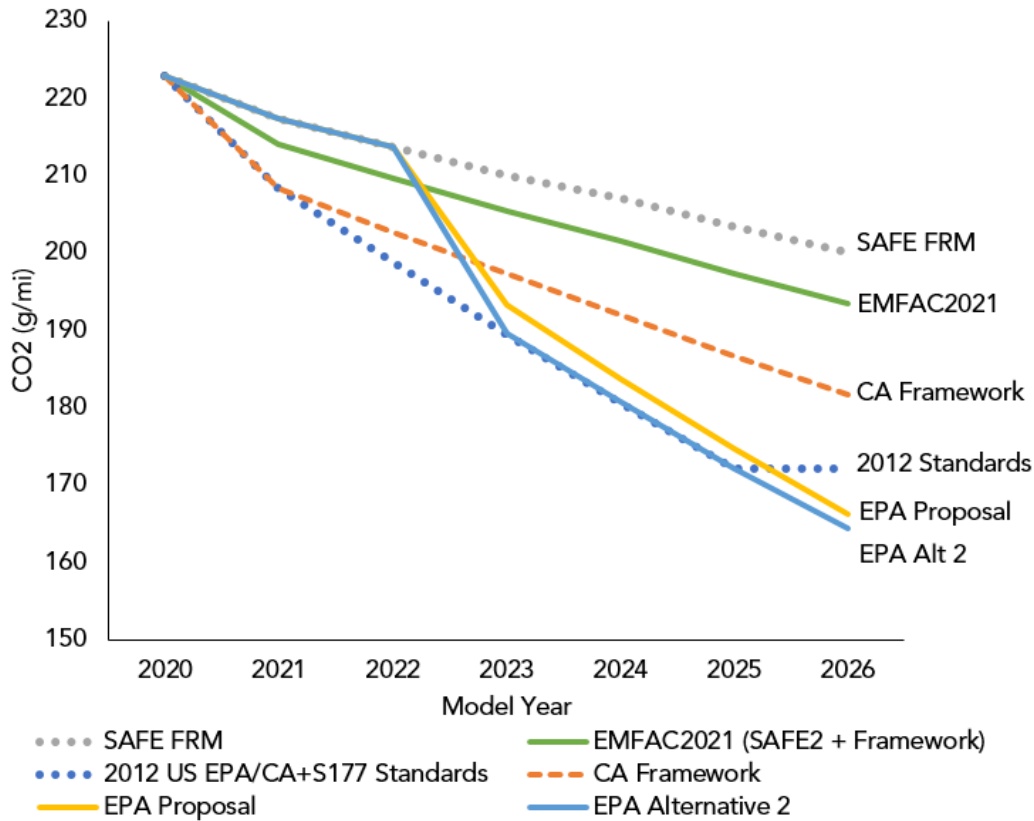


Table 1. Ratios of EPA Proposed GHG standards to Current EMFAC2021 GHG Emission Rates

MY	EPA Proposal/EMFAC2021	EPA Alt. 2/EMFAC2021
2023	0.94	0.92
2024	0.91	0.90
2025	0.89	0.87
2026+	0.86	0.85

## 2. The Numbers: Avoided GHG and NOx Emissions in California

Staff analysis showed that absent CARB’s GHG and ZEV standards, U.S. EPA’s preferred alternative federal GHG standards for passenger vehicles will reduce, in tons per year (tpy) and tons per day (tpd), upstream oxides of nitrogen (NOx) emissions of:

- 25 fewer tons per year NOx, or 0.07 tons per day, in calendar year 2023,
- 411 fewer tons per year NOx, or 1.19 tons per day, in calendar year 2031,
- 609 fewer tons per year NOx, or 1.76 tons per day, in calendar year 2037.

To consider this in context, NO<sub>x</sub> emissions in the South Coast air basin are approximately 278 tons per day as of calendar year 2021 for all mobile sources (annual average).<sup>16</sup> These emissions must be reduced to 141 tons per day to meet the 1997 ozone NAAQS of 80 parts per billion (ppb), which has a deadline of 2023. To meet the 2008 standard of 75 ppb, which has a deadline of 2031, NO<sub>x</sub> emissions must be reduced to 96 tpd. A significant portion of the reductions described above will occur in the South Coast air basin because of its high concentration of people, vehicles, and refineries; they are a significant part of the solution to meeting the air quality standards in California.

Every reduction is needed to meet these health-based standards. Other regions in California are also in non-attainment with federal standards for ozone, and reductions of all sizes are likewise needed there, although the South Coast air basin faces the most significant ozone air quality challenge in the country.

In addition, the U.S. EPA's preferred alternative standards for passenger vehicles would reduce, statewide, GHG emissions by:

- 8.5 million metric tons in 2030, and
- 16.8 million metric tons in 2045.

Based on EMFAC2021, a typical passenger vehicle emits about 4.3 metric tons of CO<sub>2</sub> per year. The statewide decreases in GHG emissions are equivalent to:

- 2.0 million passenger vehicles in 2030,
- 3.9 million passenger vehicles in 2045.

In comparison, in the absence of CARB's GHG and ZEV standards, U.S. EPA's more stringent Alternative 2 would reduce, statewide, WTT NO<sub>x</sub> emissions by:

- 33 tons per year NO<sub>x</sub>, or 0.09 tons per day, in calendar year 2023,
- 449 tons per year NO<sub>x</sub>, or 1.29 tons per day, in calendar year 2031, and
- 658 tons per year NO<sub>x</sub>, or 1.90 tons per day, in calendar year 2037;

and statewide GHG emissions by:

- 9.3 million metric tons in 2030, and
- 18.0 million metric tons in 2045.

These statewide GHG emissions reduction from Alternative 2 would be equivalent to emissions from:

- 2.2 million passenger vehicles in 2030, and
- 4.2 million passenger vehicles in 2045.

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<sup>16</sup> Based on CARB's CEPAM 2016 SIP Standard Emissions Tool  
<https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php>

### C. The Proposed Standards Will Reduce Harmful Particulate Pollution

The proposed standards will also reduce particulate matter (PM) pollution, another serious threat to public health, and will have greater benefits than the proposal acknowledges. The Benefits-per-Ton (BPT) analysis for the proposal, corroborated by U.S. EPA's Integrated Science Assessment and Policy Assessment, demonstrate the harmful human health effects of PM and, accordingly, the human health benefits of reducing PM emissions and exposures. CARB agrees the BPT method used by U.S. EPA is a well-established approach to estimating the health benefits from reductions in PM<sub>2.5</sub> due to the proposed rule. However, U.S. EPA has noted that the BPT method is currently being updated, and CARB also agrees that this update is needed to ensure it is based upon the most updated Integrated Science Assessments and expanded health endpoints. For instance, U.S. EPA has acknowledged that it is currently using BPT estimates based on the 2009 PM ISA, including the Krewski et al. 2009 study for mortality, although there are newer studies available for mortality and other endpoints.<sup>17</sup> Additional health endpoints that could be included in the BPT methodology include: lung cancer, Alzheimer's disease, and Parkinson's disease, among others, that show important associations with PM<sub>2.5</sub> exposure in the 2019 PM ISA.

Recent evidence adds to the wealth of literature showing the harmful human health effects of PM at levels below the federal health-based air quality standards. In its review of the National Ambient Air Quality Standards (NAAQS) for PM, U.S. EPA's Integrated Science Assessment document found strong associations between short and long-term PM<sub>2.5</sub> exposure and mortality and cardiovascular and respiratory effects.<sup>18</sup> As stated in CARB and OEHHA's June 29, 2020 letter to the U.S. EPA Administrator,<sup>19</sup> many epidemiological research studies and U.S. EPA's own scientists reported that health effects have been demonstrated below the current NAAQS standards.<sup>20</sup>

Significant associations have been found between PM<sub>2.5</sub> levels below the current EPA annual NAAQS standard and premature mortality in multicity epidemiological studies in the U.S. and Canada.<sup>21</sup> These studies are representative of the overwhelming body of research that

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<sup>17</sup> Krewski D, Jerrett M, Burnett RT, Ma R, Hughes E, Shi Y, Turner MC, Pope CA, III, Thurston G, Calle EE, Thun MJ, Beckerman B, Deluca P, Finkelstein N, Ito K, Moore DK, Newbold KB, Ramsay T, Ross Z, Shin H, Tempalski B. (2009). Extended follow-up and spatial analysis of the American Cancer Society study linking particulate air pollution and mortality [HEI]. (HEI Research Report 140). Boston, MA: Health Effects Institute. <https://www.healtheffects.org/system/files/Krewski140.pdf>.

<sup>18</sup> Integrated Science Assessment (ISA) for Particulate Matter (Final Report, 2019). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-19/188, 2019.

<sup>19</sup> CARB and OEHHA, June 29, 2020 letter to U.S. EPA Administrator Andrew R. Wheeler. Docket ID No. EPA-HQ-OAR-2015-0072-0069.

<sup>20</sup> *Id.*; Policy Assessment for the Review of the National Ambient Air Quality Standards for Particulate Matter. U.S. Environmental Protection Agency, Washington, DC, EPA-452/R-20-002, 2020.

<sup>21</sup> See Crouse DL, Peters PA, van Donkelaar A, Goldberg MS, Villeneuve PJ, Brion O, Khan S, Atari DO, Jerrett M, Pope CA, Brauer M, Brook JR, Martin RV, Stieb D, & Burnett RT. 2012. Risk of nonaccidental and

demonstrates adverse health impacts at PM<sub>2.5</sub> levels below the current National Ambient Air Quality Standard. Therefore, even areas currently in attainment for the PM<sub>2.5</sub> NAAQS would see health benefits from decreased PM levels, including the benefits from this proposal.

In addition, exposure to elevated pollution levels has been found to increase vulnerability to other types of illnesses. Studies in the U.S. and Europe have demonstrated associations between chronic elevated PM<sub>2.5</sub> exposure and increased COVID-19-related premature death and illness. Wu et al., found long-term exposure to PM<sub>2.5</sub> was associated with a significant increase in COVID-19 mortality in the U.S.<sup>22</sup> Additionally, a study by Pozzer and colleagues found that PM<sub>2.5</sub> air pollution contributed to COVID-19 mortality: approximately 15% worldwide, and 17% in North America.<sup>23</sup> These results suggested that air pollution is an important cofactor increasing COVID-19 mortality risk.

#### **D. Stringent Standards Will Reduce Disparate Pollution Impacts.**

U.S. EPA's proposal acknowledges the pollution disparities faced by communities with EJ concerns generally.<sup>24</sup> CARB appreciates U.S. EPA's review of disproportionate emission impacts faced by minority and low-income communities. While comprehensive air quality and health risk modeling is critical to fully understanding the impacts of the proposal on impacted populations, proximity to emissions sources is a useful indicator of potential exposure and a reasonable screening metric to emphasize and evaluate the disproportionate impacts faced by communities near roadways and the property lines of stationary sources whose operations may be affected by the proposal, like petroleum refineries. In many over-burdened communities, the pollution and public health impacts from on-road vehicle emissions are especially significant and greater than in other communities. These impacts are often

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cardiovascular mortality in relation to long-term exposure to low concentrations of fine particulate matter: a Canadian national-level cohort study. *Environmental health perspectives*, 120(5), 708–714. <https://doi.org/10.1289/ehp.1104049>; Di Q, Wang Y, Zanobetti A, Wang Y, Koutrakis P, Choirat C, Dominici F, Schwartz J. 2017. Air Pollution and Mortality in the Medicare Population. *N Engl J Med* 376: 2513-2522; Shi L, Zanobetti A, Kloog I, Coull BA, Koutrakis P, Melly SJ, Schwartz JD. 2016. Low-concentration PM<sub>2.5</sub> and mortality: Estimating acute and chronic effects in a population-based study. *Environ Health Perspect*. 124(1):46-52. doi:10.1289/ehp.1409111; Wang Y, Shi L, Lee M, Liu P, Di Q, Zanobetti A, & Schwartz JD. 2017. Long-term exposure to PM<sub>2.5</sub> and mortality among older adults in the Southeastern US. *Epidemiology*, 28(2), 207–214, <https://doi.org/10.1097/EDE.0000000000000614>; Zeger SL, Dominici F, McDermott A, & Samet JM. 2008. Mortality in the Medicare population and chronic exposure to fine particulate air pollution in urban centers (2000-2005). *Environmental health perspectives*, 116(12), 1614-1619. <https://doi.org/10.1289/ehp.11449>; Wu X, Braun D, Schwartz J, Kioumourtoglou A, and Dominici F. 2020a. Evaluating the impact of long-term exposure to fine particulate matter on mortality among the elderly. *Sci Adv*. DOI: 10.1126/sciadv.aba5692.

<sup>22</sup> Wu X., Nethery RC, Sabath MB, Braun D, and Dominici F., Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. *Sci Adv*. 2020 Nov; 6(45): eabd4049, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7673673/>.

<sup>23</sup> Pozzer A, Dominici F, Haines A, Witt C, Münzel T, Lelieveld J., Regional and global contributions of air pollution to risk of death from COVID-19, *Cardiovasc Res*. 2020 Dec 1;116(14):2247-2253. <https://pubmed.ncbi.nlm.nih.gov/33236040/>.

<sup>24</sup> See, e.g., 86 Fed. Reg. at 43,802-803.

compounded by the congregation of nearby industrial sources, including upstream, mid-stream, and downstream fuel production sources. Recognizing and underscoring the cumulative effects of socio-economic and environmental burdens in these communities is a critical first step.

### **1. The Los Angeles Area Illustrates the Importance of Stringent Standards**

The community of Wilmington, Carson, and West Long Beach in the greater Los Angeles region is an example of an overburdened community. It is impacted by a variety of sources including freight, freeway traffic, port and rail operations, oil and gas production, and five petroleum refineries – petroleum refining and related activities are one of the major sources of emissions in this region. Major freeways bisecting the community include California Highways 1, 47, 91, and 60, and Interstates 110, 405, and 710, resulting in six major freeway junctions and increased pollution exposures for the populations living and working in this community as compared to Los Angeles County as a whole. With more than 40 miles of freeways within its approximately 48 square mile community boundary area and an aggregation of major industrial sources<sup>25</sup> (Figure 1), on-road vehicle and industrial emissions are a significant contributor to the community's air pollution exposure, and its population shows a greater degree of health impacts from air pollution than other California communities. The community has a high cumulative air pollution exposure burden, a significant number of sensitive receptors, and includes census tracts that have been designated as disadvantaged communities by California law.<sup>26</sup>

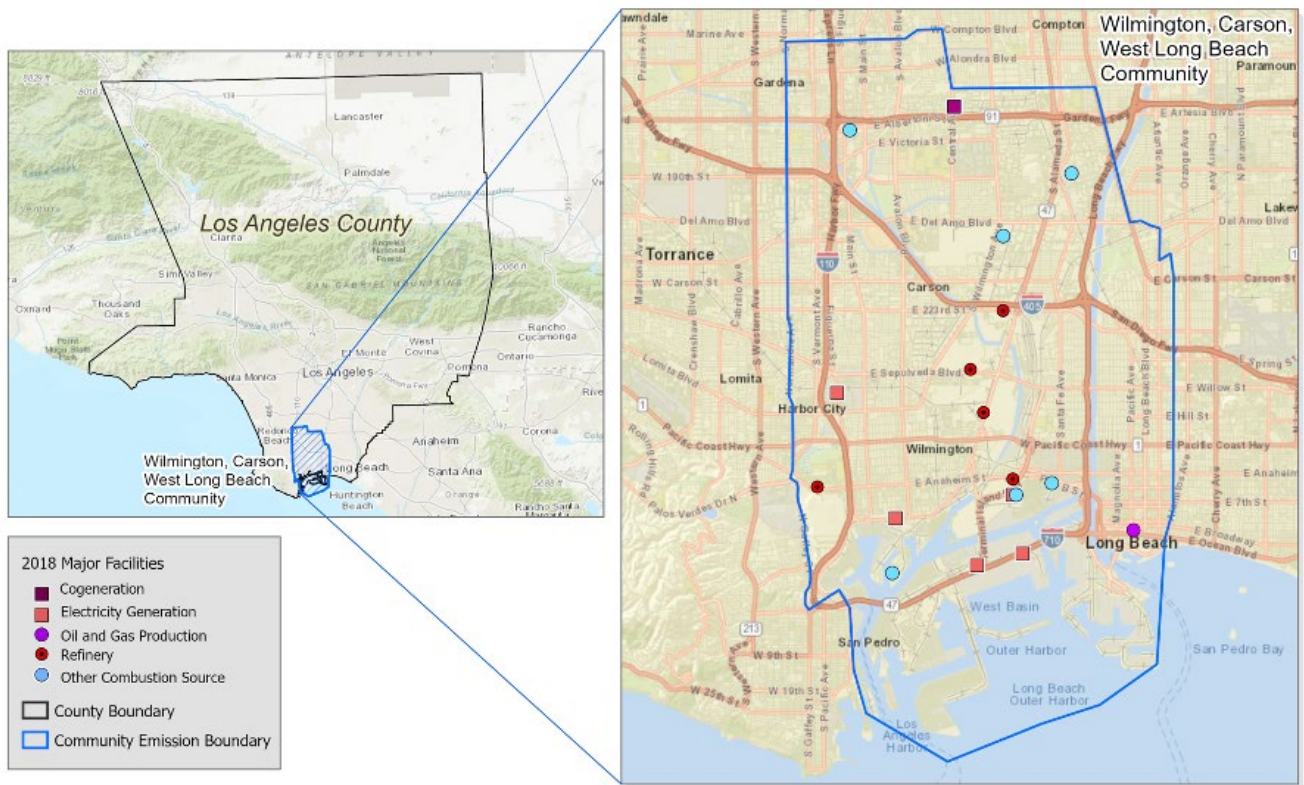
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<sup>25</sup> The figure shows major industrial sources of criteria air pollutant emissions that are subject to California's Greenhouse Gas Mandatory Reporting Regulation (MRR).

<sup>26</sup> Disadvantaged community designations per Senate Bill 535 (De León, Chapter 830, Statutes of 2012).



Figure 1. Wilmington, Carson, West Long Beach Community

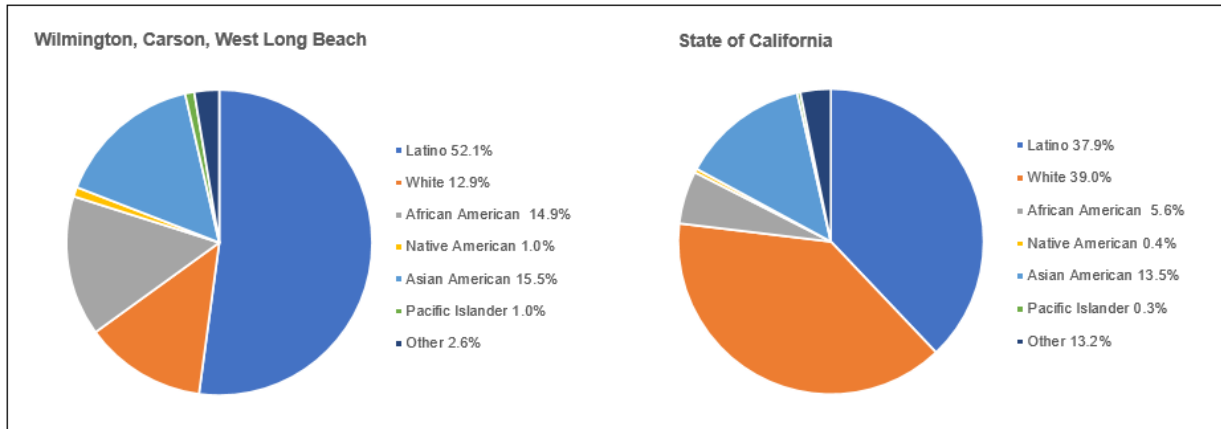


Based on the 2018 American Community Survey (ACS) data from the Census Bureau,<sup>27</sup> more than 310,600 people live within the Wilmington, Carson, West Long Beach community boundary. Approximately 67 percent of the population in this community is Latino and African American compared to a statewide average of 44 percent (Figure 2), nearly 13 percent are children under the age of 10 years, and 13 percent of the population is elderly (over the age of 65 years) (Figure 3). These population characteristics are important indicators of disparities in existing pollution burden, exposure to air pollution, and health vulnerabilities - especially for children and the elderly.

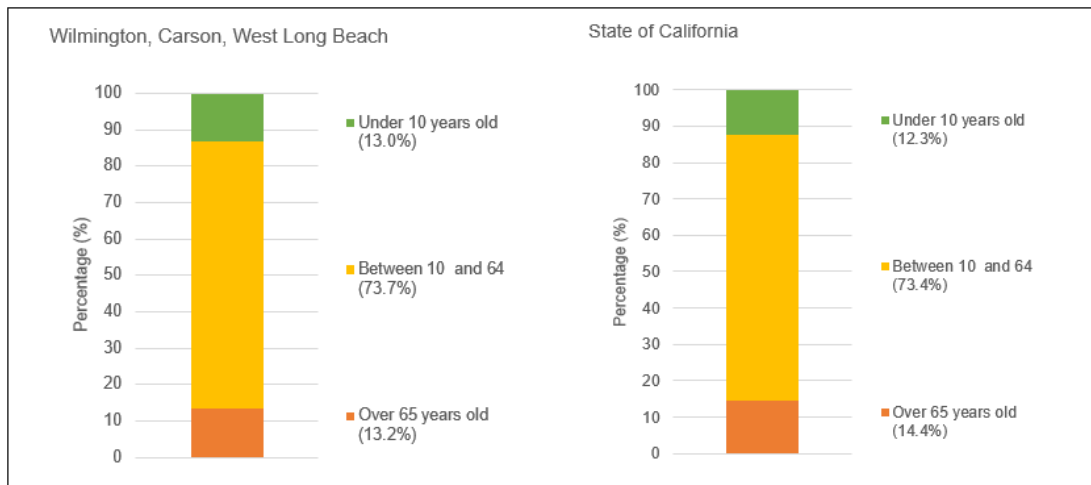
<sup>27</sup> U.S. Census Bureau, 2014-2018 American Community Survey 5-year Estimates.  
<https://data.census.gov/cedsci/>



**Figure 2. Comparison of Population by Race/Ethnicity in Wilmington, Carson, West Long Beach Community and the State of California using the Latest American Community Survey 5-year Estimates (2014-2018)**

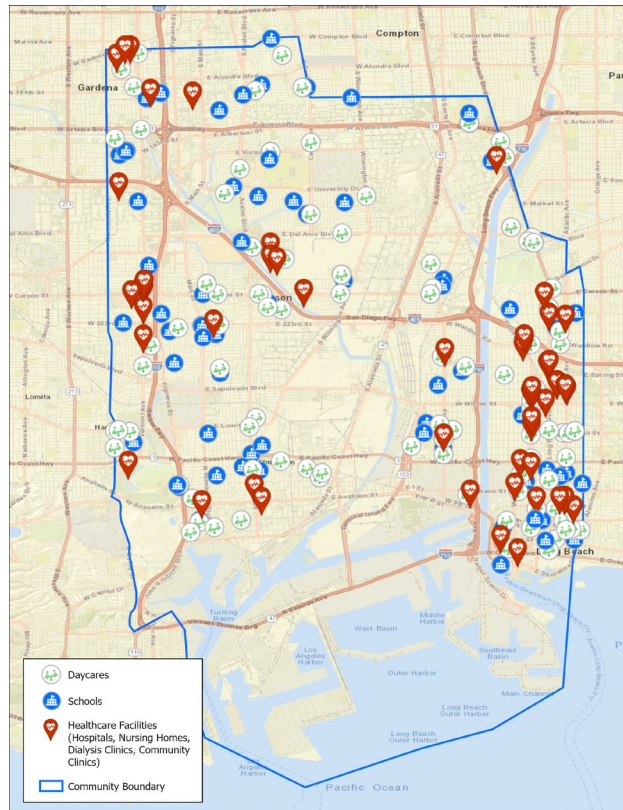


**Figure 3. Comparison of Age profile in Wilmington, Carson, West Long Beach Community and the State of California using the Latest American Community Survey 5-year Estimates (2014-2018)**



Certain groups of the general population are more vulnerable to air pollution by virtue of their age and health, including children, elderly, pregnant women, and health compromised individuals. Places where these sensitive populations gather, called sensitive receptor locations, can include schools, day-care providers, hospitals, nursing homes, and senior care facilities. There are numerous sensitive receptor locations in the Wilmington, Carson, West Long Beach community, including 83 schools, 110 licensed daycare facilities, and 53 healthcare facilities including hospitals, nursing homes and dialysis and community clinics and they are concentrated along the major freeway routes. (Figure 4).

**Figure 4. Sensitive Receptors in Wilmington, Carson, West Long Beach Community<sup>28</sup>**



Most of the census tracts in this community are considered disadvantaged under California law.<sup>29</sup> Approximately 80 percent of the census tracts in this community are in the top 25 percent (75-100<sup>th</sup> percentile) of the Draft CalEnviroScreen 4.0<sup>30</sup> (CES) scores within the State (Figure 5). The California Office of Environmental Health Hazard Assessment’s (OEHHA) CES

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<sup>28</sup> Public and private schools data obtained from the Dept. of Education for the 2018 school year. Hospitals and Other Licensed Healthcare Facilities: The data are from both Office of Statewide Health Planning and Development (OSHPD), and California Department of Public Health (CDPH), <https://data.chhs.ca.gov/dataset/healthcare-facility-locations>  
Daycares: Data are from California Department of Public Health (CDPH) <https://data.chhs.ca.gov/dataset/community-care-licensing-child-care-center-locations>  
Nursing Homes: Data from Homeland Infrastructure Foundation-Level Data (HIFLD) database , Oak Ridge National Laboratory (ORNL), National Geospatial-Intelligence Agency (NGA) Homeland Security Infrastructure Program (HSIP) Team. <https://gii.dhs.gov/HIFLD>. Data was downloaded via ArcGIS Online Living Atlas as of June 4, 2021.  
Dialysis clinics/Home Health Care: Data were compiled by Federal User Community, National Maps for USA, National Apps for USA, and A-16, and downloaded via ArcGIS Online Living Atlas June 4, 2021.  
<sup>29</sup> Disadvantaged community designations per Senate Bill 535 (De León, Chapter 830, Statutes of 2012).  
<sup>30</sup> The Office of Environmental Health Hazard Assessment (OEHHA) released a draft version of the California Communities Environmental Health Screening Tool: CalEnviroScreen 4.0 in February 2021. <https://oehha.ca.gov/calenviroscreen/report/draft-calenviroscreen-40>

is a screening method that can be used to help identify California communities that are disproportionately burdened by multiple sources of pollution.

**Figure 5. A Majority of the Census Tracts in this Community are Disadvantaged<sup>31</sup>**

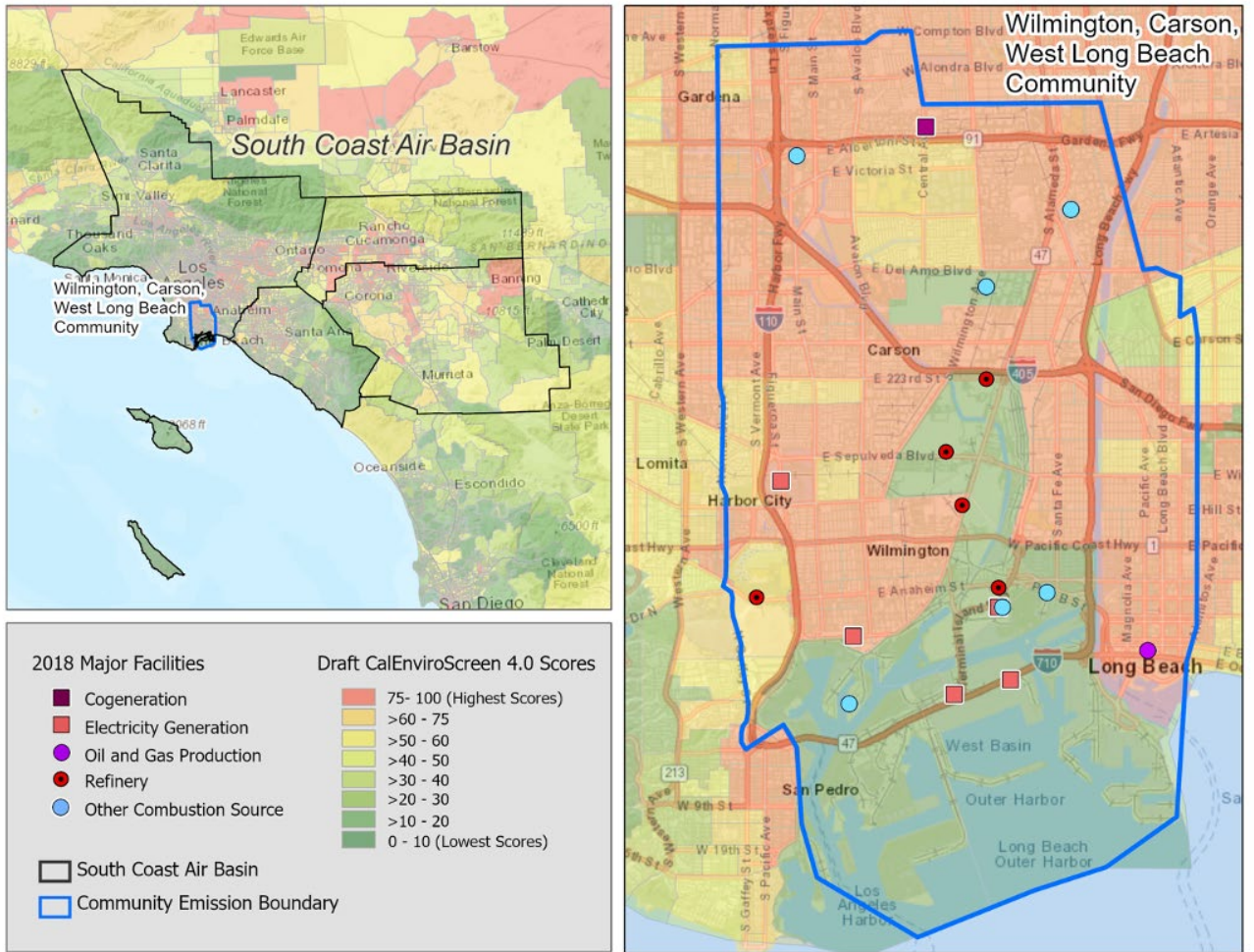
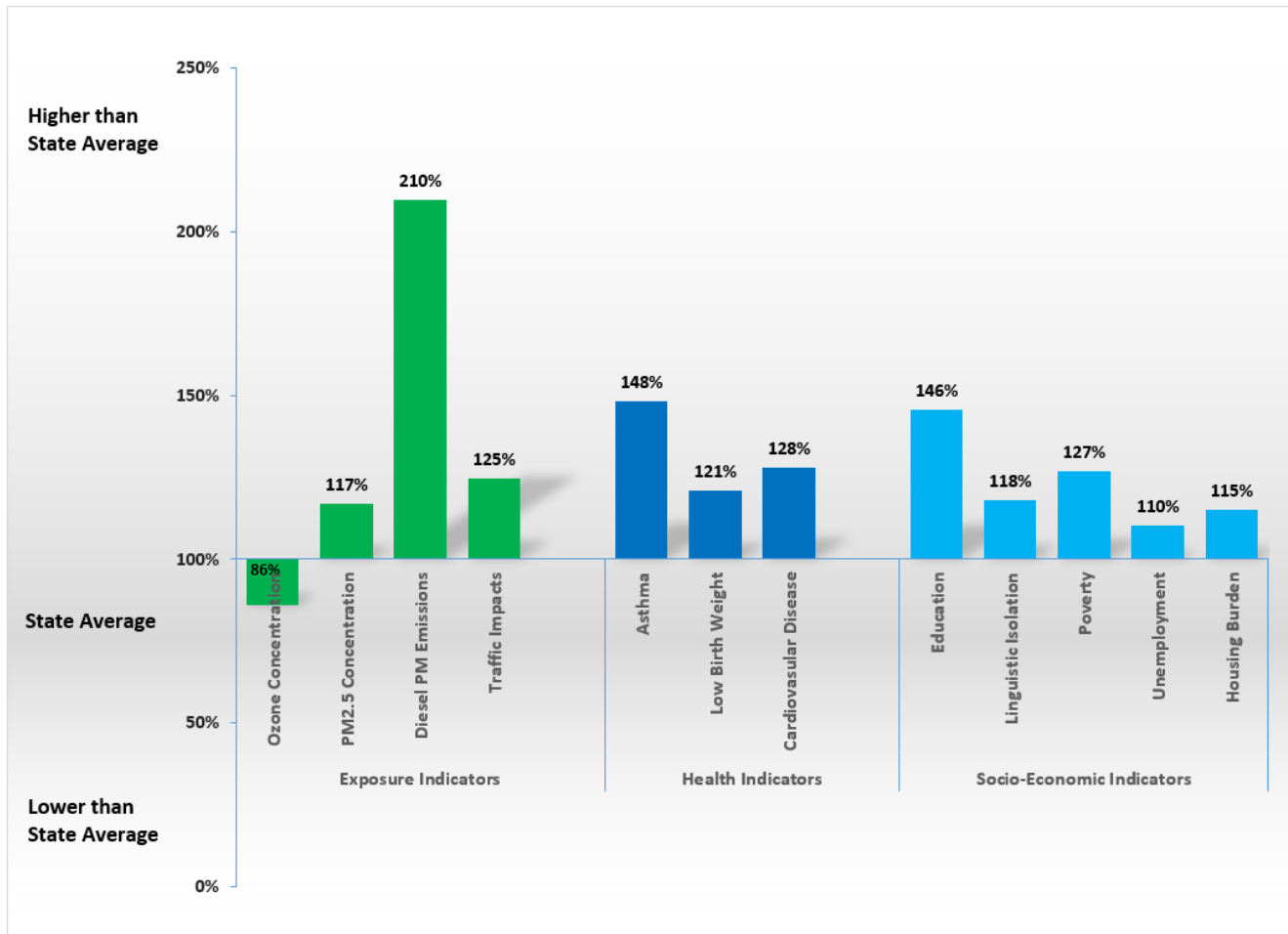


Figure 6 compares the average scores for exposure (e.g., ozone, PM2.5, diesel PM, traffic impacts), health status (asthma, cardiovascular disease, low birth weight), and socio-economic (education, linguistic isolation, poverty, unemployment, and housing burden) indicators in the community against statewide averages - the community scores for these key indicators are generally higher compared to the statewide averages.

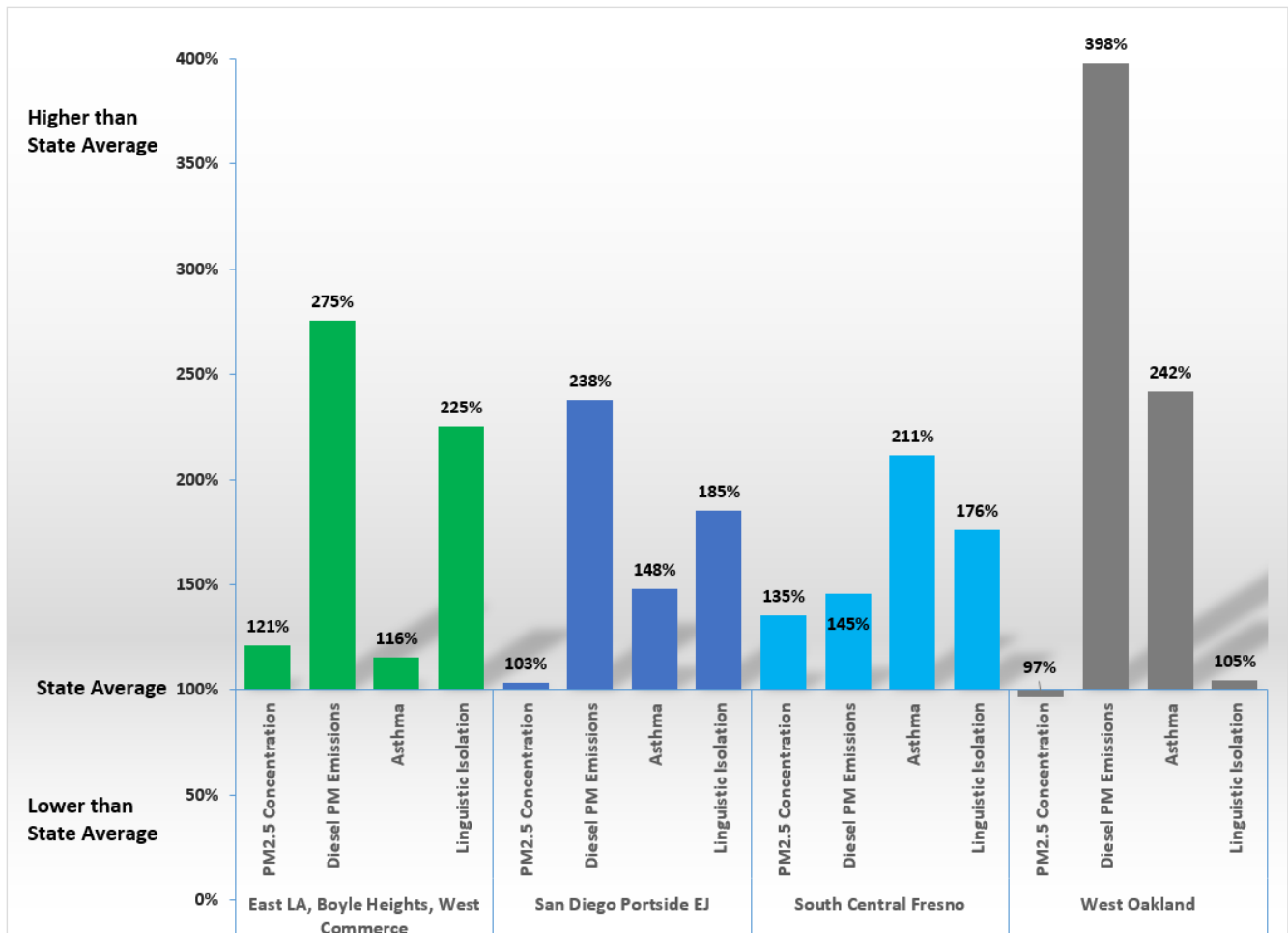
<sup>31</sup> The figure shows major facilities of criteria air pollutant emissions that are subject to California’s Greenhouse Gas Mandatory Reporting Regulation (MRR).

**Figure 6. DRAFT CalEnviroScreen (CES) 4.0 Scores for Key Indicators in the Wilmington, Carson, West Long Beach Community Relative to Statewide Averages**



The indicators discussed above explain the disparate effects of air pollution faced by many communities in California, which extends to numerous other communities across the nation. Figure 7 presents the average scores for PM2.5 concentrations and diesel PM emissions relative to statewide averages for a few communities across the State; vehicle emissions contribute predominantly to the particulate matter and diesel PM impacts in these communities. The chart includes asthma related emergency room visits and linguistic isolation (i.e., limited English speaking) as proxies for demographic and socio-economic disadvantages faced by these communities.

**Figure 7. DRAFT CalEnviroScreen 4.0 Scores for PM2.5 Concentrations, Diesel PM Emissions, and Socio-economic Indicators in California Communities**



Existing scientific literature conclusively links air pollution to adverse health outcomes, including pre-mature mortality, and the disproportionate pollution and health burden on poor and socially disadvantaged communities. OEHHA’s draft CES 4.0 report provides an exhaustive review of existing literature connecting each of the indicators used in the CES method to pollution burden and population sensitivities.<sup>32</sup> A 2019 CARB research study revealed on-road vehicles and industrial activity to be the top two sources of exposure in

<sup>32</sup> OEHHA Draft CES 4.0 Report (Feb 2021), pages 26-191, “Individual Indicators: Description and Analysis”. <https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40reportd12021.pdf>



California, each contributing to 24 percent of the total PM2.5 exposure, and disproportionately impacting non-white and low-income populations.<sup>33</sup>

Additionally, several occupational studies of refineries, petroleum storage, and distribution facilities have found that benzene exposure can increase the risk of hematological malignancies (i.e., cancers affecting the blood, bone marrow, lymph, and lymphatic system) among workers, even at low daily concentrations below 0.1 ppm. Hazardous releases from these facilities are also believed to increase the risk of cancer incidences in fence line communities.<sup>34</sup> The research report “A systematic review and meta-analysis of hematological malignancies in residents living near petrochemical facilities” referenced 16 studies that recorded the incidences of hematological malignancies across 187,585 residents living within five kilometers of petrochemical sites (upstream, midstream and downstream), across varied geographical locations, between 1960 and 2011. Findings showed that those living within five kilometers of a petrochemical facility have a 30% higher risk of developing leukemia than residents from communities with no petrochemical activity.

The 2019 report “Chemical exposures, health and environmental justice in communities living on the fenceline of industry” compared emergency department visits and hospital admissions 4 weeks after and 4 weeks prior to the 2012 major chemical release event at the Chevron refinery in Richmond, California. Results showed a 3.7-fold increase in the number of people seeking care at emergency departments within the zip codes closest to the refinery. The visits were for treatment of sensory/nervous system conditions (migraine headaches, eye conditions, and dizziness), asthma, upper and lower respiratory conditions, and chest pain.<sup>35</sup>

Research has also shown that refineries are more likely to be located in low-income communities of color who likely experience greater social stressors that may make them more vulnerable than others to the health impacts of such exposure. This is presented in the 2017 report, “Fumes Across the Fence-Line the Health Impacts of Air Pollution from Oil & Gas Facilities on African American Communities.” The report discussed a case study based out of the City of Richmond, which houses five petroleum refineries within a condensed region. The case study presents the fact that residents of color disproportionately live near the refineries and chemical plants and acknowledges that while there have been many strides

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<sup>33</sup> Apte J. et al. (2019). A Method to Prioritize Sources for Reducing High PM2.5 Exposures in Environmental Justice Communities in California. CARB Research Contract Number 17RD006.

<https://ww2.arb.ca.gov/sites/default/files/classic/research/apr/past/17rd006.pdf>

<sup>34</sup> Jephcote C. et al. (2020). A systematic review and meta-analysis of hematological malignancies in residents living near petrochemical facilities, Environmental Health.

<https://ehjournal.biomedcentral.com/track/pdf/10.1186/s12940-020-00582-1.pdf>

<sup>35</sup> Johnston, J., Cushing, L. (2020). Chemical Exposures, Health, and Environmental Justice in Communities Living on the Fenceline of Industry. *Curr Envir Health Rpt* 7, 48–57 (2020). <https://doi.org/10.1007/s40572-020-00263-8>; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7035204/>

to clean up these major sources of air pollution, health impacts in the region, including cancer rates, are still disproportionately high.<sup>36</sup>

In conclusion, many overburdened communities experience significantly higher levels of both regional and near-source air pollution; and the demographic and socio-economic characteristics of these communities exacerbate their susceptibility and vulnerability to the adverse effects of air pollution. The Wilmington, Carson, Long Beach community is just one example of many such communities across the nation that bear the consequences of multiple sources of air pollution. For these fence-line communities, reducing emissions from concentrated mobile and stationary sources is a priority.

## **2. Stringent Standards Redress Disparate Impacts of Pollution.**

Environmental equity means that no group or community bears a larger, unfair share of harmful effects from pollution or environmental hazards, or the equitable distribution of environmental benefits and burdens. The people suffering the impacts of social, economic, and environmental burdens are also often those closest to the solutions. Continual, meaningful engagement and capacity building within priority communities is key to ensuring that regulatory measures provide direct and assured benefits to those most impacted by poor air quality and lack of access to clean mobility and high-road jobs.

Achieving environmental justice is about recognizing past injustices and taking steps to address them and avoid their proliferation. Historic policies, like redlining, forced certain communities to be nearer highways, trains, factories, and other major pollutant-emitting sources. To remedy the continuing impacts, environmental equity considerations and specific principles, such as community inclusion and collaborative decision making, must be embedded in governmental decision-making from the inception.<sup>37</sup>

Federal authorities and both longstanding and recent Presidential Executive Orders (E.O.) underscore the necessity of environmental justice and increasing environmental equity through federal actions. Title VI of the Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin by programs and activities that receive federal assistance.<sup>38</sup> E.O. 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations," directs "each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately

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<sup>36</sup> Fleischman L., Franklin M. (2017). Fumes Across the Fence-line. Clean Air Task Force. [https://www.catf.us/wp-content/uploads/2017/11/CATF\\_Pub\\_FumesAcrossTheFenceLine.pdf](https://www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf)

<sup>37</sup> Past Racist "Redlining" Practices Increased Climate Burden on Minority Neighborhoods. <https://www.scientificamerican.com/article/past-racist-redlining-practices-increased-climate-burden-on-minority-neighborhoods/>

<sup>38</sup> § 601, 42 U.S.C. § 2000d et seq. ("No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."). *But see Alexander v. Sandoval*, 532 U.S. 275 (2001) (private right of action to enforce § 601 is limited to intentional discrimination).

high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations[.]<sup>39</sup>

President Biden has issued several E.O.s that underscore the need to remedy environmental inequity and direct the federal government to prioritize environmental justice. E.O. 14008, "Tackling the Climate Crisis at Home and Abroad," provides, "Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities[.]"<sup>40</sup> It establishes a White House Environmental Justice Interagency Council and directs EPA to "strengthen enforcement of environmental violations with disproportionate impact on underserved communities" and create a community notification program.<sup>41</sup> Perhaps most significantly, it creates a government-wide "Justice40 Initiative," establishing a goal that 40 percent of the overall benefits of relevant federal funding flow to disadvantaged communities.<sup>42</sup>

E.O. 14030 directs the federal government to take action on climate-related financial risk "while accounting for and addressing disparate impacts on disadvantaged communities and communities of color" and using climate finance to advance "environmental mitigation, especially in disadvantaged communities and communities of color[.]"<sup>43</sup> E.O. 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government," acknowledges, "Our country faces converging economic, health, and climate crises that have exposed and exacerbated inequities," and directs the federal government to "pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality."<sup>44</sup> U.S. EPA should act within its statutory authority consistent with these further obligations, which it plainly has discretion to do. Indeed, it would be improper for it to overlook these considerations, given the clear evidence of public health needs in many communities these authorities require it to serve. The Clean Air Act's core public health mandates are entirely consistent with setting standards stringently enough to ameliorate public health concerns in these communities.

Such action would also help California meet its own public health obligations – an important consideration in light of the Act's direction to U.S. EPA to partner with states to improve

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<sup>39</sup> E.O. 12898, Feb. 11, 1994, 59 Fed. Reg. 7,629 (Feb. 16, 1994), § 1-101.

<sup>40</sup> E.O. 14008, Jan. 27, 2021, 86 Fed. Reg. 7,619 (Feb. 1, 2021), § 219.

<sup>41</sup> E.O. 14008, Jan. 27, 2021, 86 Fed. Reg. 7,619 (Feb. 1, 2021), § 222(c).

<sup>42</sup> E.O. 14008, Jan. 27, 2021, 86 Fed. Reg. 7,619 (Feb. 1, 2021), § 223.

<sup>43</sup> E.O. 14030, May 20, 2021, 86 Fed. Reg. 27967 (May 25, 2021), §§ 1, 2(c).

<sup>44</sup> E.O. 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (EO 13985, Jan. 20, 2021, 86 Fed. Reg. 7009 (Jan. 25, 2021), § 1.



public health. Similar to the EPA definition of environmental justice,<sup>45</sup> California state law defines environmental justice as “the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.”<sup>46</sup> Equity is one of CARB’s core values and fundamental to achieving its mission.<sup>47</sup> CARB offers the following comments about its efforts in this regard for U.S. EPA to consider in meeting its obligations and demonstrate the importance of these efforts.

The Board approved its Environmental Justice Policies and Actions in 2001 to establish a framework for incorporating environmental justice into CARB’s programs consistent with state law. These policies and actions apply to all communities in California but are intended to address the disproportionate environmental exposure burden borne by low-income communities and communities of color. Most recently, on October 22, 2020, the California Air Resources Board adopted Resolution 20-33 “A Commitment to Racial Equity and Social Justice.”

As defined in California’s *Zero-Emission Vehicle Market Development Strategy*, priority communities include neighborhoods of California that disproportionately suffer from historic environmental, health, and other social burdens.<sup>48</sup> These burdens include, but are not limited to, air and water pollution, presence of hazardous wastes, poverty, high unemployment, inadequate access to educational resources and training opportunities to secure high-road jobs, and high incidence of asthma, heart disease, and other chronic illnesses. Priority communities include disadvantaged communities, low-income communities, and underserved communities, which are terms defined in many of California’s statutes and regulations.<sup>49</sup> Due to historic discrimination, these communities often include households with people of color, low-wealth status, working families, immigrants, seniors, people with disabilities, California Native American Tribes, and others who have limited awareness of or access to clean

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<sup>45</sup> 86 Fed. Reg. at 43,799 (“EPA defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”; “Fair treatment means that ‘no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental and commercial operations or programs and policies.’”).

<sup>46</sup> Cal. Gov. Code, § 65040.12, subd. (e)(1).

<sup>47</sup> CARB Vision & Roadmap. [https://ww2.arb.ca.gov/sites/default/files/2021-01/CARB\\_vision\\_roadmap\\_0121.pdf](https://ww2.arb.ca.gov/sites/default/files/2021-01/CARB_vision_roadmap_0121.pdf)

<sup>48</sup> California Zero-Emission Vehicle Market Development Strategy. [https://static.business.ca.gov/wp-content/uploads/2021/02/ZEV\\_Strategy\\_Feb2021.pdf](https://static.business.ca.gov/wp-content/uploads/2021/02/ZEV_Strategy_Feb2021.pdf)

<sup>49</sup> See, e.g., Senate Bill 535, De León, Cal. Stats. 2012, ch. 830; Senate Bill 350, De León, Cal. Stats. 2015, ch. 547; Assembly Bill 1550, Gomez, Cal. Stats. 2016, ch. 369; Assembly Bill 841, Ting, Cal. Stats. 2020, ch. 372.

mobility options and who are more likely to bear disproportionate impacts of climate change.  
50 51 52 53 54 55 56

As EPA has noted, environmental justice populations of concern are especially vulnerable to the economic impacts and health burdens associated with climate change effects.<sup>57 58 59 60 61</sup>  
62 63 64 65 Racial and ethnic minority communities are particularly vulnerable to the greatest

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<sup>50</sup> The Facts: How Climate Change Affects People Living in Poverty. <https://www.mercycorps.org/blog/climate-change-poverty>

<sup>51</sup> Report: Inequalities Exacerbate Climate Impacts on Poor. <https://www.un.org/sustainabledevelopment/blog/2016/10/report-inequalities-exacerbate-climate-impacts-on-poor/>

<sup>52</sup> Climate Change Hits Poor Hardest in U.S. <https://www.scientificamerican.com/article/climate-change-hits-poor-hardest/>

<sup>53</sup> Mapped: How Climate Change Disproportionately Affects Women's Health. <https://www.carbonbrief.org/mapped-how-climate-change-disproportionately-affects-womens-health>

<sup>54</sup> Climate Change Disproportionately Affects Women and Young Girls – And Here's Why. <https://reliefweb.int/report/world/climate-change-disproportionately-affects-women-and-young-girls-and-here-s-why>

<sup>55</sup> How climate change disproportionately impacts those with disabilities. <https://www.unep.org/news-and-stories/story/how-climate-change-disproportionately-impacts-those-disabilities>

<sup>56</sup> Rural communities are highly dependent upon natural resources that are affected by climate change. These communities also face obstacles in responding to climate change that increase their vulnerability to its impacts. See IPCC, Third National Climate Assessment, <https://nca2014.globalchange.gov/highlights/regions/rural-communities>

<sup>57</sup> 86 Fed. Reg. 43,801-803. See The Disproportionate Consequences of Climate Change. <https://ncdp.columbia.edu/ncdp-perspectives/the-disproportionate-consequences-of-climate-change/>

<sup>58</sup> Indicators of Climate Change in California: Environmental Justice Impacts Report, OEHHA, <https://oehha.ca.gov/climate-change/document/indicators-climate-change-california-environmental-justice-impacts-report>

<sup>59</sup> Report on the NOAA Office of Education Environmental Literacy Program. [https://www.noaa.gov/sites/default/files/legacy/document/2021/Feb/ELP\\_Community\\_Resilience\\_Education\\_To\\_C\\_Appendix.pdf](https://www.noaa.gov/sites/default/files/legacy/document/2021/Feb/ELP_Community_Resilience_Education_To_C_Appendix.pdf)

<sup>60</sup> What We Mean By 'Disproportionate Impacts'. <https://www.climaterealityproject.org/blog/what-we-mean-disproportionate-impacts>

<sup>61</sup> Seeking to help people at greatest risk from climate change. <https://calmatters.org/commentary/2019/09/climate-change-3/>

<sup>62</sup> Impacts, Vulnerabilities and Adaptation in Developing Countries. <https://unfccc.int/resource/docs/publications/impacts.pdf>

<sup>63</sup> IPCC Report: Climate Change Is a Generational Justice Issue. <https://www.nrdc.org/experts/christina-swanson/ipcc-report-climate-change-generational-justice-issue>

<sup>64</sup> Unequal Impact: The Deep Links Between Racism and Climate Change. <https://e360.yale.edu/features/unequal-impact-the-deep-links-between-inequality-and-climate-change>

<sup>65</sup> Making Racial Equity Real in Research. <https://greenlining.org/publications/2020/racial-equity-research-report/>

impacts of climate change.<sup>66 67</sup> Climate change increasingly impacts places, foods, and lifestyles of American Indians. In Alaska—home to 40 percent of federally recognized tribes—reduced sea ice and warming temperatures threaten traditional livelihoods and critical infrastructure.<sup>68 69 70 71 72</sup> Furthermore, a new US EPA analysis, *Climate Change and Social Vulnerability in the United States: A Focus on Six Impact Sectors*, also indicates that the most severe harms from climate change fall disproportionately upon underserved communities who are least able to prepare for and recover from associated impacts.<sup>73</sup>

Reducing transportation emissions is critical in meeting health-based air quality standards and reducing the risk of dangerous climate change, especially in areas that most vulnerable and have been disproportionately impacted. As discussed above, more stringent pollution control standards are likely to deliver greater health benefits to the communities that suffer the most from pollution from motor vehicles and the fossil fuels that power them.

The proposed standards will also deliver greater economic benefits to those that need the most assistance. California agrees that for most of the population, operating and fueling costs are lower for electric vehicles, although it may not be the case for all individuals. In assessing standards and how they affect equity, California also agrees that it is important to consider the used car market since 70 percent of car purchases are used.<sup>74</sup> More stringent standards benefit aftermarket buyers as well as new car buyers.

California appreciates EPA's actions to acknowledge past and current policies that result in environmental, health, and other social burdens and future actions to assess and minimize further harms, meet equity goals, and distribute community benefits intentionally and

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<sup>66</sup> How Minorities Are Disproportionately Affected by Climate Change, and What We Can Do to Help. <https://www.sierraclub.org/redwood/napa/blog/2020/11/how-minorities-are-disproportionately-affected-climate-change-and-what-we>

<sup>67</sup> Racial Disparities and Climate Change. <https://psi.princeton.edu/tips/2020/8/15/racial-disparities-and-climate-change>

<sup>68</sup> U.S. Climate Resilience Toolkit. <https://toolkit.climate.gov/topics/tribal-nations>

<sup>69</sup> The Impact of Climate Change on Tribal Communities In The US: Displacement, Relocation, and Human Rights.

[http://wordpress.ei.columbia.edu/climate-adaptation/files/2017/10/Maldonado-et-al-2011-Tribal-resettlement-US\\_ClimaticChange.pdf](http://wordpress.ei.columbia.edu/climate-adaptation/files/2017/10/Maldonado-et-al-2011-Tribal-resettlement-US_ClimaticChange.pdf)

<sup>70</sup> Climate Adaptation Science Centers. <https://www.usgs.gov/ecosystems/climate-adaptation-science-centers/science/indigenous-peoples>

<sup>71</sup> ITEP Tribes & Climate Change Program. <http://www7.nau.edu/itep/main/tcc/>

<sup>72</sup> The Disproportionate Impact of Climate Change on Indigenous Communities. <https://www.kcet.org/shows/tending-nature/the-disproportionate-impact-of-climate-change-on-indigenous-communities>

<sup>73</sup> Climate Change and Social Vulnerability in the United States: A Focus on Six Impact Sectors. <https://www.epa.gov/cira/social-vulnerability-report>

<sup>74</sup> Electric Vehicle Ownership Costs: Today's Electric Vehicles Offer Big Savings for Consumers. Consumer Reports, October 2020. <https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf>

equitably. Looking at the affordability and equity impacts of the proposed standards is critical to ensuring that all communities benefit and are not negatively impacted.

### **III. The Proposal Meets the Statutory Direction to Protect Public Health by Reducing Pollution.**

CARB welcomes the Administrator's recognition that Congress enacted Section 202 of the Clean Air Act to address the threats to public health and welfare from pollution by new motor vehicles.<sup>75</sup> As the proposal discusses, Congress directed U.S. EPA to adopt motor vehicle pollution control standards at levels to address all manner of air pollutants that may reasonably be anticipated to endanger public health and welfare.

The current standards do not properly respond to this core mandate. CARB supports the Administrator's proposal to adhere to Congress's direction to reduce the threat to public health and welfare by limiting, in the near- and far-terms, harmful greenhouse gas emissions. Notably, these more stringent standards will bestow significant net benefits on society, even if they impose some cost on automakers.

The preferred alternative, Alternative 2, and the requirement for further emission reductions in model year 2026 all meet U.S. EPA's obligations under the Clean Air Act when exercising its authority to establish emission standards. CARB supports and agrees with the comments of the California Attorney General and multi-state coalition that this range of standards advances the objectives of Section 202(a) of the Clean Air Act. They will significantly reduce pollution from motor vehicles. In the time available, they can be met with existing technology at a cost that is reasonable, particularly considering their benefits for protecting public health and welfare.

#### **A. The Alternatives and the Proposal Meet Lead Time Requirements.**

Manufacturers have developed the requisite technology, have time to deploy it, and can do so at a reasonable cost within the time provided to meet the preferred alternative, Alternative 2, and the requirement for further emission reductions for model year 2026. Considering the urgency of the public health crisis created by these emissions, CARB believes adopting the Alternative 2 standards as quickly as possible (and no later than model year 2024) with the additional model year 2026 stringency best responds to the agency's mandate to reduce emissions in raw terms. As we have noted above, should lead-time considerations lead U.S. EPA to finalize less stringent standards for Model Year 2023, it should recoup emissions consistent with Alternative 2 for later model years, including strengthening Model Year 2026 as U.S. EPA proposes.

In this section we discuss evidence supporting this point. We also discuss why U.S. EPA should not unduly protect credit banks earned as windfalls against the weak SAFE standards

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<sup>75</sup> See 86 Fed. Reg. at 43,786.

and make recommendations on how ZEV-only manufacturers' credits can further support U.S. EPA's proposal.

### **1. Manufacturers have Followed a Trajectory of More Stringent Standards.**

In response to comments on the SAFE Rules and actions, including from CARB, U.S. EPA has revised its prior analysis of technologies for meeting the GHG emission standards.<sup>76</sup> U.S. EPA correctly recognizes in the proposal that over the past decade, auto manufacturers have developed and deployed a variety of technologies to sufficiently reduce greenhouse gas emissions from vehicles to meet the National Program standards adopted in 2012. U.S. EPA improved its analysis for the proposal by recognizing numerous emission-reducing technologies have been incorporated into vehicles at lower costs than previously projected.

These technologies include high-compression ratio engines, cooled exhaust gas recirculation, and fixed-cylinder deactivation.<sup>77</sup> In particular, U.S. EPA has allowed advanced high-compression ratio engines to be adopted on all engines with less than 8 cylinders. Unlike the analysis supporting the Final SAFE Rules, there are no "skip flags" for such engines in the modeling supporting the proposed standards, where the modeling previously inappropriately precluded many 6- and 4-cylinder engines from adopting this technology. Consistent with U.S. EPA's assessments through the Final Determination, the analysis supporting this proposal reflect the capability of more improvement from advanced high-compression ratio engines beyond what was originally derived from first-generation production engines like the early Mazda SkyActiv Atkinson-cycle engines deployed in model year 2014.

U.S. EPA also recognizes that about half the vehicles in model year 2020 already have direct injection in spark-ignition vehicles and planetary automatic 8-speed transmissions, a third have turbochargers, and a quarter have continuously variable transmissions.<sup>78</sup>

CARB agrees with U.S. EPA that the costs for meeting the proposed standards have remained in line with previous estimates, and if anything, are less than previously estimated. U.S. EPA's estimated average per-vehicle cost to meet the preferred alternative's standards in model year 2026 of \$1,044 is a reasonable estimate and an eminently reasonable cost to achieve the benefits of more stringent standards.<sup>79</sup>

U.S. EPA also requested comment on how it should treat California's GHG and ZEV standards here.<sup>80</sup> For the reasons explained in its comments on that proceeding, CARB urges EPA to quickly reverse its SAFE 1 actions. Assuming EPA does so before it finalizes these standards, it would be reasonable for EPA to model compliance, manufacturer costs, and development of technology to meet its final standards from a no-action baseline that

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<sup>76</sup> See, e.g., Draft Regulatory Impact Analysis (DRIA), § 4.1, pp. 4-1 – 4.

<sup>77</sup> See, e.g., DRIA, § 4.1, pp. 4-1 – 4; see also § 2.3.1, pp. 2-11 - 12.

<sup>78</sup> 86 Fed. Reg. at 43,776.

<sup>79</sup> 86 Fed. Reg. at 43,775.

<sup>80</sup> 86 Fed. Reg. at 43,770.

includes California's greenhouse gas emission and zero-emission vehicle standards in those states in which they would then be in effect.

## 2. Manufacturer Planning Supports Compliance.

As U.S. EPA correctly recognizes,<sup>81</sup> and as further explained in the accompanying comments of the California Attorney General, manufacturers have had a decade to plan for the National Program standards. In contrast, the SAFE Vehicles Rule is a recent concoction that has been nothing but uncertain throughout its existence.

The SAFE Vehicles Rule proposal was extensively panned in voluminous, detailed, well-reasoned comments. And because so much of the criticism was valid, the final analysis for the SAFE Vehicles Rule deviated in many significant ways from the proposal. But it remained deficient. The final rules were immediately challenged by multiple petitioners; those consolidated cases are in abeyance pending the outcome of this proposal,<sup>82</sup> in response to the President's direction to reconsider it.<sup>83</sup> The federal agencies have realized the Final SAFE Rule standards were inappropriate and proposed to restore more stringent standards. At no time have the Final SAFE Rule standards provided a stable platform for automakers to plan their products.

As CARB explained in its comments to U.S. EPA on its proposal to restore its waiver for California's GHG emission and ZEV standards, manufacturers are well-positioned to meet those California standards.<sup>84</sup> Entering the first model year of the Final SAFE Rules, 2021, manufacturers as an industry will be on a trajectory to comply with California's standards at or below previous cost projections. The same technologies similarly leave automakers well-positioned to meet more stringent federal GHG emission standards. And under the federal standards, the credit banks that automakers have amassed provide a trajectory and assurance they will remain in compliance with the standards.<sup>85</sup> The flexibility offered by these provisions is discussed further in the next section.

Further, as Gary W. Rogers, Vice President of Advanced Technology at Roush Engineering explains in the accompanying expert report,<sup>86</sup> manufacturers are already incorporating at a

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<sup>81</sup> See 86 Fed. Reg. at 43,781, et seq.

<sup>82</sup> *Competitive Enterprise Institute v. National Highway Traffic Safety Administration*, (D.C. Cir., Case No. 20-1145, consolidated with case nos. 20-1167, -1168, -1169, -1173, -1174, -1176, -1177), April 2, 2021, Order granting abeyance, Docket No. 1892931.

<sup>83</sup> E.O. 13990, "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis," Jan. 20, 2021, 86 Fed. Reg. 7,037 (Jan. 25, 2021), § 2.

<sup>84</sup> CARB, Compliance with California's Greenhouse Gas Emission Standards, July 6, 2021, Comments of States and Cities in Support of EPA Reversing its SAFE 1 Actions, App. D, Docket ID: EPA-HQ-OAR-2021-0257-0132, incorporated by reference and submitted herewith.

<sup>85</sup> DRIA, § 2.4.

<sup>86</sup> Rogers, Gary, Roush Industries, Inc., Comments on: EPA Proposed Rule Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards (Roush Comments on EPA Proposed Rule), September 24, 2021. Note, this was erroneously dated September 27, 2021, in the accompanying list of supporting documents.

rapid and increasing rate advanced technologies that reduce emissions, improve performance, and provide additional features that consumers prefer.

These technologies have been developed to meet regulatory and consumer demand across the global market in which auto manufacturers compete. Globally, despite the Final SAFE Rules, emission standards and customer demand for cleaner transportation technology have remained strong. The Roush report illustrates the GHG emission standards in Asia, Europe, and Canada continue to require annual emission reductions more stringent than and on a similar trajectory as the National Program standards.<sup>87</sup> Manufacturers have continued to reduce the pollution from their products offered domestically and regularly incorporate advanced technologies from foreign markets in offerings here.

Manufacturers are also able to adjust, within a given model year and within their normal product planning, the emissions performance of the vehicles they offer to meet fleetwide GHG emission standards. Automotive manufacturers routinely offer variations of the same model vehicles with different combinations of powertrain components. This allows them to offer a range of pricing and features. As shown in the Roush report, models from several manufacturers that sell well can meet standards that are more stringent, in many cases by more than 10 percent, with existing and imminent vehicles and components that are already scheduled for production.<sup>88</sup>

Moreover, the expansion of mild hybrid technologies at declining costs enables even greater improvements, to say nothing of the growing sales of these technologies<sup>89</sup> and zero-emission vehicles, which are discussed below. And the potential to reduce emissions while offering benefits to consumers of those technologies continue to expand, such as by offering the capability to power external devices.<sup>90</sup>

A confluence of factors shows that U.S. EPA can expect manufacturers to be well positioned to comply with its proposal. Technologies continue to advance, costs continue to decline, and global regulatory, consumer, and investor demands motivate manufacturers to plan their products to meet stringent GHG emission standards – including the preferred alternative and Alternative 2 standards being considered here.

### **3. The Credit Provisions Support Meeting the Standards in the Given Lead-Time.**

Beyond the question of whether manufacturers have developed the technology to meet the proposed standards and its cost, the structure and design of the standards provide manufacturers with options for meeting them in any given year. While recognizing that more stringent standards than those currently in place are feasible, CARB recognizes the value of providing a variety of means to comply. CARB supports credit averaging, banking, and

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<sup>87</sup> Roush Comments on EPA Proposed Rule, pp. 3-4.

<sup>88</sup> Roush Comments on EPA Proposed Rule, pp. 7-8.

<sup>89</sup> Roush Comments on EPA Proposed Rule, pp. 9-11.

<sup>90</sup> Roush Comments on EPA Proposed Rule, pp. 11-12.

trading options that enable compliance to be determined over multiple periods and credits for innovation. CARB supports the continued use of such provisions so long as they maintain the effective stringency of the standards to reduce real-world emissions.

U.S. EPA also requested comment on whether the proposal would disrupt manufacturer plans to over-comply with current standards and produce credits to sell to other manufacturers, by raising the regulatory baseline. Fundamentally, this issue should not be a primary consideration, as the core need is to reduce emissions, not to protect potential windfall credit revenues created by the unduly weak current standards. The statute does not require that U.S. EPA protect windfall profits at the expense of public health.

Moreover, there is not a credible argument that such credit windfalls are needed for compliance nor that some manufacturers may have already developed plans that were reliant on such credit windfalls. Manufacturers must plan first to ensure they comply with their own obligations and have done so.<sup>91</sup> Primarily, these obligations were defined by the National Program standards before the Final SAFE Rule emission standards. By necessity, each manufacturer had developed a path to compliance with those standards. The uncertainty and turmoil brought about from 2018 through 2020 from the SAFE standards proposals, litigation, and final standards that were not released until the 2020 calendar year happened much too late in the product planning cycle to allow manufacturers to make wholesale changes to their original plans. If anything, the SAFE standards inequitably disrupted manufacturer plans by providing an unexpected benefit only to manufacturers that had delayed technology deployment as long as possible, thereby taking the riskiest path to compliance and the worst for public health. No manufacturers will credibly be able to claim that they have dramatically changed their plans since the Final SAFE rule was finalized in 2020 such that U.S. EPA must now act to protect windfall credits.

But such a reliance scenario could only happen in two very unlikely instances – first, if a manufacturer had carried massive deficits into those years and needed overcompliance to avoid penalties, or second, if it planned to generate credits to offset even greater shortfalls in future years.

The first scenario requires assuming a manufacturer dramatically fell short of the weak Final SAFE Rule emission standards. But because those standards were, as conceded in the SAFE proceedings, below the expected level of manufacturer compliance, this is not at all likely. The second scenario is equally implausible. Under the Final SAFE emission standards, the standard remains constant from 2026 model year on so overcompliance in 2025 and 2026 model year would also mean continued overcompliance in subsequent years. Technology continues to improve, and manufacturers have publicly committed to deeper decarbonization of their fleets, so there is not a need to protect credits against the lax Final SAFE standards. To the extent this was intended to ease compliance for anticipated future GHG standards, such action would be highly speculative, not only to the stringency of such standards, but

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<sup>91</sup> See 86 Fed. Reg. at 43,782.



also to the timing of their adoption and to whether credits earned under the current standards would even be allowed towards compliance with the future standards.

This issue of manufacturer compliance planning presents itself in yet another way in the proposal, where U.S. EPA proposes to extend the years for which credits under the 2016 through 2020 model years may be used.<sup>92</sup> U.S. EPA proposes these extensions to ease the transition to the more stringent standards and contends that existing provisions that provide a finite life for credits provides precedent for this proposal to reset those lifetimes. CARB disagrees with both premises.

When manufacturers planned their products to generate the credits, they were aware of the constraints on their use and available terms. Because these credits were earned before the Final SAFE Rules went into effect, they reflect manufacturer planning to meet the more stringent standards then in effect with improved technology after those credits had expired.

Furthermore, extending the credit life is not necessary to facilitate compliance. In the time available, manufacturers can incentivize sales of vehicles with more of the necessary technologies if they are needed to meet the proposed standards, including additional zero-emission technologies. As discussed above and in the Roush Engineering report, many manufacturers offer high-sales volume vehicles in a variety of configurations, many of which have emission rates that are more than 10 percent lower than other configurations. Manufacturers can adjust the technical content, additional features attractive to consumers, pricing, and incentives to use these attributes of their existing products to meet more stringent standards without significant additional research or development investment or changes to vehicle design.

#### **B. ZEV-Only Manufacturers Should be Fully Considered in Credit Modeling.**

ZEV-only manufacturers effectively never have a need for the credits they earn under the GHG emission standards, as they can only over-comply. Such ZEV-only manufacturers earn significant credits per vehicle under the GHG standards given the large difference between the standard and the zero or near-zero emission level at which their vehicles are counted.

Further, the annual EPA Automotive Trends Reports show that ZEV-only manufacturers are active sellers of credits in the marketplace and many of the other manufacturers of conventional vehicles have been active purchasers of such credits. This history supports recognizing that future credits earned by ZEV-only manufacturers will likely be purchased and used by other manufacturers and should be included in subsequent modeling runs to better reflect likely compliance. Additionally, even though financial details of credit transactions are not disclosed, this history of credit purchase and usage shows that such credits are being acquired at lower cost than otherwise would be expended by the purchasing manufacturer to comply. Accordingly, U.S. EPA should endeavor to model the credit market as it exists,

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<sup>92</sup> 86 Fed. Reg. at 43,753-754.

including that credits generated by ZEV-only and other manufacturers are sold to lower the overall compliance costs of the standards, rather than only modeling each manufacturer's credits and compliance strategy in a silo.

### **C. Zero-Emission and Electrification Technology Supports Alternative 2.**

CARB agrees with U.S. EPA that more stringent standards can be met with advanced gasoline vehicle technologies already in vehicles on the road and zero-emission and electrification technologies that continue existing manufacturer trends.<sup>93</sup> In addition to conventional technologies, U.S. EPA correctly recognizes the breadth of public announcements, resource commitments, and projections to incorporate zero-emission technology extensively, and in many contexts exclusively, into vehicles.<sup>94</sup> The Revised 2023 and Later Model Year Light Duty Vehicle GHG Emissions Standards Draft Regulatory Impact Analysis (DRIA) in section 2.3.3, beginning at page 2-13, discusses manufacturer plans for zero-emission technologies, investments, and vehicle models.

CARB reaches the same conclusions based on the information it has reviewed. The trend towards zero-emission technology is well underway. In 2020, 8% of new vehicle sales in California were ZEVs and PHEVs. As CARB explained in its comments to U.S. EPA on its proposal to restore California's waiver for its GHG and ZEV standards, manufacturers are expected to increase ZEV production. Manufacturers have invested heavily in zero-emission technology, reduced its costs, greatly improved its capability, and made tangible, public commitments to new vehicles. Nationally, between August 2020 and August 2021, sales of vehicles with zero-emission technology, whether battery-electric, fuel cell, or plug-in hybrid, went from 2.1% to 4.0%,<sup>95</sup> and were 5% of sales in July 2021.<sup>96</sup> Scrutiny of credits generated by ZEV-only manufacturers indicates that current sales of ZEVs are higher than U.S. EPA estimates, which further supports the feasibility of the proposed standards and Alternative 2 specifically.

Accordingly, CARB recommends that U.S. EPA utilize a newer baseline than the 2017 model year used in the analysis for the proposal. Notably, Tesla is the largest ZEV-only manufacturer and is listed in the baseline market input files used by U.S. EPA as having nationwide sales of less than 50,000 vehicles. However, Tesla has substantially increased sales since 2017 with the expansion from two to four vehicle models, including the more popular Model 3. In the 2020 model year baseline market input file used by NHTSA in its recent proposal to revise the fuel economy standards for model years 2024 through 2026, Tesla's nationwide sales are listed as nearly 200,000 vehicles, an approximate four-fold increase.<sup>97</sup> Tesla also has publicly announced plans for production of a roadster model and a truck application and U.S. EPA

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<sup>93</sup> See 86 Fed. Reg. at 43,776-777.

<sup>94</sup> See 86 Fed. Reg. at 43,775.

<sup>95</sup> Alliance for Automotive Innovation, Reading the Meter, Sept. 2, 2021, p. 8.

<sup>96</sup> Skibell, Summer saw record EV Sales, September 24, 2021.

<sup>97</sup> 86 Fed. Reg. 49,602 (Sept. 3, 2021).

has also recently certified models from both Rivian and Lucid Motors adding support for including some representation of growth in sales (and corresponding credits) from ZEV-only manufacturers in future modeling analysis.

Looking ahead at other manufacturers, the annual alternative fuel vehicle projections submitted to CARB to assist with infrastructure planning predict increasing ZEV sales. These reports include three- to five-year future model year sales projections for battery electrics, plug in hybrids, and hydrogen fuel cell vehicles. Based on this data, new vehicle sales in California of ZEVs and PHEVs are projected to reach 25% by 2023.<sup>98</sup>

This prediction is corroborated by manufacturer projection they will increase their number of available models to at least 82 by model year 2023. Ford Motor Company, General Motors, and Stellantis announced on August 4, 2021, in support of this proposal, a goal for 40-50% US ZEV sales by 2030.<sup>99</sup> Ford followed up with plans to double its production target of the Lightning full-size electric pickup truck.<sup>100</sup> Nissan has announced 40% of their US sales will be BEVs by 2030.<sup>101</sup> Audi also recently announced its new corporate strategy, "Vorsprung 2030", which states that the company will introduce its last new combustion engine product in 2026, and completely phase out its internal combustion engines by 2033.<sup>102</sup>

Sales are also expected to increase because vehicles will better meet consumer needs and at lower costs. Several start-up manufacturers have product releases imminent that are pushing vehicle range even higher with greater vehicle utility. Rivian's R1T pickup truck and R1S SUV are expected to start shipping in September of this year.<sup>103</sup> Lucid's Air sedan is expected to ship in the second half of this year.<sup>104</sup> The company has also shown a concept SUV based on the Air's platform that is planned to go on sale in 2023.<sup>105</sup> Those vehicles reflect "clean-sheet" design approaches that take full advantage of the integration and design opportunities that a dedicated BEV platform can provide. The Rivian models have options for over 400 miles of range and the Lucid Air will offer over 500 miles.

The agency cites the National Academies of Sciences recently released light-duty vehicle technology assessment. That technology assessment expects battery pack costs of \$90-

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<sup>98</sup> CARB, Public Workshop on Advanced Clean Cars II, May 6, 2021, p. 38, [https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2\\_workshop\\_slides\\_may062021\\_ac.pdf](https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2_workshop_slides_may062021_ac.pdf).

<sup>99</sup> See <https://www.reuters.com/business/autos-transportation/us-automakers-say-they-aspire-up-50-ev-sales-by-2030-sources-2021-08-04/>.

<sup>100</sup> Klayman, Exclusive Ford double Lightning production target on strong pre-launch demand – sources, August 23, 2021.

<sup>101</sup> See [https://www.greencarreports.com/news/1133155\\_nissan-targets-40-battery-electric-models-for-us-by-2030-more-than-biden-pact](https://www.greencarreports.com/news/1133155_nissan-targets-40-battery-electric-models-for-us-by-2030-more-than-biden-pact).

<sup>102</sup> See <https://www.audi-mediacycenter.com/en/press-releases/vorsprung-2030-audi-accelerating-transformation-14180>.

<sup>103</sup> See <https://www.motortrend.com/news/2022-rivian-r1t-delivery-delay/>.

<sup>104</sup> See <https://finance.yahoo.com/video/lucid-ceo-says-production-debut-155931057.html>.

<sup>105</sup> See <https://www.lucidmotors.com/future-models/>.

115/kWh in 2025 and \$65-80 in 2030.<sup>106</sup> In May 2021, CARB presented its initial assessment of ZEV technology and battery costs to support its upcoming rulemaking to adopt future standards for ZEVs. This included its draft Modeling Cost Workbook that included an assessment of battery costs and estimated a cost of \$100/kWh in 2026 - similar to the estimates of the National Academies.<sup>107</sup> Those battery costs fall well below those used in the draft TAR and Proposed Determination Technical Support Document. Costs for non-battery components are also declining due to improvements in design and integration, demonstrated by several vehicle and component teardowns like those available from Munro & Associates, Inc.<sup>108</sup> Costs are declining more quickly than previously expected, making it more likely that those OEM announcements will materialize.

As costs decline, zero-emission technology becomes cost-competitive and even superior to conventional technology. In comparison to conventional vehicles, zero-emission vehicles, especially battery-electric technology, can cost less to drive and maintain, on average. In every state, the cost of electricity is less than gasoline, and is 60% less on average across the nation. Similarly, the average maintenance cost per mile of a battery-electric vehicle is about 60% of a conventional vehicle.

#### **D. The Proposed ZEV Multipliers Should be Reduced.**

Although ZEV sales are projected to increase, they currently remain a minority portion and could benefit from continued incentives. U.S. EPA's emission standards incentivize various advanced technologies for reducing emissions through credit from production multipliers. The proposed standards would revive these kinds of incentives for advanced technologies to promote market penetration that were a feature of the National Program standards through model year 2021.<sup>109</sup> These incentives took the form of production multipliers for electric vehicles, plug-in hybrid electric vehicles, fuel cell vehicles, and natural gas vehicles. The SAFE Final Rule allowed these multipliers to lapse, with the exception of natural gas vehicles for which it increased and extended the multiplier. The proposal would revive and extend the multipliers for model year 2022 through model year 2025 for BEVs, FCEVs, and PHEVs, and end the multiplier for NGVs after model year 2022.

CARB supports the appropriate use of multipliers to incentivize clean technology. But incentives for BEVs, PHEVs, and FCVs are not appropriate under the relaxed SAFE Final Rule standards for model year 2022 that will remain in place. This would effectively weaken the

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<sup>106</sup> See National Academies of Sciences, Engineering, and Medicine. 2021. Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035. Washington, DC: The National Academies Press, <https://doi.org/10.17226/26092>; see also <https://www.nationalacademies.org/our-work/assessment-of-technologies-for-improving-fuel-economy-of-light-duty-vehicles-phase-3>.

<sup>107</sup> See CARB, Advanced Clean Cars (ACC) II Workshop, Presentation Slides, and Modeling Cost Workbook, May 6, 2021.

<sup>108</sup> See <https://leandesign.com/teardown-benchmarking/>.

<sup>109</sup> See 86 Fed. Reg. at 43,757.

program for model year 2022 even more than was already done under the SAFE Final Rule, setting the nation even further behind in much needed GHG reductions. The multipliers should not be reinstated for that year, contrary to the proposal.

For model years 2023-2025, the proposed per car advanced technology vehicle multipliers are too generous to sufficiently incentivize zero-emission technology. Based on simple calculations, the proposed cap will be met with BEV sales of far less than 2% per year of manufacturers' fleets. Nationwide, many manufacturers already are selling ZEVs at or near these levels and as discussed above, manufacturers are poised to produce ZEVs in greater percentages. The multipliers should be set to require manufacturers to increase their production of ZEVs to receive the maximum credit allowance. For example, a BEV multiplier at 1.3 for model years 2023 and 2024 and 1.15 for model year 2025 would require a manufacturer to average BEV sales of approximately 8% per year to reach the full credits under the cap. Similarly, multipliers of 1.1 and 1.05, respectively, would require a manufacturer to average BEV sales of approximately 25% per year to meet the cap.<sup>110</sup> U.S. EPA should revise the per car multipliers for BEVs, PHEVs, and FCEVs downward to effectively require a sales level that is above what typical manufacturers are expected to produce in order to properly incentive and reward those that achieve higher sales rates. The proposed cap should stay the same. This will adequately incentivize and reward increased ZEV sales in these key transitional years.

CARB agrees that the multiplier for NGVs should be eliminated. These vehicles have not been produced in this sector for some time and the multiplier has not been used. More importantly, these vehicles directly emit pollutants. A production multiplier is unwarranted.

The proposed standards would also reinstate a credit from the National Program for full-size pick-ups. The National Program standards provided two options for these credits. One option provided credits for hybrid technology, and the other provided performance-based credits if emissions were reduced by at least 20% less than the applicable footprint-based standard for a given vehicle. The SAFE Final Rules eliminated these options. EPA proposes to restore the credits with a modification to prevent any one vehicle from earning both kinds of credits.<sup>111</sup>

CARB supports restoring the full-size pickup credits in conjunction with revised standards for model years 2023 through 2026. But CARB disagrees the credits should be restored for model year 2022. As noted earlier, vehicles produced for model year 2022 will remain subject to the overly lax SAFE Final Rule standards and no action should be taken to effectively further weaken the 2021 or 2022 standards. There is no valid basis for providing additional credits.

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<sup>110</sup> See CARB, Calculation of Federal MY 2023-2026 ZEV Multiplier Credits, September 27, 2021.

<sup>111</sup> See 86 Fed. Reg. at 43,760, et seq.

#### **IV. The Benefits of the Standards Outweigh the Costs and are Likely Greater Than U.S. EPA Estimated.**

As described above, CARB agrees that more stringent standards will deliver significant benefits to society that far outweigh their costs. CARB supports the work of U.S. EPA to reconsider its approach to estimating the impacts of the proposed standards. But CARB believes the standards are more beneficial than U.S. EPA estimates and encourages the agency to improve its analysis of the costs and benefits of more stringent emission standards in several respects.

##### **A. U.S. EPA Improved its Analysis of the Rebound Effect and Should Revisit the Sales Elasticity Effects.**

CARB appreciates the work U.S. EPA has taken to reconsider its treatment of the rebound effect from the SAFE Vehicles Rule.<sup>112</sup> As U.S. EPA recognizes, and as Professor Gillingham, a recognized authority on energy and environmental economics whose research on transportation, energy efficiency, and the adoption of new technologies has been widely-published, further explains in his enclosed expert analysis, the Final SAFE Rule rebound effect of 20% is not defensible.<sup>113</sup> To the contrary, a national rebound effect of 10% is defensible, although it, too, may be an overestimate. U.S. EPA should apply a rebound effect of not more than 10% to estimate the impacts of the final rule.

CARB appreciates U.S. EPA's recognition that consumers value savings differently than presumed in the SAFE Final Rule. However, CARB continues to disagree that a sales elasticity of -1 is a valid estimate of consumer response to price changes. Even U.S. EPA's Science Advisory Board has criticized a sales elasticity estimate of -1. As Professor Gillingham explains in his enclosed expert comment, it is not much more than an assumption. The best evidence supports an elasticity of -0.34. U.S. EPA should adopt this estimate as its base case, which is close to its sensitivity case of -0.4, and explore sensitivity cases using a sales elasticity closer to zero.<sup>114</sup> Underscoring the point, as Gary Rogers of Roush Engineering explains in his accompanying expert report, consumers are responding positively to the features and performance of the vehicles that pollute less.

U.S. EPA should apply more reliable estimates of the rebound and sales effects of more stringent standards to provide more reliable estimates of the costs and benefits of the proposal. In both instances, it happens that the net benefits are greater than otherwise estimated.

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<sup>112</sup> See 86 Fed. Reg. at 43,769.

<sup>113</sup> Gillingham, K., The Rebound Effect of Fuel Economy Standards: Comment on the Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, Sept. 20, 2021.

<sup>114</sup> Gillingham, K., The New Vehicle Demand Elasticity: Comment on the Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, Sept. 20, 2021.

## **B. The Standards Do Not Significantly Affect Highway Fatalities.**

CARB agrees that the impact on highway fatalities of the Final SAFE Rule and the proposed standards are similar and the model does not provide statistically significant results irrespective of the varying stringency. The emissions standards do not significantly lead to fatalities, where the analysis does not provide statistically significant effects, and any fatalities attributed to the standards are, unfortunately, overwhelmed by total highway fatalities. Moreover, CARB supports considering risk on a per-mile traveled basis when assessing fatalities.

## **C. Stringent Standards Increase Domestic Energy Security.**

As Dr. Stanton discusses in her enclosed expert report, *An Analysis of EPA's Proposed Revised 2023 and Later Model Year Light-Duty Greenhouse Gas Emission Standards*, U.S. EPA has improved its analysis of the benefits of more stringent greenhouse gas emission standards, but still likely understates their benefits.<sup>115</sup> Stricter standards will benefit the United States through decreased exposure to volatile oil prices, reduced prices from reduced demand, and potential savings to the federal budget from reduced dependency on imported oil.

The proposed standards will reduce U.S. oil demand. They are thus likely to reduce the global price of oil, known as a monopsony effect. This is true regardless of the position of the U.S. as a net exporter and in any event the net effect is not definitive; the U.S. is importing heavier crude oils to satisfy the needs of refineries.<sup>116</sup> U.S. EPA's Draft Regulatory Impact Analysis disregards the monopsony impacts that come from decreased domestic demand. Instead, U.S. EPA treats this effect as a neutral transfer payment. It is not neutral in its effects. The shift of costs to oil producers and away from U.S. consumers would likely have wider societal benefits than the other way around.

Stricter standards that reduce consumption is also likely to reduce exposure to volatile prices. Dr. Stanton recognized that U.S. EPA "appears to conservatively understate the costs of global oil market instabilities, omitting costs of managing oil market volatility and likely underestimating U.S. exposure to global oil markets."<sup>117</sup> CARB recommends that U.S. EPA consider a broader range of sectors that can be impacted by oil imports and prices. This is expected to more accurately show the benefits from stricter emission standards, including on the budgets of the federal government and consumers.

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<sup>115</sup> Stanton, E., *An Analysis of EPA's Proposed Revised 2023 and Later Model Year Light-Duty Greenhouse Gas Emission Standards*, Sept. 2021.

<sup>116</sup> DRIA, p. 3-16; *Oil imports and exports - U.S. Energy Information Administration (EIA)*, April 13, 2021.

<sup>117</sup> Stanton, E., *An Analysis of EPA's Proposed Revised 2023 and Later Model Year Light-Duty Greenhouse Gas Emission Standards*, Sept. 2021, p. 7.

Although U.S. EPA asserts it is not able to quantify the potential for stringent standards to reduce U.S. military expenditures, the available information suggests it could be significant. The U.S. military helps secure international oil production and imports.<sup>118</sup> Studies cited in U.S. EPA's Draft Regulatory Impact Analysis of the proposal estimate the implicit subsidy of crude oil for this security ranges from \$11.25 to more than \$30 a barrel.<sup>119</sup> If decreased demand for oil meant that the U.S. no longer needed to defend oil supplies and sea lines in the Persian Gulf, the savings to the U.S. defense budget could be significant. The RAND study cited by U.S. EPA stated that the U.S. defense budget could be reduced by 12-15%.<sup>120</sup> The defense budget in 2019 was \$704 billion. If this was reduced 12%, it would save U.S. taxpayers more than \$84 billion a year.

Moreover, the U.S. military is the largest single consumer of oil in the world, using about 100 million barrels (despite also heavily investing in clean technology).<sup>121</sup> Separate from expenditures for securing oil supply lines, a decrease in the price of oil from decreased demand would directly benefit the U.S. military budget. This effect can be quantified based on the estimated effects of the proposal on oil prices.

In sum, stricter emission standards that pay for themselves through reduced fuel costs would deliver greater benefits to the people that need them most – those with lower incomes who spend a greater percentage of their household budget on transportation. U.S. EPA fails to quantify these benefits.

## V. Conclusion

Time is of the essence to stabilize our climate. The worsening climate catastrophes show the urgent need to recover the progress lost under the previous federal administration. CARB urges U.S. EPA to quickly finalize this proposal and adopt the most stringent standards feasible. Alternative 2, a return to the National Program standards with an improvement of those standards for model year 2026 by an additional 10 grams of carbon dioxide per mile, would achieve the greatest emission reductions amongst the proposal. However, should U.S. EPA determine additional lead time is appropriate, the best option is to adopt standards at least as stringent as its preferred alternative for model year 2023 and greater stringency thereafter, along the lines of Alternative 2 for later model years, with additional reductions

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<sup>118</sup> See Sovacool, B.K & Brown, M. *Competing Dimensions of Energy Security: An International Perspective*. Georgia Tech and Ivan Allen College School of Public Policy. Accessed on October 24, 2018. <https://smartech.gatech.edu/bitstream/handle/1853/27736/wp45.pdf>.

<sup>119</sup> DRIA, p. 3-22.

<sup>120</sup> DRIA, p. 3-22. CARB notes that NHTSA drew a different conclusion in its *Technical Support Document: Proposed Rulemaking for Model Years 2024-2026 Light-Duty Vehicle Corporate Average Fuel Economy Standards (nhtsa.gov)*, § 6.2.4.5.

<sup>121</sup> The U.S. military uses more oil than any other institution in the world—but it's also a leader in clean vehicle technology. The Union of Concerned Scientists. Accessed October 24, 2018. [https://www.ucsusa.org/clean\\_vehicles/smart-transportation-solutions/us-military-oil-use.html#.W5BNzuhKjIV](https://www.ucsusa.org/clean_vehicles/smart-transportation-solutions/us-military-oil-use.html#.W5BNzuhKjIV)



Mr. Regan  
September 27, 2021  
Page 41

required in model year 2026 to recoup further lost emission reductions. These would deliver tangible benefits to everyone who breathes and drives that they will be able to feel.

Please contact Mr. Craig Segall, Deputy Executive Officer, at [Craig.Segall@arb.ca.gov](mailto:Craig.Segall@arb.ca.gov) for any questions you may have about our comments.