APPENDIX E

DRAFT ENVIRONMENTAL ANALYSIS

FOR THE PROPOSED

Advanced Clean Cars II Program

California Air Resources Board
1001 I Street
Sacramento, California 95814

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LIST OF ABBREVIATIONS

AB	Assembly Bill
AC	alternating current
ACC	Advanced Clean Cars
APE	area of potential effect
BEV	battery electric vehicles
CAA	Clean Air Act
CAL FIRE	California Department of Forestry and Fire Protection
CalEPA	California Environmental Protection Agency
CARB or Board	California Air Resources Board
CCAA	California Clean Air Act
CCS	Combined Charging Standard
CEC	California Energy Commission
CEM	compressor-expander module
CEQA	California Environmental Quality Act
CO	carbon monoxide
CPUC	California Public Utilities Commission
CUPA	Certified Unified Program Agency
dBA	A-weighted decibels
DC	direct current
DEF	diesel exhaust fluid
DOE	U.S. Department of Energy
Draft EA	Draft Environmental Analysis
DTSC	California Department of Toxic Substances Control
EA	Environmental Analysis
EGR	exhaust gas recirculation
EIR	environmental impact report
EJ	environmental justice
EVSE	electric vehicle supply equipment
FCEV	fuel cell electric vehicles
FSOR	Final Statement of Reasons
FTA	Federal Transit Administration
FTP	Federal Test Procedure
GCWR	gross combined weight rating

GDL	gas diffusion layer
GHG	greenhouse gas
GM	General Motors
GW	gigawatts
HD	heavy duty
HDV	heavy-duty vehicle
HWY	Highway
ICA	Integration Capacity Analysis
ICEV	internal combustion engine vehicles
ICT	Innovative Clean Transit
in/sec	inch per second
ISO	Independent System Operator
ISOR or Staff Report	Initial Statement of Reasons
kW	kilowatt
lbs	pounds
LED	low-emission diesel
L_{eq}	equivalent level measurements
LEV	Low-Emission Vehicle
L_{max}	maximum sound level
LMO	Lithium-Manganese-Oxide
MAW	moving average window
MDV	medium-duty vehicles
mg/mile	milligrams per mile
MOU	Memorandum of Understanding
MUD	multi-unit dwellings
MW	megawatts
NAAQS	national ambient air quality standards
NCA	Nickel-Cobalt-Aluminum
NHTSA	National Highway Traffic Safety Administration
NiMH	nickel metal hydride
NIRCOS	non-integrated refueling canister only system
NMC	Nickel-Manganese-Cobalt
NOP	Notice of Preparation
NO_X	oxides of nitrogen
NPDES	National Pollution Discharge Elimination System

NREL	National Renewable Energy Laboratory
OBD	on-board diagnostics
PEM	Proton Exchange Membrane
PEV	plug-in electric vehicle
PGM	platinum-group metals
PHEV	plug-in hybrid electric vehicles
PM	particulate matter
PM_{10}	respirable particulate matter
$PM_{2.5}$	fine particulate matter
ppb	parts per billion
PPV	peak particle velocity
PRC	Public Resources Code
Proposed Program	Advanced Clean Cars ACC II Program
ROG	reactive organic gases
SAE	Society of Automotive Engineering
SAFE	Safer Affordable Fuel-Efficient
SB	Senate Bill
SCR	selective catalytic reduction
SIP	State Implementation Plan
SMR	steam methane reformers
SP	Suppliers Partnership
SULEV	super-ultra-low emission vehicle
SULEV30	Super Ultra Low-Emission-Vehicle 30 emission levels
TAC	toxic air contaminants
TCR	tribal cultural resources
TDM	transportation demand management
TWC	three-way catalyst
U.S. EPA	U.S. Environmental Protection Agency
UDDS	Urban Dynamometer Drive Schedule
UL	Underwriters Laboratories
ULEV	Ultra LEV
VdB	vibration decibels
VMT	vehicle miles travelled
VW	Volkswagen
WSA	Water Supply Assessment

ZEV	Zero-Emission Vehicle

1.0 INTRODUCTION AND BACKGROUND

A. Introduction

This draft environmental analysis (Draft EA) is a program environmental document prepared to cover the Advanced Clean Cars (ACC) II Program (Proposed Program). This Draft EA is included as Appendix E of the California Air Resources Board (CARB or Board) Initial Statement of Reasons (ISOR or Staff Report) that will be presented to the Board for consideration. The Project Description section of this Draft EA presents a summary of the Proposed Program, as defined under the California Environmental Quality Act (CEQA). A detailed description of the Proposed Program is included in the "Staff Report: Initial Statement of Reasons for the Proposed Advanced Clean Cars II Regulations" date of release April 12, 2022, which is hereby incorporated by reference.

This Draft EA is intended to identify and disclose the Proposed Program's potential significant impacts on the environment and identify potential feasible mitigation measures and alternatives to lessen or avoid those significant environmental impacts. The Proposed Program is intended to create environmental benefits related to greenhouse gas (GHG) reductions and air quality improvements. However, in some cases, as described in Chapter 4 of this Draft EA, potentially significant effects to environmental resources may occur due to implementation of compliance responses associated with the Proposed Program. It is expected that many of these potentially significant impacts can be feasibly avoided or mitigated to a less-than-significant level, as described in each resource area, due to project-specific environmental review processes associated with compliance responses and compliance with local and State laws and regulations. However, the Draft EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient to mitigate an impact to less than significant or may not be implemented by other parties) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

B. Scope of Analysis and Assumptions

The degree of specificity required in a CEQA document corresponds to the degree of specificity inherent in the underlying activity it evaluates. An EA for broad programs cannot be as detailed as it can be for specific projects (Title 14 California Code of Regulations [CCR] § 15146). For example, the assessment of a construction project would be naturally more detailed than one concerning the adoption of a local general plan because construction-related effects can be predicted with more accuracy (Title 14 CCR §15146(a)). Because this analysis addresses a broad regulatory program, a general level of detail is appropriate. However, this Draft EA makes a rigorous effort to evaluate significant adverse impacts and beneficial impacts of the reasonably foreseeable compliance responses that could result from implementation of the Proposed Program

and contains as much information about those impacts as is currently available, without being unduly speculative.

The scope of analysis in this Draft EA is intended to help focus public review and comments on the Proposed Program, and ultimately to inform the Board of the environmental benefits and adverse impacts of the Proposed Program. This analysis specifically focuses on potentially significant adverse and beneficial impacts on the physical environment resulting from reasonably foreseeable compliance responses resulting from implementation of the Proposed Program.

The analysis of potentially significant adverse environmental impacts of the Proposed Program is based on the following assumptions:

1. The analysis addresses the potentially significant adverse environmental impacts resulting from implementation of the Proposed Program compared to existing conditions and regulations concerning emissions standards for light- and medium-duty vehicles and other applicable regulations.

2. The environmental baseline is defined by existing vehicle and related fuel emissions programs, policies, and regulations. The existing regulatory condition includes the existing Low-Emission Vehicle and Greenhouse Gas regulations (LEV III) and the existing Zero-Emission Vehicle regulation, as well as other relevant, previous California rulemakings, and all comparable federal regulations.

3. The analysis of environmental impacts and determinations of significance are based on a comparison of reasonably foreseeable compliance responses taken in response to implementation of the Proposed Program with the current methods of compliance related to the existing State and federal regulatory framework.

4. The analysis addresses environmental impacts within California and outside the State to the extent they are reasonably foreseeable and do not require speculation.

5. The level of detail of impact analysis is necessarily and appropriately general because the Proposed Program is programmatic. Attempting to predict decisions by entities regarding the specific location and design of infrastructure, source and production of materials, and other activities undertaken in response to implementation of the Proposed Program would be speculative (if not impossible) at this early stage, given the influence of other business and market considerations in those decisions. As a result, there is some inherent uncertainty in the degree of mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in this Draft EA. Consequently, this Draft EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the potential that feasible mitigation may not be implemented by the agency with authority to do so, or may not be sufficient) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, where appropriate. It is also possible that the amount of mitigation necessary to

reduce environmental impacts to below a significant level may be less than disclosed in this Draft EA on a case-by-case basis. Specific actions undertaken to implement the Proposed Program would undergo project-level environmental review and compliance processes as required at the time they are proposed. It is expected that many individual development projects would be able to feasibly avoid or mitigate potentially significant impacts to a less-than-significant level.

6. This Draft EA generally does not analyze site-specific impacts when the location of future facilities or other infrastructure changes are speculative. However, the Draft EA does examine regional (e.g., local air district and/or air basin) and local issues to the degree feasible where appropriate. As a result, the impact conclusions in the resource-oriented sections of Chapter 4, Impact Analysis and Mitigation Measures, cover broad types of impacts, considering the potential effects of the full range of reasonably foreseeable actions undertaken in response to the Proposed Program.

C. Background Information on the Advanced Clean Cars Program

The ACC program, first adopted by CARB in 2012, incorporated three elements that combined the control of smog-causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2015 through 2025. These three elements included the Low-Emission Vehicle and Greenhouse Gas regulations (LEV III) and the Zero-Emission Vehicle (ZEV) regulation.

The LEV III regulations include increasingly stringent emission standards for both criteria air pollutants (including precursors) and GHGs for new passenger vehicles through the 2025 model year. The LEV III criteria standards were developed to address the continued increase in driving throughout the State while also improving air quality. CARB adopted new emission standards to reduce smog-forming emissions beginning with 2015 model year vehicles. Implementation of this regulation was estimated to result in cars emitting 75 percent less smog-forming pollution in 2025 than the average car sold in 2012. The LEV III GHG component was developed in coordination with the United States Environmental Protection Agency (U.S. EPA) and National Highway Traffic Safety Administration (NHTSA) for one National Program to harmonize GHG and fuel economy standards.

The ZEV regulation is designed to achieve the State's long-term emission reduction goals by requiring auto manufacturers to offer specific numbers of the cleanest cars available for sale. These vehicle technologies include full battery-electric, hydrogen fuel cell, and plug-in hybrid-electric vehicles. CARB first adopted the ZEV requirement in 1990 as part of the LEV regulation. Over the last 30 years, the ZEV regulation has been modified to reflect the state of technology. Modifications adopted in 2012, along with the other two ACC regulations, have set California on a path toward ZEV commercialization with the resurgence of battery technology enabling auto manufacturers to offer competitively priced zero-emission vehicles to consumers. Since

2010, more than 1 million zero-emission vehicles and plug-in hybrids have been registered in California.

D. Environmental Review Process: Requirements Under the CARB Certified Regulatory Program

CARB is the lead agency for the Proposed Program and has prepared this Draft EA pursuant to its regulatory program certified by the Secretary of the Natural Resources Agency (Title 14 CCR § 15251(d); Title 17 CCR §§ 60000-60008). In accordance with Public Resources Code § 21080.5 of the CEQA, public agencies with certified regulatory programs are exempt from certain CEQA requirements, including but not limited to preparing environmental impact reports, negative declarations, and initial studies (Title 14 CCR § 15250). CARB has prepared this Draft EA to assess the potential for significant adverse and beneficial environmental impacts associated with the Proposed Program, as required by CARB's certified regulatory program (Title 17 CCR § 60005(b)). The resource areas from the CEQA Guidelines Environmental Checklist were used as a framework for assessing the potential for significant impacts (Title 17 CCR § 60005(b)).

If comments received during the public review period raise significant environmental issues, staff will summarize and respond to the comments in the Final Statement of Reasons (FSOR) prepared for the Proposed Program. The written responses to environmental comments will be approved prior to final action on the Proposed Program (Title 17 CCR § 60007(a)). If the Proposed Program is adopted, a Notice of Decision will be posted on CARB's website and filed with the Secretary of the Natural Resources Agency for public inspection (Title 17 CCR § 60007(b)).

E. Organization of the Draft EA

The Draft EA is organized into the following chapters to assist the reader in obtaining information about the Proposed Program and its specific environmental issues.

- **Chapter 1, Introduction and Background,** provides a project overview and background information, and other introductory material.
- **Chapter 2, Project Description,** summarizes the Proposed Program, the potential reasonably foreseeable compliance responses taken in response to the Proposed Program, and implementation assumptions.
- **Chapter 3, Environmental and Regulatory Setting,** contains the environmental and regulatory setting relevant to the environmental analysis of the Proposed Program.
- **Chapter 4, Impact Analysis and Mitigation**, identifies the potential environmental impacts associated with the Proposed Program and mitigation measures for each resource impact area.
- **Chapter 5, Cumulative and Growth-Inducing Impacts**, analyzes the potential for cumulative effects of implementing the Proposed Program against a backdrop of past, present, and reasonably foreseeable future projects.

- **Chapter 6, Mandatory Findings of Significance**, discusses the potential for adverse impacts on human beings, cumulatively considerable environmental impacts, and whether the Proposed Program would have the potential to degrade the quality of the environment.
- **Chapter 7, Alternatives Analysis**, discusses a reasonable range of potentially feasible alternatives that could reduce or eliminate adverse environmental impacts associated with the Proposed Program.
- **Chapter 8, References**, identifies sources of information used in this Draft EA.

F. Public Review Process for the Environmental Analysis

On July 21, 2021, CARB issued a Notice of Preparation (NOP) for the Proposed Program, announcing that it would prepare an EA. At a public workshop held on August 11, 2021, CARB staff discussed proposed regulatory concepts for the Proposed Program. Staff also described plans to prepare a Draft EA for the Proposed Program and invited public feedback on the scope of environmental analysis.

In accordance with CARB's certified regulatory program, and consistent with CARB's commitment to public review and input on regulatory actions, this Draft EA is subject to a public review process. The Staff Report, which includes this Draft EA, is posted for a 45-day public review period that begins on April 15, 2022 and ends on May 31, 2022. This period complies with requirements for a minimum of 45 days of public review. (Title 17 CCR, § 60004.2(b)(2).)

At the conclusion of the public review period, the Board will hold public hearings on the Proposed Program. At the first hearing, currently scheduled for June 9, 2022, the Board will not take any approval action on the proposal; however, the Board may provide direction to staff on modifications to make to the Proposed Program. Staff would address any proposed changes in a notice that would be issued with modified regulatory language and supporting documentation for one or more 15-day review and comment periods as required under the Administrative Procedure Act.

At the conclusion of all review periods, staff will compile public comments and responses, including comments on the Draft EA made during the noticed 45-day comment period (or during any further comment period if CARB determines recirculation of the Draft EA is necessary), and prepare a final hearing package, which includes the Final EA and response to environmental comments, for the Proposed Program for the Board's consideration at a second public hearing. This second hearing is currently planned for late summer 2022. If the final Regulation is adopted by the Board at that time, a Notice of Decision will be posted on CARB's regulatory webpage and will be filed with the Secretary of the Natural Resources Agency. The FSOR for the final Regulation would be prepared by staff and the completed regulatory package would be filed with the Office of Administrative Law.

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2.0 PROJECT DESCRIPTION

A. Objectives

Recognizing the requirements of Assembly Bill (AB) 32 and Senate Bill (SB) 32 to reduce Greenhouse Gas (GHG) emissions, statutory authority in the Health and Safety Code to achieve the maximum degree of emission reduction possible from mobile sources, the goal under Executive Order N-79-20 to deploy zero-emission technologies, and the need for California to attain the national and state ambient air quality standards for criteria air pollutants and to reduce exposure to toxic air contaminants (TACs), the primary objectives of the Advanced Clean Cars II Program (Proposed Program) include the following:

1. Accelerate the deployment of vehicles that achieve the maximum emissions reductions possible from light- and medium-duty vehicles to assist in the attainment of national ambient air quality standards for criteria air pollutants (Health & Safety Code §§ 43000.5(b), 43018(a)).

2. Develop a regulation that is consistent with and meets the goals of the State Implementation Plan (SIP), providing necessary emission reductions from vehicular sources for the federal ambient air quality standards to be met in all of California, which has the most extreme nonattainment areas in the nation and has for decades (Health & Safety Code §§ 39002, 39003, 39602.5, 43000, 43000.5, 43013, 43018).

3. Because California endures some of the most extreme effects of climate change and is acutely vulnerable to those impacts, decrease GHG emissions in support of statewide GHG reduction goals by adopting strategies to deploy light-duty zero-emission vehicles (ZEVs) in California as identified in the Scoping Plan, which was developed to reduce GHG emissions in California as directed by AB 32 (Ch. 488, Stats. of 2006, Nuñez). CARB's 2017 Climate Change Scoping Plan and 2020 Mobile Source Strategy aim to accelerate development and deployment of the cleanest feasible mobile source technologies and to improve access to clean transportation. Implementation of the Proposed Program would contribute to reducing GHG emissions through the electrification of the mobile source sector in a manner that minimizes costs and maximizes benefits for California's economy, maximizes environmental and economic co-benefits under Health and Safety Code § 38501, and would also provide further GHG reductions pursuant to AB 1493 (Ch. 200, Stats. of 2002, Pavley).

4. Maintain and continue reductions in emissions of GHGs beyond 2020, in accordance with AB 32 (Health & Safety Code §§ 38551(b), 38562, 38562.5), and pursue measures that implement reduction strategies covering the State's GHG emissions in furtherance of California's mandate to reduce GHG emissions to 40

percent below the 1990 level by December 31, 2030 in accordance with SB 32 (Health & Safety Code § 38566)

5. Lead the transition of California's light-duty transportation sector from internal combustion to zero-emission powertrains.

6. Reduce the State's dependence on petroleum as an energy resource and support the use of diversified fuels in the State's transportation fleet (Health & Safety Code § 43000(e), California Public Resources Code (PRC) § 25000.5). In addition, petroleum use as an energy resource contributes substantially to the following public health and environmental problems: air pollution, acid rain, global warming, and the degradation of California's marine environment and fisheries (PRC § 25000.5(b), (c)).

7. Complement existing programs and plans to ensure, to the extent feasible, that activities undertaken pursuant to the measures complement, and do not interfere with, existing planning efforts to reduce GHG emissions, criteria pollutants, petroleum-based transportation fuels, and TAC emissions.

8. Achieve emission reductions that are real, permanent, quantifiable, verifiable, and enforceable (Health & Safety Code §§ 38560, 38562(d)(1)).

9. Provide market certainty for zero-emission technologies and fueling infrastructure to guide the acceleration of the development of environmentally superior light-duty vehicles that will continue to deliver performance, utility, and safety demanded by the market.

10. Take steps to ensure all Californians can live, work, and play in a healthful environment free from harmful exposure to air pollution. Protect and preserve public health and well-being, and prevent irritation to the senses, interference with visibility, and damage to vegetation and property (Health & Safety Code § 43000(b)) in recognition that the emission of air pollutants from motor vehicles is the primary cause of air pollution in many parts of the State (Health & Safety Code § 43000(a)).

11. Spur economic activity of zero-emission technologies in the light-duty vehicle sector. Incentivize innovation that will transition California's economy into greater use of clean and sustainable zero-emission technologies and promote increased economic and employment benefits that will accompany this transition (AB 1493, § 1(g); Health & Safety Code §§ 38501(e), 43018.5(c)). Reduce emissions from vehicles in a manner that is equitable, does not disproportionately impact low-income communities, and minimizes the administrative burden of complying with the regulations. (Health and Safety Code §§ 38562, 38562.5, 44391.2.)

B. Description of Proposed Project and Reasonably Foreseeable Compliance Responses

The ACC program was first adopted by CARB in 2012, including the Low-Emission Vehicle (LEV) III Criteria Regulation, the LEV Greenhouse Gas (GHG) Regulation, and the Zero-Emission Vehicle (ZEV) Regulation. The Proposed Program establishes the next set of LEV criteria and ZEV requirements to further reduce emissions of criteria air pollutants (including precursors) and GHGs from light- and medium-duty vehicles in California. Accordingly, the Proposed Program would include more stringent emission standards and requirements for passenger vehicle manufacturers to increase zero-emission technology in vehicles offered for sale in California.

The main objective of the Proposed Program is to maximize criteria emission reductions from internal combustion engine vehicles (ICEVs), while accelerating the transition to ZEVs through both increased stringency of requirements and associated actions to support wide-scale ZEV adoption and use. Under the Proposed Program, the LEV IV Criteria Regulation will aim to reduce emissions by tightening standards where necessary and adding requirements that translate to real-world emission benefits, such as ensuring that cold-start emissions are well-controlled, revising medium-duty vehicle standards to cover a broader range of in-use driving conditions, and strengthening emission standards for aggressive driving. The ZEV Regulation will increase the new vehicle sales requirements to 100 percent plug-in hybrid electric vehicles and ZEVs by 2035 in California. Additionally, the Proposed Program will aim to ensure that ZEVs will eliminate emissions from conventional engines by being fully capable of replacing conventional vehicles for all drivers, for both new and used markets, and through requirements for manufacturers to provide consumers comparable information, durability, and access to maintenance and repairs for ZEVs as for conventional engines. These requirements include ZEV assurance measures, such as requiring a consumer-facing battery state of health indicator, adding ZEVs into existing service information requirements, and adding useful life and minimum warranty requirements for ZEVs. The major components of the Proposed Program are discussed in greater detail below.

As discussed further in Section C of this chapter, for CEQA purposes the "project" is the collective set of proposed regulatory amendments that would affect manufacturer design of vehicles, while also meeting other regulatory requirements. The proposed regulations and amendments are analyzed as one project because the regulations are related and compliance responses by vehicle manufacturers would have a combined effect on the statewide vehicle fleet, how light- and medium-duty vehicles are produced, sold, and leased, and the use of alternative fuels. For LEV IV and ZEV, the regulated community would be automobile manufacturers. For the Proposed Program as a whole, fuel producers (e.g., hydrogen), electricity generators, suppliers and installers of infrastructure to refuel ZEVs, and mining could also be affected. A combined analysis is necessary to provide a comprehensive review of the effects of these collective regulations.

1. Regulated Community Compliance Responses

Compliance responses are activities undertaken by regulated communities to comply with regulations. Compliance activities would change in response to regulatory amendments included in the Proposed Program. This Draft Environmental Analysis (EA) presents a programmatic evaluation that describes reasonably foreseeable environmental impacts resulting from the change in compliance responses by regulated communities. The analysis considers reasonable, potential compliance responses, but does not speculate as to all the conceivable iterations of compliance responses that could occur within the passenger vehicle fleet or at the site- or project-specific level.

It is not possible to know with a reasonable level of certainty the specific actions that would be selected by regulated communities to comply with the regulatory changes under the Proposed Program. Individual vehicle manufacturers could choose other compliance responses that result in different project impacts. For the purposes of this EA, the least expensive compliance responses are generally expected to be implemented by covered industries, although the responses of individual regulated communities within affected industries may differ depending on relative compliance costs and other factors.

The following compliance responses have been identified as reasonably foreseeable actions and provide the basis for a reasoned, good-faith assessment of potential, significant environmental impacts of the regulatory amendments under the Proposed Program. The compliance responses associated with each component of the Proposed Program are discussed separately below.

2. Proposed Program

The Proposed Program recommends new LEV criteria and ZEV regulations for 2026 and subsequent model year vehicles. Staff's proposal also recommends new supporting LEV and ZEV test procedures as well as establishing what are referred to as ZEV assurance measures, which include new durability, warranty, serviceability, data standardization, and battery labeling requirements for ZEVs, to ensure ZEVs can serve as true replacements to conventional ICEVs and provide consumer confidence to ensure that they effectively displace emissions from ICEVs. The major elements of the Proposed Program are described below.

C. LEV Proposals

As the Proposed Program guides the light-duty vehicle sector toward nearly 100 percent electrification by 2035 (i.e., sales of plug-in hybrid electric vehicles will continue to be permitted), it signifies that the last conventional ICEVs may be sold during this period. However, these ICEVs may remain in-use on California's roads well beyond 2035. As such, the Proposed Program will include three primary elements aimed to mitigate the impacts of the remaining ICEVs. First, it will prevent emission backsliding of ICEVs as more ZEVs are sold in California. Second, it will clean up the worst emitting vehicles in

the new-vehicle fleet for exhaust and evaporative emissions. Third, it will reduce cold-start emissions by ensuring more robust emission calibration and provide better emission control for a broader range of in-use driving conditions. The combination of these three elements will help deliver real-world emission benefits from the ICEVs that will complement more significant emission reductions gained by ever increasing use of zero-emission technologies.

For the medium-duty vehicle segment, the Proposed Program will first provide better emission control for a broader range of in-use driving conditions with the moving average in-use standard for towing vehicles. Second, the proposal will further push cleaner vehicles based on certification data and deliver needed criteria air pollutant emission reductions. Third, the proposal will clean up the worst emitting vehicles.

These proposals would be implemented in tandem with corresponding certification requirements. For manufacturers to sell new light-duty vehicles in California, they must be certified by CARB under an Executive Order. To get this certification, a gasoline or diesel vehicle must demonstrate that its exhaust (also known as tailpipe) emissions and evaporative emission control systems (as applicable, depending on the specific vehicle category) comply with the emission standards for the vehicle's useful life, which is 15 years or 150,000 miles. The certification testing is carried out by the vehicle manufacturer, and the certification vehicle typically represents a group of similar vehicle models. Vehicles are lumped into test groups for exhaust emission testing, and into evaporative families for evaporative emission testing. Vehicles in the same test group share attributes such as similar engine size and the number and arrangement of cylinders, while vehicles in the same evaporative family share similar fuel tank size as well as common emission control components.

Each test group must meet emission standards set on different test cycles in a testing laboratory. The emission test cycles include the Federal Test Procedure (FTP) cycle which represents urban driving and the Highway (HWY) cycle which represents highway driving, as it is named. The FTP and HWY cycle are combined and referred to as a 2-cycle test. Vehicles must also be tested on the US06 cycle which represents aggressive driving, the SC03 cycle which accounts for driving with air conditioning use in warm weather, and FTP tests at ambient temperatures of 20°F and 50°F to represent driving in cold weather conditions. These cycles are meant to represent the worst-case emissions during cold and hot starts. The FTP, Highway, US06, SC03, and 20°F tests are collectively referred to as the 5-cycle tests and result in certification to specific emission standard bins.

In general, the proposed standards continue to require emission reductions already achieved under the existing standards. The Proposed Program adjusts how compliance is determined and the operating conditions under which they apply to ensure the expected emission reductions are realized across a broader range of operating conditions. The requisite technology to meet the standards has already been developed and is available in the market.

Further details of individual LEV criteria proposals are outlined below.

1. Fleet Average Standard without ZEVs

a) Summary

Existing LEV III standards require the light-duty vehicle fleet to meet a declining fleet average standard for non-methane organic gases and oxides of nitrogen (NMOG+NOx) that reaches 0.030 grams per mile in the 2025 model year. Currently, manufacturers factor in all ICEVs, plug-in hybrid electric vehicles (PHEVs), and ZEVs when calculating their compliance with the LEV fleet average regulation. As ZEV sales grow, automakers could (under the current standards) increase emission rates from conventional vehicles and continue to meet the existing emission standards. To prevent any potential backsliding, staff is proposing to maintain the fleet average at 0.030 grams per mile beyond the 2025 model year, while gradually phasing-out ZEVs from the NMOG+NOx fleet average by the 2029 model year. This proposal will guarantee that ICEVs will not backslide on emissions as they will be required to meet a fleet average of 0.030 grams per mile on their own in 2029 and subsequent model years, regardless of how many ZEVs are sold.

b) Compliance Responses

The proposed changes to the NMOG+NOx fleet average requirements of taking ZEVs out of the fleet average are not expected to have any additional compliance responses relative to the baseline. Generally, modifications to the fleet average standard would affect the mix of vehicle models and types that manufacturers would sell and lease in California, as a greater proportion of the vehicle fleet would consist of vehicles from the more stringent emission performance classes. The prior LEV III rulemaking included requirements to convert all ICE vehicles in the light-duty fleet from the existing LEV and Ultra LEV (ULEV) emission levels down to Super Ultra Low-Emission-Vehicle 30 emission levels (SULEV30) by 2025, meaning the prior rulemaking already accounted for meeting the fleet average without any ZEVs. Technologies included in the LEV III analysis were larger volume catalysts, greater catalyst precious metal loading, more optimized close coupled catalysts, optimized thermal management, low thermal mass turbochargers, double layer catalyst washcoat, and improved fuel injection control. Staff is assuming no additional actions, beyond those already considered in the LEV III rulemaking, will be needed to phase-out ZEVs from the fleet average as part of this Proposed Program.

2. Stand-Alone Standards & PM Standard for Aggressive Driving

a) Summary

Staff is proposing new rules that will clean up or eliminate the highest emitting vehicles in the fleet. To account for emissions during urban driving, existing regulations allow manufacturers to certify ICEVs using the urban Federal Test Procedure (FTP) test cycle in discrete emission bins, ranging from 0.020 grams per mile to 0.160 grams per mile. Staff proposes to eliminate the dirtiest FTP emission certification bins and add cleaner emission bins to provide more options for manufacturers to certify vehicles at lower

emission levels. As a result, this proposal will move the ICEV fleet to cleaner emission bins by reducing the upper limit to 0.070 grams per mile and extending the lower limit to 0.015 grams per mile.

Staff also propose changes to the certification options and emission standards for aggressive driving to better control criteria emissions during rapid accelerations and high speeds. For NMOG+NOx emissions, current rules allow aggressive driving emissions, such as US06 cycle, to be certified using a composite standard that averages results from US06, SC03 and FTP. However, staff's analysis found that the composite average method allowed for poor emission control during aggressive driving on the US06 cycle for a small portion of the fleet. Therefore, staff proposes to eliminate the composite average certification option and require all vehicles to certify using a stand-alone standard for the aggressive US06 cycle that is equivalent to the urban driving FTP cycle. For particulate matter emissions, staff's analysis found that the majority of vehicles emit less than 3 milligrams per mile on the aggressive US06 cycle, even though the current standard for light duty vehicles is 6 milligrams per mile. Beginning in the 2026 model year, staff proposes to reduce the US06 emission standard from 6 to 3 milligrams per mile for all vehicles. These changes will clean up the highest emitting vehicles in the fleet by ensuring all vehicles have good emission control during aggressive driving.

b) Compliance Responses

Staff is proposing new rules to both tighten and require all vehicles to be certified to the stand-alone US06 emission standards for NMOG+NOx. The aim of this proposal is to clean up the highest emitting vehicles in the fleet, so the proposed standards were set at levels that most vehicles in the fleet are already able to meet. Analysis of certification data revealed that only 7 percent of the fleet currently exceeds the proposed emission targets for the stand-alone US06 NMOG+NOx standards (see Calibration work may include determining optimal fuel injection timing, fuel quantity, fuel atomization/mixing, spark timing, and other intake and exhaust air flow management through variable valve timing and electronic throttle control. However, most vehicles are not expected to incur additional calibration relative to what is already typically done for ICEVs. Instead, like most vehicles that already comply with the standard, it is likely that a higher emphasis would be placed on maintaining low emissions when developing and optimizing the calibration among other competing factors such as drivability, performance, and noise/vibration mitigation.

On the other hand, upgrades to the catalyst system would likely be needed to meet the proposed US06 NMOG+NOx standards. For the emission control hardware, CARB's staff analysis revealed that vehicles expected to meet the proposed standards had, on average, a catalyst that was more heavily loaded with precious metals compared to the 7 percent of the fleet that is expected to be out-of-compliance. Given this dominant factor in catalyst system design to meet the standards, it is anticipated that there may be an increased demand of key precious metals platinum, palladium, and rhodium. At the same time, improvements in catalyst technology, such as improved wash coats that are more durable and provide the same or higher conversion efficiencies with less

precious metal content, are expected to continue to decrease precious metal content demand. Furthermore, as the light-duty fleet transitions to ZEVs, the catalyst precious metal demand will continue to decrease.

Table 1 for the number of vehicles affected by this Proposed Program). Therefore, compliance responses associated with the proposed changes only apply to a relatively small percentage of the fleet. To comply with the proposed standards, these vehicles would likely need better optimized calibration work, and some may need to upgrade the emission control hardware, namely, the catalyst system.

Calibration work may include determining optimal fuel injection timing, fuel quantity, fuel atomization/mixing, spark timing, and other intake and exhaust air flow management through variable valve timing and electronic throttle control. However, most vehicles are not expected to incur additional calibration relative to what is already typically done for ICEVs. Instead, like most vehicles that already comply with the standard, it is likely that a higher emphasis would be placed on maintaining low emissions when developing and optimizing the calibration among other competing factors such as drivability, performance, and noise/vibration mitigation.

On the other hand, upgrades to the catalyst system would likely be needed to meet the proposed US06 NMOG+NOx standards. For the emission control hardware, CARB's staff analysis revealed that vehicles expected to meet the proposed standards had, on average, a catalyst that was more heavily loaded with precious metals compared to the 7 percent of the fleet that is expected to be out-of-compliance. Given this dominant factor in catalyst system design to meet the standards, it is anticipated that there may be an increased demand of key precious metals platinum, palladium, and rhodium. At the same time, improvements in catalyst technology, such as improved wash coats[1] that are more durable and provide the same or higher conversion efficiencies with less precious metal content, are expected to continue to decrease precious metal content demand. Furthermore, as the light-duty fleet transitions to ZEVs, the catalyst precious metal demand will continue to decrease.

Table 1: Anticipated Number of Vehicles Affected by the Proposed US06 NMOG+NOx Standards by Model Year

Model Year	Vehicles Affected
2026	0
2027	0
2028	72,785
2029	71,028
2030	59,201
2031	48,608

[1] Emission control catalysts are typically manufactured by applying wash coat onto catalyst supports. The wash coat serves as the carrier for a precious metal catalyst.

Model Year	Vehicles Affected
2032	40,640
2033	32,595
2034	14,733
2035	12,698
Total	352,289

CARB staff is also proposing to reduce the US06 PM standard from 6 milligrams per mile (mg/mile) to 3 mg/mile. Certification data indicate that over 80 percent of current vehicles already emit below 3 mg/mile on the US06 cycle. Therefore, the aim of the current proposal is to clean up the worst emitting vehicles and to ensure those that are already cleaner do not get worse. CARB staff expects that the percentage of vehicles in compliance with the proposed 3 mg/mile US06 standard will continue to grow towards 100 percent as vehicles are redesigned to meet the more stringent 1 mg/mile FTP standard that is required by the LEV III regulations, which are currently in effect. This is expected because much of the technology that will be applied to vehicles to meet the 1 mg/mile FTP standard should also enable vehicles to meet the proposed 3 mg/mile US06 standard as confirmed by CARB staff emission testing where the lower-emitting vehicles on the FTP cycle typically also had lower emissions on the US06 cycle.

However, in the absence of a tighter 3 mg/mile US06 standard, some vehicles could end up using less robust solutions or less refined calibrations that allow excess PM emissions under the higher speeds and acceleration rates represented by the US06 cycle. For instance, approaches that only focus on reducing PM emissions at initial start-up such as adjusting early fuel injection pressure and timing as well as spray pattern with injector design, orientation, and split injections could have a large impact on FTP emissions but no impact on the US06 where start emissions are excluded. Reasonably foreseeable responses for complying with tightening the US06 PM standard are; therefore, hardware and software solutions that achieve low PM emissions under broader driving conditions, such as by ensuring good air-fuel control during transient operating events or rapid accelerator movement and avoiding or mitigating the use of fuel enrichment under acceleration.

3. Cold-Start Emission Control

a) Summary

The Proposed Program will introduce new rules that regulate cold-start emissions during a broader range of driving conditions than current certification tests. Staff's analysis of real-world driving data found differences between in-use driving patterns and lab test procedures that disproportionately impacted in-use emissions. First, lab tests require vehicles to be "soaked," meaning the vehicle is shut-off and stored in a controlled temperature environment at 68 to 86 degrees Fahrenheit for 12-36 hours before a cold-start emission test. However, in-use data suggested that over 40 percent of trips had much shorter "partial soaks" of 20 minutes to 5 hours. Vehicle testing revealed that

partial soaks caused higher emissions than full soaks of 12 to 36 hours, caused by poor vehicle emission control calibration. Therefore, staff proposes new emission standards for partial soaks (or partial cool down start emissions) based on test data of the lowest emitting vehicles which shows that it is possible to control emission at these soak levels. The proposal will lead to real-world emission benefits by ensuring vehicles have good emission control for all soaks because of new testing requirements.

Staff will also propose new standards that will help control cold-start emissions for quick drive-aways at the start of a trip. Staff found differences in initial idle duration between real-world driving and lab test procedures. The FTP cold-start certification test begins by turning on the vehicle and idling the engine for 20 seconds before the first acceleration. Current vehicles heavily rely on those first 20 seconds of engine idle to gradually warm-up the engine after-treatment catalyst before the first acceleration. However, in-use data revealed shorter idling periods, where 50 percent of trips had an initial idle of 14 seconds or less and 25 percent of trips had an initial idle of 8 seconds or less. Vehicle testing showed that shorter idling times led to higher emissions than were shown on certification tests. Therefore, staff proposes cold-start emissions to be certified using the current FTP test and an additional "quick drive-away" FTP cold-start certification test that has a shorter initial idle of 8 seconds. The emission standards for this new test would be based on the lowest emitting vehicles tested by CARB. The addition of a new cold-start test with a shorter initial idle would ensure better emission control over a broader range of real-world driving conditions and result in lower early drive-away cold-start emissions.

Finally, staff also found PHEVs can have higher in-use cold-start emissions if the combustion engine start is triggered by high-power demand, such as a freeway acceleration event. High-power cold starts represent an emission concern that is unique to blended PHEVs[2], since non-blended PHEVs can drive fully electric even during high-power demand. Therefore, staff proposes blended PHEVs must meet a new cold-start emission standard for the more aggressive US06 test. The emission targets for this new test will be based on the best performing PHEVs tested by CARB. The new requirements will lead to better vehicle calibration and reduce cold-start emissions during high-power engine starts.

b) Compliance Responses

Staff is proposing three new requirements to reduce cold-start emissions from light-duty vehicles – a new standard to control partial cool down start emissions, a new standard to regulate early drive-away cold-start emissions, and a new standard to control high-power cold-start emissions from plug-in hybrid electric vehicles. CARB staff expect that vehicles would predominantly meet the new standards by improving cold-start emission calibration through software updates without needing any hardware upgrades.

[2] "Blended" PHEVs refer to those that require the engine to meet the full power demands of the vehicle before the battery has been depleted and hit charge sustaining mode.

Manufacturers have designed and calibrated their emission control strategies that accelerate initial catalyst warm-up to work on overnight soaks where both the engine and catalyst are at ambient temperature. Some manufacturers have not considered intermediate temperatures on shorter soaks. After the issue was brought to light by CARB testing, some manufacturers have already started voluntarily implementing software calibration changes to reduce start emissions from intermediate soaks. Some strategies that may need to be re-optimized include engine idle speed, spark ignition timing, fuel injection control, and variable valve timing. Similarly, software calibration is also expected to control early drive-away cold-start emissions. Calibration changes may be necessary to reduce engine-out emissions during the first 8 seconds of idle or to help heat-up the catalyst more efficiently.

For blended PHEVs, although improvements can be made by better calibration of the transition from pure electric to blended operation, more significant improvements may require added or redesigned hardware. To date, some PHEVs have moved to more powerful electric motors and batteries that would reduce the reliance on the combustion engine and reduce the occurrence of these high-power cold starts. Other manufacturers have been exploring the use of added emission controls like electrically heated catalysts that would accelerate catalyst light-off and/or preheat the catalyst before starting the engine.

4. Lower Running Loss Standard

a) Summary

Running loss emissions are a part of evaporative emissions that encompass the fuel vapors escaping from the vehicle during driving. The current standard has not been changed since its introduction in the 1990s. Based on manufacturer's model year 2021 certification data, most of the vehicles (92 percent) certified at or below 0.01 gram per mile. Therefore, staff proposes to reduce the evaporative emission running loss standard from 0.05 grams per mile down to 0.01 grams per mile. The goal of the Proposed Program to the evaporative running loss standards is to improve a small proportion of vehicles which are currently certifying to a higher level of emissions.

The second part of the evaporative emission proposal involves controlling emissions unique to special sealed non-integrated refueling canister only system (NIRCOS) gasoline tanks common on PHEVs (and some HEVs). The carbon canister is one of the main components of an evaporative system and absorbs and stores gasoline vapors. Because of the way these vehicles are tested, staff found that these canisters may be undersized sometimes for real world driving conditions. Instead of adding additional testing requirements, staff proposes a formula to determine a minimum canister size. Specifically, staff proposes a minimum canister size for vehicles with a NIRCOS fuel system and other vehicles which have fuel tank pressure exceeding a specified threshold. About 6 percent of vehicles in the California fleet have this type of fuel system, and these numbers are expected to grow in the future as a result of staff's proposed ZEV regulation. Staff's estimate is that almost all of vehicles with NIRCOS

tanks currently do have a large enough canister, and only one vehicle which is currently produced has an undersized canister. However, with the likelihood of more PHEVs, which use this type of fuel system, entering the fleet in the future, it is important that canisters on these vehicles are adequately sized to handle puff emissions. Manufacturers would demonstrate compliance using a CARB defined evaporative model and a defined calculation without adding testing burden.

b) Compliance Responses

The Proposed Program includes vehicle certification requirements for evaporative emission standards. Manufacturers would comply with these regulations through testing and calculation reporting.

Both increasing purge of stored fuel vapors and reducing fuel vapor generation by keeping the fuel tank cooler are known to improve running loss emissions. Low permeation materials and connections for the fuel lines are also key to low running loss emissions. To meet the proposed running loss standard, staff estimates a one-time redesign need for about 8 percent of new vehicles that are not already capable of meeting the proposed running loss standard. This redesign would likely reconfigure the vehicle's layout to get more space around the fuel tank. More space around the fuel tank would result in less heating of the fuel tank from neighboring components and could also allow for better air circulation while driving, which would cool the fuel tank. This should ultimately result in less fuel vapors being generated and escaping to the atmosphere while the vehicle is driving (running loss emissions).

The technologies necessary to meet the proposed LEV IV running loss evaporative emission standards would generally be the same as the technologies currently used to meet the existing standards. The nature of compliance for this measure is primarily expected to be through design layout and calibration, rather than incurring additional hardware. Because the types of technologies used currently would also be employed to meet the amended regulations, no substantial change in the manufacturing of emissions control equipment would be expected. Staff expects that the proposed minimum canister size requirement will have minimal impact on compliance burden, since the vast majority of vehicles on the market today already meet this. Therefore, this is intended as an anti-backsliding measure, assuring that future vehicles, especially PHEVs which have the NIRCOS fuel system which this proposal applies to, have enough canister capacity to handle puff emissions.

5. Modifications to Emission Standards for Medium-Duty Vehicles

a) Summary

i) PEMS In-use Standards for MDVs greater than 14,000 GCWR

The Proposed Program would require that chassis certified medium-duty vehicles (MDVs) with a gross combined weight rating (GCWR) over 14,000 pounds (lbs) meet a new in-use requirement like the heavy duty (HD) moving average window (MAW)

requirement.[3] The test procedures and standards for this new in-use requirement will be similar to those adopted as part of the HD Low NOx Omnibus rulemaking[4] adopted by the Board at the August 2020 board hearing. This proposal would ensure emissions are adequately controlled during all engine operations that occur on-road, especially during towing.

The new in-use requirement for chassis certified MDVs would require automakers to test in-use chassis certified MDVs in class 2b and 3 on-road using a Portable Emissions Measurement System (PEMS) installed on the vehicle driving on-road. The PEMS unit would measure and record emissions data from the vehicle tailpipe exhaust outlet. The method for analyzing the PEMS emissions test data collected is referred to as the Moving Average Window (MAW) method. This method analyzes the PEMS data over continuous five-minute periods that start at every second. Each period or window is binned based on engine load into its own specific bin and compared to the in-use emission threshold. This requirement is new to MDVs and takes the testing outside the lab to measure emissions during on-road driving. The emissions evaluated during in-use PEMS testing will consist of NOx, NMHC, CO, and PM. Automakers will be responsible for conducting their own PEMS in-use testing and will report for the test groups selected by CARB.

ii) Lower Fleet Average Standards for Medium-Duty Fleet

Similar to LEV III light-duty vehicles, chassis-certified LEV III MDVs in Class 2b and Class 3 must meet a fleet average standard that reduces each year through 2022 model year. In 2022 the fleet average standard is 0.178 g/mile and 0.247 g/mile for Class 2b and 3 respectively. Currently, vehicles certify to lower bins and additional technology exists so that they can continue to make improvements. The Proposed Program would reduce both fleet average standards to 0.150 g/mile and 0.175 g/mile for class 2b and 3, respectively, starting in 2026. In addition, this proposal includes the removal of medium duty ZEVs from the fleet average in 2026 for both class 2b and class 3, as ZEVs are expected to make up 50 percent of MDV sales by 2035 to comply with the ACT regulation (California Code of Regulations, title 13, §1963).

Existing regulations allow automakers to certify ICE MDVs on the FTP test cycle for urban driving in discrete emission bins, ranging from 0.150 g/mile up to 0.250 g/mile for Class 2b and 0.200 g/mile to 0.400 grams per mile for Class 3. To help meet the lower fleet average standards, the proposal also revises emission bins for urban driving by eliminating the dirtiest emissions bins and adding lower emission bin options for

[3] There are two types of MDVs – those that are certified using the chassis dynamometer and those certified using an engine dynamometer. Chassis-certified vehicles make up about 80 percent of the MDV category and are generally gasoline-powered. The remaining 20 percent of the MDV category are engine-certified vehicles, mostly diesel-powered.

[4] California Air Resources Board. 2020. "Public Hearing to Consider the Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments." Released June 23, 2020. Accessed January 31, 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hdomnibuslownox/isor.pdf

manufacturers to certify vehicles. As a result, this proposal would move the fleet to cleaner emission bins by reducing the upper limit for class 2b to 0.150 g/mile and expanding the lower limit to 0.075 g/mile. Similarly, class 3 emission bin upper limits would reduce to 0.230 g/mile and the lower limit would expand to 0.100 g/mile.

iii) Standalone Standards for MDV for Aggressive Driving Cycles

As with passenger cars and trucks, staff also propose changes to the certification options and emission standards for aggressive driving for MDVs. For NMOG+NOx, carbon monoxide (CO), and particulate matter, current regulations allow aggressive driving emissions to be certified using a composite standard that averages aggressive driving emissions with urban driving emissions. However, staff's analysis found that the composite average method allowed for poor emission control during aggressive driving for a small portion of the fleet. Therefore, staff proposes to eliminate the composite average certification option and instead require all vehicles to certify aggressive driving emissions using a stand-alone standard for the aggressive test cycles such as the US06 or hot 1435UC/LA92 cycle depending on the category the vehicle is certified to. The stand-alone aggressive driving standard would require class 2b and class 3 MDVs to meet the same emission levels as the FTP emission bins they currently certify under. These changes will clean up the highest emitting vehicles in the fleet by ensuring all vehicles have good emission control during aggressive driving

b) Compliance Responses

For chassis-certified MDVs over 14,000 lbs GCWR, which are mostly diesel vehicles, meeting the proposed PEMS in-use requirement would require hardware and calibration changes. Chassis-certified MDVs are already typically equipped with some emission reduction technologies such as exhaust gas recirculation (EGR) cooler bypass. However, additional emissions controls would be needed to meet the new in-use standards. These technologies include split selective catalytic reduction (SCR) systems, ammonia slip catalyst systems, and dual diesel exhaust fluid (DEF) dosing systems.

CARB staff's testing and analysis has shown that gasoline chassis-certified MDV emissions are already much better controlled than diesel vehicles and would require much less improvement to meet the proposed PEMS in-use standard. For chassis-certified gasoline MDVs, the reasonably foreseeable compliance responses include changes to the three-way catalyst (TWC) system, such as catalyst sizing and precious metal loading, and the use of multiple TWC systems, as well as calibration work. Additional technologies may also be available, such as cylinder deactivation, electrical heaters for catalyst, electronic throttle control, cooled exhaust manifold, and advance transmissions which could be used to help reduce emissions over all engine operations.

MDVs that are required to meet the proposed PEMS in-use standard would also have to meet the more stringent proposed FTP and SFTP standards. However, as the PEMS standard covers a broader spectrum of engine operating conditions than the certification test cycles, the implementation of these new emission control systems used

to comply with the PEMS standard is expected to also reduce emissions adequately during their certification test cycles to meet the more stringent proposed chassis standards. Accordingly, no further compliance response is assumed above and beyond the responses likely for the proposed PEMS standard.

MDVs that are exempt from the proposed PEMS requirement (i.e., MDVs less than 14,000 lbs GCWR) would potentially need to make additional hardware or calibration changes to meet the more stringent FTP and SFTP standards. However, based on certification data and testing by CARB, many of these MDVs appear capable of already meeting the proposed standards. Staff has analyzed certification data to determine what fraction of test groups under 14,000 lbs GCWR would likely be required to make changes to meet the proposed standards. Based on certification data, 1 of 3 diesel test groups and 6 of 9 gasoline test groups are estimated to need hardware changes and/or calibration changes. By comparing the catalyst information between vehicles meeting the proposed standards and those that were not, staff found that most vehicles that could not meet the proposed standards had directionally lower precious metal loadings than those that could meet the proposed standards. As such, likely compliance responses include changes to SCR or TWC catalytic converters to include higher catalyst loadings, thus potentially increasing precious metal demand. For those vehicles with equivalent catalyst loading to the better performing vehicles, staff assume that only calibration work, such as updates to the software in the engine control module, would be needed.

D. ZEV Proposals

Light-duty vehicle manufacturers are also subject to the ZEV Proposed Program that require this vehicle segment to expand to 100 percent ZEV and heavily electrified PHEV sales in California by 2035. In the current ZEV regulation, the manufacturers must meet a credit requirement for each model year based on their total California sales. Current ZEV requirements vary for manufacturers based on the number of vehicles they produce and deliver for sale in California, and credits per vehicle vary based on vehicle technology and performance attributes. Overcompliance with current ZEV requirement has generated a bank of credits that the new regulation must account for and define credit life to transition to 100 percent ZEV sales. Building on the success of electrification in the last 10 years, now is the appropriate time to push for all new vehicle sales in the light-duty sector to be electrified by the middle of the next decade. Every major manufacturer in California has announced electrification commitments and meaningful sustainability targets to meet not only California's goals, but also those of the United States and the world. Additionally, falling costs of lithium batteries, advancements in battery chemistry and technology, and other electrification components impose modest incremental costs the market can sustain that deliver significant increases in performance. The technology necessary to meet a requirement for all new vehicle sales to be zero emission or plug-in hybrid has been or is capable of being developed in the time provided.

To fully realize 100 percent ZEVs and PHEVs, staff has taken a new approach in this proposal compared to prior regulatory changes. Overall, manufacturers must continue to meet a growing percentage of new vehicle sales to be ZEVs and PHEVs. However, instead of earning variable credit for each vehicle produced, staff is proposing minimum technical requirements for battery electric vehicles (BEVs) and PHEVs to count towards the annual percentage requirement.

Further, since these ZEVs would replace all new vehicle sales of ICEVs by 2035, the proposal contains additional requirements for durability, warranty, electric charging standardization, battery labeling and serviceability, which are collectively called the ZEV assurance measures.

1. ZEV Stringency: Annual Zero-Emission Vehicle Percentage Requirements

a) Summary

As currently written, the ZEV regulation requires manufactures to deliver for sale an increasing percentage of annual California sales as ZEVs or PHEVs, ending with a credit requirement of 22 percent in model year 2025. The existing ZEV requirement applies to manufacturers who produce and deliver for sale more than or equal to 4,500 light-duty vehicles on average annually in California, exempting those below 4,500 light duty vehicles indefinitely. In total, the requirements affect manufacturers responsible for approximately 98 percent of new passenger cars and trucks sold in California.

Starting in the 2026 model year, staff proposes annual percent delivered for sale requirements stated in Table 2, which achieve 100 percent sales by 2035 model year:

Table 2: ZEV Percent Requirements for 2026 and Subsequent Model Years

Model Year	Percentage Requirement
2026	35%
2027	43%
2028	51%
2029	59%
2030	68%
2031	76%
2032	82%
2033	88%
2034	94%
2035 and subsequent	100%

The requirements have a trajectory that is slightly more aggressive in the first 6 years of the regulation and moderately less aggressive in the final years to 2035. This is because

staff expect the largest-sized vehicle segments would take longer to electrify as costs remain high in the early years.

Because small volume manufacturers typically certify only one or two test groups and represent less than 3 percent of California's light duty vehicle market, staff proposes manufacturers who deliver for sale less than 4,500 light-duty vehicles in California annually must submit a compliance plan by the end of 2032 and must meet the 100 percent ZEV and PHEV requirement no later than the 2035 model year. This would ensure a path for all manufacturers certifying light duty vehicles in California to be in compliance with 100 percent ZEV and PHEV sales beyond 2035 model year.

i) Requirement Structure

In the current ZEV regulation, manufacturers must meet an increasing annual credit requirement for each model year based on an average of their total California sales. As a result, requirements vary for manufacturers based on the total number of vehicles and are expressed in terms of credits. Manufacturers fulfill requirements by delivering for sale ZEVs and PHEVs which earn credits. Credits per vehicle vary based on vehicle technology and performance attributes, most notably the vehicle's all-electric range. Currently, manufacturers can earn credits for qualifying vehicles and use, bank, and sell those credits to other manufacturers for use in future model years. Manufacturers overall are currently over complying with the standard and amassing credits for use toward future standards. Though over compliance does represent desired market growth, it does cause uncertainty for future ZEV volumes, especially for those manufacturers that have not fully committed to zero-emission technologies and are relying on credits from other manufacturers. Staff is therefore proposing to restructure the ZEV requirement for 2026 and subsequent model years.

In general, manufacturers would still be required to produce ZEVs that meet certain minimum technical criteria to be able to apply that ZEV to their annual requirement. Alternatively, manufacturers can fulfill up to 20 percent of their annual requirement with PHEVs that also meet certain technical criteria, discussed below. Eligible ZEVs and PHEVs produced in excess of the requirement could be banked, traded, and used toward a subsequent model year requirement for up to 4 additional model years. For example, 2026 model year ZEVs delivered for sale in excess of a manufacturer's 2026 requirement could be used to meet a manufacturer's requirement through the 2030 model year. Allowing for manufacturers to bank and use excess vehicles in subsequent model years helps manage year to year fluctuations in annual vehicle volumes and still allow for full compliance. Limiting the life of banking within the program will help ensure manufacturers make progress toward future requirements rather than to accumulate large compliance banks to stave off further deployment of ZEVs.

Staff proposes manufacturers may fulfill a portion of their annual requirement with vehicles that generated ZEV credit prior to 2026 model year. Staff is putting forth three proposals related to this flexibility. First, staff proposes to convert pre-2026 banked credits to better fit in with the new regulatory structure. Pre-2026 ZEV credit banks are proposed to be divided by 4, which represents the maximum number of credits earned by a ZEV under the

existing regulation. Pre-2026 PHEV[5] credit banks are proposed to be divided by 1.1, which represents the maximum number of credits earned by a PHEV under the existing regulation. After the credit banks are converted, staff proposes to further limit the use of these pre-2026 MY credits, first by placing a 15 percent cap on each portion of the requirement annually, and second by expiring these converted credits after the 2030 model year.

ii) Minimum Technical Requirements for Vehicles that Count towards the Requirement

2. Minimum Technical Requirements for ZEVs

A ZEV is defined as a vehicle that produces zero exhaust emissions of any criteria air pollutant (including precursors) or GHG emissions under any possible operational modes or conditions. Currently, BEVs and hydrogen fuel cell electric vehicles (FCEVs) meet the definition of a ZEV and can qualify to meet a manufacturers ZEV requirement, so long as other technical minimum requirements[6] are also satisfied. Staff is proposing updating the technical minimum requirements of a ZEV to a 200-mile all electric certified combined city and highway test range. Additionally, staff is proposing that BEVs must have direct current (DC) fast charge capability, with inlets that conform with the Society of Automotive Engineers (SAE) J1772 Combined Charging Standard (CCS). To guarantee appropriate charging speeds, BEVs will be required at minimum to have a 5.76-kilowatt (kW) on-board charger and be equipped with a 20-foot Underwriter Laboratory (UL) 2594 certified convenience cord capable of both level 1 and level 2 electrical charging. Additionally, manufacturers would be required to comply with the durability, warranty, data standardization, service information, and battery label requirements described below.

3. Minimum Technical Requirements for PHEVs

A PHEV is defined as a vehicle that can draw propulsion power from multiple on-board sources including a combustible fuel and a traction battery, with the ability to charge the battery from an off-vehicle power source, such as the electric power grid. Currently, PHEVs are required to have at least 10 miles all electric range, must meet super-ultra-low emission vehicle (SULEV) emission standards, and have an extended warranty on emission related parts. However, staff has found the actual emission reductions and electric vehicle miles traveled on the road by PHEVs are highly variable and consumer dependent. To that end, staff is proposing updated technical minimum requirements for PHEVs to count towards no more than 20 percent of a manufacturer's annual ZEV requirement. Staff is proposing a minimum 50-mile all electric U.S. EPA label range and the ability to do at least 40 miles on an aggressive drive cycle (US06) to demonstrate the strength of the vehicle's electric capability. Staff is also including a 3- year phase-in

[5] PHEV credit banks are referred to as "transitional zero emission vehicle credits" or "TZEV credits" in § 1962.2, title 13, CCR. PHEV will be the nomenclature going forward, and TZEV will no longer be used in future regulations.

[6] ZEVs currently earn credit for having an electric range of 50 miles or more on the Urban Dynamometer Drive Schedule (UDDS), utilizing a credit equation that scales with increased electric range.

option for 2026 through 2028 model year PHEVs with more than 30 miles all-electric range, where manufacturers can earn partial credit based on the vehicle's all-electric range and US06 capability. As with current PHEVs that count toward manufacturers requirements, 2026 and subsequent PHEVs would need to be certified to a SULEV emission bin and have an extended warranty on emission related components for 15 years or 150,000 miles (whichever occurs first). As will be required of BEVs, PHEVs would be required, at a minimum, to have a 5.76 kW onboard charger and be equipped with a 20-foot UL certified convenience cord capable of both level 1 and level 2 electrical charging. Additionally, manufacturers would be required to comply with the warranty and battery label requirements described below.

a) Compliance Responses

i) Fleet Mix

The requirements of the ZEV regulation as proposed for amendment under the Proposed Program are designed to allow vehicle manufacturers to comply with these requirements in a variety of ways. While the proposed changed to the ZEV regulation would require manufacturers to deliver for sale actual ZEVs (i.e., BEVs or FCEVs), a portion of this requirement could also be fulfilled with PHEVs.

Compliance by manufacturers with the ZEV regulation as proposed would significantly increase the number of ZEVs and PHEVs being sold and leased in California, as compared with the current regulation. Table 3 summarizes this projected increase. The proposed ZEV regulation also eliminates differences in the treatment of large- and intermediate-volume vehicle manufacturers in meeting the requirements.[7] Some manufacturers are more focused on fulfilling their ZEV requirements with BEV technologies, while others are more interested in developing FCEVs. The projected numbers of PHEVs, BEVs, and FCEVs are based on the proposed regulatory requirement for each model year assuming that the manufacturers comply in the least costly way for converting their vehicle classes to a ZEV technology.

Table 3: Projected Numbers of ZEVs Sold or Leased in California by Technology Type and Year

Year	BEV	PHEV	FCEV	Total
2026	599,844	63,665	5,616	669,125
2027	756,756	64,000	5,646	826,402
2028	875,698	103,775	5,674	985,147
2029	910,518	229,055	5,702	1,145,274
2030	1,062,766	230,144	33,343	1,326,253
2031	1,202,011	231,191	55,825	1,489,028

[7] Large-volume manufacturers include companies that sell or lease more than 20,000 vehicles per year in California, and intermediate volume manufacturers are companies that sell more than 4,500 vehicles per year.

Year	BEV	PHEV	FCEV	Total
2032	1,325,397	232,213	56,072	1,613,682
2033	1,449,595	233,198	56,310	1,739,103
2034	1,715,148	93,543	56,539	1,865,230
2035	1,752,019	183,238	56,759	1,992,017

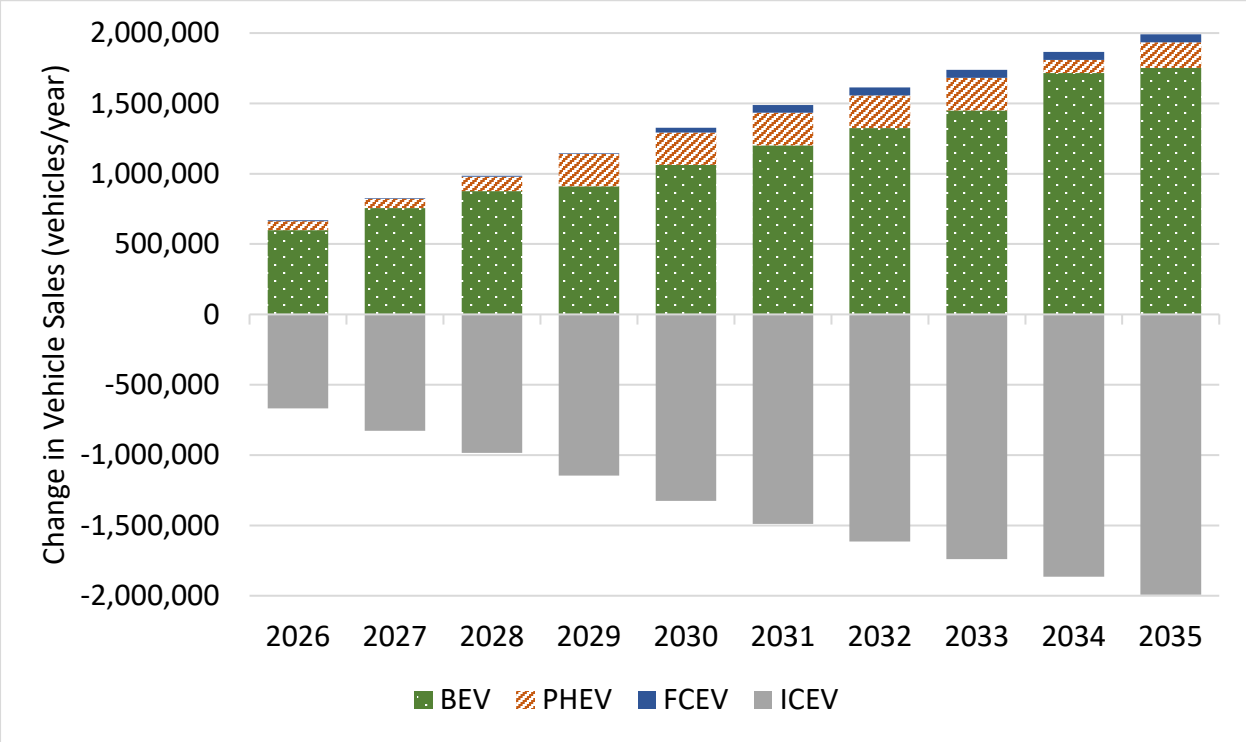

Figure 1: Vehicle sales by technology type

provides a summary of the ZEV sales by vehicle technology added to the fleet to comply with the proposed ZEV regulation by year. For example, in 2030 the figure shows a reduction of about 1,300,000 ICVEs relative to the baseline, which are projected to be replaced primarily with BEVs and some PHEVs and FCEVs.

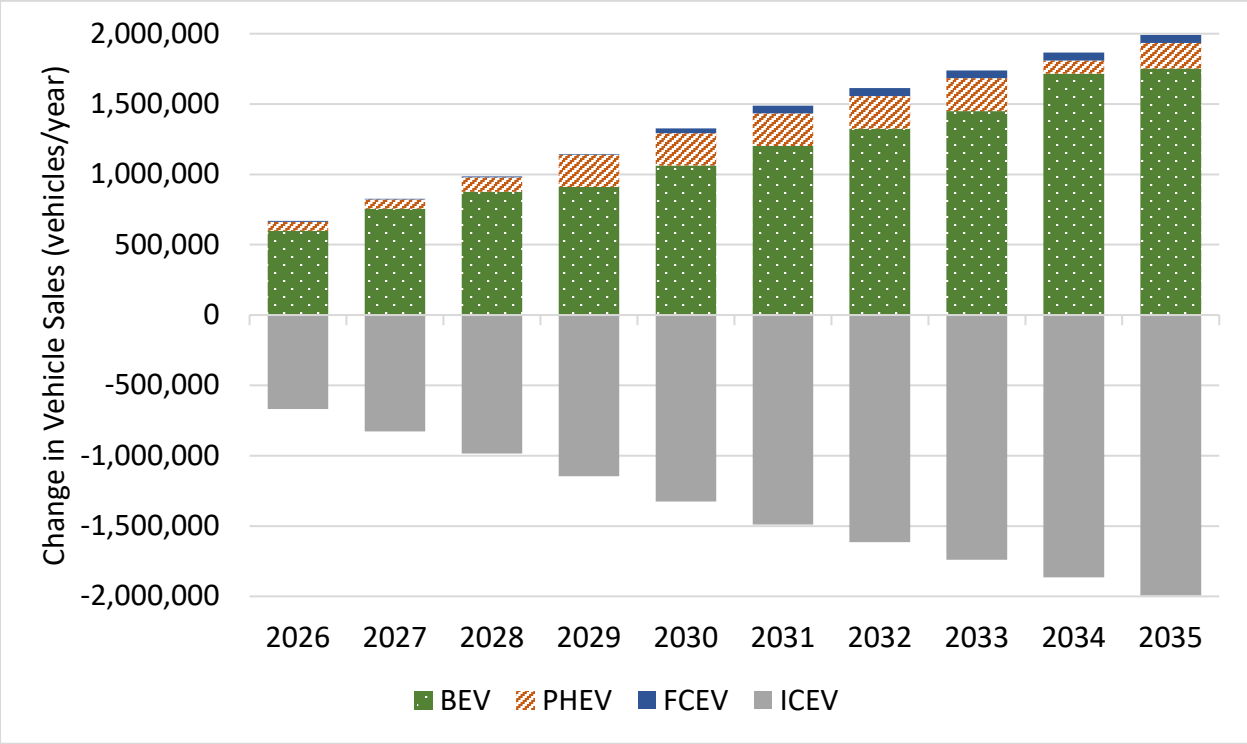

Figure 1: Vehicle sales by technology type

ii) Battery Production

The increase in ZEVs and PHEVs produced by manufacturers to meet requirements of the amended ZEV regulation would be accompanied by an increase in the production of propulsion batteries. Most of today's PHEVs and BEVs use lithium-ion batteries, though the exact chemistry often varies from that of consumer electronics batteries. Lithium-ion batteries are currently used in most portable consumer electronics such as cell phones and laptops because of their high energy per unit mass relative to other electrical energy storage systems. They also have a high power-to-weight ratio, high energy efficiency, good high-temperature performance, and low self-discharge.

Table 4 shows staff estimates of the aggregated amount of propulsion batteries needed to meet the proposed requirements of the ZEV regulation. The battery capacity represents the amount of energy stored in a battery. Battery capacity expresses the projected increase of propulsion batteries because the amount of battery capacity installed in each vehicle would vary according to its size and desired range. CARB staff used the projected ZEV and PHEV volumes for each vehicle class to meet the proposed stringency and the battery sizes for each of those ZEV and PHEV technology packages to generate the required aggregate battery energy capacity for each model year of the proposed rule. By 2035, CARB staff estimates that approximately 150 gigawatt-hours of propulsion battery capacity will need to be produced annually to supply ZEVs and PHEVs in California.

Table 4: Projected Annual Increase in Battery Production (GW-hr)

Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Capacity of Propulsion Batteries	43.2	54.5	63.4	68.7	83.5	97.1	109.3	121.5	145.0	150.8

Notes: GW-hr = gigawatt hours = 1,000,000,000 watts
Source: Projections estimated by CARB, 2022

It is expected that the longevity of batteries would be sufficient to serve their function during the full operational life of the vehicle and that they would not need to be replaced by the owner. Because the number of ZEVs and PHEVs produced would generally be offset by a corresponding decrease in production of internal combustion engine-based vehicles, a net increase in vehicle production facilities would not be anticipated. As the demand for propulsion batteries increases; however, new manufacturing facilities would likely need to be constructed and/or existing plants would be retooled to increase production. Some vehicle manufacturers would produce the batteries used in their cars while others would purchase the batteries from suppliers. Lithium-ion batteries require high quality-control, often including clean-room production facilities, which may necessitate the building of new production facilities.

iii) Critical Mineral Demand

Reasonably foreseeable compliance responses for the ZEV regulation include an increase in demand for lithium-ion batteries, which could require an increase in manufacturing facilities and associated increases in lithium mining and exports from countries with raw mineral supplies. The U.S. is also a source for lithium (e.g., a mining operation currently exists in Nevada, and new facilities are planned in California). Demand for other critical mineral resources, such as cobalt, nickel, and manganese, is also likely to increase.

(a) Lithium

To meet the demand for lithium, new mining operations would likely continue to develop, including potential operations in California. As with other extractive processes necessary for conventional vehicles, the mining of lithium and the other metals used in lithium-ion- batteries have an environmental footprint. Energy consumption, GHG gas emissions, sulfur dioxide emissions, and water consumption associated with extraction vary depending upon the extraction process. An Argonne National Laboratory assessment of the impacts associated with extraction from either concentrated lithium brine (naturally dried in large ponds to evaporate the water and concentrate the lithium) or lithium ores, determined that brine extraction had lower impacts.[8]

[8] Kelly, Jarod C., Michael Wang, Qiang Dai, and Olumide Winjobi. 2021. "Energy, greenhouse gas, and water life cycle analysis of lithium carbonate and lithium hydroxide monohydrate from brine and ore resources and their use in lithium ion battery cathodes and lithium ion batteries." *Resources, Conservation and Recycling,* 174 (2021): 105762. https://doi.org/10.1016/j.resconrec.2021.105762.

However, there is another extraction method planned for California that promises a much smaller impact. It would exploit existing geothermal hot spots in the Salton Sea area. There, dissolved lithium exists in the superheated brines that are currently pumped from reservoirs 8,000 feet underground to the surface to extract the heat energy to generate electricity. Under the new process, lithium would be extracted from the brine before it is reinjected underground. General Motors is investing in Controlled Thermal Resources' Hell's Kitchen project in the Salton Sea area. The project could be producing 60,000 tons of lithium per year by 2024, equal to the lithium battery requirements of as many as 6 million EVs—by mid-2024, making it the largest U.S. producer of lithium.[9]

The California Energy Commission has provided $7.8 million in funding to two other companies also planning to extract lithium from the Salton Sea area using a similar extraction technique. BHER Minerals, LLC will conduct a demonstration project at an existing geothermal power facility in Calipatria that can cost-effectively process at least 100 gallons of geothermal brine per minute to produce battery-grade lithium carbonate, and Materials Research LLC will conduct a pilot-scale demonstration project that uses a newly developed sorbent material to extract lithium from brine and a separate process for the direct formation of high-purity lithium carbonate, which has additional economic value in industry and medicine.[10]

(b) Cobalt

Current lithium-ion EV batteries have shifted from a Lithium-Manganese-Oxide (LMO) based cathode chemistry to a Nickel-Manganese-Cobalt (NMC) or Nickel-Cobalt-Aluminum (NCA) based chemistry for greater energy density and life. This shift to increased cobalt, however, presents issues with human rights concerns and potential supply constraints. Approximately 70 percent of all global mined cobalt production occurred in DRC Congo in 2019, and it is estimated that roughly 46 percent of global cobalt reserves reside in the DRC Congo.[11,12] Cobalt is used in numerous diverse commercial, industrial, and military applications. On a global basis, the leading use of cobalt is in rechargeable battery electrodes.[13] Superalloys, which are used to make parts for gas turbine engines, are another major use for cobalt.

[9] Morris, Charles. 2021. "GM invests in California geothermal lithium project." *ChargedEVs.* July 14. Accessed March 11, 2022. https://chargedevs.com/newswire/gm-invests-in-california-geothermal-lithium-project/.
[10] California Energy Commission. 2020. Geothermal, Lithium Recovery Projects Get Boost from California Energy Commission. May 13. Accessed March 11, 2022. https://www.energy.ca.gov/news/2020-05/geothermal-lithium-recovery-projects-get-boost-california-energy-commission.
[11] United States Geological Survey. 2020. "Mineral Commodity Summaries, Cobalt (2019)" https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-cobalt.pdf.
[12] United States Geological Survey. 2022. "Mineral Commodity Summaries, Cobalt (2021)." https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-cobalt.pdf.
[13] USGS National Minerals Information Center. 2022. "Cobalt Statistics and Information" U.S. Department of the Interior. Accessed March 17, 2022. https://www.usgs.gov/centers/national-minerals-information-center/cobalt-statistics-and-information

Due primarily to human rights concerns, industry is rapidly moving to batteries with lower cobalt chemistries. NMC111 batteries (also known as NMC333) are commonly used today and represent equal parts nickel, manganese, and cobalt, but other battery variations contain lower cobalt as a percentage. NMC811, which contains 80 percent nickel, 10 percent manganese, and 10 percent cobalt, is already in some products in the Chinese market and is expected to debut in other global products soon. UBS estimates that the use of cobalt would decline by 69 percent when switching from NMC111 based cathode chemistry to NMC811 on a per kWh basis.[14] Telsa's Model 3 and Y has lower cobalt content than what was, and is, produced in the Model S and X, which was also far less than what was in the original Roadster. Tesla claims that their current Panasonic NCA chemistry in Models 3 and Y produced in its Nevada Gigafactory contains less cobalt on a per kWh basis than NMC811 chemistries, and they have plans to move to a zero-cobalt chemistry. Similarly, GM announced that its Ultium batteries from LG Chem will use far less cobalt than its current products. It uses a new Nickel-Manganese-Cobalt-Aluminum chemistry claimed to displace up to 70 percent of the cobalt that was used in original Bolt batteries. GM is also planning on working towards a zero cobalt and zero nickel cell.[15]

To ensure that other battery metals are sourced responsibly and do not rely on conflict minerals (e.g., minerals produced in countries suffering armed conflicts over resource control) or forced child labor, some manufacturers are also now requiring battery makers to use blockchain technology to ensure traceability of the mineral supply chain. For example, Volvo's agreement with LG Chem requires the blockchain to include data on the origin, size, and weight, as well as the chain of custody of cobalt used in its batteries.

iv) Battery Reuse, Recycling, and Disposal

Lithium-ion batteries are currently expensive and represent a sizeable physical system in a vehicle (volume and mass). As a result, it is natural to consider battery second use where a vehicle battery is repurposed for other uses after reaching its useful life in the car or battery recycling (to minimize waste).

U.S. automakers typically warrant traction or high-voltage batteries on BEVs to retain 70 percent of their capacity for a period of 8 years or 100,000 miles, whichever comes first.[16] (As discussed later, CARB will also be requiring minimum warranties under the ACC II Program.) The traction batteries on PHEVs certified to CARB's current transitional ZEV standard are warranted for 10 years or 150,000 miles. During that period, the capacity of the battery will naturally degrade based on usage, thermal management, number of fast charging sessions, and other factors. If battery capacity drops below 70 percent, or if the vehicle is out of warranty and the battery pack or individual modules

[14] Hummel, Patrick, David Lesne, Julian Radlinger, Chervine Golbaz, Colin Langan, Kohei Takahashi, David Mulholland, et al. 2017. Q-Series: UBS Evidence Lab Electric Cars Teardown. May 18. https://neo.ubs.com/shared/d1wkuDlEbYPjF/.
[15] Visnic, Bill. 2020. "GM's Ultium Battery System Future-Proofed." *SAE International*. May 22. Accessed March 11, 2022. https://www.sae.org/news/2020/05/gm-ultium-battery-update.
[16] Office of Energy Efficiency & Renewable Energy, 2016. "Fact #913: February 22, 2016 The Most Common Warranty for Plug-In Vehicle Batteries is 8 Years/100,000 Miles". Posted February 22, 2016.

are replaced, those batteries can enter the first stage in the end-of-life management process: reuse (second life) or recycle. Fortunately, end-of-life management should be easier with automotive traction batteries than with consumer electronic batteries because the batteries are already aggregated in large quantities and are handled at a relatively small number of automaker or dismantler facilities, creating a stable supply of significant quantities to support the next stage of resource use.

Electric-drive vehicles are relatively new to the U.S. auto market, so to date only a small number of them have approached the end of their useful lives. As a result, few post-consumer batteries from electric-drive vehicles are available; thus, limiting the extent of battery-recycling infrastructure. However, as electric-drive vehicles become increasingly common, the battery-recycling market is expected to expand in response to the supply of batteries and demand for the resource they can fulfill, described below. Academic studies and industry reports estimate a range of 112-275 GWh per year of second-life batteries becoming available by 2030 globally. California is the largest market for EVs in the U.S. and by 2027, an estimated 45,000 EV batteries could be retired from the state.[17]

(a) Battery Reuse

Properly thermally managed battery modules, with minimal degradation and free from defects or damage, can either be refurbished and reused directly as a warranty replacement for the same vehicle model or can be used for energy storage.[18] Examples of energy storage applications include backup power for homes or cellular towers, or, in larger arrays, for large buildings like arenas or even in utility grid applications.[19]

Using vehicle battery packs (or modules from packs) for second use has significant potential. There are many public and private parties studying battery second use and the potential business opportunities. The business case for battery second use depends on the value of the competitive product, which would be new batteries specifically designed for stationary rather than vehicular purposes. Varying use profiles and applications are being considered. This includes back-up power for buildings (e.g., warehouses, cell phone towers) or energy storage for buildings and/or the grid to supplement renewable energy. Second-life energy storage, when used to back up the utility grid, offers the same power reliability at lower cost than more polluting and less efficient peaker generating plants (e.g., combined-cycle gas turbines). It also allows utilities to store excess renewable energy during periods of high production (e.g., solar generation during the afternoons) and use it when demand for energy ramps up in the evenings at the same time as renewables production drops off.

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[17] Ambrose, Hanjiro. 2020. "The Second-Life of Used EV Batteries." *Union of Concerned Scientists.* May 27. https://blog.ucsusa.org/hanjiro-ambrose/the-second-life-of-used-ev-batteries/.
[18] Ambrose, "Second-Life of Used EV Batteries"
[19] Wentworth, Adam. 2018. "Amsterdam Arena Installs Major New Battery Storage." *Climate Action.* July 2. Accessed March 11, 2022. https://www.climateaction.org/news/amsterdam-arena-installs-major-new-battery-storage.

Preliminary analysis shows cost margins may be small, but there is strong potential for battery reuse to grow. Second-life batteries may be 30 to 70 percent less expensive than new ones in energy storage applications in 2025. Minimizing costs for removing the batteries from vehicles and repurposing them will be important. This includes identifying quick and low cost means to test the used battery's varying cells for performance and life to determine if some cells need to be repaired or replaced. By 2030, the second-life battery supply from the burgeoning electric vehicle market could exceed 200 gigawatt-hours per year, which could exceed demand by almost 25 percent.[20]

Second-life batteries would reduce the demand for virgin materials used in the production of new energy storage batteries and could have an extended lifetime of approximately ten years in reuse applications.[21]

(b) Battery Recycling

Widespread battery recycling would keep hazardous materials from entering the waste stream, both at the end of a battery's useful life and during its production. Work is now under way to develop battery-recycling processes that minimize the lifecycle impacts of using batteries in vehicles. Batteries that power vehicles will be recycled at recycling facilities, where they will be transformed into valuable scrap commodities like cobalt, copper, nickel, and lithium carbonate, which can then be used to produce another battery more efficiently. Battery recycling can also reduce the demand for virgin materials used in the production of new batteries.[22]

At the battery recycling plants, the recycling process begins with manually sorting the batteries according to their chemistries (may also be done prior to arrival). NiCd, NiMH, Lithium-Ion and lead acid are often placed in designated boxes at the collection point. From there, not all recycling processes are the same:

- **Pyrometallurgy**. A smelting process is used to heat the batteries to high temperatures, driving off organics like separators and plastics as waste gases. The remaining nickel, cobalt, and copper is recovered in a mixed alloy that can be further separated using hydrometallurgy. The lithium and aluminum remain in a slag by-product. It is not economically viable to separate out the lithium hydrometallurgically, so instead, it is typically sold for use as an additive in

[20] Engel, Hauke, Patrick Hertzke, and Giulia Siccardo. 2019. "Second-life EV batteries: The newest value pool in energy storage." *McKinsey & Company*. April 19. Accessed March 11, 2022. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/second-life-ev-batteries-the-newest-value-pool-in-energy-storage.

[21] Casals, Lluc Canals, B. Amante Garcia, and Camille Canal. 2019. "Second life batteries lifespan: Rest of useful life and environmental analysis." *Journal of Environmental Management*, February 15: 354-363. https://www.sciencedirect.com/science/article/pii/S0301479718313124.

[22] E.g., Dunn, Jessica, Margaret Slattery, Alissa Kendall, Hanjiro Ambrose, and Shuhan Shen. 2021. "Circularity of Lithium-Ion Battery Materials in Electric Vehicles." *Environ. Sci. Technol.* 2021, 55, 8, 5189–5198. https://pubs.acs.org/doi/abs/10.1021/acs.est.0c07030.

concrete or as an insulation material.[23] Pyrometallurgy is energy intensive and costly and can potentially emit hazardous gases. Additionally, in addition to not being able to recover the lithium easily, there is no ability to recycle the electrolyte or plastics. However, it has been an economically viable way to recover cobalt and nickel from batteries with high contents of one or both metals.

- **Hydrometallurgy**. This process dissolves battery constituents or alloys in acid to produce metal sulfates. It can be used to recover metals after a mechanical process or from the pyrometallurgy alloys or slag by-products with high recycling efficiencies. Hydrometallurgy requires less energy, but because of the cost of chemicals and purification, the process is complex and costly. It also generates a lot of wastewater.[24]
- **Direct Recycling**. This is a relatively new process that only targets the most valuable component of the battery – the cathode. The goal of direct recycling is to recover electrode materials in a suitable condition to be used as direct inputs in battery production, without separating each individual material. Direct recycling resynthesizes cathode materials through various chemical processes, yielding an alloy with similar if not identical properties to the new cathode material. The benefit of recovering usable cathode material is that it preserves the embedded energy and economic investment by avoiding the need to resynthesize cathode materials (e.g., lithium, nickel, cobalt, or manganese) into a cathode compound. Unlike the other two processes, it does not break down the crystalline structure of the cathode into its constituent elements, but instead allows a degraded cathode to be regenerated through a process called cathode relithiation. Typically, direct recycling involves physical separation of the cathode material from other components, washing of the PVDF binder, thermal treatment, lithium replenishment of the active material, and a final thermal treatment step. This is the least energy intensive of the processes but does not work with mixed battery chemistries and is furthest from full commercialization.[25]

Most components of lithium-ion batteries can be recycled, but the cost of material recovery remains a challenge for the industry.[26] Separating the different kinds of battery materials is often a stumbling block in recovering high-value materials. Recycling

[23] Engel, Jan and Gretchen A. Macht. 2016. "Comparison of Lithium-Ion Recycling Processes for Electric Vehicle Batteries." *Proceedings of the 2016 Industrial and Systems Engineering Research Conference*, 2016. https://www.researchgate.net/publication/316858332_Comparison_of_Lithium-Ion_Recycling_Processes_for_Electric_Vehicle_Batteries.
[24] Pavón, Sandra, Doreen Kaiser, Robert Mende and Martin Bertau. 2021. "COOL-Process—A Selective Approach for Recycling Lithium Batteries." *Metals* 2021, 11, 259. https://doi.org/10.3390/met11020259.
[25] ReCell Advanced Battery Recycling. n.d. "Direct Cathode Recycling." Accessed March 11, 2022. https://recellcenter.org/research/direct-cathode-recycling/.
[26] US Department of Energy. n.d. "Batteries for Hybrid and Plug-In Vehicles." Alternative Fuels Data Center. Accessed March 11, 2022. https://afdc.energy.gov/vehicles/electric_batteries.html#:~:text=Most%20plug%2Din%20hybrids%20and,%2Delectric%20vehicles%20(EVs).

impacts will depend, in part, on battery design that considers disassembly and recycling. Standardizing batteries, materials, and cell design would also make recycling easier and more cost-effective.[27]

Several companies in North America can recycle PEV batteries, but none have recycling facilities in California. If a company were to construct a facility in California with the intention of conducting recycling activities on hazardous wastes, it would require a form of authorization, for example a hazardous waste facility permit, from DTSC to conduct said treatment activities.

Table 5 below describes the processes used and the commercialization stage of recycling facilities in North America. In the Recycling Process column, M=Mechanical Pretreatment, P=Pyrometalurgical, H=Hydrometallurgical, D=Direct Cathode Recycling.

Table 5: List of Battery Recycling Facilities in North America

Recycler	Facility Location	Recycling Process	Stage (pilot, commercial)
American Battery Technology Company	Nevada	M, H	Pilot by 2022
American Manganese Inc.	British Columbia	H	Pilot plant
Battery Resources	Massachusetts	D	Pilot plant
Battery Solutions	Michigan	H	Commercial
Glencore	Ontario, Canada	P, H	Process limited numbers and only cobalt chemistries.
INMETCO	Pennsylvania	P	Commercial
Li-Cycle (Spoke 1)	Toronto	M	Commercial
Li-Cycle (Spoke 2 and Hub)	New York	M, H	Pretreatment is Commercial, Hydrometallurgy is planned.
Li-Cycle (Spoke 3)	Arizona	M	Planned
Lithion Recycling	Quebec	H	Pilot plant under construction
OnTo Technology	Oregon	D	Seeking industrial partners
Redwood Materials	Nevada	M, P, H	Commercial
Retriev (Kinbursky Brothers)	Ohio, British Columbia	M, Cryo-H	Commercial

[27] U.S. DOE, "Batteries for Hybrid and Plug-In Vehicles."

Recycler	Facility Location	Recycling Process	Stage (pilot, commercial)
Tesla Gigafactory	Nevada	M, Unknown purification	Pilot
Umicore	U.S. plant by 2030	P, H	

(c) Federal Actions on Battery Recycling

At the federal level, there are regulations addressing the transportation and handling of batteries as universal waste, but there are no regulations promoting recycling. In 2018, the U.S. Department of Energy (DOE), in a joint venture with Argonne National Laboratory, established the ReCell Center, a lithium-ion battery recycling research center.[28] In 2019, the DOE sponsored a Battery Recycling Prize to encourage innovative solutions to lithium-ion battery end-of-life management.[29]

The DOE's National Renewable Energy Laboratory is developing design for recycling guidelines for batteries. These guidelines include using recycled materials, labelling, and easy removal of components and materials. These guidelines for battery and auto manufacturers could help to mitigate many of the challenges inherent in lithium-ion battery recycling.

(d) State Actions on Battery Recycling

California's hazardous waste management regulations classify all types of batteries, including nickel-metal hydride and lithium-ion batteries, as hazardous waste when discarded and must be managed accordingly. More specifically, facilities that treat, store, dispose and recycle batteries in California are also regulated under California's hazardous waste generator laws and regulations for Universal Waste (CCR, Title 22, § 66261.9). These facilities are regulated and inspected by the California Department of Toxic Substances Control (DTSC), which is authorized by U.S. EPA to administer its own hazardous waste program for California. The local Certified Unified Program Agency (CUPA) is given authority to enforce hazardous waste management laws and regulations at the local level by the Secretary of CalEPA. Generators of universal wastes must recycle their waste by relinquishing it to the following: (1) a universal waste handler (e.g., household hazardous waste facility, a 'Take-it-Back Partner' such as retailers or manufacturers); (2) a universal waste transporter; or (3) a destination facility (facility permitted by DTSC to treat, store, dispose or recycle).

[28] ReCell. 2022. "ReCell Advanced Battery Recycling." U.S. Department of Energy Office of Science. Accessed March 17, 2022. https://recellcenter.org/

[29] United States Department of Energy. 2019. "Energy Department Announces Battery Recycling Prize and Battery Recycling R&D Center." January 17. Accessed March 11, 2022. https://www.energy.gov/articles/energy-department-announces-battery-recycling-prize-and-battery-recycling-rd-center.

Assembly Bill 2832 (Dahle 2018)[30], required the Secretary of the California Environmental Protection Agency (CalEPA) to convene a Lithium-Ion Car Battery Recycling Advisory Group to review and advise the Legislature on policies pertaining to the recovery and recycling of lithium-ion batteries sold with motor vehicles in the state. The Advisory Group is to submit policy recommendations to the California Legislature, on or before April 1, 2022, aimed at ensuring that as close to 100 percent as possible of lithium-ion vehicle batteries in the State are reused or recycled at end-of-life in a safe and cost-effective manner. The Advisory Group and its Recycle, Logistics, and Reuse Subcommittees have been meeting in consultation with universities and research institutions conducting battery recycling research, automakers, and the recycling industry approximately quarterly since November 2019. A draft report from the Advisory Group was released on December 1, 2020, focusing on two policy areas – defining responsibility for recycling and mitigating barriers to the reuse, repurposing, and recycling of lithium-ion batteries. Widely supported policies that address specific barriers include labeling and digital identifier requirements, incentives and a guaranteed permitting timeline for recycling facilities, enforcement of unlicensed dismantling laws, and development of strategic collection and sorting infrastructure to reduce transportation costs.[31]

In addition to the AB 2832 Advisory Group effort, signatories from CalRecycle, the California Public Utilities Commission (CPUC), the California Air Resources Board (CARB), and the California Energy Commission (CEC) have entered into a memorandum of understanding to cooperatively develop consistent approaches to the proper collection and management of used or damaged electric vehicle traction batteries and energy storage systems based on lithium-ion technology that can no longer serve their primary purpose. An interagency staff-level working group was convened in the first quarter of 2019 and held a public workshop the same quarter. Signatories will explore: how end-of-use materials can be recycled in a way that minimizes harm to the environment and public health; whether financially sustainable mechanisms exist to incentivize/facilitate the collection, reuse or recycling, and proper management of these technologies when they reach end-of-life; and solutions to adequately address these current and future technologies at end-of-life. The working group is developing a white paper which will provide policy recommendations for the end-of-life management of photovoltaic panels and batteries for electric vehicles and energy storage.

[30] Codified in Article 3 (commencing with § 42450.5) of Chapter 8 of Part 3 of Division 30 of the Public Resources Code

[31] Kendall, Alissa, Margaret Slattery, and Jessica Dunn. 2021. Lithium-ion Car Battery Recycling. Draft Report, Sacramento: CalEPA. https://www.calepa.ca.gov/wp-content/uploads/sites/6/2021/12/Materials-Meeting-16-Lithium-ion-Car-Battery-Recycling-Advisory-Group-AB-2832-Draft-Policy-Recommendations-as-of-12.01.2021.pdf.

(e) Current Manufacturer Activities on Battery Reuse and Recycling

Many automaker partnerships are already underway or are planned with battery recycling and reuse companies. Ford announced a global battery center of excellence called Ford Ion Park, which will accelerate battery research and development but will also work to optimize end-of-life.[32] Ford has also teamed up with Redwood Materials on closed-loop battery recycling to put recycled content back into new batteries.[33] General Motors (GM) reports that it has reused or recycled 100 percent of the battery packs received from customers, including those replaced through warranty service, and has launched the recyclemybattery.com website to share information with vehicle dismantlers on how to safely remove and ship battery packs. GM has also signed an agreement with Li-Cycle to recycle material scrap from new Ultium Cells battery manufacturing facilities.[34,35] Hyundai has entered into separate agreements with Underwriters Laboratories (UL) and Wärtsilä, a company that has power plants and energy storage systems, to further the safe deployment and use of car batteries in energy storage systems.[36,37] Kia and Hyundai have also entered into an agreement with battery maker SK Innovation on end-of-life reuse in energy storage systems and recycling. [38] [39]

[32] Ford. 2021. "Ford Accelerates Battery R&D with Dedicated Team, New Global Battery Center of Excellence Named Ford Ion Park." *Ford Media Center*. April 27. Accessed March 11, 2022. https://media.ford.com/content/fordmedia/fna/us/en/news/2021/04/27/ford-accelerates-battery-r-d.html.

[33] Ford. 2021. "Ford, Redwood Materials Teaming Up on Closed-Loop Battery Recycling, U.S. Supply Chain." *Ford Media Center*. September 22. Accessed March 23, 2022. https://media.ford.com/content/fordmedia/fna/us/en/news/2021/09/22/ford-redwood-materials-battery-recycling.html

[34] General Motors. 2021. "Ultium Cells LLC and Li-Cycle Collaborate to Expand Recycling in North America." GM Corporate Newsroom. May 11, 2021. Accessed March 11, 2022. https://media.gm.com/media/us/en/gm/news.detail.print.html/content/Pages/news/us/en/2021/may/0511-ultium.html.

[35] McEachern, Sam. 2021. General Motors Launches Dedicated Battery Recycling Site. *GM Authority*. August 3. Accessed March 11, 2022. https://gmauthority.com/blog/2021/08/general-motors-launches-dedicated-battery-recycling-site/.

[36] Kennedy, Ryan. 2021. "Hyundai and UL Ally to Give EV Batteries a Second Life." *PV Magazine*. August 6. Accessed March 11, 2022. https://pv-magazine-usa.com/2021/08/06/hyundai-and-ul-ally-to-give-ev-batteries-a-second-life/.

[37] Klijaic, Vanja. 2018. "Hyundai Has New Second-Life Use For Battery Packs." *InsideEVs*. July 27. Accessed March 11, 2022. https://insideevs.com/news/338931/hyundai-has-new-second-life-use-for-battery-packs/.

[38] Hyundai Motor Group. 2020. "SK Innovation to Collaborate on Development of EV Battery Industry Ecosystem." *Hyundai Media Center*. September 8. Accessed March 11, 2022. https://www.hyundainews.com/en-us/releases/3123.

[39] Randall, Chris. 2021. "Kia and SK Innovation Plan Circular EV Battery Economy." *Electrive*. April 29. Accessed March 11, 2022. https://www.electrive.com/2021/04/29/kia-sk-innovation-plan-circular-ev-battery-economy/.

Nissan, in a joint venture with Sumitomo, established 4R Energy Corporation, which has been reusing Leaf batteries in the automated guided vehicles that work in its factories.[40] Nissan has also been providing battery reuse applications for home and commercial energy storage, especially in Europe, even powering Amsterdam's Johan Cruijff Arena stadium.[41] Toyota, in partnership with Jera, a joint fuel-procurement venture between Tokyo Electric Power and Chubu Electric Power, is constructing large scale energy storage projects using second life plug-in electric vehicle (PEV) batteries.[42] Volkswagen (VW) first assesses batteries to see if they can perform second-life duty in mobile energy storage systems. If not, they are discharged, dismantled, and shredded in a pilot recycling plant in Salzgitter, Germany. Material separation and hydrometallurgical processing then is carried out by VW partners.[43] And, Stellantis announced during its EV Day in July 2021 that it intends to maximize the full value of its packs, including through reuse and recycling.[44]

Tesla states that 100 percent of the battery packs returned to the company by consumers are recycled. Manufacturing scrap from its Gigafactory in Nevada is currently recycled by Redwood Materials just over 50 miles away,[45] but the Gigafactory will be bringing both battery manufacturing scrap and end-of-life battery recycling in house, having installed the first phase of their recycling facility in late 2020.[46] Redwood Materials meanwhile has announced a new 100 GWh battery material factory to further help create a circular supply chain for electric vehicles, and is working with Panasonic to supply recycled battery materials that will end up in Tesla vehicles.[47] [48]

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[40] Beedham, Matthew. 2021. "Old Nissan Leaf batteries are now powering the robots that used to make them." *The Next Web*. March 15. Accessed March 24, 2022. https://thenextweb.com/news/nissan-old-leaf-batteries-robots-make-new-leafs.
[41] Kane, Mark. 2018. "148 Nissan LEAF Batteries Power This Stadium." *InsideEVs*. June 30. Accessed March 11, 2022. https://insideevs.com/news/338994/148-nissan-leaf-batteries-power-this-stadium/.
[42] Cogan, Roy. 2018. "Toyota Aims at Reuse of EV Batteries." March 30. Accessed March 11, 2022. https://greencarjournal.com/news/toyota-aims-at-reuse-of-ev-batteries/.
[43] Volkswagen of America. 2021. "Volkswagen Group Components begins battery recycling pilot." *VW US Media Site*. January 29. Accessed March 22, 2022. https://media.vw.com/en-us/releases/1465
[44] Holman, Jacqueline. 2021. "Stellantis to source over 260 GWH in EV battery capacity by 2030." S&P Global Commodity insights. July 08. Accessed March 22, 2022. https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/070821-stellantis-to-source-over-260-gwh-in-ev-battery-capacity-by-2030
[45] Oberhaus, Daniel. 2020. "The Race to Crack Battery Recycling – Before it's Too Late." *Wired*. November 30, 2020. Accessed March 24, 2022. https://www.wired.com/story/the-race-to-crack-battery-recycling-before-its-too-late/
[46] Lambert, Fred. 2021. "Tesla claims 92% battery cell material recovery in new recycling process." *Electrek*. August 9, 2021. Accessed March 11, 2022. https://electrek.co/2021/08/09/tesla-battery-cell-material-recovery-new-recycling-process/.
[47] Lambert, Fred. 2021. "Tesla cofounder JB Straubel announces new 100 GWh battery material factory in the US." *Electrek*. September 14, 2021. Accessed March 11, 2022. https://electrek.co/2021/09/14/tesla-co-founder-jb-straubel-100-gwh-battery-material-factory-us/.
[48] Lambert, Fred. 2022. "Panasonic turns to JB Straubel's Redwood for recycled battery materials to supply Tesla Giga Nevada." *Electrek*. January 4, 2022 Accessed March 24, 2022.

In addition to these individual efforts, Ford, General Motors, Honda, Stellantis, and Toyota are members of the Suppliers Partnership (SP) for the Environment Responsible Battery Working Group. According to SP, the working group provides a forum to promote information exchange on challenges and opportunities related to end-of-life battery management and to identify opportunities for collaboration across the value chain to advance best practices in responsible management of those batteries. SP states that the working group is developing strategies/practices for optimizing the safe and proper collection, storage, and transportation of end-of-life batteries and facilitating information sharing between automakers, suppliers, recyclers, and other stakeholders across the value chain.[49]

Beyond individual automaker partnerships with battery recycling companies, a new facility and operation was recently announced in Georgia to support growing electric vehicle manufacturing in that area.[50] [51]

v) Plug-in Electric Vehicle Charging Infrastructure

Growth in plug-in electric vehicles (both BEVs and PHEVs) would be accompanied by increased demand for electric charging infrastructure. Plug-in electric vehicles require charging, which can take place at home using conventional household plugs or by using upgraded equipment at home or in the public. Virtually all plug-in electric vehicle drivers require at least one readily available charging station at their place of residence, in areas where their vehicle is commonly parked, or at stations that offer fast recharging. While most PEV drivers today charge at single-family homes, shared and public charging infrastructure will be increasingly critical as PEV adoption spreads beyond early adopters and to urban, rural, low-income, and disadvantaged communities.[52] Several recent reports emphasize that continued growth in the PEV market will depend on driver

https://electrek.co/2022/01/04/panasonic-jb-straubels-redwood-for-recycled-battery-materials-supply-tesla-giga-nevada/.

[49] Suppliers Partnership for the Environment. 2022. "SP Responsible Battery Work Group." Accessed March 24, 2022. https://www.supplierspartnership.org/responsible-battery-work-group/.

[50] State of Georgia. 2022. "Gov. Kemp: Battery Resourcers to Open North America's Largest Lithium-ion Battery Recycling Facility in Georgia, Create 150 Jobs." *Governor Brian P. Kemp Office of the Governor*. January 05, 2022. Accessed March 24, 2022. https://gov.georgia.gov/press-releases/2022-01-05/gov-kemp-battery-resourcers-open-north-americas-largest-lithium-ion.

[51] Klender, Joey. 2022. "Georgia lands $43M battery recycling plant project shortly after Rivian commitment." *Teslarati*. January 10, 2022. Accessed March 11, 2022. https://www.teslarati.com/georgia-lands-43m-battery-recycling-project-battery-resourcers-rivian/.

[52] Eighty-three percent of California PEV drivers reside in detached houses, and these drivers charge primarily (≥84 percent) at home. Nicholas, Michael et al. 2019. Quantifying the Electric Vehicle Charging Infrastructure Gap Across U.S. Markets. The International Council on Clean Transportation. January 2019. https://theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf.

confidence in charging infrastructure.[53,54] Drivers who lack reliable charging at home or work will rely on public charging for their mobility needs.

Chargers, sometimes referred to as electric vehicle supply equipment (EVSE), are manufactured appliances that safely deliver electricity to charge a plug-in electric vehicle. As summarized in Table 6, three categories are used to describe light-duty PEV chargers: Level 1, Level 2, and direct current (DC) fast charging. Level 1 charging uses a standard 120-volt receptacle (e.g., a typical wall outlet), and a charging cord set provided with most plug-in electric vehicles at the time of purchase. Level 2 charging is faster than Level 1, with a variety of power outputs from 16 to 40 amps at 240-volts. The higher power output results in faster charging, with 14 to 35 miles of electric range provided per hour of charging. Level 2 chargers are therefore common solutions for residential, commercial, and workplace settings.[55] Level 1 and Level 2 chargers deliver alternating current (AC) electricity to the vehicle and use the Society of Automotive Engineering (SAE) J1772 standard connector. While all PEVs can use the SAE J1772 connector,[56] not all have a separate charging port compatible with DC fast charging.

DC fast chargers deliver DC electricity to the vehicle and are the fastest charging option for plug-in electric vehicles, where a vehicle with a 100-mile range can obtain a full charge in approximately 30 minutes.[57] New DC fast chargers capable of charging at even faster rates (with 150-350 kilowatts of power) are continuing to be installed and will significantly reduce charging times.[58] DC fast chargers are used along major travel corridors and in urban environments where slower charging and overnight charging opportunities are less convenient. Three types of connectors are used for DC fast charging in the North American market: CHAdeMO, Combined Charging System (CCS), and Tesla. The charging inlet of a PEV determines the type of DC fast charging connector the vehicle can use.

[53] A survey by Autolist indicated that lack of charging infrastructure was among the top three concerns among prospective buyers. Autolist. 2019. "Survey: Price, Range and Weak Charging Network Are Top Reasons Consumers Avoid EVs." August 2019. https://www.autolist.com/news-and-analysis/survey-electric-vehicles.

[54] Separately, a study conducted by the Harris Poll on behalf of Volvo found that lack of charging infrastructure was the second largest concern among drivers. Volvo Car USA. 2019. "The State of Electric Vehicles in America." *Volvo Car USA Newsroom*. February 26. Accessed March 11, 2022. https://www.media.volvocars.com/us/en-us/media/documentfile/249123/volvo-reports-the-state-of-electric-vehicles-in-america.

[55] CALeVIP. 2021. "Electric Vehicle Charging 101." *Center of Sustainable Energy*. Accessed March 11, 2022. https://calevip.org/electric-vehicle-charging-101.

[56] Tesla vehicles require an adapter supplied at purchase to use the J1772 connector.

[57] CALeVIP, "Electric Vehicle Charging 101"

[58] Electrify America. 2022. "Our Investment Plan." Accessed March 11, 2022. https://www.electrifyamerica.com/our-plan.

Table 6: Types of Chargers[59]

Parameter	Level 1	Level 2	DC Fast Charger
Voltage	120 Volts AC	208-240 Volts AC	200-1000 Volts DC
Maximum power output in kilowatts (kW)	1.9 kW	19.2 kW	450 kW
Typical added range per hour of charging*	~4 miles at 1.44 kW	~23 miles at 7.2 kW	~90 miles in 30 mins at 55 kW ~204 miles in 30 mins at 150 kW

* Range estimates based on a 110 MPG-equivalent vehicle

AB 2127, ch. 365, stats. 2018, directs the California Energy Commission (CEC) to biennially examine existing and future charging infrastructure needs,[60] which includes the chargers, hardware and software, make-ready electrical equipment,[61] and other programs to accelerate the adoption of electric vehicles for light-, medium-, and heavy-duty vehicles operating on roads and highways, as well as off-road, port, and airport electrification applications. The CEC has several concurrent analysis and modeling efforts covering these identified areas, and CEC staff have reported on charging infrastructure needs to meet the goal of 100 percent ZEV and PHEV sales by 2035.

To estimate infrastructure needed to meet the demand of California's light-duty PEV drivers, a simulation model developed by the National Renewable Energy Laboratory (NREL) is used that helps determine the number, locations, and types of chargers required – this is called the Electric Vehicle Infrastructure Projection tool (EVI-Pro 2). EVI-Pro estimates the charging demand from light-duty PEVs and designs a supply of residential (including for multi-unit dwellings (MUDs)), workplace, and public charging infrastructure capable of meeting the demand.

The EVI-Pro 2 model projects that California will need more than 700,000 shared private and public chargers in 2030 to support 5 million ZEVs. Counts for chargers at workplaces, public destinations, and multiunit dwellings generally indicate the number of Level 2 chargers needed. In some cases, Level 1 chargers may be sufficient at select multiunit dwellings. These values do not include chargers at single-family homes.

[59] Alexander, Matt, Noel Crisostomo, Wendell Krell, Jeffrey Lu, and Raja Ramesh. July 2021. *Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030 – Commission Report.* California Energy Commission. Publication Number: CEC-600-2021-001-CMR.
[60] Assembly Bill No. 2127 (Ting, Statutes of 2018). Public Resource Code Section 25229. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB2127.
[61] "Make-ready" refers to the electrical infrastructure required to operate a charger, such as transformers or wiring.

Table 7: Projected 2030 Charger Counts to Support 5 Million Light-Duty Zero-Emission Vehicles

Plug Type	Charger count (in thousands)
MUDs	224
Workplace	188
Public	278
DC Fast Chargers	24
Total Chargers	714

Source: CEC and National Renewable Energy Laboratory[62]

Table 8 presents the range of EVI-Pro 2 results indicating the number of chargers needed to support 5 million ZEVs by 2030.

Table 8: Annual Statewide EVI-Pro 2 Results for the IEPR Aggressive Forecast (5 million ZEVs by 2030)

Year	MUDs (Level 1+2) Low	MUDs (Level 1+2) High	MUDs (Level 1+2) Low	MUDs (Level 1+2) High	Public (Level 2) Low	Public (Level 2) High	Public (DCFC) Low	Public (DCFC) High	Total Chargers Low	Total Chargers High
2020	64,243	96,056	31,087	31,878	59,499	60,711	3,723	3,850	158,551	192,494
2021	71,891	106,419	44,065	45,141	81,442	83,065	5,297	5,467	202,694	240,092
2022	80,897	119,894	57,110	58,375	101,253	103,165	6,476	6,675	245,735	288,109
2023	87,778	130,166	75,263	76,796	128,814	131,127	7,943	8,177	299,798	346,266
2024	93,696	139,017	90,588	92,343	152,421	155,078	7,767	7,997	344,471	394,434
2025	102,554	152,280	102,022	103,950	164,356	167,190	9,374	9,642	378,306	433,062
2026	117,978	175,244	117,504	119,660	186,487	189,639	10,461	10,754	432,430	495,297
2027	133,257	197,996	136,052	138,478	211,393	214,907	12,565	12,908	493,267	564,288
2028	148,610	220,869	152,316	154,980	233,521	237,353	14,441	14,828	548,888	628,031
2029	164,107	243,960	172,689	175,649	260,197	264,419	16,416	16,849	613,409	700,876
2030	179,973	267,620	186,403	189,564	275,613	280,059	17,476	17,934	659,464	755,177

Source: CEC and National Renewable Energy Laboratory[63]

Similarly, the Electric Vehicle Infrastructure for Road Trips (EVI-RoadTrip) model projects the number and locations of DC fast chargers needed to enable electrified road trips within and across California's borders. EVI-RoadTrip focuses on long-distance interregional (100+ mile) trips, while EVI-Pro 2 focuses on short-distance intraregional trips for daily routines. Table 9 shows the number of needed DC fast chargers and stations in 2030 to support the BEV fleet of more than 5 million vehicles. These results show that California will need between 2,108 and 7,408 DC fast chargers (average of

[62] Alexander et al., *Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment*
[63] Alexander et al., *Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment*

4,758) located at 1,039 to 1,338 stations (average of 1,189) to support electric interregional travel.

Table 9: DC Fast Charging Infrastructure Needed to Support 2030 Interregional Electric Travel for BEVs

Result	Low	Average	High
DC Fast Charge Stations	1,039	1,189	1,338
DC Fast Chargers	2,108	4,758	7,408

Source: CEC and National Renewable Energy Laboratory

While EVI-RoadTrip addresses a unique use case and a unique charger fleet compared to EVI- Pro 2, in practice some DC fast chargers could be used for intraregional and interregional purposes. The estimates shown above do not reflect this synergy and, therefore, may slightly overestimate the number of needed DC fast chargers.

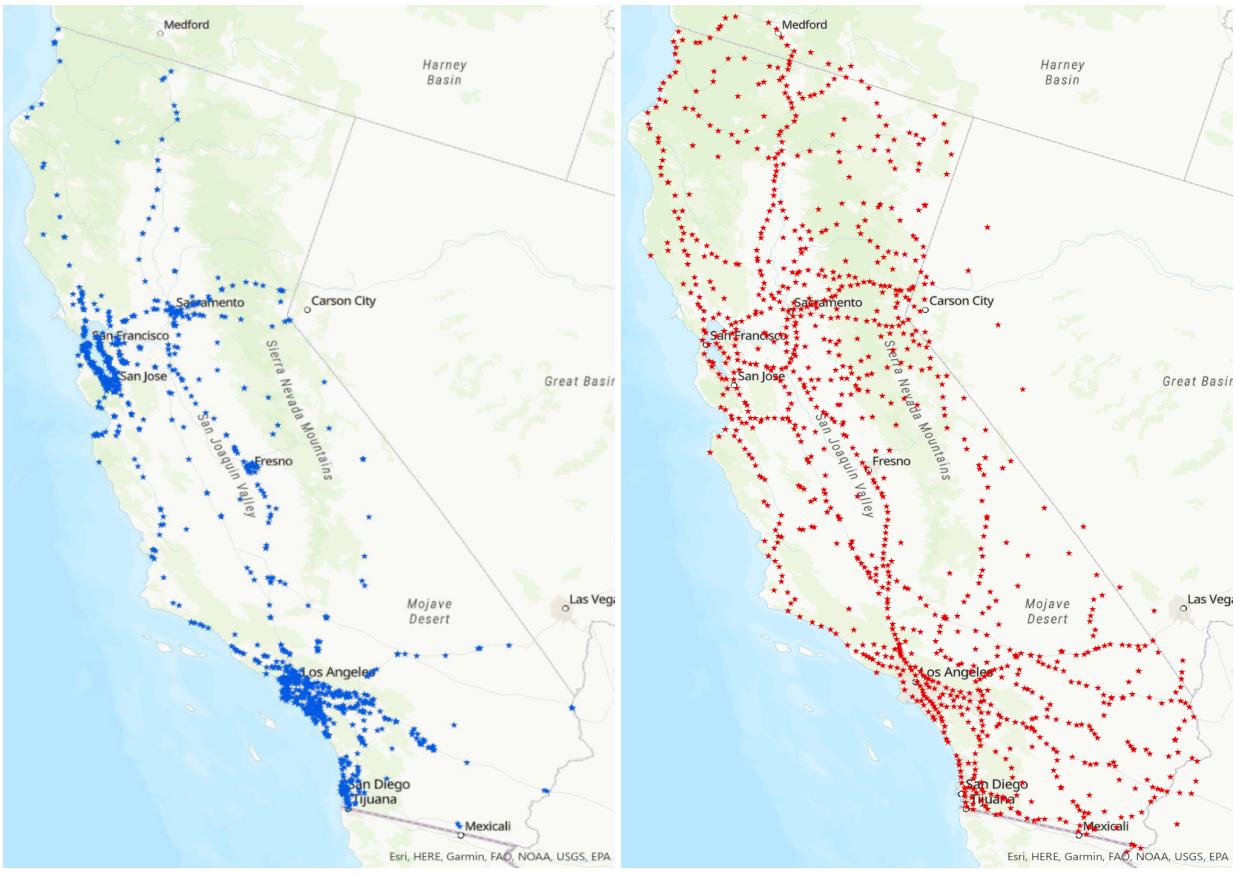

Figure 2: Station Locations to Support 2030 Interregional Electric Travel for BEVs
Source: CEC, National Renewable Energy Laboratory, and Alternative Fuels Data Center

The map on the left side shows the existing DC fast charging station locations in California listed by the Alternative Fuels Data Center (retrieved April 2, 2021). The map on the right shows the simulated locations of needed fast charging infrastructure in 2030 to support long-distance interregional travel for more than 5 million BEVs.

Existing stations are largely concentrated in the major metropolitan areas of the state, with a sparser distribution along major highways in rural areas. The EVI-RoadTrip results indicate that by 2030, stations need to more thoroughly cover California's road network to enable long-distance travel.

CARB staff assumes no additional compliance response related to charging-related proposals in the Proposed Program, including DCFC inlet standardization and convenience cords. Proposed requirements apply to minimum standards for BEVs and PHEVs that would count toward meeting a manufacturers ZEV requirement.

In 2022, 51 vehicle models are expected to have the CCS1 inlet, 6 are expected to have the Tesla inlet and 2 are expected to have the CHAdeMO inlet for DC fast charging. The vehicle models with the CCS1 inlet already exist and therefore require no modifications to comply with the inlet standard. All other existing and new models with the Tesla or the CHAdeMO inlet are anticipated to incur no substantial modifications for this requirement because these vehicles already have the wire, cooling, necessary processing chips, and inlets for DC charging. This leaves the difference in the shape and configuration of the connector which can occur with vehicle redesign. Alternatively, manufacturers could choose to add the required connector in addition to their alternative connector or to provide an adapter to connect between their connector and the required one. However, both alternatives would be more costly and thus, an approach the manufacturer would utilize for reasons other than the proposed requirement.

Currently, all manufacturers provide a convenience cord to customers who purchase BEVs and PHEVs, though not all current convenience cords meet the proposed standards. Industry leaders, such as Tesla, do supply customers with convenience cords that likely already meet the proposed requirements. As proposed, the more capable convenience cords provided with the vehicle may help reduce public infrastructure demand and enable more travel using electric drive.

vi) Electricity Demand

The state's electric grid has expanded and evolved over time as consumer demand for electricity services has grown with the modern lifestyle. Electrification of California's transportation sector, particularly when combined with increased electrification of the state's building stock, will pose a significant new challenge to grid planning and require investments in transmission and local distribution systems. New electric load from ZEVs has steadily increased in recent years and has the potential to grow rapidly over the next decades. As more Californians opt to purchase ZEVs with the expectation of having sufficient fueling availability, California's existing electric system planning process must keep pace and make investments to ready the grid for new ZEV loads. The state's planners are working to ensure this happens.

The charging of BEVs and PHEVs has the potential for both positive and negative effects to the electric grid but charging millions of PEVs will introduce new load onto the electric grid. As shown in Figure 3, EVI-Pro 2 projects that electricity consumption in 2030 from

light-duty vehicle charging will reach around 5,400 megawatts (MW) around midnight and 4,600 MW around 10 a.m. on a typical weekday, increasing electricity demand by up to 25 and 20 percent at those times, respectively. While current results indicate that nonresidential charging demand will generally align with daytime solar generation, more than 60 percent of total charging energy will still be demanded when sunshine is not abundantly available. Charging load as modeled with EVI-Pro 2 could add up to 7 and 8 percent to the total system electric load at 8 p.m. on weekdays and weekends, respectively. A projected surge of charging demand around midnight when off-peak electricity rates take effect may strain local distribution infrastructure.

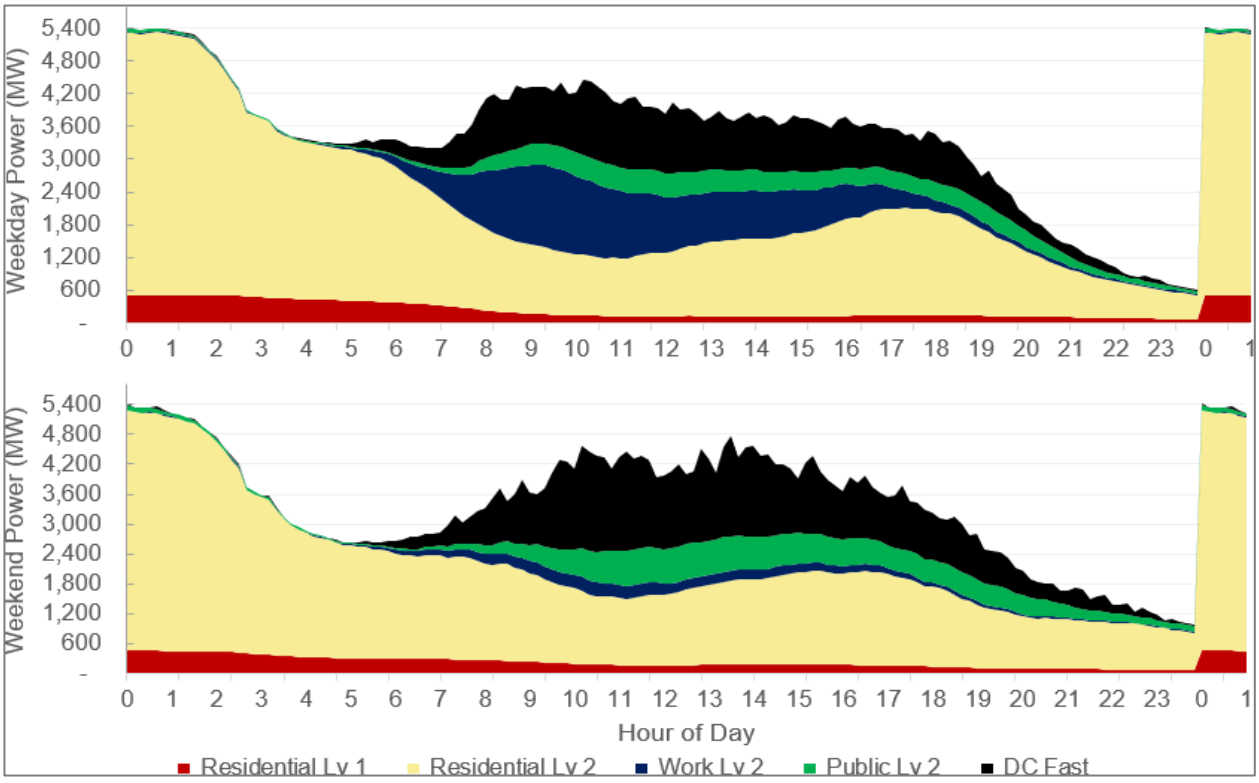

Figure 3: Projected 2030 Statewide PEV Charging Load for Intraregional Travel of 8 Million Light-Duty ZEVs in EVI-Pro 2
Source: CEC, National Renewable Energy Laboratory, and UC Davis

To fully realize the economic, air quality, and climate benefits of electrification, California must pursue greater vehicle-grid integration, or coordination of charging with grid needs, to ensure that charging is better aligned with clean, renewable electricity without sacrificing driver convenience. The timing of charging is a key determining factor. ZEVs are a unique electric load and are potentially advantageous compared to other types of load. In most circumstances, electric vehicles do not draw energy at the same time they are operating, and charging time is usually much shorter than vehicle dwell time. This provides flexibility to charge at times that are less impactful to the grid and at times of abundant renewable generation availability. Electric vehicles are also able to take

advantage of grid friendly vehicle-grid integration strategies, such as rate design, to encourage specific vehicle charging behaviors. Additionally, more advanced strategies, such as onsite and local software and hardware solutions, can shift a large portion of charging loads to hours that are less impactful to the grid, or to charge with renewable generation.

There are significant efforts underway to alter the load shape generated by vehicle charging, whether by use of electricity pricing incentives, actively managed or smart charging, or onboard programming of charging times. These would have the effect of moving the load off the peak. Modeling results from the CEC's AB 2127 report suggest that with some residential charging management strategies, a large amount of charging load will align with daytime solar generation. Furthermore, demand for DC fast charging, as well as public and work Level 2 charging occurs mostly during the day. However, more than half of total charging energy demand still occurs outside solar generation hours (9 a.m. to 5 p.m.) and the sudden spike in charging load at midnight due to the simultaneous response to off-peak time-of-use rates may overload distribution equipment and affect power quality.[64]

At a system level, due to diversity of charging times, the electricity demand of these types of vehicles is relatively low; however, many PEV charging at once can affect utility generation and transmission assets. The potential stresses on the electric grid can be avoided through asset management, system design practices, and managed charging to shift a significant amount of the load away from system peak. Charging management strategies beyond time-of-use rates, including those that reflect wholesale prices and carbon intensity, will be needed to align electric vehicle loads with daytime solar generation. And residential charging technologies should be coordinated with distribution systems to lessen the impact of charging timed to begin at midnight. At current ZEV adoption rates, the electric system is likely able to accommodate increasing EV loads in the short term. However, depending on near-term adoption rates and longer-term growth, local distribution system impacts and transmission level constraints, (particularly when accounting for electrification across multiple vehicle classes), may occur and need to be planned for now. Traditional system planning and investments can be combined with new strategies, such as managed/smart charging.[65] Further, storage could manage peak loads from charging in California, and models suggest that EV charging can reduce renewables curtailment anywhere from 25–90 percent.[66]

The CEC, California Independent System Operator (ISO), CPUC, CARB, and other stakeholders are working to update the state's roadmap to integrate electric vehicle charging needs with the needs of the electrical grid. The update will reflect advancements in VGI technology and include actions the state can take to advance the

[64] Alexander et al., *Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment*
[65] Kintner-Meyer, M. et al. 2020. *Electric Vehicles at Scale – Phase I Analysis: High EV Adoption Impacts on the Western U.S. Power Grid*. Pacific Northwest National Laboratory. July 2020. https://www.pnnl.gov/sites/default/files/media/file/EV-AT-SCALE_1_IMPACTS_final.pdf
[66] Kintner-Meyer, M. et al., *Electric Vehicles at Scale.*

goals established by the Governor's Executive orders to put at least 5 million ZEVs on California roads by 2030 and install 250,000 electric vehicle chargers by 2025.

In December 2020, the CPUC adopted a decision on VGI which created metrics and strategies for advancing VGI and authorized almost $40 million for the utilities to spend piloting VGI technologies and programs. In November 2021, the CPUC adopted a Resolution creating a pathway for alternating current (AC) interconnection for vehicle-to-grid integration and allowing some PEVs to more easily enable bidirectional mode. The CPUC is continuing to consider streamlining procedures for both PEV charging and bidirectional PEV interconnections.

To properly launch the PEV charging infrastructure necessary to meet California's ZEV adoption goals, it is important to identify enough geographically dispersed locations that can economically host charging stations. The CEC's EDGE model is designed to help users focus charger deployment strategies and plan infrastructure investments. The algorithmic approach compares the load contributions from the CEC's infrastructure model results to the capacities of existing distribution grids in the state to host new electricity loads. If there is a capacity deficit in a location, EDGE flags that location as needing an infrastructure upgrade. Preliminary results as displayed in Figure 4 based on IOU Integration Capacity Analysis (ICA) maps show large areas of the grid with little to no excess capacity. Most electric utilities in California have enough capacity in urban areas to support PEV charging, but many rural areas may require local distribution grid upgrades.

CEC modeling indicates that the necessary make-ready infrastructure to support EVSEs requires special attention and investment. To support the needed infrastructure for PEVs in California, investment in transformers, meters, breakers, wires, conduit, and associated civil engineering work will be necessary. State agencies and electric utilities have already begun proactively planning for these electrical infrastructure updates through statewide energy system planning processes, such as the CEC's IEPR forecasting, CAISO transmission planning, and CPUC integrated resource planning.

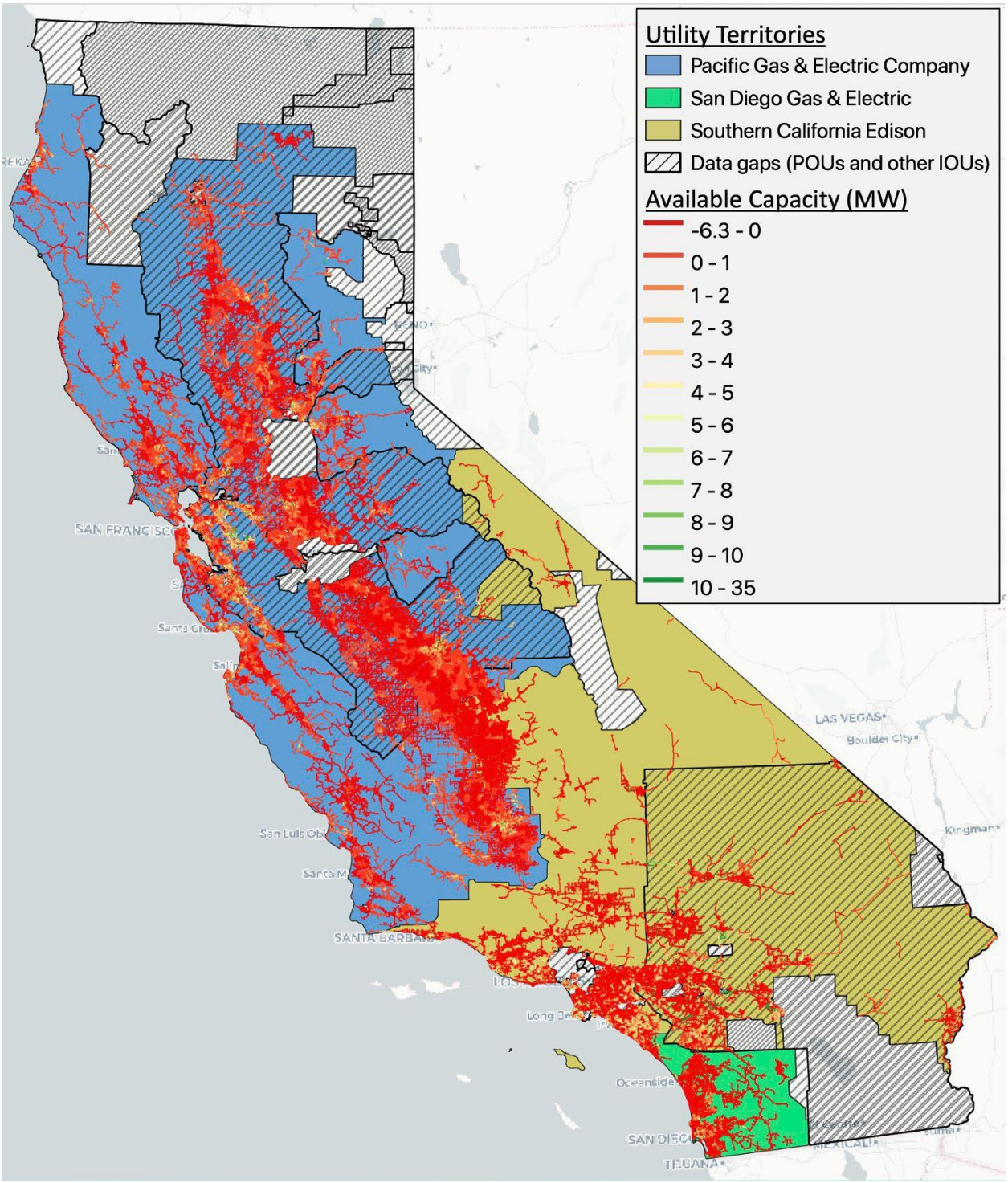

Figure 4: Capacity Analysis from CEC's EDGE Model
Red lines indicate areas where the grid cannot accommodate additional load without any thermal or voltage violations. Grey hatched areas indicate regions where gaps in utility grid data exist (mostly in POU service areas). Colored lines, keyed in the legend, indicate the available circuit capacity in megawatts.

vii) Fuel Cell Production, Recycling, and Disposal

Fuel cell electric vehicles are targeted to fit into both the LDV and heavy-duty vehicle (HDV) sectors. FCEV technology complements BEV technology. While both can be built into many vehicle platforms, FCEVs tend to offer advantages for vehicles in applications that present challenges to BEVs. This includes applications that require long-distance driving, fast refueling, operation in cold weather, and hauling (or towing) heavier loads. In particular, the long range and fast refueling times (under five minutes) make FCEVs well suited to demanding duty cycles for larger LDV platforms. The increase in FCEVs produced by manufacturers to meet requirements of the amended ZEV regulation would be accompanied by an increase in the production of hydrogen fuel cells. As the demand for automotive fuel cells increases, new manufacturing facilities may need to be constructed and/or existing plants would be retooled to increase production. Some vehicle manufacturers would produce fuel cells in their own facilities while others would purchase the fuel cells from suppliers. However, because the number of FCEVs produced would generally be offset by a corresponding decrease in production of internal combustion engine-based vehicles, a net increase in vehicle production facilities would not be anticipated.

FCEVs are full electric drive vehicles where the propulsion energy typically supplied by a battery is supplied by hydrogen and a fuel cell stack that transforms the chemical energy stored in hydrogen into electricity as needed. The inputs of the electrochemical process for the fuel cell stack are oxygen and hydrogen, with the byproducts being electricity, water, and heat. The major components of the fuel cell system include the fuel cell stack, the hydrogen storage (tank), balance of plant (e.g., valves, safety release, vent, fill tubes), and a battery pack for dynamic load balancing/response, moving the motor directly, capturing braking regeneration, and energy storage. Additionally, the system includes coolant subsystems, an air handling subsystem with compressor-expander module (CEM) precooling, and humidification.

The fuel cell stack is much like a battery in that it consists of an anode, a cathode, and dividing electrolyte membrane (thus the name of the type used for light-duty applications: proton exchange membrane fuel cell).[67] Additional stack components include the gas diffusion layer (GDL) that helps transport hydrogen and oxygen from flow channels to the anode and cathode surfaces, as well as separator plates that divide each individual cell.

Platinum is a vital component of proton exchange membrane fuel cells, which is the leading type of fuel cell that would be used in FCEVs. The proton exchange membrane fuel cell's primary advantages include low operating temperature, high electric current densities, fast start capability, no corrosive fluid spillage hazard, low weight, small size,

[67] EPA, 2016. U.S. Environmental Protection Agency, U.S. National Highway Traffic Safety Administration, California Air Resources Board, "Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025," July, 2016. https://www3.epa.gov/otaq/climate/documents/mte/420d16900.pdf

and potentially low-cost to manufacture. Platinum serves as the catalyst that splits hydrogen into ions and electrical current. Thus, increased production and sales of FCEVs would be accompanied by an increase in demand for platinum and platinum-group metals. However, the leading demand sector for platinum-group metals is currently catalysts to decrease emissions of criteria air pollutants in both light- and heavy-duty vehicles. Because the number of FCEVs produced would generally be offset by a corresponding decrease in production of internal combustion engine-based vehicles, a net increase in platinum demand would not be anticipated.

Fuel cells are manufactured once for each vehicle and are designed to last for the lifetime of the vehicle, which is somewhere between 150,000 and 200,000 miles, or 15 to 20 years. The Society of Automotive Engineers formed a Committee for Fuel Cell Standards that has published "Recommended Practice to Design for Recycling Proton Exchange Membrane (PEM) Fuel Cell Systems." This publication advises manufacturers to consider environmental impacts and recommended practices when producing recyclable fuel cells for automotive use. More specifically, the report explains ways fuel cell design can account for the need to disassemble and recycle the product at the end of its useful life.

viii) Hydrogen Fueling, Supply, and Production

Like an increase in demand for plug-in electric vehicle chargers, fueling infrastructure for fuel cell electric vehicles will also be needed. It is anticipated that new individual hydrogen fueling facilities would be constructed at existing public retail gasoline service stations. Most stations are currently located in urban areas where they are positioned to serve the most drivers in the early FCEV market. As the market grows, geographic coverage will need to expand and become established in a more diverse set of regions, including urban and rural locations.). For all locations, new hydrogen stations will be built consistent with local zoning.

Building a new hydrogen fueling facility would typically take place at an existing retail gas station where the facilities and equipment required for hydrogen fueling could fit within the available square footage of larger gas station sites (e.g., within the same footprint of a carwash). Development of a new facility would include obtaining the standard design and building approvals and permits from the city, county and state authorities having jurisdiction. For the equipment area, construction would typically include minor trenching and filling for utilities and pouring concrete foundations for walls and equipment pads. Major equipment present at the station would include hydrogen storage tanks that hold either liquid or compressed gas, a hydrogen compression system, a refrigeration/cooling unit, safety monitors and sensors, a system control panel, and a hydrogen fuel dispenser.

The hydrogen dispenser would typically be added to the end of an existing fueling island. However, in some cases, a gasoline dispenser may be removed and replaced with a hydrogen dispenser, or a separate stand-alone hydrogen dispensing island with or without a canopy may be added to the station. Like at a gasoline station, a FCEV pulls up to a hydrogen dispenser that is designed and built to appear like a gasoline

dispenser. The dispenser nozzle often looks like a nozzle on a natural gas or propane dispenser. The nozzle locks on to the receptacle on the vehicle and, when the seal is tight, gaseous hydrogen fuel flows into the tank.

In total, California is expected to have more than 176 Open-Retail hydrogen fueling stations by 2026 and may meet the AB 8 goal of at least 100 stations by the end of 2023. The California Energy Commission also plans to fund additional stations to close the gap to 200 stations funded by 2025 in Executive Order B-48-18.[68] [69]Accounting for all currently funded station projects, by 2026 the total hydrogen fueling capacity in the state would be sufficient for cumulative deployment of approximately 250,000 FCEVs in California. Auto manufacturers have responded positively to this reinforced outlook for fueling network development, though many additional factors contribute in varying degree to auto manufacturers' deployment decisions. The network's planned future capacity provides opportunity for auto manufacturers to continue accelerating the planning and deployment of FCEVs in California over the coming years.[70]

Like gasoline stations, most hydrogen stations have their onsite fuel supply delivered by a tanker truck. Gaseous hydrogen is stored in banks of long narrow tanks secured to a truck trailer bed (referred to as a tube trailer), and liquid hydrogen is stored in large above-ground tanks. The liquid hydrogen vaporizes at ambient temperature to a gaseous state and is compressed before dispensing into the FCEV. Hydrogen stored in gaseous state usually undergoes additional compression before dispensing. Hydrogen delivery frequency depends on the amount stored at each station, state of the hydrogen stored (gaseous or liquid) and demand for hydrogen at the station. Deliveries of gaseous hydrogen may either involve replacing an empty tube trailer with a full one (a process that takes less than one hour) or transferring hydrogen from a delivery tube trailer to the on-site bulk hydrogen storage tubes (which typically takes longer than the trailer swap method). One station in California also receives gaseous hydrogen via pipeline, which may become a more common form of hydrogen delivery depending on technology advancement and FCEV adoption rate. Delivery of liquid hydrogen involves the transfer of liquid hydrogen from the tanker truck to the station's storage tank, a process that would typically require approximately 2 hours.

In only a few locations, stations produce hydrogen onsite through electrolysis or steam methane reformation (SMR). An electrolyzer uses electrical power to separate water molecules into hydrogen and oxygen. A SMR generates steam and uses it to separate the hydrogen from the natural gas molecule. The hydrogen is then purified, stored, and compressed for dispensing. Maintenance of the station consists of regular safety

[68] Brecht, Patrick. 2021. 2021–2023 Investment Plan Update for the Clean Transportation Program. California Energy Commission. Publication Number: CEC-600-2021-038-CMF.
[69] State of California Governor Edmund G. Brown, Jr. 2018. *Executive Order B-48-18*. January 26. Accessed March 1, 2022. https://www.library.ca.gov/wp-content/uploads/GovernmentPublications/executive-order-proclamation/39-B-48-18.pdf.
[70] CARB, 2021. 2021 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development. California Air Resource Board. https://ww2.arb.ca.gov/sites/default/files/2021-09/2021_AB-8_FINAL.pdf

checking of hoses, nozzles, and related equipment; calibration of sensors and dispensers; compressor repairs; valve/solenoid checks; and normal lubrication.

For delivered gaseous hydrogen, modifications to central plants may be necessary to further purify the hydrogen so that it meets the purity standards required for FCEVs Hydrogen as a transportation fuel requires higher purity levels than hydrogen for industrial uses because fuel cells stack membranes are sensitive to impurities. Plant modifications are also necessary so that purified hydrogen can be compressed and dispensed into delivery trailers. The construction work associated with these plant modifications would have to satisfy State and local requirements for permitting, hazardous materials, and other resource areas, which are typically handled by local agencies. Additional land may be required to install the equipment, which may or may not fit within the hydrogen plant's existing fence line. Any earthwork activities that could generate dust would have to be conducted in accordance with local ordinances regarding dust and earthwork. Emissions associated with the operation of the hydrogen purification and compression equipment would be subject to the authority of the local air pollution control district. Any release of combustible gases could be vented through the facility's existing flare system. Hazardous wastes, such as lubrication oil waste and catalyst waste associated with the purification equipment, would be generated in small quantities. Existing hydrogen production facilities would manage additional hazardous wastes associated with the new operations according to their existing hazardous waste permits. It is important to note that California standards for hydrogen production require that 33 percent of the hydrogen that is produced for transportation be made from eligible renewable resources (California Public Utilities Code § 399.12).

ix) Consumer Response Effects

CARB staff's Proposed Program would increase new vehicle upfront prices in the near-term; however, many PEV applications can lower vehicle operating costs on a cost-per-mile basis compared to conventional internal combustion engine vehicles. Changes in vehicle prices and other attributes may affect consumer purchase decisions and behavior. For example, not all consumers may be willing to pay more for the vehicle that they might have otherwise purchased, and some consumers may purchase a used vehicle instead of a new vehicle that would be in accordance with their respective budgets. Others may wait until the following year or respond in some other way. Such decision changes can affect the California vehicle fleet mix and possibly emissions.

Additionally, some suggest that the lower operating costs of PEVs will lead to a "rebound effect." The rebound effect refers to an economic theory suggesting consumers would drive more if the vehicles they use are cheaper to operate. As a result of this potential action by consumers to drive more, there may be associated impacts relative to safety, economic benefits of additional accessibility for drivers, increased traffic congestion, and increased vehicle miles travelled (VMT). If lower operating costs do indeed lead to increased driving (i.e., the VMT rebound effect), it could offset some of the anticipated GHG emissions reductions.

Studies of the rebound effect have mainly been in the context of ICEVs and conventional hybrid vehicles, with limited research in the context of PEVs. For conventional cars, on average, an elasticity or rebound effect estimated in ranges from 8–14 percent has found some support, but the long-term effect is more likely close to zero.[71] Other studies have found that while lower electricity prices at home may lead to a higher share of PEV VMT in total household VMT, there is no presence of rebound effect from current PEV drivers. [72] While there is no evidence that the lower running costs of PEVs will cause drivers to travel more, this cannot be ruled out as a possibility in an increasingly changing PEV market.

In the worst-case scenario, it can be assumed that the rebound effect of approximately 10 percent for conventional vehicles is also applicable to PEVs. CARB staff examined the extent to which VMT levels in California may increase due to the incremental reduction in operating costs associated with implementation of the proposed regulatory changes. The incremental increase in VMT due to rebound effects was estimated using the percent difference in the cost-per-mile between ZEVs and PHEVs compared to ICE vehicles and applying a 10 percent elasticity assumption. As a result, VMT may increase approximately 4 percent due to rebound as a worst-case estimate.

4. ZEV Assurance Measures

Currently, ICEVs are required to not only meet criteria air pollutant standards, but also to guarantee and meet those certification levels throughout the vehicle's life, which are broadly called durability standards. Manufacturers are also required to provide a minimum warranty on the emission control systems and must be equipped with on-board diagnostics (OBD) meant to track and diagnose emission failures over the life of the vehicle. Lastly, manufacturers must provide repair information and make available the necessary tooling to non-dealer repair shops. Together these requirements help to control the emissions of the ICEVs over the life of the vehicles and ensure that failures are diagnosed and able to be repaired quickly. ZEVs have never been brought into these types of requirements, as volumes have been low, and technology has been quickly changing. However, to support the drastic and necessary change of the light duty fleet and ensure ZEVs meet market expectations necessary to displace emissions from conventional engines, staff is proposing the following ZEV Assurance Measures meant to ensure ZEVs, both as an option for new vehicle buyers and used vehicle buyers, can be fully effective replacements for ICEVs in every household in California.

[71] Gillingham, Kenneth. 2018. The Rebound Effect of Fuel Economy Standards: Comment on the Safer Affordable Fuel-Efficient (SAFE). Vehicles Proposed Rule for Model Years 2021–2026 Passenger Cars and Light Trucks. October 24, 2018. https://ww2.arb.ca.gov/sites/default/files/2020-04/10_24_2018_gillingham_yale_rebound_effect_ac_0.pdf.

[72] Chakrabotry, Debapriya, Scott Hardman, and Gil Tal. 2022. "Integrating plug-in electric vehicles (PEVs) into household fleets- factors influencing miles traveled by PEV owners in California." *Travel Behaviour and Society* 26: 67-83. https://doi.org/10.1016/j.tbs.2021.09.004

a) Durability

i) Summary

Staff proposes BEV and FCEV test groups must be designed to maintain 80 percent of certified combined city and highway test range for 10 years or 150,000 miles, whichever occurs first. Manufacturers will be required to submit battery state of health data at age 3 and age 6 of the vehicles to show compliance with the standard over useful life. CARB will retain the right to pull, at minimum, 10 vehicles from the test group in for verification testing. If 5 or more of the vehicles fail CARB initiated durability testing, the manufacturer will be required to submit a compliance plan, which could include remedy up to recall of all the vehicles within the test group.

ii) Compliance Responses

Based on information submitted by manufacturers, the dominant share of many ZEVs currently in production would likely be able to meet the proposed 10-year/150,000-mile durability requirement to maintain 80 percent of certified two cycle electric range. Public data from Tesla also supports that current production vehicles are on track to exceed this durability on vehicles introduced over 4 years ago.[73] In discussions with manufacturers and suppliers, manufacturers have consistently indicated a projected durability above the proposal for most vehicle owners.

However, manufacturers have expressed concern that some consumers could experience more rapid degradation because of habits including frequency and depth of fast charging, resting state of charge, or storing their vehicle in extreme ambient air temperatures. From rapid aging of batteries and individual cells during development, manufacturers know that continual operation with some of these practices can cause more aggressive degradation in the battery. Therefore, manufacturers are pursuing improvements to the battery itself to make it less sensitive to such variances in usage. They are also implementing engineering solutions beyond the battery itself and into the vehicle thermal management, charging control, and even consumer education about optimal usage. For example, modifications to the software in the battery management system could set limitations during DC fast charging sessions to better regulate battery temperature.

This provision could result in longer-lasting ZEVs that could help reduce solid waste, manufacturing, and disposal impacts from ZEVs and vehicles generally, as ZEVs tend to have far fewer parts than conventional vehicles that must be made and ultimately disposed of.

b) Battery Warranty

i) Summary

Staff proposes that manufacturers provide a minimum warranty of 3 years or 50,000 miles (or 7 years, 70,000 miles for high priced parts, or those that are more than a

[73] Tesla. 2020. "2020 Tesla Impact Report." Released 2021. Accessed January 31, 2022. https://www.tesla.com/ns_videos/2020-tesla-impact-report.pdf.

consumer price index adjusted number, currently approximately 650 dollars) for all powertrain (propulsion-related) components, excluding the traction battery. For traction batteries in BEVs and PHEVs, staff proposes a minimum 8 year or 100,000-mile 70-percent state of health warranty for 2026 through 2030 model year. Staff is proposing to increase the state-of-health from 70-percent to 75-percent for 2031 and subsequent model year BEVs and PHEVs. In addition to the minimum warranty length, staff proposes BEVs and FCEVs be included into the same warranty reporting requirements applicable to ICEVs and PHEVs. Additionally, as with ICEVs, if a manufacturer in its reporting shows more than 4 percent of warranty failures of a single component within a test group, the manufacturer will be required to submit a corrective action plan that could include remedy up to recall.

ii) Compliance Responses

Staff is proposing minimum warranty requirements for ZEVs: one set of requirements for propulsion-related parts, not including the battery, and a separate set of requirements for the battery. Staff's proposals for these warranties are largely in line with what manufacturers are currently offering on ZEVs, but notably would extend warranty coverage for some powertrain components and impose a more rigorous and objective battery warranty.

CARB staff assessed the current coverage offered on several ZEV models to identify likely incremental differences to what the proposal would require. The proposed definition for coverage for all propulsion-related components is typically broader than what manufacturers have called out as electric drivetrain or powertrain components. Second, while most manufacturers offer a 'bumper-to-bumper' warranty of 3/36k (3 years or 36,000 miles), slightly shorter than the proposed 3/50k component warranty, every ICEV is already required to have an emission-related component warranty of 3/50k that covers a significantly higher number of individual components than it would cover on BEVs. Further, Tesla, the one BEV-only manufacturer with products that are not currently subject to this emission-warranty requirement, already offers a 4/50k basic vehicle warranty that exceeds the proposed requirement. As such, no compliance response is deemed necessary for the 3-year/50k warranty.

While virtually every BEV is offered with some sort of extended warranty for a portion of the electric drivetrain, this warranty does not exactly align with the proposed high-priced category that would necessitate 7/70k coverage in the proposal, yet there is significant overlap in the component coverage. To the extent that some manufacturers currently have more restrictive policies offering coverage for fewer components than others, the highly competitive market is likely to require those manufacturers to match coverage offered by their competitors before staff's proposal would take effect. The majority of these drivetrain coverages are already for terms that exceed the proposed 7/70k such as 8/100k+ or 10/100k. CARB staff assumes that the slight differences in coverage would be offset by the shorter term of the proposal, therefore no additional compliance response is needed for the 7/70k component warranty.

Manufacturers would likely take several actions in response to the proposed battery warranty. Battery technology is continuing to evolve, and improvements are being made to better understand the physical and chemical methods of degradation and changes to the chemistry, construction, and management of the battery to counteract or prevent such degradation. Even more importantly, manufacturers are learning at a rapid pace about how BEVs are being used across a large base of customers and what the battery is exposed to because of that usage. This is allowing them to continually target patterns that emerge in more rapid degradation and engineer solutions to avoid that usage subjecting the battery to the damaging conditions. For example, manufacturers can, and are, limiting the state of charge window that can be used by a customer, routinely or even dynamically based on current battery conditions, better ensuring the health of the battery by minimizing risk for over or under voltage excursions. Manufacturers can and are optimizing battery thermal conditioning systems to minimize battery operation in higher temperatures that can be damaging. Manufacturers are even implementing preventative measures to modify charging behavior based on the current condition of the battery. Further, with the increasing trend towards vehicle software that can be updated remotely, or 'over-the-air', manufacturers are able to take advantage of learning even after the vehicle is already in service and deploy further improvements.

In the occurrence of a vehicle battery falling below the required warranty trigger of 70 percent state of health, the manufacturer is not obligated or expected to replace the entire battery pack or to install a brand-new battery pack equivalent to the capacity that existed on day one of the vehicle's life. Manufacturers are allowed, and most currently already have practices in place, to restore/repair/replace/rebuild as needed to return the battery to a state of health appropriate for the age and mileage of the vehicle. This is an important distinction to note as it can dramatically reduce impacts associated with individual warranty repairs.

c) Service Information and Standardized Data Parameters

i) Summary

Staff is proposing to require the same access and disclosure of repair information to independent repair shops as is required for ICEVs. For ZEVs, this will be information for propulsion-related component repairs. As with ICEVs, manufacturers will be required to comply with the same tooling standardization requirements to be able to reprogram the vehicle electronic control unit. Staff is requiring standardized data related to vehicle usage as well as access to propulsion-related fault codes. Staff is proposing vehicles be equipped with a standardized data connector and follow standardized communication protocols to be able to access this subset of information on the vehicle.

ii) Compliance Responses

Most manufacturers, largely as a result of a Massachusetts law known as the Right-to-Repair Act,[74] already make available all (not just emission-related or propulsion-related) repair information for ICEVs and for ZEVs through voluntary compliance with a Memorandum of Understanding (MOU) that provides for access in all states.[75] Tesla, the one manufacturer not currently making cars subject to CARB's service information rule, has not signed a similar MOU but has recently begun to provide access to at least a portion of its repair information and tooling.[76] As a result, staff assumes no additional compliance response for this element of the proposal, as both the information required by the Right-to-Repair Act and the information Tesla appears to currently be making available are a larger subset of repair and tooling information than just the propulsion-related information that would be required by the proposal.

The service information proposal also requires manufacturers to make their information available, at a fair and reasonable price, to third party service information providers. Likewise, the regulation has similar requirements for manufacturers to make available tooling information to third party tool manufacturers to replicate the function and data that the OEM scan tools provide to authorized service technicians to help them diagnose and repair vehicles. In addition to making available information and tooling, the service information regulation also mandates that emission-related, or in the case of ZEVs, propulsion-related, electronic control units (ECUs, e.g., the onboard computers) that are reprogrammable in the field by repair technicians, must be able to be reprogrammed using a standardized hardware interface compliant with SAE J2534 "Recommended Practice for Pass-Thru Vehicle Programming." All traditional ICEV manufacturers currently meet this requirement, and future manufacturers can comply with software packages.

d) Battery Label

i) Summary

Staff's proposal would result in high volumes of batteries that would eventually go into second life applications or would need to be recycled or disposed. Ensuring the success of endeavors to avoid waste would help increase the recycled content available for future battery development and decrease the demand for new critical mineral resources. Requiring information to be provided on the battery itself can help enable these second use and recycling processes. Staff proposes requiring a battery label for all vehicles with a traction battery, or a battery used to power the electric motors of hybrid electric

[74] The Commonwealth of Massachusetts. *An Act Protecting Motor Vehicle Owners and Small Businesses in Repairing Motor Vehicles.* House No.4362. Filed July 31, 2012. https://malegislature.gov/Bills/187/H4362.
[75] Alliance and Global Automakers. 2014. *Right to Repair Memorandum of Understanding*. Washington Area New Automobile Dealers Association. January 15, 2014. Accessed March 11, 2022. https://wanada.org/wp-content/uploads/2021/01/R2R-MOU-and-Agreement-SIGNED.pdf.
[76] Tesla. 2022. "Service Subscriptions." Accessed March 10, 2022. https://service.tesla.com/service-subscription.

vehicles, battery electric vehicles, and fuel cell electric vehicles. The proposed required label would contain four key pieces of information:

- Cell cathode chemistry
- Capacity performance
- Composition and voltage
- Digital identified (QR Code) linked to a digital repository that could be updated overtime with information relevant to secondary users, vehicle dismantlers, and recyclers.

ii) Compliance Responses

This proposal requires that specific information be printed directly on a label, a QR code to be printed on the label that links to a website with additional information, and for such a label to be attached to each portion of the battery pack intended to be replaced separately. This would apply to conventional hybrids, FCEVs, PHEVs, and BEVs. Manufacturers and suppliers are already commonly labeling virtually every component including the battery with printed labels, so no compliance response is deemed necessary to create or apply labels. These labels would either replace or supplement the existing labels already being used and installed during the manufacturing process.

Staff's proposal will result in high volumes of batteries that will eventually go into second life applications or will need to be recycled. To improve the economics of recycling and reuse, it is important to improve separation technology to recover battery cells, develop greater recycling process flexibility, and standardize battery materials and designs.[77] Staff anticipates that requiring information to be made known on the battery itself can help enable these second use and recycling processes, which can increase the recycled content available for future battery development and decrease the demand for new critical mineral resources.

5. ZEV Regulatory Flexibilities

a) Summary

i) Environmental Justice Vehicle Values

Staff are proposing that optional environmental justice (EJ) vehicle values be awarded to manufacturers under the ZEV regulation who help increase affordable access to ZEVs for priority communities. The environmental justice allowance would be a distinct category under the ZEV regulation where vehicle values earned can be banked, traded, and used in 2026 through 2031 model years. Staff is also proposing a 5 percent cap on EJ values that can be used in any given year to fulfill a manufacturer's annual requirement under the regulation. After 2031 model year these optional EJ values expire. The EJ values are aimed at providing manufacturers additional vehicle values for

[77] Gaines, Linda. 2014. "The future of automotive lithium-ion battery recycling: Charting a sustainable course." Sustainable Materials and Technologies 1-2 (2014) 2-7. November 15, 2014. http://dx.doi.org/10.1016/j.susmat.2014.10.001.

voluntary actions that help achieve more equitable outcomes and that increase access and exposure to ZEV technologies for underserved communities.

EJ values can be earned in three ways:

- ZEVs and PHEVs remaining in California after leasing term. A 2026 through 2028 model-year ZEV or PHEV can earn an additional 0.10 vehicle value if they were under an MRSP cap, initially leased in California as new and subsequently sold at end of lease to a dealership participating in a financial assistance program.
- Discounted ZEVs and PHEVs placed in a community-based clean mobility program. 2026 through 2031 model-year ZEVs and 6-passenger PHEVs that are placed at a minimum discount of 25 percent in a community mobility program can earn an additional 0.50 and 0.40 vehicle value, respectively.
- Low-Priced ZEVs and PHEVs. A 2026 through 2028 model-year ZEV or PHEV delivered for sale with a MSRP less than or equal to $20,275 for passenger cars and less than or equal to $26,670 for light-duty trucks could earn an additional 0.10 vehicle value.

ii) Pooling with California and Section 177 States

Section 177 of the Clean Air Act allows other States to adopt California's regulations to help attain criteria air pollutant emission reductions. At present, 14 states have adopted California's ZEV regulation: Colorado, Connecticut, Maine, Maryland, Massachusetts, Minnesota, Nevada, New Jersey, New York, Oregon, Rhode Island, Vermont, Virginia, and Washington. Though it is unknown which states will adopt the proposed Advanced Clean Cars II regulation for 2026 and subsequent model years, it can be assumed that states will still exercise the right to adopt California's ZEV regulation to spur the sale in the absence of a federal ZEV regulation.

To provide some flexibility to manufacturers in 2026 through 2030 model years, particularly in states where ZEV adoption is not currently as high as in California, manufacturers will be allowed to transfer or "pool" ZEVs delivered for sale in excess of their individual state requirement to meet up to 25 percent of their annual requirement in 2026, declining thereafter, as shown in Table 10. For example, ZEVs earned in excess of a manufacturers California requirement can be transferred to meet the manufacturers requirement, up to the allowed cap, in New York. "Pooling" maintains the overall stringency of the ZEV regulation while allowing for minor state-to-state variability in vehicles sales.

Table 10: Maximum Percent of Annual Requirement Allowed using Pooled ZEVs

Model Year	2026	2027	2028	2029	2030
Pooling Cap	25%	20%	15%	10%	5%

iii) Early Compliance

Staff is proposing to reward progress above current market shares, and thus is calibrated to award value depending on sales averages in states with greater or lesser current market development – thereby rewarding progress in states still coming up to speed, or accelerated progress in more developed markets, while not diluting overall regulatory requirements. Staff proposes to allow manufacturers who deliver for sale more than 20 percent new vehicle sales on average in 2024 and 2025 model year, in a state that has a total sales average above 7 percent ZEVs and PHEVs in 2020 through 2022, may optionally bank values associated with those vehicles above 20 percent sales for use in 2026 through 2028 model year. For those states that have a 2020 through 2022 ZEV and PHEV sales average below 7 percent, manufacturer who deliver for sale more than 7 percent new vehicle sales on average in 2024 and 2025 model year can earn values to use in 2026 through 2028 model years. These early compliance values may meet up to 15 percent of a manufacturer's annual ZEV requirement and are treated as though they were earned in the model year. For example, a manufacturer with an obligation of 100 in 2026 model year could fulfill its obligation with 85 ZEV values from 2026 model year and 15 ZEV values from 2024 and 2025 model years.

b) Compliance Response

These provisions provide flexibilities to manufacturers to meet their ZEV requirement. Environmental Justice allowances could result in a decrease in the number of ZEVs and PHEVs delivered for sale in model years 2026 to 2031 since these allowances can be used to meet up to 5 percent of a manufacturer's compliance. On the other hand, pooling is likely to increase the number of ZEVs and PHEVs delivered for sale in California relative to the regulatory ZEV stringency requirement since it is likely that manufacturers will over comply in states that have large market potential, such as California, to meet compliance in other states. Early compliance vehicle values provide flexibility to manufacturers who are building a market prior to 2026 model year, rewarding manufacturers for being on a clear path to compliance with the new ZEV requirements.

E. The "Project" as a Combined Regulatory Amendment Package

The "project," as defined by CEQA, undergoing environmental review in this EA is the combined set of amendments to the LEV criteria and ZEV regulations (Proposed Program). The amendments to these regulations are analyzed as one project, because the regulations are related and compliance responses by vehicle manufacturers and fuel providers would have a combined effect on the statewide vehicle fleet, the ways light- and medium-duty vehicles are sold and leased, and the availability and use of alternative fuels. This is necessary to provide a comprehensive review of the combined, or cumulative, effect of these regulatory amendments.

F. Summary of Compliance Responses

To meet the requirements for criteria air pollutant (including precursor) emissions of the Proposed Program, manufacturers would be expected to reduce emissions using a range of technologies and solutions. Manufacturers would be expected to improve current emission control system technologies across their light- and medium-duty vehicle fleet to clean up vehicles that perform poorly under real-world driving conditions. Based on past compliance with previous versions of the LEV regulation (i.e., LEV I, LEV II, and LEV III), these improved emission control systems would be expected to include improved evaporative emission control systems based on vehicle redesign, more efficient catalysts with higher precious metal loadings, and better calibration of vehicles.

Implementation of the Proposed Program for ZEVs would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium and platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities.

The Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction.

Disposal of any portion of vehicles, including portions of lithium-ion batteries that could not be repurposed, would be subject to and must comply with existing laws and regulations governing solid and hazardous waste, such as California's Hazardous Waste Control laws (Health and Safety Code, Division 20, Chapter 6.5; 22 CCR, Division 4.5), and implementing regulations, such as California's Universal Waste Rule (22 CCR Division 4.5, Chapter 23). Disposal of used batteries into solid waste landfills is prohibited; however, they could be refurbished, reused, or disposed of as hazardous waste. For lithium-ion batteries, it is anticipated they still have a useful life at the end of vehicle life and are likely to be repurposed for a second life. To meet an increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

The Proposed Program would require BEVs, FCEVs, and PHEVs that count toward a manufacturer's ZEV requirement to meet a suite of ZEV assurance measures, which include durability, battery warranty, battery labeling, service information, charging standardization, and on-board data standardization. Most of these proposed measures mimic similar standards already in place for gasoline vehicles. Therefore, as the fleet is converted from ICEVs to ZEVs, most of these measures will not result in a new compliance response. However, these measures may result in less solid waste,

manufacturing, and disposal impacts as the ZEVs and PHEVs last longer, are more accessible for repair, and their batteries are labelled for convenient reuse or recycle.

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3.0 ENVIRONMENTAL AND REGULATORY SETTING

The California Environmental Quality Act (CEQA) Guidelines require an environmental impact report (EIR) to include an environmental setting section that discusses the current environmental conditions in the vicinity of the project. This environmental setting normally constitutes the baseline physical conditions against which an impact is compared to determine whether it is significant (14 CCR § 15125). For this Draft Environmental Analysis (EA), the California Air Resources Board (CARB) is using a 2021 baseline, as that is the year in which the environmental analysis commenced (the Notice of Preparation was posted on July 21, 2021.

As discussed in Chapter 1 of this Draft EA, CARB has a CEQA certified regulatory program and prepares an EA in lieu of an EIR. This Draft EA is a functional equivalent to an EIR under CEQA; therefore, in an effort to comply with the policy objectives of CEQA, an environmental setting and a regulatory setting with environmental laws and regulations relevant to the Proposed Program have been included as Attachment A to this Draft EA.

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4.0 IMPACT ANALYSIS AND MITIGATION MEASURES

A. Approach to the Environmental Impacts Analysis and Significance Determination

This chapter contains an analysis of environmental impacts and mitigation measures associated with Advanced Clean Cars (ACC) II Program (Proposed Program). The California Environmental Quality Act (CEQA) states the baseline for determining the significance of environmental impacts would normally be the existing conditions at the time the environmental review is initiated (Title 14 California CCR § 15125(a)). Therefore, significance determinations reflected in this Draft Environmental Analysis (EA) are based on a comparison of the potential environmental consequences of the Proposed Program with the regulatory setting and physical conditions in 2020 (see Attachment A). For the purpose of determining whether the Proposed Program may have a potential effect on the environment, CARB evaluated the potential physical changes to the environment resulting from the reasonably foreseeable compliance responses described in further detail in Chapter 2 of this Draft EA. A table summarizing all the potential impacts and proposed mitigation for each resource area discussed below is included in Attachment B to this document.

The reasonably foreseeable compliance responses associated with the Proposed Program are analyzed in a programmatic manner for several reasons: (1) any individual action or activity would be carried out under the same authorizing regulatory authority; (2) the reasonably foreseeable compliance responses would result in generally similar environmental effects that can be mitigated in similar ways (Title 14 CCR § 15168(a)(4)); and (3) while the types of foreseeable compliance responses can be reasonably predicted, the specific location, design, and setting of the potential actions cannot feasibly be known at this time. If a later activity would have environmental effects that are not examined within this Draft EA, the public agency with authority over the later activity may be required to conduct additional environmental review as required by CEQA or other applicable law.

The analysis is based on reasonably foreseeable compliance responses that are based on a set of reasonable assumptions. While the compliance responses described in this Draft EA are not the only conceivable ones, they provide a credible basis for impact conclusions that are consistent with available evidence. And, as discussed in this Draft EA Chapter 2, the evaluation of certain compliance responses would be speculative under CEQA. CEQA does not require evaluation of speculative impacts (Title 14 CCR § 15145). For that reason, an evaluation of effects of these responses are not required and is not included in this analysis. The analysis also includes actions that could likely occur under a broad range of the potential scenarios. The impact discussions reflect a conservative assessment to describe the type and magnitude of effects that may occur (i.e., the conclusions tend to overstate adverse effects) because the specific location, extent, and design of potential new and/or modified facilities cannot be known at this time.

1. Adverse Environmental Impacts

The potentially significant adverse impacts on the environment discussed in this Draft EA, and significance determinations for those effects, reflect the programmatic nature of the reasonably foreseeable compliance responses of the regulated entities. These reasonably foreseeable compliance responses are described in more detail in Chapter 2 (Project Description) of this Draft EA. The Draft EA addresses broadly defined types of impacts or actions that may be taken by others in the future as a result of implementation of the Proposed Program.

This Draft EA takes a conservative approach and considers some environmental impacts as potentially significant because of the inherent uncertainties in the relationship between physical actions that are reasonably foreseeable under the Proposed Program and environmentally sensitive resources or conditions that may be affected. This conservative approach tends to overstate environmental impacts in light of these uncertainties and is intended to satisfy the good-faith, full-disclosure intention of CEQA. If and when specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts recognized as potentially significant in this Draft EA can actually be avoided or reduced to a less-than-significant level.

Where applicable, consistent with CARB's certified regulatory program requirements (Title 17 CCR § 60004.2), this Draft EA also acknowledges potential beneficial effects on the environment in each resource area that may result from implementation of the Proposed Program. Any beneficial impacts associated with the Proposed Program are included in the impact analysis for each resource area listed below.

2. Mitigation Measures

The Draft EA contains a degree of uncertainty regarding implementation of feasible mitigation for potentially significant impacts. "'Feasible' means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors." (Cal. Public Resources Code, § 21061.1) While CARB is responsible for adopting the Proposed Program, it does not have authority over all the potential infrastructure and development projects that could be carried out in response to the Proposed Program. Other agencies are responsible for the review and approval, including any required environmental analysis, of any facilities and infrastructure that are reasonably foreseeable, including any definition and adoption of feasible project-specific mitigation measures, and any monitoring of mitigation implementation. For example, local cities or counties must review and decide to approve proposals to construct new facilities; CARB does not have jurisdiction over land use permitting of any potential development associated with the compliance responses. (Cal. Const., Article XI, § 7 ["A county or city may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws."]; *California Building Industry Assn. v. City of San Jose* (2015) 61 Cal.4th 435, 455; *Big Creek Lumber Co. v. County of Santa Cruz* (2006) 38 Cal.4th 1139, 1151-1152; HSC §§ 39000-44474 [CARB's statutory authority provides no

authority to regulate local land use permitting].) Additionally, State and/or federal permits may be needed for specific environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because CARB cannot predict the location, design, or setting of specific projects that may result and does not have authority over implementation of specific infrastructure projects that may occur, the programmatic analysis in the Draft EA does not allow for identification of the precise details of project-specific mitigation. As a result, there is inherent uncertainty in the degree of feasible mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in the Draft EA.

Given the foregoing, and due to legal factors affecting the feasibility of CARB's proposed mitigation for several of the identified potential significant indirect impacts associated with the Proposed Program, CARB's implementation of the identified mitigation measures is infeasible, based on the following: 1) the lack of certainty of the scope, siting and specific design details of compliance-response development projects, which prevents CARB from being able to determine the projects' significant environmental impacts; and 2) although there was certainty with respect to compliance-response development projects and associated significant environmental impacts, CARB lacks the legal authority and jurisdiction to permit these projects, which, inherently, prevents CARB from legally imposing any enforceable mitigation measures on the projects. Therefore, CARB's implementation of the mitigation measures suggested, below, in this EA are legally infeasible to enforce.

Consequently, this Draft EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient to mitigate an impact to less than significant) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, where appropriate. It is also possible that the amount of mitigation necessary to reduce environmental impacts to below a significant level may be far less than disclosed in this Draft EA on a case-by-case basis. It is expected that many potentially significant impacts of facility and infrastructure projects would be avoidable or mitigatable to a less-than-significant level as an outcome of their project-specific environmental review processes, conducted by the appropriate permitting agency with jurisdiction as the lead agency under CEQA.

B. Resource Area Impacts and Mitigation Measures

The following discussion provides a programmatic analysis of the reasonably foreseeable compliance responses that could result from implementation of the Proposed Program, described in Chapter 2 of this Draft EA. These impacts are discussed under each environmental resource area in accordance with the topics presented in the Environmental Checklist in Appendix G to the CEQA Guidelines (Title 14 CCR § 15000 et. seq). These impact discussions are followed by the types of mitigation measures that could be required to reduce potentially significant environmental impacts.

1. Aesthetics

Landscape character can be defined as the visual and cultural image of a geographic area. It consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique. Visual character may range from predominately natural to heavily influenced by human development. Its value is related, in part, to the importance of a site to those who view it. Viewer groups typically include residents, motorists, and recreation users.

Impact 1-1: Short-Term Construction-Related and Long-Term Operational-Related Effects on Aesthetics

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[78]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Short-term construction-related activities associated with the reasonably foreseeable compliance responses would involve typical off-road construction equipment (e.g., backhoes, graders, dozers) and on-road heavy duty vehicles for transport of materials to and from construction sites. Earth moving, paving, or other activities could create temporary mounds or piles of dirt or require staging areas where materials or equipment would be temporarily stored. Depending on the hours when construction is conducted, sources of glare or lighting could be present. Although there is uncertainty regarding the locations of these activities, scenic vistas or views from a State scenic highway could be degraded by the presence of heavy-duty equipment, glare, lighting, or disturbed earth.

[78] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

Although it is reasonably foreseeable that activities associated with new or modified facilities could occur, there is uncertainty as to the exact location or character of any new facilities or modification of existing facilities. Some of the reasonably foreseeable compliance responses could be accomplished with minimal ground-disturbing activity or other changes to the existing visual setting. For instance, increased recycling and refurbishment of lithium batteries could be performed within existing recycling centers that undergo internal retrofitting. The outward appearance of such facilities would not require physical modifications that could degrade the visual character or quality of the surrounding area. Thus, visual impacts would not be substantial in these cases.

However, development of new facilities for the manufacture of ZEVs, PHEVs and infrastructure would be expected to occur in areas appropriately zoned. Such facilities could conceivably introduce or increase the presence of visible artificial elements (e.g., heavy-duty equipment, new or expanded buildings, electric charging and hydrogen fueling stations) in areas of scenic importance, such as visibility from State scenic highways. The visual impact of such development would depend on several variables, including the type and size of facilities, distance and angle of view, visual prominence (including presence of visual obstructions), and placement in the landscape. In addition, facility operation may introduce substantial sources of glare, exhaust plumes, and nighttime lighting for safety and security purposes. These types of impacts could result in significant effects on aesthetic resources.

Increased use of ZEVs and PHEVs will produce additional demand for batteries, such as lithium-ion and nickel metal hydride (NiMH) batteries, resulting in increased demand for lithium, nickel, and cobalt. Discrete impacts for these resources are discussed below.

Worldwide, the majority (80 to 90 percent) of raw lithium is currently mined and exported from Australia, Chile, Argentina, and Bolivia. Lithium is typically derived from hard rock mining practices or from brine extraction. Hard rock mining, which is typical in Australia, requires the use of heavy-duty equipment (e.g., crushers, rigs, loaders, cutting equipment, cranes) and could result in harmful visual changes to the natural environment such as hillside erosion, contamination of surface waters, artificial drainage patterns, subsidence, night-time lighting, and deforestation. In contrast, brine extract, which occurs in Chile, Argentina, and Bolivia, involves vertical pumping of brine, which evaporates to form brown and white cones of salt minerals. It is reasonably foreseeable that increased lithium could cause additional these types of adverse visual effects in areas where hard rock mining (Australia) and brine extraction activities (Chile, Argentina, and Bolivia) occur.

The primary nickel exporting countries are Russia, Indonesia, the Philippines, and Australia, among others including the U.S. Nickel is typically found in lateritic nickel ore deposits, which are extracted through sulfuric acid leaching and reduction roast-ammonia leaching. Leaching entails the use of aqueous solutions to extract metal from metal-bearing materials. Leach mining can produce leach piles that, if left alone, may cause visual impacts to a scenic area. Additionally, leaching entails the use of heavy-duty equipment and piping that may adversely alter a visual landscape. Cobalt is

primarily exported from the Democratic Republic of the Congo. Cobalt extraction is typically extracted using traditional hard rock mining practices that produce similar visual impacts as those disclosed above for lithium mining. Additionally, artisanal and small-scale mining account for a notable amount of worldwide cobalt supply. These mines entail the physical deterioration of a hillside or landscape, use of hand held equipment such as pick axes and shovel, and cloudy pools of water. All these visual elements have the capacity to degrade a visual landscape.

The deployment of new ZEVs and PHEVs could also result in accelerated turnover of lithium-ion and NiMH batteries which could place additional demand such that existing recycling facilities would need to be expanded or modified. Modifications to existing recycling centers could occur within the confines of such facilities and, therefore, would not result in additions of external equipment that would degrade visual quality; however, development of new facilities, although expected to occur in areas appropriately zoned, could increase or increase the presence of visible human-made elements (e.g., heavy-duty trucks, new structures) in areas of scenic importance. There is uncertainty surrounding the specific locations of new recycling facilities; therefore, adverse effects to scenic vistas or views from a State scenic highway could occur. Further, sources of daytime glare and nighttime lighting associated with these facilities could be introduced.

Therefore, short-term construction-related long-term operational-related effects to aesthetics associated with implementation of the Proposed Program would be potentially significant.

Potential scenic, glare, and lighting impacts could be reduced to a less -than -significant level by mitigation measures prescribed by local, State, federal, or other land use or permitting agencies (either in the U.S. or abroad) with approval authority over the development projects.

Mitigation Measure 1-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to visual resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts to aesthetic resources include:

- Proponents of new development and new facilities and structures constructed will submit applications to State or local land use agencies to seek

entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents will implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project.
- To the extent feasible, the sites selected for use as construction staging and laydown areas shall be areas that are already disturbed and/or are in locations of low visual sensitivity. Where feasible, construction staging and laydown areas for equipment, personal vehicles, and material storage would be sited to take advantage of natural screening opportunities provided by existing structures, topography, and/or vegetation. Temporary visual screens would be used where helpful if existing landscape features did not screen views of the areas.
- All construction and maintenance areas shall be kept clean and tidy, including the re-vegetation of disturbed soil. Storage of construction materials and equipment shall be screened from view and/or generally not visible to the public, where feasible.
- Siting projects and their associated elements next to important scenic landscape features or in a setting for observation from State scenic highways, national historic sites, national trails, and cultural resources shall be avoided to the greatest extent feasible.
- The project proponent shall contact the lead agency to discuss the documentation required in a lighting mitigation plan, submit to the lead agency a plan describing the measures that demonstrate compliance with lighting requirements, and notify the lead agency that the lighting has been completed and is ready for inspection.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this Draft EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant scenic and nighttime lighting impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses that short-term construction-related and long-term operational-related scenic and nighttime lighting effects resulting from the Proposed Program would be **potentially significant and unavoidable**.

2. Agricultural and Forest Resources

Impact 2-1: Short-Term Construction-Related and Long-Term Operation-Related Effects on Agriculture and Forestry Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[79]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Short-term construction-related and long-term operational impacts on agriculture and forestry resources may occur. New or expanded manufacturing facilities, recycling facilities, production facilities, new infrastructure, and increased mining would likely occur in areas of compatible zoning (e.g., industrial). While it is reasonable to anticipate that land use policies controlling the location of new industrial facilities would generally avoid conversion of important agricultural land, the potential cannot be entirely dismissed. Thus, there exists the potential that Prime Farmland, Unique Farmland, Farmland of Statewide Importance, Williamson Act conservation contracts, and forest land or timberlands could be converted to industrial uses.

Increased demand for lithium-ion and NiMH batteries could place additional demand on lithium, nickel, and cobalt ore extraction internationally. Lithium ore derived from brines typically occurs within desert areas, which are generally not considered valuable land for agricultural or forestry practices; however, lithium, nickel, and cobalt ore extracted from hard rock mining could result in the loss of agricultural and forest lands of importance if resources are identified on land used for agriculture or forestry. Similar to lithium-ion and NiMH batteries, an increase in demand for fuel cells could result in platinum mining and exports from source countries or other states.

[79] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

Increased use of alternative fuels, fuel cells, and lithium-ion and NiMH batteries, could require infrastructure that may be in areas with agriculture or forestry resources. New facilities for the production and distribution of alternative fuels would be expected to occur in areas appropriately zoned; however, such facilities could conceivably be introduced in areas of with agricultural uses or in forested areas and may require either temporary or permanent conversion of these resources. Conversely, implementation of ZEV and PHEV requirements under the Proposed Program would reduce gasoline and diesel fuel consumption and extraction, thus minimizing the potential for new gasoline and diesel extraction facilities to result in the permanent conversion of farmland and forested areas. Nevertheless, short-term construction-related long-term operational-related effects to agriculture and forestry resources associated with implementation of the Proposed Program would be potentially significant.

Mitigation Measure 2-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to agriculture and forestry resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts on agriculture and forestry resources include:

- Proponents of new or modified facilities constructed because of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.
- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. Because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels. Any mitigation specifically required for a new or modified facility would be determined by the local lead agency and future environmental documents by local and State lead agencies should include analysis of the following:
    - Avoid lands designated as Important Farmland (State defined Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) as defined by the Farmland Mapping and Monitoring Program. Before converting Important Farmland to non-agricultural use, analyze the

feasibility of using farmland that is not designated as Important Farmland (e.g., through clustering or design change to avoid Farmland) prior to deciding on the conversion of Important Farmland.

- Avoid lands designated as forest land or timberland before converting forestland or timberland to non-forest use, analyze the feasibility of using other lands prior to deciding on the conversion of forest land or timberland.
- Any mitigation for permanent conversion of Important Farmland caused by facility construction or modification shall be completed prior to the issuance of a grading or building permit by providing the permitting agency with written evidence of completion of the mitigation. Mitigation may include but is not limited to:
  - Restore agricultural land to productive use through removal of equipment or structures or other means, such that the land can be designated as Farmland.
  - If restoration is not feasible, permanently preserve off-site Important Farmland of equal or better agricultural quality, at a ratio of at least 1:1. Preservation may include the purchase of agricultural conservation easement(s); purchase of credits from an established agricultural farmland mitigation bank; contribution of agricultural land or equivalent funding to an organization that provides for the preservation of Important Farmland.
  - Participate in any agricultural land mitigation program, including local government maintained or administered, that provides equal or more effective mitigation than the measures listed.

Any mitigation for permanent conversion of forest land or timberland caused by facility construction or modification shall be completed prior to the issuance of a grading or building permit by providing the permitting agency with written evidence of completion of the mitigation. Mitigation may include but is not limited to permanent preservation of forest land or timberland of equal or better quality at a ratio of 1:1 or 1.5:1 because some lost ecological value may not be replaceable. Preservation may include purchase of easements or contribution of funds to a land trust or other agency.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that a lead agency may ultimately implement to reduce the potentially significant impacts if they approve these potential projects.

Consequently, while impacts could likely be reduced to some degree (although not to a less-than-significant level if Important Farmland were converted) with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies

for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operational impacts on agriculture and forestry resources associated with the Proposed Program would remain **potentially significant and unavoidable**.

3. Air Quality

Impact 3-1: Short-Term Construction-Related Effects on Air Quality

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[80]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Implementation of the Proposed Program could include construction of new ZEV and PHEV emission infrastructure or modifications to existing facilities. Any proposed modifications to facilities resulting from any of the Proposed Program measures would require approvals from the applicable local or State land use authority prior to their implementation. Part of the development review and approval process for projects located in California requires environmental review consistent with California environmental laws (e.g., CEQA) and other applicable local requirements (e.g., local air quality district rules and regulations). The environmental review process would include an assessment of whether implementation of such projects could result in short-term construction-related air quality impacts.

At this time, the specific location, type, and number of construction activities are not known and would be dependent upon a variety of factors that are not within the control

[80] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

or authority of CARB and not within its purview. Thus, CARB has not quantified the potential construction-related emission impacts as these would be too speculative to provide a meaningful evaluation. Nonetheless, the analysis presented herein provides a good-faith disclosure of the general types of construction emission impacts that could occur with implementation of these reasonably foreseeable compliance responses. Further, subsequent environmental review would be conducted at such time that an individual project is proposed, and land use or construction approvals are sought.

Generally, it is expected that during the construction phase for any facilities, criteria air pollutants and toxic air contaminants (TACs) could be generated from a variety of activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would generate fugitive particulate matter (PM) dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., respirable particulate matter [PM_{10}] and fine particulate matter [$PM_{2.5}$]) vary as a function of several parameters, such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. It is probable that transport of light equipment and personnel for construction activities would take place using light duty trucks, while transport of heavy equipment or bulk materials would be hauled in heavy-duty trucks. Exhaust emissions from construction-related mobile sources also include reactive organic gases (ROG) and oxides of nitrogen (NO_X). These emission types and associated levels fluctuate greatly depending on the type, number, and duration of usage for the varying equipment. CARB implements several regulations with the purpose of reducing NO_X, PM, and imposing limits on idling from in-use vehicles and equipment - the Truck and Bus Regulation, the Regulation for In-Use Off-Road Diesel Fueled Fleets, and the Portable Engine Airborne Toxic Control Measure. Much of the equipment used during the construction phase would be subject to these regulations.

The site preparation phase of construction typically generates the most substantial emission levels because of the on-site equipment and ground-disturbing activities associated with grading, compacting, and excavation. Site preparation equipment and activities typically include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Although detailed construction information is not available at this time, based on the types of activities that could be conducted, it would be expected that the primary sources of construction-related emissions include soil disturbance- and equipment related activities (e.g., use of backhoes, bulldozers, excavators, and other related equipment). Based on typical emission rates and other parameters for above mentioned equipment and activities, construction activities could result in hundreds of pounds of daily NO_X and PM emissions (amount generated from two to four pieces of heavy-duty equipment working eight hours per day), which may exceed general mass emissions limits of a local or regional air quality management

district depending on the location of the emissions. Thus, implementation of new, or amended, regulations and/or incentives could generate levels that conflict with applicable air quality plans, exceed or contribute substantially to an existing or projected exceedance of State or national ambient air quality standards, or expose sensitive receptors to substantial pollutant concentrations.

Construction of projects may generate short-term odors from the use of diesel-powered construction equipment; however, the duration of these emissions would likely be short-term in nature and would produce localized impacts. The extent of the significance of these impacts would be determined by the proximity of a project to sensitive receptors and the duration of construction schedule. If future construction activities would be located near the locations of sensitive receptors, construction-related odor impacts could be potentially significant.

As a result, short-term construction-related air quality impacts associated with some of the Proposed Program measures would be potentially significant.

These short-term construction-related air quality effects could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB.

Mitigation Measure 3-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to air quality. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would typically qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts to air quality include the following:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents shall implement all feasible mitigation to reduce or substantially lessen the potentially significant air quality impacts of the project.

- Project proponents shall apply for, secure, and comply with all appropriate air quality permits for project construction from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to construction mobilization.
- Project proponents shall comply with the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA) (e.g., New Source Review and Best Available Control Technology criteria), if applicable.
- Project proponents shall comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure (e.g., construction-related fugitive PM dust regulations, indirect source review, and payment into offsite mitigation funds).
- For projects located in PM nonattainment areas, project proponents shall prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this Draft EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. Although it is unlikely, construction emissions, even after implementation of mitigation measures, could still exceed local air district threshold levels of significance depending on the magnitude of construction.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related air quality effects resulting from compliance responses associated with the Proposed Program would be **potentially significant and unavoidable**.

Impact 3-2: Long-Term Operational-Related Effects on Air Quality

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in

production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[81]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Increased demand for lithium-ion and NiMH based batteries could increase the need for manufacturing, refurbishing, and recycling facilities domestically and abroad, which may require modifications to or construction of new facilities. Increased use of lithium and NiMH batteries could also increase lithium, nickel, and cobalt mining and exports from countries with raw mineral supplies. Some lithium demand may be met domestically; additionally, as discussed under Impact 12-1, "Short-Term Construction-Related and Long-Term Operation-Related Effects to Mineral Resources," some nickel demand could be met domestically; however, the majority of nickel production is produced outside of the United States. Additionally, the majority of cobalt is mined outside of the United States.

It is possible that compliance responses may contribute at some level to demand for fuel cells, which could result in platinum mining and exports from source countries or other states and increased recycling, refurbishment, or disposal of hydrogen fuel cells. The movement of lithium, nickel, cobalt, and platinum domestically and worldwide would generate emissions from vehicle and vessel movement that ship and distribute resources to global manufacturing facilities. Additionally, the mining of these resources would require the use of heavy equipment, which would likely be powered by diesel fuel. However, these materials would ultimately offset the combustion of gasoline, diesel, and other fossil fuels, reducing associated emissions.

Despite the dramatic emission reductions and air quality improvements achieved to date, areas of California, including the South Coast Air Basin in Southern California and the San Joaquin Valley, continue to exceed the NAAQS and the California Ambient Air Quality Standards (CAAQS) for PM_{10}, $PM_{2.5}$, and ozone. The Proposed Program would introduce new ZEV and PHEV requirements that would directly reduce tailpipe emissions.

ZEVs would be mostly battery-electric (excepting ZEVs powered by hydrogen fuel cells), while PHEVs would have an electric range that would be supplemented by a hybrid ICE. The electricity needed to power ZEV and PHEVs can be provided by California's electricity grid or a compliant distributed generation power source. Air pollutant emissions associated with producing electricity for ZEV and PHEVs will vary depending on the relative shares of zero/low-emission sources (e.g., hydro, wind, solar) and higher emission sources (e.g., coal- and natural gas -fired power plants) that are used. The

[81] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

relative shares of fuel sources will change over time (and even vary hour-to-hour depending on electricity demand and time of a day).

California's Renewable Portfolio Standard (RPS), which was established by legislation enacted in 2002 and its most recent targets were set by Senate Bill (SB) 100, requires that California's load-serving entities to procure 60 percent of their retail electricity from eligible renewable sources by 2030. The RPS also established interim targets for utilities as shown below.

- 33 percent of retail sales by December 31, 2020;
- 44 percent of retail sales by December 31, 2024;
- 52 percent of retail sales by December 31, 2027; and
- 60 percent of retail sales by December 31, 2030.[82]

As mentioned in Section 1 of SB 100, "The 100 Percent Clean Energy Act of 2018" California aims for 100 percent of total retail sales of electricity in California to come from eligible renewable energy resources and zero-carbon resources by December 31, 2045.[83]

According to the California Energy Commission, in 2020, 36 percent of all California consumed electricity was sourced from renewable power.[84] As grid power electricity becomes cleaner over time to meet the RPS targets, emission reductions from use of electricity compared to ICEs will shift accordingly. As such, the shift to ZEV and PHEVs from fossil-fuel ICEs would yield increasing operational air quality benefits over time as the State's electrical grid becomes more renewable pursuant to the RPS. Over the time the Proposed Program are in effect (2026–2040), emissions would continue to decrease, relative to both the existing conditions baseline and the projected emissions under the current ACC Regulation.

Upstream emissions associated with the generation of electricity used for ZEV and PHEVs (i.e., emissions from power plants that supply electricity to the grid) are considered in the reduction benefits of the Proposed Program. The emission reductions associated with reduced gasoline/diesel consumption are spatially distributed according to the locations and activities of existing refineries and biofuel production facilities

[82] California Energy Commission. 2022. "Renewables Portfolio Standard- Verification and Compliance." Accessed March 24, 2022. https://www.energy.ca.gov/programs-and-topics/programs/renewables-portfolio-standard/renewables-portfolio-standard.

[83] Senate Bill No. 100, California Renewables Portfolio Standard Program: emissions of greenhouse gases, 2018. Last accessed August 9, 2021. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB100.

[84] California Energy Commission. 2020. "Tracking Progress: Renewable Energy." February 2020, last accessed August 9, 2021. https://www.energy.ca.gov/sites/default/files/2019-12/renewable_ada.pdf.

throughout California.[85] Specifically, the reductions occur in the air basins where existing fuel production facilities reside. Staff also modeled criteria emissions from the fuel product transportation phase via heavy-duty trucks that deliver fuel. The emissions are allocated proportionally by the fraction of state-wide fuel consumption for each air basin.

The main purpose of the Proposed Program is to reduce mobile source emissions of criteria air pollutants and toxic air contaminants to improve air quality. The Proposed Program is an action in addition to existing commitments in the State Implementation Plan that would help further CARB's federal obligations to attain the National Ambient Air Quality Standards.

The emission benefits of the Proposed Program for LDVs and MDVs are estimated using CARB's latest version of its on-road vehicle emission inventory tool EMFAC2021[86] and CARB's Vision model, which can be used to quantify upstream emissions from the transportation fuel and electric power industries.[87] To assess the impact of the Proposed Program, the EMFAC2021 model with customized "annual average" settings was run to estimate statewide light-duty vehicle emissions by calendar year, vehicle category, fuel type, and model year. EMFAC2021 reflects the latest planning assumptions, California-specific driving and environmental conditions, passenger vehicle fleet mix, and most importantly the impact of California's unique mobile source regulations. These include all currently adopted regulations such as the LEV, LEV II and LEV III programs, and California inspection and maintenance programs. The default number of ZEVs in the EMFAC2021 fleet was also adjusted to account for recent changes to the U.S. EPA vehicle standards up to model year 2026.[88] The current regulatory setting through 2026 (prior to the ACC II Program) is reflected as the business-as-usual (BAU) scenario.

Relative to BAU, the Proposed Program is projected to reduce NO_X emissions by 69,569 tons cumulatively by 2040. Additionally, the Proposed Program is projected to reduce $PM_{2.5}$ by 4,469 tons by 2040 when compared to the BAU scenario. Table 11 and Table 12 summarize the NOx and $PM_{2.5}$ emission benefits.

[85] The assumption on refinery reduced operations is based on observations of refinery activity over the past few years as gasoline demand declined. A number of refineries scaled down operations or shut down altogether with plans to shift to renewable liquid fuels. Additionally, it is not clear demand in international markets for California exported refined gasoline would occur.
[86] California Air Resources Board. 2021. EMFAC 2021 Volume III Technical Document. Published April 2021. Accessed March 10, 2022. *https://ww2.arb.ca.gov/sites/default/files/2021-08/emfac2021_technical_documentation_april2021.pdf*.
[87] California Air Resources Board. 2017. Vision 2.1 Scenario Modeling System Limited Scope Release. Published February 2017. Accessed March 10, 2022. *https://ww2.arb.ca.gov/sites/default/files/2020-06/vision2.1_scenario_modeling_system_general_documentation.pdf*.
[88] U.S. Environmental Protection Agency, "Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards." *Federal Register 86*, no. 248 (December 30, 2021): 74434. *https://www.govinfo.gov/content/pkg/FR-2021-12-30/pdf/2021-27854.pdf*.

Table 11: NOX Emission Benefits from the Proposed Program

Year	BAU Emissions (tons/day)	ACC II Program Emissions (tons/day)	Emission Reduction (tons/day)	Percent Emission Reduction*
2021	250	250	0.00	0.0%
2026	163	162	0.59	0.4%
2030	123	118	5.58	4.5%
2035	95	78	17.02	17.9%
2040	79	49	30.14	38.2%

*The benefits shown are relative to BAU, and the benefit relative to the 2021 existing conditions/baseline would be higher.

Table 12: PM2.5 Emission Benefits from the Proposed Program

Year	BAU Emissions (tons/day)	ACC II Program Emissions (tons/day)	Emission Reduction (tons/day)	Percent Emission Reduction*
2021	14	14	0.0	0.0%
2026	13	13	0.0	0.2%
2030	12	12	0.3	2.5%
2035	11	10	1.1	9.4%
2040	11	9	2.0	18.5%

*The benefits shown are relative to BAU, and the benefit relative to the 2021 existing conditions/baseline would be higher.

The following figures demonstrate the overall air quality reductions anticipated from the Proposed Program, year over year. Staff have estimated an inventory under the current BAU scenario and the Proposed Program from 2021 to 2040. Figures 5 and 6 below show the anticipated NO_X and $PM_{2.5}$ emissions from a 2021 baseline, the BAU scenario, and the Proposed Program.

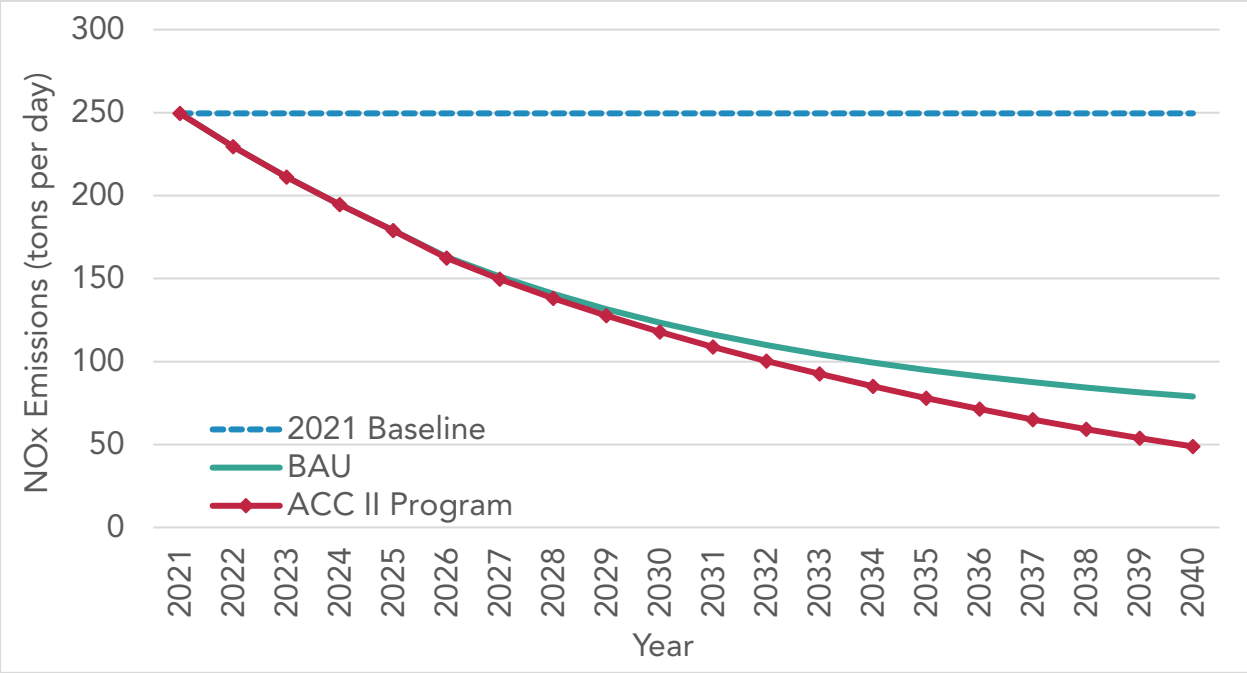

Figure 5: Projected Statewide NOx Tailpipe Emissions in Tons per Day Between Proposed Project and Business-as-Usual for Light- and Medium-Duty Vehicles

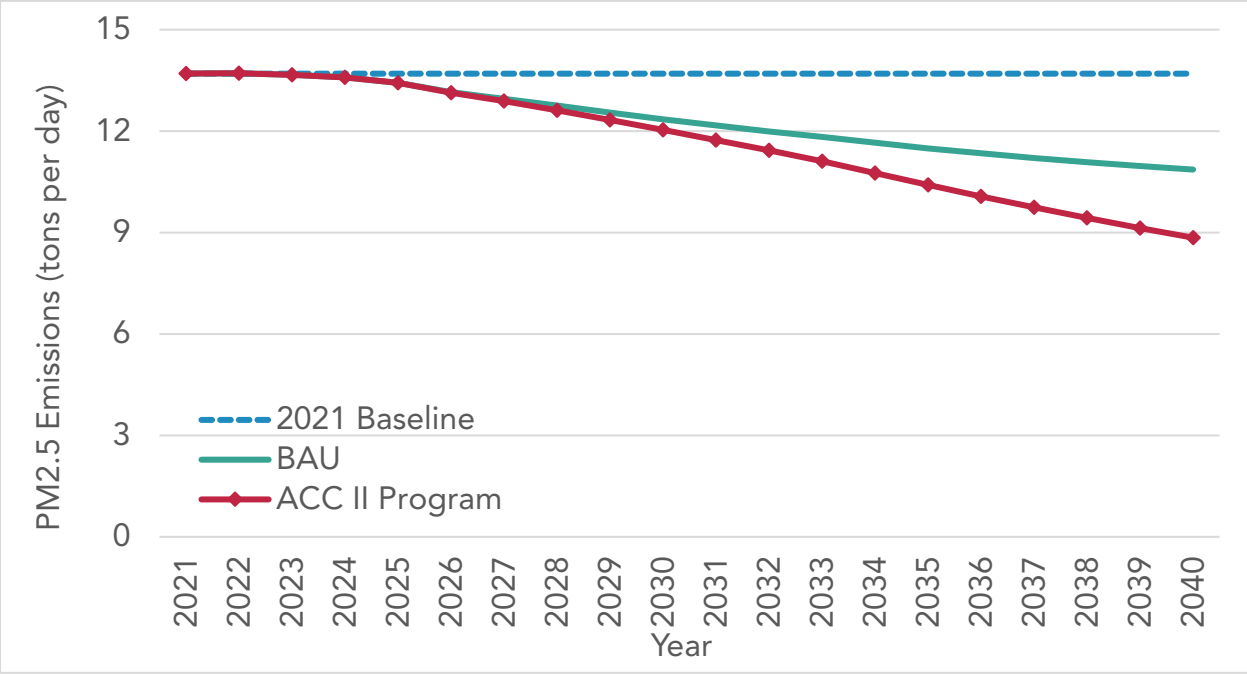

Figure 6: Projected Statewide Fine Particulate Matter (PM2.5) Including Exhaust, Brake-Wear and Tire-Wear Emissions in Tons Per Day between Proposed Program and Business-as-Usual for Light- and Medium-duty Vehicles

For more details regarding quantified emission reductions from the operations associated with the Proposed Program, see Appendix D of the ISOR.

Overall, the Proposed Program is expected to considerably reduce emissions across the state, as set forth in detail in the Staff Report and in this EA. These emissions reductions would lead to substantial net improved health outcomes across the state, as described in the Staff Report.

Implementation of the Proposed Program would minimize emissions associated from light- and medium-duty vehicles and would assist the State in meeting the NAAQS and CAAQS both regionally and statewide. As discussed in detail in the Staff Report, emission reductions resulting from the implementation of the Proposed Program are expected to far outweigh any long-term operational-related emissions increases and would result in high net positive overall health benefits over the life of the Proposed Program.

For these reasons, long-term operational-related air quality impacts would be **beneficial.**

4. Biological Resources

Impact 4-1: Short-Term Construction-Related Effects on Biological Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[89]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Short-term construction-related and long-term operational impacts on biological resources may occur. Construction of manufacturing facilities, recycling facilities,

[89] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

production facilities, new infrastructure, and increased mining would result in ground disturbance that could adversely affect biological resources, and the biological resources affected would depend on the specific location of the compliance responses. These impacts would occur from modifications to existing habitat including the removal, degradation, and fragmentation of riparian systems, wetlands, and/or other sensitive natural wildlife habitats and plant communities; interference with wildlife movement or wildlife nursery sites; loss of or disturbance to special-status species; and/or conflicts with local ordinances or the provisions of adopted habitat conservation plans, natural community conservation plans, or other conservation plan or policies to protect natural resources.

New or expanded manufacturing facilities, recycling facilities, production facilities, new infrastructure, and increased mining would likely occur in areas of compatible zoning (e.g., industrial). While it is reasonable to anticipate that land use policies controlling the location of new industrial facilities would generally avoid conversion of wildlife habitat, the potential cannot be entirely dismissed. Additionally, there are some plant and animal species that occur in developed or disturbed areas and impacts on these species would not be entirely avoided through siting project construction in industrial areas. Direct mortality of individual plants and animals could result from destruction of dens, burrows, or nests through ground compaction, ground disturbance, debris, or vegetation removal. Construction noise disturbance could cause nest or den abandonment and loss of reproductive or foraging potential around the site during construction, transportation, or destruction of equipment and existing structures.

Increased mining for lithium would include expansion of existing extraction facilities or construction of new facilities in the Salton Sea area. The Salton Sea is an important feeding grounds for more than 400 species of birds including waterfowl and shorebirds during annual migration and several bird species also use the area for breeding (USFWS 2021). Nesting native bird species are protected under the Migratory Bird Treaty Act and California bird protection statutes (Fish and Game Code §§ 3503, 3503.5, 3513). Impacts on nesting or foraging birds in the Salton Sea area would be similar to those described above but the magnitude of these impacts may be greater due to the high concentrations of birds at the Salton Sea.

In summary, implementation and compliance with the Proposed Program could result in potentially significant impacts on biological resources. Depending on the regulatory status of the species (e.g., listed as endangered under the federal or state Endangered Species Acts), and the nature of the habitat disturbance, compliance with permitting requirements under the National Environmental Policy Act, the federal or state Endangered Species Act, Migratory Bird Treaty Act, Clean Water Act § 404, California Fish and Game Code, or related state or local laws would be required. It is expected that potential impacts on special-status species and sensitive habitats would be minimized through compliance with the aforementioned protective regulations; however, the terms of permits obtained under these regulations are unknown as are the precise locations at which construction work would occur. Moreover, it is beyond the

authority of CARB to enforce such compliance. Therefore, short-term construction-related biological resources impacts would be potentially significant.

Mitigation Measure 4-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to biological resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts on biological resources include:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Program would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on biological resources associated with the project.
- Actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified port/terminal facility or other lands would be determined by the local lead agency:
    - Retain a qualified biologist to prepare a biological inventory of site resources prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Construction and operational planning will require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.
    - Retain a qualified biologist to prepare a delineation of onsite state or federally protected wetlands or other sensitive habitats (e.g., riparian habitat, sensitive natural communities). This survey shall be used to establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 404 of the Clean Water Act and is administered by the U.S. Army Corps of Engineers.

- Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices.
- Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring, as needed, to address project activities that could cause an active nest to fail.
- Prepare site design and development plans that avoid or minimize disturbance of habitat and wildlife resources and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board.
- Prepare spill prevention and emergency response plans, and hazardous waste disposal plans as appropriate to protect against the inadvertent release of potentially toxic materials.
- Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with "no net loss" requirements.
- Contractor will keep the site and materials organized and store them in a way to prevent attracting wildlife by not creating places for wildlife to hide or nest (e.g., capping pipes, covering trashcans and emptying trash receptacles consistently and promptly when full).

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that a lead agency may ultimately implement to reduce the potentially significant impacts if they approve these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts on biological resources associated with the Proposed Program would remain **potentially significant and unavoidable**.

Impact 4-2: Long-Term Operation-Related Effects on Biological Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and

deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[90]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Anticipated operation-related impacts on biological resources from the reasonably foreseeable compliance responses listed above would likely occur primarily from operation of new facilities and increased mining activity associated with increased demand for lithium batteries. Long-term operation of manufacturing, recycling, and production facilities would often include the presence of workers; movement of automobiles, trucks, and heavy-duty equipment; and operation of stationary equipment. This environment would generally not be conducive to the presence of biological resources located on-site or nearby. For example, operation of a new facility could deter wildlife from the surrounding habitat or could impede wildlife movement through the area. As is already the case with these facilities, this impact would be substantial if there is not adequate habitat nearby. Vegetation management may be necessary to comply with fire codes and defensible space requirements, which may require tree trimming and other habitat modification that could, for example, result in species mortality or nest failure. Furthermore, operation of facilities could result in the accidental introduction of hazardous substances to the environment which could adversely affect biological resources.

While increased mining activity would include methods with relatively small environmental footprints, hard rock and continental brine mining activities would directly alter the character of a sensitive habitat that may support special-status species or serve as a wildlife corridor. Impacts could include reduction in habitat, loss of special-status species, water contamination, and conflict with a habitat conservation plan or natural community conservation plan. Long-term operational impacts on biological resources associated with the Proposed Program would be potentially significant.

[90] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

Mitigation Measure 4-2

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to biological resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts on biological resources include:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Program would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on biological resources associated with the project. The definition of actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - Prohibit vegetation management activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring as needed to ensure that project activity does not cause an active nest to fail.
    - Maintain site design and development plan features that avoid or minimize disturbance of habitat and wildlife resources and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways during project operation.
    - Maintain and replace, as needed, trees and permanently protected suitable habitat identified during the construction phase of the project.

The impacts on biological resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, state, and local lead agencies, but is beyond the authority of CARB. The authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this Draft EA does not attempt to address project-specific details of mitigation. Thus,

there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if they approve these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts on biological resources associated with the Proposed Program would remain **potentially significant and unavoidable**.

5. Cultural Resources

Impact 5-1: Short-Term Construction-Related and Long-Term Operational Impacts on Cultural Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[91]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

[91] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

The Proposed Program could result in construction of manufacturing, production, and recycling facilities as well as new infrastructure and increased mining activity, which would require construction and ground disturbance. In general, construction and ground disturbance activities would occur in areas of compatible zoning (e.g., industrial). Regardless, there is a possibility that these activities may occur in or adjacent to a region consisting of known significant prehistoric and/or historic-era cultural resources. Additionally, while it is reasonable to anticipate that land use policies controlling the location of new industrial facilities would generally avoid areas that have not been disturbed, these areas may not be avoided and therefore may contain these resources. As such, it is foreseeable that known or undocumented cultural or paleontological resources could be unearthed or otherwise discovered during ground-disturbing and construction activities. Unique archaeological or historical resources might include stone tools, tool-making debris, stone milling tools, shell or bone items, and fire-affected rock or soil darkened by cultural activities. Paleontological resources include fossils. Historic materials might include metal, glass, or ceramic artifacts. Finally, historic structures could be removed or damaged if present within or adjacent to a proposed construction site. Tribal cultural resources are addressed below.

Operation of facilities and infrastructure would not result in additional ground disturbance beyond that which occurred during construction and modification because operation activities would occur within the footprint of the constructed or modified facility. Therefore, most operational activities would not have the potential to affect archaeological, paleontological, or historical resources. Presence of new infrastructure may, however, change the visual setting of the surrounding area, which could adversely affect historic resources and districts with an important visual component. For example, although it is unlikely such a facility would be sited in a historic district, a new control system may not be consistent with the visual character of a historic district. As a result, operation impacts could be potentially significant.

Therefore, short-term construction-related and long-term operational-related impacts to cultural resources associated with implementation of the Proposed Program would be potentially significant.

Mitigation Measure 5-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to cultural resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts to cultural resources include:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Program would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to avoid, reduce or substantially lessen the potentially significant impacts on cultural resources associated with the project.
- Actions required to mitigate potentially significant cultural resources impacts may include the following; however, any mitigation specifically required for a modified facility would be determined by the local lead agency.

    - Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61.
    - In the event that cultural resources are discovered during project activities, all work in the immediate vicinity of the find shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. Work on the other portions of the project outside of the buffered area may continue during this assessment period.
    - Seek guidance from the State and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.
    - Regulated entities shall consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies shall provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.
    - If a resource determined to be significant by the qualified archaeologist (i.e., because the find is determined to constitute either an historical resource, cultural resource, or a unique archaeological resource), the archaeologist shall work with the project proponent to avoid disturbance to the resource, and if complete avoidance is not possible, follow accepted professional standards in recording any find Preservation in place is the preferred manner of mitigating impacts to archaeological sites.
    - Regulated entities shall define the area of potential effect (APE) for each project, which is the area where project construction and operation may directly or indirectly cause alterations in the character

or use of historic properties. The APE shall include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access.

- Regulated entities shall retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures, Society of Vertebrate Paleontology.[92]
- Regulated entities shall conduct initial scoping assessments to determine whether proposed construction activities, if any, could disturb formations that may contain important paleontological resources. Whenever possible, potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment shall be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements.
- If human remains or funerary objects are encountered during any activities associated with the project, work in the immediate vicinity and within a reasonable buffer zone, shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code § 7050.5 and that code enforced for the duration of the project.
- The regulated entity's qualified paleontological resources specialist shall determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossiliferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:
  - A preliminary survey (if not conducted earlier) and surface salvage prior to construction.

[92] Society of Vertebrate Paleontology. 2010. "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources." Accessed January 14, 2022. https://vertpaleo.org/wp-content/uploads/2021/01/SVP_Impact_Mitigation_Guidelines.pdf.

- Physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries.
- Monitoring and salvage during excavation.
- Specimen preparation.
- Identification, cataloging, curation, and storage.
- A final report of the findings and their significance.
- Choose sites that avoid areas of special scientific value.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if they approve these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operational impacts to cultural resources associated with the Proposed Program would remain **potentially significant and unavoidable**.

6. Energy

Impact 6-1: Short-Term Construction-Related Impacts to Energy Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially

decreasing rates of oil and gas extraction and gasoline refining activities[93]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Temporary increases in energy demand associated with constructing new facilities would include fuels used during construction and gas and electric demands. Typical earth-moving equipment that may be necessary for construction includes: graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. While energy would be required to complete construction for any new or modified facilities or infrastructure projects, it would be temporary and limited in magnitude such that a reasonable amount of energy would be expended.

While all aforementioned compliance responses would require the consumption of energy resources, these actions would enable the transition to zero-emission technologies to comply with the provisions of the Proposed Program and would not involve the wasteful or inefficient use of energy. A major objective of the Proposed Program is to reduce air pollution, toxic air contaminants, and GHG emissions in the long-term and would require some energy to construct the necessary infrastructure and technical components to support this objective. Therefore, while energy demand would increase during the construction of future projects in response to implementation of the Proposed Program, these energy expenditures would be necessary to facilitate the actions that would result in environmental benefits such as reduced air pollution and GHG emissions. Therefore, short-term energy consumption would not be considered unnecessary. Moreover, energy needed to power necessary equipment would not be anticipated to generate high electrical demand beyond baseline energy load as most construction-related energy is typically consumed by the operation of heavy-duty construction equipment that would be powered by diesel fuel and from construction-related commute trips, which would result in the consumption of gasoline and diesel fuel if worker's vehicles are powered by internal combustion engines. Short-term construction-related energy impacts associated with the Proposed Program would be **less than significant**.

Impact 6-2: Long-Term Operational-Related Impacts to Energy Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states.

[93] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[94]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Utility service and hydrogen fuel providers would provide the electricity and hydrogen to meet the demand generated from various regulations covered under the Proposed Program, including those that directly result in the displacement of energy derived from the combustion of gasoline and diesel fuel to power vehicles to ZEVs and PHEVs that rely on electricity. The electrification of the various sectors affected by the Proposed Program could increase local and regional energy use and impact supplies and requirements for additional capacity. The Proposed Program may also impact peak and base load period demands for electricity and other forms of energy. The level of energy demand generated from these actions, and the potential for a change in energy demand, would be site-specific and dependent on the location and scale that the electrification of these sectors would occur. Where there are situations with substantial electrical loads, distributed generation resources, or lithium-ion storage batteries could be relied on during periods when total demand is high and the energy grid is experiencing peak levels of demand.

As noted in Chapter 2, "Project Description," CEC models project that electricity consumption in 2030 from light-duty vehicle charging will reach around 5,500 megawatts (MW) around midnight and 4,600 MW around 10 a.m. on a typical weekday, increasing electricity demand by up to 25 and 20 percent at those times, respectively. CEC's modeling also suggests that charging demand in 2030 will result in a peak load of about 5.4 gigawatts (GW) at midnight from residential charging, adding up to 25 percent to total electric load during that period on weekdays and weekends. Nonresidential charging contributes to a daytime peak load of about 4.4 GW around 10 a.m., adding up to 20 and 23 percent to total electric load during that period on weekdays and weekends, respectively. Finally, charging load as modeled by CEC could add up to 7 and 8 percent to the total system electric load at 8 p.m. on weekdays and weekends, respectively.

The potential stresses on the electric grid resulting from implementation of the Proposed Program could be avoided through asset management, system design practices, and managed charging to shift a significant amount of the load away from system peaks. Charging management strategies beyond time-of-use rates, including those that reflect wholesale prices and carbon intensity, will be needed to align electric

[94] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

vehicle loads with daytime solar generation. And residential charging technologies should be coordinated with distribution systems to lessen the impact of charging timed to begin at midnight.

To properly launch the PEV charging infrastructure necessary to meet California's ZEV adoption goals, it is important to identify enough geographically dispersed locations that can economically host charging stations. CEC's EDGE model is designed to help users focus charger deployment strategies and plan infrastructure investments. The algorithmic approach compares the load contributions from the CEC's infrastructure model results to the capacities of existing distribution grids in the state to host new electricity loads. If there is a capacity deficit in a location, EDGE flags that location as needing an infrastructure upgrade. Preliminary results as displayed in Figure 4 of Chapter 2, "Project Description," maps show large areas of the grid with little to no excess capacity. Most electric utilities in California have enough capacity in urban areas to support EV charging, but many rural areas may require local distribution grid upgrades.

CEC modeling indicates that the necessary make-ready infrastructure to support EVSEs requires special attention and investment. To support the needed infrastructure for PEVs in California, investment in transformers, meters, breakers, wires, conduit, and associated civil engineering work would be necessary.

Nevertheless, the State's energy capacity is expected to increase as a result of a menu of GHG reducing regulations and policies. To meet the statewide targets of 40 percent below 1990 levels of GHG emissions by 2030 (i.e., SB 32), reductions will need to be made from several sectors including the energy and mobile source sectors. Statewide regulations such as the light duty ZEV Regulation proposals in this project, Advanced Clean Fleet Regulation, Advanced Clean Transit Regulation, and the Innovative Clean Transit (ICT) Regulation aim to achieve GHG reductions from the mobile source sector through the deployment of ZEVs and PHEVs, which would replace vehicles powered by internal combustion engines. Electric utilities are working in coordination with the CPUC to fund infrastructure expansion projects to meet this future demand. The CEC is also working to fund hydrogen stations to increase the passenger vehicle hydrogen fueling network. CPUC is also responsible for regulating Electric Power Procurement and Generation and evaluates the necessity for additional power generation by California utilities in both the short and long term.

Additional electrical energy capacity in the State would be achieved through improved energy efficiency, energy storage, demand response, and generation of renewable resources. The efficiency of new homes is continually improving through triennial updates to Parts 6 and 11 of the Title 24 Building Standards Code (California Energy Code and California Green Building Standards Code), which achieve energy reductions through use of mandatory and prescriptive energy efficiency design features and green building practices. The California Energy Code is anticipated to trend towards decarbonization, or the elimination of on-site natural gas combustion to power stoves and water heaters consistent with the findings of the 2018 Integrated Energy Policy

Report, which identifies carbonization of the building sector as a major policy shift that will assist the State in meeting its long-term GHG reduction goals (i.e., reducing transportation GHG emissions by 80 percent of 1990 levels by 2050, and achieving carbon neutrality statewide across all sectors by 2045).

Moreover, as mandated by SB 100, the State's electrical utilities are legislatively required to procure 60 percent and 100 percent of their total energy supply from eligible renewable energy sources (i.e., solar, wind, geothermal, small-scale hydroelectric, and biomass) by 2030 and 2045, respectively. The abovementioned factors combine to expand the State's energy capacity as compared to previous years. For example, in-state energy capacity rose from 55,530 megawatts (MW) in 2001 to 82,323 MW in 2020, an increase of 48 percent. Additionally, as mentioned above, the California Energy Code is expected to increase the energy efficiency of buildings within the state, which would reduce energy demand generated by the building sector.

The Proposed Program could result in the expansion of hydrogen fuel-cell vehicle technologies and an increase in operation of fuel cells within the state. This could increase the energy demand of producing hydrogen fuel cells. Further, hydrogen fuel used for transportation is required to achieve specific renewable energy targets. SB 1505 requires that state to adopt regulations that will ensure that state funding for the production and use of hydrogen fuel, as described in the California Hydrogen Highway Blueprint Plan. SB 1505 requires that 33.3 percent of total hydrogen production be supplied from renewable sources. Additionally, the LCFS allows for the generation of low-CI credits from hydrogen fueling stations that meet a 40 percent renewables requirement. Currently, SB 1505 only applies to stations with State co-funding. To date, the requirements of SB 1505 has been primarily handled by similar requirements in CEC solicitations for grant co-funding. However, it is also important to note that CEC does not guarantee that meeting their solicitation requirements will also meet SB 1505. CARB and CEC currently estimate actual renewable content right now between 82-92 percent. However, significant amounts of that renewable content are from indirect sources (such as renewable energy credits from steam methane reformers (SMR) of renewable natural gas occurring elsewhere in the hydrogen provider's operations, with book-and-claim accounting).

Operation of new or expanded facilities could result in an increase in vehicle mileage of workers and result in an increase in gasoline and diesel fuel consumption associated with worker commute trips. However, this increase in vehicle miles traveled (VMT) would facilitate meeting the goals and objectives of the Proposed Program, and would, therefore, not be considered unnecessary or wasteful.

Implementation of the Proposed Program could result in the increased use of alternative fuels such as LNG, which would displace diesel fuel currently used to power generators, engines, and other equipment. Appendix F of the CEQA Guidelines identifies the use of alternative fuels as a measure to reduce energy demand. Moreover, Appendix F also lists increased use of renewable energy as an appropriate strategy to mitigate energy impacts. Use of ZEV and PHEV emission technologies, as discussed above, would divert

energy from fossil fuel-powered systems and engines to electrical systems, which, as mandated by the renewable portfolio standard, will become increasingly more renewable in the coming years. Arguably, through the use of alternative fuels and an increasingly more renewable energy grid, implementation of the Proposed Program would improve the efficiency of energy usage across the State.

As such, implementation of the Proposed Program would not result in the wasteful, unnecessary, or inefficient use of energy. Thus, long-term operation-related energy impacts would be **less than significant.**

7. Geology and Soils

Impact 7-1: Short-Term Construction-Related and Long-Term Operational-Related Impacts to Geology and Soils

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[95]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Although it is reasonably foreseeable that construction and operational activities could occur, there is uncertainty as to the exact location of any new facilities or modification of existing facilities. Construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Additional disturbance could result from the increased mineral ore extraction activities which would provide raw materials to these manufacturing facilities and energy projects. These activities would have the potential to adversely affect the geology and soils in construction or mineral ore extraction areas such that a rupture of a known

[95] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

earthquake fault, strong seismic ground shaking, liquefication, landslides, erosion, or the destruction of a unique paleontological resource or geographic feature could occur.

New facilities could be in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil compaction, soil erosion, and loss of topsoil during construction. The level of susceptibility varies by location. However, the specific design details, siting locations, and soil compaction and erosion hazards for manufacturing facilities are not known at this time and would be analyzed on a site-specific basis at the project level.

New facilities constructed as a result of implementation of the Proposed Program would be likely be located in industrial areas that would be serviced by a water utility and would have access to a sewer system and would therefore not be dependent on septic systems. Therefore, the potential for new facilities to be sited on soils incapable of supporting the use of septic systems or alternative wastewater disposal systems would be less than significant.

New facilities could be sited on locations containing and supporting unique paleontological resources or unique geologic features, however, as stated previously, the specific locations of future facilities is unknown at this time. These effects would be analyzed on a project-level basis when the location and size of future facilities have been determined.

Short-term construction-related and long-term operational-related effects to geology and soils associated with the Proposed Program would be potentially significant.

Potential construction-related and operational-related geology and soils could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB and not within its purview.

Mitigation Measure 7-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to geology and soils. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology and soils include:

- Proponents of new or modified facilities constructed because of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.
- Based on the results of the environmental review, proponents shall implement all mitigation measures identified in the environmental document to reduce or substantially lessen the environmental impacts on soil erosion, landslides, loss of topsoil, and damage to a unique paleontological and geologic feature. The definition of actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility will be determined by the local lead agency.
    - Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare a geotechnical investigation/study, which would include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, mineral resources, and the presence of hazardous materials.
    - Proponents of new or modified facilities or infrastructure will provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents will avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible.
    - Disturbed areas outside of the permanent construction footprint will be stabilized or restored using techniques such as soil loosening, topsoil replacement, revegetation, and surface protection (i.e., mulching).

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and this programmatic level of review does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts on geology and soils

associated with the Proposed Program would remain **potentially significant and unavoidable**.

8. Greenhouse Gas Emissions

Impact 8-1: Short-Term Construction-Related and Long-Term Operational-Related Impacts to Greenhouse Gas Emissions

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[96]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Construction of facilities would require use of vehicles and equipment that would consume fuel and emit GHGs for construction activities, materials transport, and worker commutes. Construction-related GHG emissions would be temporary and last only for the duration of construction. Local agencies, such as air pollution control districts, are generally charged with determining acceptable thresholds of GHG emissions, measured in metric tons of carbon dioxide equivalent per year ($MTCO_2e$/year). Quantification of short-term construction-related GHG emissions is generally based on a combination of methods, including the use of exhaust emission rates from emissions models, such as OFFROAD 2007 and EMFAC 2021. These models require consideration of assumptions, including construction timelines and energy demands (e.g., fuel and electricity).

Air districts differ in their treatment of construction emissions. For instance, the Sacramento Metropolitan Air Quality Management District recommends that construction emissions be compared to a bright-line threshold of significance of 1,100 $MTCO_2e$ per year.[97] Other air districts, such as the Bay Area Air Quality Management

[96] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.
[97] Sacramento Metropolitan Air Quality Management District. 2021. CEQA Guide. http://www.airquality.org/LandUseTransportation/Documents/Ch6GHG2-26-2021.pdf.

District, does not have a numerical threshold for assessing the significance of construction-generated GHG emissions.[98] Additionally, other air districts, such as the South Coast Air Quality Management District, recommend amortizing construction emissions over a 30-year period and adding these emissions to total operational emissions.[99]

Depending on project size, the generation of construction emissions are inherently short-term when compared to operational emissions which continue to emit until a project or facility has been decommissioned. Nevertheless, GHGs typically have a long atmospheric lifespan. Therefore, construction emissions must be considered in the overall context of a project. Thus, it is important that the Proposed Program's benefits outweigh the emissions from the construction level.

The Proposed Program would achieve GHG benefits to the State of California relative to the current ACC regulation. The Proposed Program is projected to reduce approximately 383.5 million metric tons of CO_2 equivalent ($MMTCO_2e$) of GHG from 2026 to 2040 (quantified as CO2e as defined above). In 2040, when comparing the Proposed Program to the BAU, GHG emissions would be reduced 181,889 tons of CO2e, a reduction of 52 percent. This additional reduction is achieved by reducing fuel consumption through the transition to ZEV and PHEVs in the mobile sector.

Projected GHG emissions compared to the business-as-usual scenario, GHG emissions in 2021 (baseline year), and the forecasted emissions of the Proposed Program can be seen in Figure 7.

For more details regarding quantified GHG reductions from the Proposed Program, see Appendix D of the ISOR.

Table 13: GHG Emission Benefits from the Proposed Program[100]

Year	BAU Emissions (ton/day)	Proposed Program Emissions (ton/day)	Emission Reduction (ton/day)	Percent Emission Reduction*
2021	479,811	479,811	-	0.0%

[98] Bay Area Air Quality Management District. 2017. CEQA Air Quality Guidelines. https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en.
[99] South Coast Air Quality Management District. 2008. Draft Guidance Document – Interim CEQA Greenhouse Gas Significance Threshold. http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgattachmente.pdf.
[100] The combined emission benefits associated with upstream fuel production and vehicle emissions (i.e., well-to-wheel) are summarized. Given the potentially large impacts of this specific regulation upon transportation fuels as a result of its scope and ambition, an upstream fuels discussion was deemed appropriate in this instance with caveats and transparency as to its assumptions provided in Appendix D of the ISOR. Separate policy, regulatory, or industry actions, such as changing import/export balance decisions at refineries, could cause different results. A complete policy portfolio of both technology and upstream regulations will affect the ultimate outcome. This analysis reflects one reasonable scenario.

Year	BAU Emissions (ton/day)	Proposed Program Emissions (ton/day)	Emission Reduction (ton/day)	Percent Emission Reduction*
2026	442,980	440,034	2,946	1%
2030	405,508	372,917	32,663	8%
2035	371,668	265,774	105,915	28%
2040	351,608	169,719	181,889	52%

* The benefits shown are relative to BAU, and the benefit relative to the 2021 existing conditions/baseline would be higher.

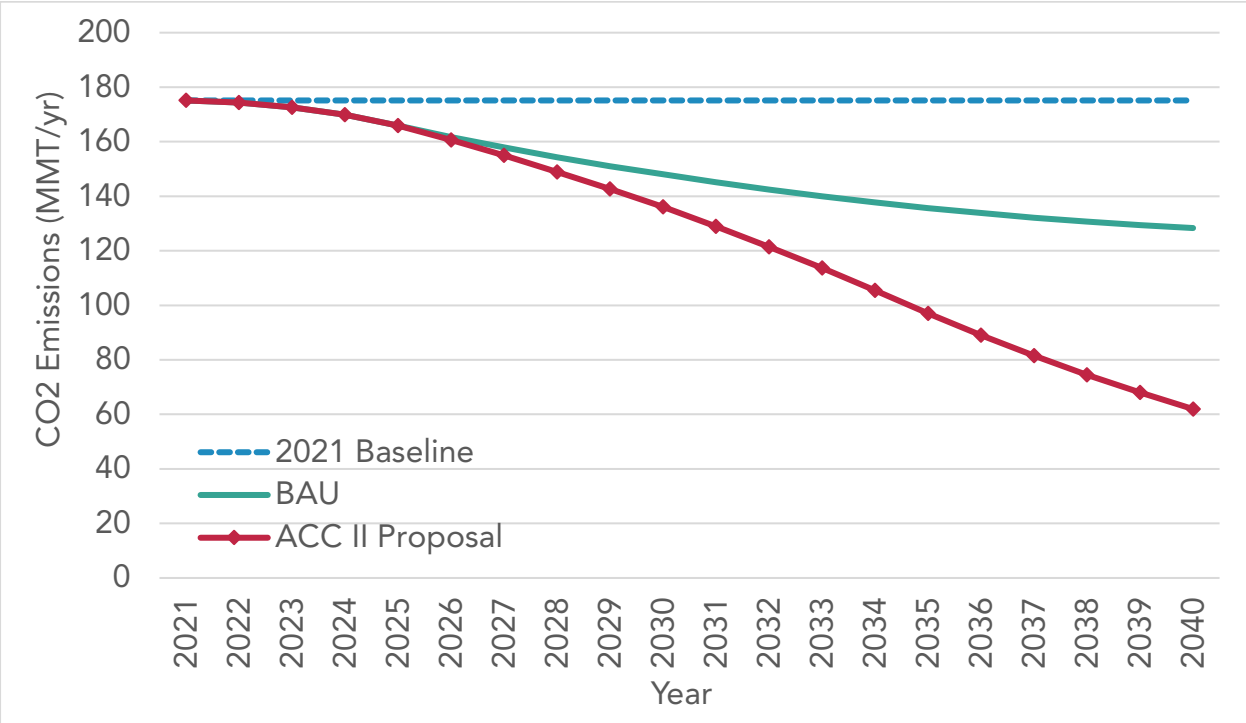

Figure 7: Projected Upstream GHG Emissions in Million Metric Tons per Year Between Proposed Project and Business-as-Usual

Increased demand for lithium-ion and NiMH based batteries could increase the need for manufacturing, refurbishing, and recycling facilities domestically and abroad, which may require modifications to or construction of new facilities. Increased use of lithium and NiMH batteries could also increase lithium, nickel, and cobalt mining and exports from countries with raw mineral supplies. Some lithium demand may be met domestically; additionally, as discussed under Impact 12-1, "Short-Term Construction-Related and Long-Term Operation-Related Effects to Mineral Resources," some nickel demand could be met domestically; however, the majority of nickel production is produce outside of the United States. Additionally, the majority of cobalt is mined outside of the United States.

It is possible that compliance responses may contribute at some level to demand for fuel cells, which could result in platinum mining and exports from source countries or other states and increased recycling, refurbishment, or disposal of hydrogen fuel cells. The movement of lithium, nickel, cobalt, and platinum domestically and worldwide would generate GHG emissions from vehicle and vessel movement that ship and distribute resources to global manufacturing facilities. Additionally, the mining of these resources would require the use of heavy equipment, which would likely be powered by diesel fuel, the combustion of which would produce GHG emissions. However, these materials would ultimately offset the combustion of gasoline, diesel, and other fossil fuels, reducing associated emissions.

As discussed under Impact 3-2, "Long-Term Operation-Related Effects on Air Quality," of this Draft EA, the electrical demand generated by the use of ZEV and PHEVs would be supplied by public utility companies. California's electrical grid will become increasingly cleaner by utilizing more renewable energy over the coming years to comply with the targets mandated by the RPS. Implementation of the Proposed Program would minimize emissions associated with operation of light- and medium-duty vehicles and would assist the State in meeting GHG reduction goals. Therefore, long-term operational-related GHG impacts associated with implementation of the Proposed Program would be **beneficial.**

9. Hazards and Hazardous Materials

Impact 9-1: Short-Term Construction-Related Impacts to Hazards and Hazardous Materials

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[101]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce

[101] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

The Proposed Program could require the construction of manufacturing, production, and recycling facilities as well as new infrastructure and increased mining activity. Construction activities associated with these facilities and new infrastructure as well as increased mining activities may require the transport, use, and disposal of hazardous materials. Construction activities generally use heavy-duty equipment requiring periodic refueling and lubricating fluids. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site as they are not designed for use on public roadways. Thus, such maintenance uses a service vehicle that mobilizes to the location of the construction equipment. It is during the transfer of fuel that the potential for an accidental release is most likely. Although precautions would be taken to ensure that any spilled fuel is properly contained and disposed, and such spills are typically minor and localized to the immediate area of the fueling (or maintenance), the potential remains for a substantial release of hazardous materials into the environment. Therefore, short-term construction-related impacts to hazards and hazardous materials associated with the Proposed Program would be potentially significant.

Mitigation Measure 9-1

The Regulatory Setting in Attachment A includes, but is not limited to, applicable laws, regulations, and policies related to hazards and hazardous materials. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with discretionary local land use and/or permitting authority. New or modified facilities in California could qualify as a "project" under CEQA. The jurisdiction with primary permitting authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation may be identified during the environmental review by agencies with discretionary project approval authority. Recognized practices that are routinely required to avoid upset and accident-related impacts include:

- Proponents of new or modified facilities constructed as a compliance response to the Proposed Program would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.
- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant upset and accident-related hazard impacts may include the following; however, any mitigation

specifically required for a new or modified facility would be determined by the local lead agency.

- Handling of potentially hazardous materials/wastes shall be performed by or under the direction of a licensed professional with the necessary experience and knowledge to oversee the proper identification, characterization, handling and disposal or recycling of the materials generated as a result of the project. As wastes are generated, they shall be placed, at the direction of the licensed professional, in designated areas that offer secure, secondary containment and/or protection from storm water runoff. Other forms of containment may include placing waste on plastic sheeting (and/or covering with same) or in steel bins or other suitable containers pending profiling and disposal or recycling.
- The temporary storage and handling of potentially hazardous materials/wastes shall be in areas away from sensitive receptors such as schools or residential areas. These areas shall be secured with chain-link fencing or similar barrier with controlled access to restrict casual contact from non-Project personnel. All project personnel that may encounter potentially hazardous materials/wastes shall have the appropriate health and safety training commensurate with the anticipated level of exposure.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if they approve these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potential short-term construction-related impacts regarding hazards and hazardous materials associated with the Proposed Program could be **potentially significant and unavoidable**.

Impact 9-2: Long-Term Operational Impacts to Hazards and Hazardous Materials

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in

ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[102]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Proposed Program related to operation of charging infrastructure and hydrogen stations could use potentially hazardous equipment such as electrical cables, high voltage systems, and high pressure hydrogen gas transport and storage systems. The long-term operation of new infrastructure and facilities associated with alternative fuels would result in the routine transport, use, and disposal of hazardous materials, such as lubricating fluids for heavy-duty equipment. Maintenance of heavy-duty construction equipment presents the potential for the accidental release of hazardous materials due to the location of where maintenance activities would occur. While precautions would be taken to minimize risk, the potential for accidental release of a hazardous material during construction still exists. Hazardous materials can enter lakes, reservoirs, and other waters through accidental spills. Hazardous materials spilled on the ground or leaking from equipment can contaminate groundwater.

There could be an increase in use of facilities that manufacture, recycle, and refurbish batteries and fuel cells due to increased demand. Hazardous materials are used during and created by operations of such facilities. For example, smelting is used to recycle batteries and creates hazardous emissions, although those are generally treated. Chemical leaching processes uses chemicals such as hydrochloric acid and sulfuric acid.[103] These activities would be more likely to occur indoors in a contained area and with proper equipment, limiting the potential effects of spills and accidents as activities involving the use of hazardous materials would occur within the confines of facilities. Risk of outdoor release of hazardous materials would be highest during the movement of raw goods to manufacturing facilities or the export of finished goods containing hazardous materials following the manufacturing process. The transport, use, and disposal of hazardous materials would be required to comply with all applicable federal, State, and local laws that would reduce the potential for accidents and require certain

[102] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.
[103] Jacoby, Mitch. 2019. "It's time to get serious about recycling lithium-ion batteries." July 14, 2019. Accessed March 11, 2022. https://cen.acs.org/materials/energy-storage/time-serious-recycling-lithium/97/i28.

actions should a spill or release occur; however, the potential remains for the release of hazardous materials into the environment.

Implementation of the Proposed Program could result in an increase in demand for lithium mining. Lithium is currently sourced in two ways: from hard rock, and from the evaporation of salt brines. Lithium from rock sources is primarily produced from spodumene, a lithium/aluminum/silicate mineral. Salt brine sources include salt lakes, which are currently the main source of lithium, and geothermal brines and salt brines associated with oil deposits. Lithium is the lightest solid metal. It can be absorbed into the body by inhalation of its aerosol and by ingestion and is corrosive to the eyes, the skin, and the respiratory tract. Lithium reacts violently with strong oxidants, acids, and many compounds (hydrocarbons, halogens, halons, concrete, sand and asbestos) causing a fire and explosion hazard. In addition, lithium reacts with water, forming highly flammable hydrogen gas and corrosive fumes of lithium hydroxide. Lithium hydroxide represents a potentially substantial environmental hazard, particularly to water organisms. Implementation of the Proposed Program may also increase demand for platinum mining. Platinum mining can expose workers to excessive dust that can result in respiratory ailments.[104]

Lithium metal batteries contain potentially toxic metals, such as copper and nickel, and organic chemicals, like toxic and flammable electrolytes.[105] Improper management of lithium-ion batteries could pose an environmental hazard and be of concern to public safety. There have been some cases with consumer products containing lithium-ion batteries catching fire after or during transportation to disposal facilities. Once ignited, the resulting fires can be especially difficult to extinguish as temperatures can rapidly increase to up to 500 degrees Celsius (932 degrees Fahrenheit) as a result of interactions between a battery's cathodes and anodes, and water is an ineffective extinguisher.[106] The likelihood to overheat or ignite is increased if the batteries are poorly packaged, damaged, or exposed to a fire or a heat source. However, when packaged and handled properly, lithium-ion batteries pose no environmental hazard (79 Fed. Reg. 46011, 46032). Further, these impacts are largely associated with the use and production of lithium-ion batteries used in consumer products as compared to lithium-ion batteries used for automotive cars.

There are inherent risks associated with the installation and use of hydrogen fuel cells including fire and explosion, electric shock, and exposure to toxic materials. Hydrogen

[104] Sepadi, Maasago M., Martha Chadyiwa, and Vusumuzi Nkosi. 2020. "Platinum Mine Workers' Exposure to Dust Particles Emitted at Mine Waste Rock Crusher Plants in Limpopo, South Africa." *International Journal of Environmental Research and Public Health* 17 (2): 655. doi:10.3390/ijerph17020655.

[105] Zeng, Xianlai, Jinhui Li, and Lili Liu. 2015. "Solving spent lithium-ion battery problems in China: Opportunities and challenges." Renewable and Sustainable Energy Reviews, December: 1759-1767. doi:10.1016/j.rser.2015.08.014.

[106] Battery University. 2022. "BU-304a: Safety Concerns with Li-ion." Last updated February 22, 2022. Accessed March 24, 2022. https://batteryuniversity.com/article/bu-304a-safety-concerns-with-li-ion.

possesses several hazardous properties such as a very wide flammability range, very low ignition energy, low viscosity, high diffusivity, and is chemically lighter than air.[107] However, fuel cell manufacturers developed and extensively safety-tested carbon-fiber hydrogen tanks, which can withstand environmental and man-made damage, including crash testing and ballistics. Hydrogen tanks are designed with multiple safety enhancements to prevent leaks in both routine use and extreme circumstances. Should a leak and subsequent ignition happen, the low radiant heat of a hydrogen fire and high diffusivity of hydrogen would reduce any potential damage, especially when compared to a gasoline fire.

The design of lithium-ion batteries and hydrogen fuel cells and the compliance with regulations are sufficient to reduce adverse impacts associated with hazards and hazardous materials.

An increase in demand for lithium-ion batteries and fuel cells could result in increased recycling, refurbishment, or disposal of lithium-ion batteries and hydrogen fuel cells. However, any increased rates of disposal of lithium-ion batteries and hydrogen fuel cells would need to comply with California law, including, but not limited to, California's Hazardous Waste Control Law and implementing regulations. Compliance with the appropriate federal and state laws governing the handling of potentially hazardous materials would be sufficient to minimize the risks from lithium-ion batteries and fuel cells because they ensure adequate handling and disposal safeguards to address these risks.

For the reasons described above, long-term operational impacts to hazards and hazardous materials associated with the Proposed Program would be potentially significant.

Mitigation Measure 9-2: Implement Mitigation Measure 9-1

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant impacts if it approves these potential projects.

Consequently, while impacts could be reduced to a less-than-significant level with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potential long-term operation-related impacts

[107] Health and Safety Executive, Fuel Cells: Understand the Hazards, Control the Risks, 2004.

regarding hazards and hazardous materials associated with the Proposed Program could be **potentially significant and unavoidable**.

10. Hydrology and Water Quality

Impact 10-1: Short-Term Construction-Related Impacts to Hydrology and Water Quality

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[108]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Specific construction projects would be required to comply with applicable erosion, water quality standards, and waste discharge requirements (e.g., NPDES, Stormwater Pollution Prevention Plan).

Short-term construction-related effects to hydrologic resources associated with the Proposed Program would be potentially significant.

Potential construction-related hydrology and water quality impacts could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB and not within its purview.

Mitigation Measure 10-1

The Regulatory Setting in Attachment A includes applicable laws and regulations regarding hydrology and water quality. CARB does not have the authority to require

[108] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project -specific impacts and mitigation measures would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or mitigate hydrology and water quality-related impacts include the following:

- Proponents of new or modified facilities constructed because of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.
- Based on the results of the environmental review, proponents shall implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the potentially significant impacts of a project. The definition of actions required to mitigate potentially significant hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. Project proponents shall implement the following measures as applicable:
    - Implement Best Management Practices to reduce sedimentation and pollution of surface waters, such as installation of silt fencing around the perimeter of active construction areas, sediment traps, revegetation, and rock and gravel cover
    - Train construction workers for proper response to hazardous materials spills as well as responsibilities for maintaining BMPs on site.
    - Drainage plans for runoff shall be designed to contain adequate capacity for projected flows on site.
    - Avoid filling of waters of the United States and waters of the State to the extent feasible. If activities require a waste discharge requirement or Section 401 Water Quality Certification, comply with all avoidance, reduction, and compensatory measures.
- Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed project shall prepare a stormwater drainage and flood control analysis and management plan. The plans will be prepared by a qualified professional and will summarize existing conditions and the effects of project improvements, and will include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to

protection downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features will be designed to protect existing downstream flow conditions that will result in new or increased severity of offsite flooding.

- Project proponents shall establish drainage performance criteria for off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious areas; (b) maximizing permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the system design.
- The project proponent shall design and construct new facilities to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs will be approved by the local or State land use agency. The project proponent will also consult with the appropriate flood control authority on the design of offsite stream crossings such that the minimum elevations are above the predicted surface-water elevation at the agency's designated design peak flows. Drainage and flood prevention features shall be inspected and maintained on a routine schedule specified in the facility plans, and as specified by the county authority.
- As part of subsequent project-level planning and environmental review, the project proponent shall coordinate with the local groundwater management authority and prepare a detailed hydrogeological analysis of the potential project-related effects on groundwater resources prior to issuance of any permits. The proponent shall mitigate for identified adverse changes to groundwater by incorporating technically achievable and feasible modifications into the project to avoid offsite groundwater level reductions, use alternative technologies or changes to water supply operations, or otherwise compensate or offset the groundwater reductions.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and this programmatic level of review does not allow for those project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related effects to hydrology and water quality associated with the Proposed Program would be **potentially significant and unavoidable**.

Impact 10-2: Long-Term Operational-Related Effects to Hydrology and Water Quality

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[109]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Implementation of the Proposed Program would result in increased demand for batteries, which would accelerate the market for mined resources, lithium for example. Mining of hard rock would require the use of conventional mining practices including the creation of underground mines and open pits, which would result in the removal of organic material (e.g., bedrock, vegetation). Additionally, lithium can be collected from continental brines found in various basins. Salty groundwater is pumped into lagoons where it undergoes evaporation producing salts containing lithium compounds. This process could result in overdrafting of groundwater as well as groundwater contamination from metals such as antimony and arsenic.

Mineral extraction and mining activities within the U.S. would be required to comply with the provisions of the Clean Water Act and the natural resource protection and land reclamation requirements of the appropriate State and federal land managers. For instance, the U.S. Bureau of Land Management and U.S. Forest Service mining permit conditions contain protections for hydrologic resources and require mining reclamation standards. However, lithium is obtained from areas outside of the U.S., where State and U.S. laws and regulation are not enforced. Thus, water quality impacts related to mining could occur related to the implementation of the reasonably foreseeable compliance responses associated with the Proposed Program.

[109] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

Under the Proposed Program, the demand for oil and gas extraction activities could decrease. Oil and gas extraction can produce substantial adverse effects to hydrology. For instance, fracking requires the use of millions of liters of water and consequently millions of liters of wastewater, which can contaminate groundwater with toxic chemical compounds.[110] As on June 2015, U.S. EPA had identified 1,173 known chemicals used in the fracking industry. Additionally, accidental release of oil or gas and related wastewater (e.g., spills from pipelines or trucks, leakage from wastewater ponds or tanks) can introduce toxicants, radionuclides, and dissolved metals, and affect the salinity of local drinking water supplies.[111] Through implementation of the Proposed Program, the aforementioned effects to hydrologic resources would be reduced as zero-emission technologies displace internal combustion engines. As a result, adverse hydrologic effects associated with oil and gas extraction could be decreased through implementation of the Proposed Program.

New facilities constructed as a result of implementation of the Proposed Program could have long-term effects on hydrologic conditions and characteristics. Depending on the location of these facilities, the physical alterations caused by these facilities could produce long-term effects to runoff patterns and natural drainage, impede or reroute natural flood patterns. As such, operation of new facilities could have long-term effects related to the permanent introduction of new surfaces that could alters the existing drainage pattern of a project site or area. These impacts would be potentially significant.

As such, long-term operational-related effects to hydrology and water quality would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB and not within its purview.

Mitigation Measure 10-2: Implement Mitigation Measure 10-1

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative

[110] European Parliament. 2012. "Policy Department A: Economic and Scientific Policy, Workshop on the Impact of Shale Gas and Shale Oil Extraction on the Environment and on Human Health." March. https://www.europarl.europa.eu/document/activities/cont/201312/20131205ATT75545/20131205ATT75545EN.pdf.

[111] Konkel, Lindsey. 2016. "Salting the Earth: The Environmental Impact of Oil and Gas Wastewater Spills." *Environmental Health Perspectives* 124 (12). December 2016. http://dx.doi.org/10.1289/ehp.124-A230.

approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational-related impacts to hydrology and water quality under the Proposed Program would be **potentially significant and unavoidable**.

11. Land Use

Impact 11-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Land Use

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[112]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Reasonably foreseeable compliance responses associated with the Proposed Program may include: increased infrastructure for hydrogen refueling and electric recharging stations; increased demand for battery manufacturing and associated increases in mining and exports; increased recycling or refurbishment of batteries; reduced extraction, refinement, and distribution of oil and gas products; increased solid waste to be diverted to landfills from the scrapping of old equipment; the construction and operation of new manufacturing facilities to support zero-emission technologies; and the construction and operation of new power plants, solar fields, wind turbines, and other electricity generation facilities to accommodate increased electrical demand associated with the deployment of zero-emission technologies.

Short-term construction-related effects on land use and planning associated with implementation of the Proposed Program may not be consistent with existing and

[112] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

planned land uses. The environmental consequences of land use changes are considered in their respective sections of the EA.

New or expanded battery manufacturing facilities would be subject to local zoning ordinances and would generally be located on sites planned for those types of facilities, which are typically placed apart from residential communities and would not typically divide an established community. Also, projects that are more likely to divide an established community tend to be linear (e.g., new highway, railroad, etc.). New transmission lines to support EV charging and other electrification would also not typically divide an established community because they are generally either undergrounded or strung on lines and therefore do not obstruct travel or lines of site between areas of the community. Therefore, the Proposed Program would have a **less than significant impact**.

12. Mineral Resources

Impact 12-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Mineral Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[113]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Implementation of the Proposed Program could also require construction and operation of substantial new and improved infrastructure (e.g., pipelines, compressor stations, fueling stations) to support the use of alternative fuels and fuel cells. Construction and operation of new and modified infrastructure could occur in areas that might have mineral resources, but it is more likely they would be located in areas zoned appropriately for such industrial uses rather than in areas with recoverable mineral

[113] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

resources that are zoned for mineral recovery. Similarly, these facilities are also more likely to be in already disturbed areas (e.g., fueling stations would be in areas already used by vessels for fueling or maintenance activities) that are not conducive to mineral recovery. Therefore, it is not expected these activities would impede recovery of mineral resources.

Increased use of ZEVs and PHEVs will require the use of batteries sourced by various precious metals (e.g., lithium, nickel, and cobalt) or fuel cells (e.g., platinum) for passenger vehicles covered by the Proposed Program. An increase in demand for batteries and fuel cells could result in lithium, nickel, cobalt, and platinum mining, among other resources, and exports from source countries or other states. While CARB recognizes that existing battery technology may contain a menu of various semi-precious metals, minerals, and other mined resources, lithium and platinum will comprise the focus of this analysis, as many electric vehicle batteries and fuel cells primarily contain these notable metals. However, the reduced used of conventional internal combustion engine vehicles will result in a reduction in demand for platinum for catalytic converters.

Implementation of the Proposed Program could have an effect on the availability of known materials because it would involve mining lithium. Owing to continued exploration, identified lithium resources have increased substantially worldwide and total about 86 million tons. In 2021, the total amount of lithium ore available in the United States was 7.9 million tons in the form of continental brines, geothermal brines, hectorite, oilfield brines, and pegmatites. Lithium consumption for batteries has increased substantially in recent years due to increased demand for rechargeable lithium-ion batteries, which use approximately 74 percent of the world's lithium resources.[114] As of March 2022, a domestic lithium mine is in operation in Nevada and the developer, Controlled Thermal Resources has begun extracting lithium in the Salton Sea. Two companies produced a large array of downstream lithium compounds in the United States from domestic or South American lithium carbonate, lithium chloride, and lithium hydroxide. From 2016 through 2019, the United States imported lithium from Argentina (55 percent), Chile (36 percent), China (5 percent), Russia (2 percent), and others (2 percent).[115] However, there are current initiatives at the State and federal level that are likely to influence lithium mining domestically, which includes efforts in California. Table 14 details lithium mine production and reserves by country.

Table 14: Lithium Mine Production and Reserves by Country[116]

Country	Mine Production in 2020 (Tons)	Mine Production in 2021 (Tons) (estimated)	Reserve Amount (Tons)
United States	Withheld	Withheld	750,000

[114] United States Geological Survey. 2022. "Mineral Commodity Summaries, Lithium." January 2022. Accessed March 7, 2022. https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-lithium.pdf.
[115] United States Geological Survey, "Mineral Commodity Summaries, Lithium."
[116] United States Geological Survey, "Mineral Commodity Summaries, Lithium."

Country	Mine Production in 2020 (Tons)	Mine Production in 2021 (Tons) (estimated)	Reserve Amount (Tons)
Argentina	5,900	6,200	2,200,000
Australia	39,700	55,000	5,700,000
Brazil	1,420	1,500	95,000
Chile	21,500	26,000	9,200,000
China	13,300	14,000	1,500,000
Portugal	348	900	60,000
Zimbabwe	417	1,200	220,000
Other Countries	—	—	2,700,000
Worldwide Total (rounded and excluding U.S. production)	82,500	100,000	22,000,000

The magnitude of reserves, shown above, is necessarily limited by many considerations, including cost of drilling, taxes, price of the mineral commodity being mined and the associated demand. In addition to the reserves described above, deposits of mineral resources are also important to consider in assessing future supplies. Furthermore, owing to continuing exploration, identified lithium resources have increased substantially worldwide. Worldwide in 2021, lithium resources are currently estimated to be approximately 100 million tons, including 7.9 million tons in the United States, 21 million tons in Bolivia, 19.3 million tons in Argentina, 9.6 million tons in Chile, 6.4 million tons in Australia, 5.1 million tons in China, 3 million tons in the Congo, 1.7 million tons in Mexico, 1.3 million tons in Czechia, and 1.2 million tons in Serbia. In addition, Peru, Mali, Zimbabwe, Brazil, Spain, Portugal, Ghana, Austria, Finland, Kazakhstan, and Namibia have resources of less than one million tons each. Further, due to steadily increasing demand for lithium, domestic recycling of lithium has also increased.[117]

As mentioned, there are efforts to increase domestic supply of lithium. Efforts to address supply chains of mineral commodities has gained substantial interest from the State and federal government, both of which have sought to address mineral independence and security. Examples of efforts include California Assembly Bill 1657 (Garcia), Chapter 271, 2020 (AB 1657), which requires the California Energy Commission (CEC) to convene a Blue-Ribbon Commission on Lithium Extraction in California (Lithium Valley Commission). The Lithium Valley Commission is charged with reviewing, investigating, and analyzing issues and potential incentives regarding lithium extraction and use in California. At the federal level, EO 14017 directed federal agencies to perform a 100-day review of "supply chain risks" for four classes of products, including semiconductors, high-capacity batteries (including for electric vehicles), critical and strategic minerals

[117] United States Geological Survey, "Mineral Commodity Summaries, Lithium."

(including rare earths), and pharmaceuticals.[118] The EO additionally directs agencies to perform year-long reviews of supply chains in six critical sectors, which includes transportation and energy. The reviews will seek to identify supply chain risks that leave the United States vulnerable to reductions in the availability and integrity of critical goods, products, and services, and will include policy recommendations for address such risks. The EO indicates that, among other approaches, the current administration will explore how trade policies and agreements can be used to strengthen the resilience of U.S. supply chains.

In summary, while substantial research has been done and there is a clear commitment to increasing domestic supply of lithium, exact actions that will be taken in response to this goal of increasing domestic supply of lithium are yet to be identified with certainty. However, the increase in demand that could be associated with the Proposed Program suggests existing extraction facilities would be used rather than requiring development of new extraction facilities.

The Proposed Program could also result in an increase in nickel mining to manufacture NiMH batteries. In 2021, the underground Eagle Mine in Michigan produced approximately 18,000 tons of nickel in concentrate, which was exported to smelters in Canada and overseas. A company in Missouri recovered metals, including nickel, from mine tailings as part of the Superfund Redevelopment Initiative. Nickel in crystalline sulfate was produced as a byproduct of smelting and refining platinum-group-metal ores mined in Montana.[119] Table 15 below summarizes mine production of nickel by country in 2020 and 2021.

Table 15: Nickel Mine Production and Reserves by Country[120]

Country	Mine Production in 2020 (Tons)	Mine Production in 2021 (Tons) (estimated)	Reserve Amount (Tons)
United States	16,700	18,000	340,000
Australia	169,000	160,000	21,000,000
Brazil	77,100	100,000	16,000,000
Canada	167,000	130,000	2,000,000
China	120,000	120,000	2,800,000
Indonesia	771,000	1,000,000	21,000,000
New Caledonia	200,000	190,000	NA
Philippines	334,000	370,000	4,800,000
Russian	283,000	250,000	7,500,000

[118] Presidential Documents 2021. "America's Supply Chains." Federal Register 86, no. 38 (February 24, 2021): 14017. https://www.govinfo.gov/content/pkg/FR-2021-03-01/pdf/2021-04280.pdf.
[119] United States Geological Survey. 2022. "Mineral Commodity Summaries, Nickel." January 2022. Accessed March 7, 2022. https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-nickel.pdf.
[120] United States Geological Survey, "Mineral Commodity Summaries, Nickel."

Country	Mine Production in 2020 (Tons)	Mine Production in 2021 (Tons) (estimated)	Reserve Amount (Tons)
Other Countries	373,000	410,000	20,000,000
Worldwide Total (rounded and excluding U.S. production)	2,510,000	2,700,000	>95,000,000

Cobalt mining may also increase as a result of implementation of the Proposed Program as battery production, which requires the use of cobalt, increases to support the electrification of the on-road mobile source sector. Identified cobalt resources of the United States are estimated to be about 1 million tons. Most of these resources are in Minnesota, but other important occurrences are in Alaska, California, Idaho, Michigan, Missouri, Montana, Oregon, and Pennsylvania. With the exception of resources in Idaho and Missouri, any future cobalt production from these deposits would be as a byproduct of another metal. Identified world terrestrial cobalt resources are about 25 million tons. The vast majority of these resources are in sediment-hosted stratiform copper deposits in the Democratic Republic of the Congo and Zambia; nickel-bearing laterite deposits in Australia and nearby island countries and Cuba; and magmatic nickel-copper sulfide deposits hosted in mafic and ultramafic rocks in Australia, Canada, Russia, and the United States. More than 120 million tons of cobalt resources have been identified in polymetallic nodules and crusts on the floor of the Atlantic, Indian, and Pacific Oceans. Table 16 summarizes cobalt extraction by country.[121]

Table 16: Cobalt Mine Production and Reserves by Country[122]

Country	Mine Production in 2020 (Tons)	Mine Production in 2021 (Tons) (estimated)	Reserve Amount (Tons)
United States	600	700	69,000
Australia	5,630	5,600	1,400,000
Canada	3,690	4,300	220,000
China	2,200	2,200	80,000
Democratic Republic of the Congo	98,000	120,000	3,500,000
Cuba	3,800	3,900	500,000
Indonesia	1,100	2,100	600,000
Madagascar	850	2,500	100,000
Morocco	2,300	2,300	13,000
Papua New Guinea	2,940	3,000	47,000

[121] United States Geological Survey. 2022. "Mineral Commodity Survey, Cobalt." January 2022. Accessed March 7, 2022, https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-cobalt.pdf.
[122] United States Geological Survey, "Mineral Commodity Survey, Cobalt."

Country	Mine Production in 2020 (Tons)	Mine Production in 2021 (Tons) (estimated)	Reserve Amount (Tons)
Philippines	4,500	4,500	260,000
Russia	9,000	7,600	250,000
Other Countries	7,640	6,600	610,000
Worldwide Total (rounded and excluding U.S. production)	142,000	170,000	7,600,000

An increased demand for hydrogen fuel cell-powered vehicles and a related increase in demand for mining of platinum-group metals (PGMs) could occur. The leading domestic use for PGMs is in catalytic converters to decrease harmful emissions from gasoline fueled automobiles. Platinum-group metals are also used in catalysts for bulk-chemical production and petroleum refining; dental and medical devices; electronic applications, such as in computer hard disks, hybridized integrated circuits, and multilayer ceramic capacitors; glass manufacturing; investment; jewelry; and laboratory equipment.[123] Table 17 summarizes world platinum and palladium production and reserves. The United States has some platinum production and reserves, and internationally South Africa has the highest volume of platinum production and reserves.[124]

Table 17: Platinum and Palladium Mine Production and Reserves[125]

Country	2019 (metric tons Platinum)	2020 (metric tons Platinum) (estimated)	2019 (metric tons Palladium)	2019 (metric tons Palladium) (estimated)	Reserves (metric tons)
U.S.	4,150	4,000	14,300	14,000	900,000
Canada	7,800	7,800	20,000	20,000	310,000
Russia	24,000	21,000	98,000	91,000	3,900,000
South Africa	133,000	120,000	80,700	70,000	63,000,000
Zimbabwe	13,500	14,000	11,400	12,000	1,200,000
Other Countries	3,730	3,800	2,600	2,600	Not Available
World total (rounded)	186,000	170,000	227,000	210,000	69,000,000

Reserves data are dynamic. They may be considered a working inventory of mining companies' supply of an economically extractable mineral commodity. Inventory is

[123] United States Geological Survey. 2021. "Mineral Commodity Summaries, Platinum." January 2021. Accessed August 11, 2021. https://pubs.usgs.gov/periodicals/mcs2021/mcs2021-platinum.pdf.
[124] United States Geological Survey, "Mineral Commodity Summaries, Platinum."
[125] United States Geological Survey, "Mineral Commodity Summaries, Platinum."

limited by many considerations, including cost of drilling, taxes, price of the mineral commodity being mined, and the demand for it.

Palladium has been substituted for platinum in most gasoline-engine catalytic converters because of the historically lower price for palladium relative to that of platinum. About 25 percent of palladium can routinely be substituted for platinum in diesel catalytic converters; the proportion can be as much as 50 percent in some applications. For some industrial end uses, one PGM can substitute for another, but with losses in efficiency. From 2016 through 2019, the United States imported platinum from South Africa (43 percent), Germany (21 percent), Italy (7 percent), Switzerland (6 percent), and other countries (23 percent). During the same period, the United States imported palladium from Russia (38 percent), South Africa (33 percent), Germany (8 percent), the United Kingdom (5 percent), and other countries (16 percent).[126]

Appendix G of the CEQA Guidelines considers an impact on mineral resources to be the loss of availability of a known mineral resource that would be of value to a local entity, a region, or the State. As discussed above, facilities developed in response to implementation of the Proposed Program would be located in areas within existing footprints or in areas with consistent zoning where original permitting and analyses considered these issues. Implementation of the Proposed Program and associated compliance responses could result in an increase in mining for lithium and PGMs but would be generally small when viewed in the context of global lithium markets. Thus, implementation of the Proposed Program would not affect the economic potential related to known mineral resources or substantially affect supply. Thus, long-term operation-related mineral resources effects associated with the Proposed Program would be **less than significant.**

13.Noise and Vibration

Impact 13-1: Short-Term Construction-Related Impacts to Noise and Vibration

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in

[126] United States Geological Survey, "Mineral Commodity Summaries, Platinum."

production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[127]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Construction noise levels that could result from the implementation of new manufacturing facilities and ZEV and PHEV-related infrastructure would fluctuate depending on the type, number, size, and duration of usage for the varying equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Construction generally occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. These variations in the operational characteristics of the equipment change the effect they have on the noise environment of the project site and in the surrounding community for the duration of the construction process.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes, mobile and stationary. Mobile equipment sources move around a construction site performing tasks in a recurring manner (e.g., loaders, graders, dozers). Stationary equipment operates in a given location for an extended period to perform continuous or periodic operations. Operational characteristics of heavy construction equipment are additionally typified by short periods of full-power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

Additionally, when construction-related noise levels are being evaluated, activities that occur during the more noise-sensitive evening and nighttime hours are of increased concern. Because exterior ambient noise levels typically decrease during the late evening and nighttime hours as traffic volumes and commercial activities decrease, construction activities performed during these more noise-sensitive periods of the day can result in increased annoyance and potential sleep disruption for occupants of nearby residential uses.

The site preparation phase typically generates the most substantial noise levels because of the on-site equipment associated with grading, compacting, and excavation, which uses the noisiest types of construction equipment. Site preparation equipment and activities include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Construction of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which may also generate noise levels. Although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of

[127] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

noise would include backhoes, bulldozers, and excavators. Noise emission levels from typical types of construction equipment can range from approximately 74 to 94 A-weighted decibels (dBA) at 50 feet.

Based on this information and accounting for typical usage factors of individual pieces of equipment and activity types, on-site construction could result in hourly average noise levels of 87 dBA equivalent level measurements (L_{eq}) at 50 feet and maximum noise levels of 90 dBA maximum sound level (L_{max}) at 50 feet from the simultaneous operation of heavy-duty equipment and blasting activities, if deemed necessary. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within thousands of feet from project sites could exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours).

Additionally, construction activities may result in varying degrees of temporary groundborne noise and vibration, depending on the specific construction equipment used and activities involved. Groundborne noise and vibration levels caused by various types of construction equipment and activities (e.g., bulldozers, blasting) range from 58 – 109 vibration decibels (VdB) and from 0.003 – 0.089 inch per second (in/sec) peak particle velocity (PPV) at 25 feet. Like the above discussion, although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of groundborne vibration and noise would include bulldozers and trucks. According to the Federal Transit Administration (FTA), levels associated with the use of a large bulldozer and trucks are 0.089 and 0.076 in/sec PPV (87 and 86 VdB) at 25 feet, respectively. With respect to the prevention of structural damage, construction-related activities would not exceed recommended levels (e.g., 0.2 in/sec PPV). However, based on FTA's recommended procedure for applying a propagation adjustment to these reference levels, bulldozing and truck activities could exceed recommended levels with respect to the prevention of human disturbance (e.g., 80 VdB) within 275 feet.

Thus, implementation of reasonably foreseeable compliance responses could result in the generation of short-term construction noise in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels.

Short-term construction-related effects on noise associated with the Proposed Program would be potentially significant.

Potential construction-related noise impacts could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB and not within its purview.

Mitigation Measure 13-1

The Regulatory Setting in Attachment A includes, but is not limited to, applicable laws and regulations that pertain to noise. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that could be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation measures would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize noise include:

- Proponents of new or modified facilities constructed under the reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.
- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant noise impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - Ensure noise-generating construction activities (including truck deliveries, pile driving, and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors.
    - Use noise barriers, such as berms, as needed (where feasible) to limit ambient noise at property lines, especially where sensitive receptors may be present.
    - Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment.
    - All construction equipment used would be adequately muffled and maintained.
    - Use battery-powered forklifts and other facility vehicles, as needed to remain within acceptable noise levels.
    - Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby sensitive receptors or shielded.
    - Properly maintain mufflers, brakes, and all loose items on construction- and operation-related-related vehicles to minimize noise and address operational safety issues. Keep truck operations to the

quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum.
- Use noise controls on standard construction equipment; shield impact tools.
- Use flashing lights instead of audible back-up alarms on mobile equipment, if necessary to maintain acceptable noise levels.
- Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines.
- Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.
- Contain facilities within buildings or other types of effective noise enclosures.
- Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and this programmatic level of review does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the short-term construction-related effect regarding noise resulting from the construction of new facilities or reconstruction of existing facilities associated with the Proposed Program could be **potentially significant and unavoidable**.

Impact 13-2: Long-Term Operation-Related Effects to Noise and Vibration

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially

decreasing rates of oil and gas extraction and gasoline refining activities[128]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Operational-related activities associated with mining could produce substantial stationary sources of noise. Mechanical equipment (e.g., dozers) required to excavate bedrock and vegetation would generate noise that could be considered adverse to sensitive receptors; however, it would be expected that expansion of existing mines would not involve sensitive receptors given that mines typically are in areas zoned industrial. Also, it would be anticipated that new lithium mines constructed as a compliance response to the Proposed Program would be in areas of consistent zoning and therefore not in close proximity to sensitive receptors.

New sources of noise associated with implementation of Proposed Program could include operation of manufacturing plants. Manufacturing activity could include on-site noise sources, including fuel-delivery and other hauling-related activities (e.g., truck unloading), fuel-handling and processing activities (e.g., conveyor system, wheeled loader, dozer), and mechanical equipment (e.g., boiler, turbine, fans, pumps). Depending on the proximity to existing noise-sensitive receptors, stationary source noise levels could exceed applicable noise standards and result in a substantial increase in ambient noise levels.

Long-term operational noise effects associated with the Proposed Program would be potentially significant.

Mitigation Measure 13-2: Implement Mitigation Measure 13-1

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this Draft EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. Although it is unlikely, even after implementation of Mitigation Measure 13-2, significant impacts on noise could occur.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational noise effects associated with the Proposed Program would be **potentially significant and unavoidable**.

[128] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

14.Population and Housing

Impact 14-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Population and Housing

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[129]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Construction and maintenance activities associated with new manufacturing, production, and recycling facilities, as well as new infrastructure and increased mining activities could result in additional employment; however, there is uncertainty as to the exact location or character of any new facilities. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project). Therefore, it is anticipated that there would not be a need for substantial numbers of construction workers to relocate and that a sufficient construction employment base would likely be available.

Operation of new or modified facilities would generate varying levels of employment opportunities. The number of jobs produced would be directly related to the maintenance needs of these facilities. There is inherent uncertainty surrounding the exact locations of the new facilities. For lithium mines, the numbers of jobs produced would be directly related to the size, capacity, and, in some cases, commodity manufactured. This range could be between twenty (e.g., small feedstock processing facility) to several thousand (e.g., Tesla Gigafactory); however, it would be expected that locations of these facilities would be selected such that an appropriate employment base existed to support operation or where local jurisdictions have planned for increased population and employment growth. As such, no additional housing would

[129] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

be required to implement the reasonably foreseeable compliance response to the Proposed Program.

Additionally, it is unlikely that any new facilities would be constructed in areas with existing housing because of the nature of the facilities. That is, industrial facilities would be sited in areas zoned for them. Therefore, it is unlikely the Proposed Program would displace existing housing.

Any additional employment needed to support the compliance response to these Proposed Program, including a rise in employment opportunities, would not be substantial enough to substantially increase a community's population, require the construction of housing, or displace housing. Impacts would be **less than significant**.

15.Public Services

Impact 15-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Public Services

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[130]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

An increased need for public services is generally associated with growth in population. As discussed under Impact 14-1, the Proposed Program are not expected to result in a rise in employment opportunities that is great enough to substantially increase a community's population. As a result, short-term construction-related and long-term operational-related effects, associated with the Proposed Program on response time for

[130] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

fire protection, police protection, schools, parks, and other facilities would be **less than significant**.

16. Recreation

Impact 16-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Recreation

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[131]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Construction and operation activities as well as new or modified facilities would likely occur within footprints of existing facilities, or in areas with appropriate zoning that permit such uses and activities. Therefore, compliance responses would not displace any recreational facilities. An increased need for recreational facilities and the accelerated degradation of existing recreational facilities is associated with growth in population. As discussed under Impact 14-1, the Proposed Program are not expected to result in a rise in employment opportunities that is great enough to substantially increase a community's population. Therefore, new or expanded recreational facilities would not be needed, and existing facilities would not experience accelerated degradation. As a result, short-term construction-related and long-term operational-related effects, associated with the Proposed Program on recreational facilities would be **less than significant**.

[131] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

17.Transportation

Impact 17-1: Short-Term Construction-Related Effects to Transportation and Traffic

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[132]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

State CEQA Guidelines § 15064.3(b) identifies criteria for analyzing the transportation impacts of a project, including land use projects (§ 15064.3[b][1]) and transportation projects (§ 15064.3[b][2]). As discussed under Impact 14-1, construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project) and would not result in construction worker migration. Therefore, while implementation of the Proposed Program includes development and operation of new facilities, short-term construction would not drive development of urban areas, residential development, major employment generation, or transportation projects. As discussed throughout this EA, including in Impact 3-1 above, predicting the precise location, timing, duration and intensity of individual projects undertaken as compliance responses to the Proposed Program is not possible, given the performance standard-based nature of the requirements and given that the responses depend on individual business decisions. Therefore, modeling changes to VMT during construction of the various projects undertaken in response to the Proposed Program is not possible at this high-level planning stage.

Although detailed information about potential specific construction activities is not currently available, it would be anticipated to result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. Construction would induce some increase in localized VMT; however, this level would

[132] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

not be substantial and would be short-term in nature. The amount of construction activity would vary depending on the type, number, and duration of usage for the varying equipment, and the phase of construction. These variations would affect the amount of project-generated traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. This effect would be potentially significant.

Potential construction-related traffic and transportation impacts could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB and not within its purview.

Mitigation Measure 17-1

The Regulatory Setting in Attachment A includes applicable laws and regulations regarding transportation. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation measures would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize construction traffic impacts include:

- Proponents of new or modified facilities constructed will coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body will certify that the environmental document was prepared in compliance with applicable regulations and will approve the project for development.
- Based on the results of the environmental review, proponents will implement all mitigation identified in the environmental document to reduce or substantially lessen potentially significant impacts on traffic and transportation. The definition of actions required to mitigate potentially significant traffic impacts may include the following; however, any mitigation specifically required for a new or modified facility will be determined by the local lead agency.
    - Minimize the number and length of access, internal, service, and maintenance roads and use existing roads when feasible.

- Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements.
- If new roads are necessary, prepare a road siting plan and consult standards contained in federal, State, or local requirements. The plans should include design and construction protocols to meet the appropriate roadway standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and minimize side-hill cuts. Roads internal to a project site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils.
- Prepare a Construction Traffic Control Plan and a Traffic Management Plan.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and this programmatic level of review does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related effects to transportation and traffic associated with the Proposed Program would be **potentially significant and unavoidable**.

Impact 17-2: Long-Term Operational-Related Effects to Transportation and Traffic

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially

decreasing rates of oil and gas extraction and gasoline refining activities[133]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Implementation of the Proposed Program could require the operation of new infrastructure to distribute alternate fuels (such as electricity and hydrogen). Additionally, increased demand for lithium-ion storage batteries and fuel cells could result in an increase in lithium and platinum mining. As discussed in Impact 14-1, it is not anticipated that substantial amount of new personnel would be needed to operate new facilities because a sufficient employment base would be available, indicating that VMT associated with employees may not substantially increase depending on their location. Pursuant to SB 375, CARB established GHG reduction targets for metropolitan planning organizations that range from 13 to 19 percent by 2035. These are based on land use patterns and transportation systems specified in Regional Transportation Plans and Sustainable Community Strategies. Locations of facilities with newly installed infrastructure to distribute and dispense alternative fuels cannot currently be known; therefore, the total change in VMT cannot be assessed. Many activities, such as lithium battery manufacturing, recycling, and refurbishing, would take place at existing facilities; however, long-term operational-related activities associated with deliveries and distribution of goods (e.g., alternative fuels) could result in the addition of new trips, which could increase regional VMT to a potentially significant level.

However, there are a number of transportation activities that would be reduced as gasoline fuel demand declines. Fuel delivery activities for conventional gasoline from on-road trucks to retail stations would decline. Additionally, rail activity for transporting ethanol used to blend into E10 gasoline at regional blending stations would be reduced. Further, rail and ocean tanker activity for transporting crude oil to refineries would decline.

As such, long-term operational-related effects to transportation and traffic would be potentially significant.

Potential long-term operational-related transportation and traffic impacts could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB and not within its purview.

Mitigation Measure 17-2

The Regulatory Setting in Attachment A includes applicable laws and regulations regarding transportation. CARB does not have the authority to require implementation of mitigation related to increases in VMT; these must be addressed by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or

[133] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

State land use approval and/or permitting authority. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Recognized practices that are routinely required to avoid and/or minimize transportation impacts include:

- Identify and implement road and intersection design requirements or improvements for any project that would significantly impact the safety of roads and intersections.
- Consult with and implement recommendations from local fire protection services regarding emergency access requirements.
- Prepare transportation demand management (TDM) plans that prioritize and promote use of non-automobile forms of transportation to minimize significant increases in VMT.

Because the authority to determine operational impacts and require operational mitigation lies with land use and/or permitting agencies for individual projects, and this programmatic level of review does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational-related effects to transportation and traffic associated with the Proposed Program would be **potentially significant and unavoidable**.

18. Tribal Cultural Resources

Impact 18-1: Short-Term Construction-Related and Long-Term Operational Impacts on Tribal Cultural Resources

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially

decreasing rates of oil and gas extraction and gasoline refining activities[134]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Tribal cultural resources include sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe. The Proposed Program could result in construction of manufacturing, production, and recycling facilities, as well as new infrastructure and increased mining activities, which would require ground disturbance. In general, construction and ground disturbance activities would occur in areas of compatible zoning (e.g., industrial). Regardless, there is a possibility that these activities may occur in or adjacent to a region consisting of known significant tribal cultural resources. As such, it is foreseeable that known or undocumented tribal cultural resources could be unearthed or otherwise discovered during ground-disturbing and construction activities.

Operation of facilities and infrastructure would not result in additional ground disturbance beyond that which occurred during construction and modification because operation activities would occur within the footprint of the constructed or modified facility. Therefore, most operational activities would not have the potential to affect tribal cultural resources. Presence of new facilities and infrastructure may, however, change the visual setting of the surrounding area, which could adversely affect trial cultural resources, as determined by a California Native American Tribe. As a result, operation impacts could be potentially significant. As a result, operation impacts could be potentially significant.

Therefore, short-term construction-related and long-term operational-related impacts on tribal cultural resources associated with implementation of the Proposed Program would be potentially significant.

Mitigation Measure 18-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to tribal cultural resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts to tribal cultural resources include:

[134] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Program would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on tribal cultural resources associated with the project.
- Actions required to mitigate potentially significant tribal cultural resources impacts may include the following; however, any mitigation specifically required for a modified facility would be determined by the local lead agency.
- Retain the services of tribal cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61.
- Seek guidance from the State and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.
- Follow notification procedures and conduct consultation as required with California Native American Tribes under Assembly Bill (AB) 52 (including Public Resources Code § 21080.3.1 and 21080.3.2.). Provide notice to Native American Tribes of project details to identify potential tribal cultural resources (TCRs). In the case that a TCR is identified, consistent with Public Resources Code § 21084.3(b), prepare mitigation measures that:
    - Avoid and preserve the resource in place.
    - Treat the resource with culturally appropriate dignity.
    - Employ permanent conservation easements.
    - Protect the resource.
- Regulated entities shall consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies shall provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, and because CARB lacks the authority to impose this project-level mitigation for individual projects, CARB finds it legally infeasible to enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow for review of project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in

the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if they approve these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation measures imposed by the land use and/or permitting agencies acting as lead agencies for these individual projects under CEQA, if and when a project proponent seeks a permit for compliance-response related project, this Draft EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operational impacts to tribal cultural resources associated with the Proposed Program would be **potentially significant and unavoidable**.

19. Utilities and Service Systems

Impact 19-1: Long-Term Operational-Related Impacts to Utilities and Service Systems

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially decreasing rates of oil and gas extraction and gasoline refining activities[135]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

Reasonably foreseeable compliance responses to the Proposed Program could result in increased demand for lithium-ion and NiMH batteries for ZEV and PHEVs. As the vehicle fleet turns over to ZEVs and PHEVs, the disposal of vehicles outside of California may occur. Lithium-ion batteries may be recycled, and due to increasing demand for ZEV and PHEVs, rates of lithium-ion battery recycling have increased.[136] In the U.S. overall, there are limited regulations for the disposal of lithium-ion batteries; however, due to

[135] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.
[136] United States Geological Survey, "Mineral Commodity Summaries, Lithium."

value of recovered metals (e.g., cobalt, nickel, lithium), there is incentive to collect and recycle batteries. According to current practice, typical recycling procedures (i.e., hydrometallurgical recovery, high-temperature or pyrometallurgical, and direct recycling) recover and average of approximately 99 percent of the materials, redirecting about 1 percent of waste to landfills.[137]

Currently, lead acid batteries comprise approximately 20 million of the registered vehicles in use within the state.[138] Deployment of the Proposed Program may result in ZEV and PHEV turnover, which would spur the disposal of existing lead-acid batteries; however, ZEV and PHEVs would also include lead-acid batteries. Additionally, ZEV and PHEVs could include lead-acid batteries; however, use of ZEV and PHEVs would not drive additional lead-acid battery production above existing rates. Therefore, rates of disposal would not generate notable strain on existing manufacturing, disposal and recycling facilities such that additional adverse effects to utilities would occur.

Reasonably foreseeable compliance responses associated with the Proposed Program could result in new demand for water, wastewater, electricity, and gas services for new or modified facilities. Generally, facilities would be cited in areas with existing utility infrastructure—or areas where existing utility infrastructure is easily assessable. New or modified utility installation, connections, and expansion would be subject to the requirements of the applicable utility providers.

Any new or modified facilities, no matter their size and location would be required to seek local or State land use approvals prior to their development. In addition, part of the land use entitlement process for facilities proposed in California requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the CEQA Guidelines. It is assumed that facilities proposed in other states would be subject to comparable federal, State, and/or local environmental review requirements (e.g., CEQA) and that the environmental review process would assess whether adequate utilities and services (i.e., wastewater services, water supply services, solid waste facilities) would be available and whether the project would result in the need to expand or construct new facilities to serve the project. Through the environmental review process, utility and service demands would be calculated; agencies would provide input on available service capacity and the potential need for service-related infrastructure including expansions to waste water treatment plants, new water supply entitlements and infrastructure, storm water infrastructure, and solid waste handling capacity (e.g., landfills). Resulting environmental impacts would also be determined through this process.

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[137] Sommerville, Roberto, Pengcheng Zhu, Mohammad Ali Rajaeifar, Oliver Heidrich, Vannessa Goodship, and Emma Kendrick. 2021. "A Qualitative Assessment of Lithium Ion Battery Recycling Processes." *Resources, Conservation & Recycling* 165 (2021) 105219. October 28, 2020. https://doi.org/10.1016/j.resconrec.2020.105219.

[138] California Department of Resources Recycling and Recovery (CalRecycle). 2019. *Lead-Acid Batteries—Hazards and Responsible Use.* Publication #612-2000-0002. April 10, 2019. https://www2.calrecycle.ca.gov/Publications/Details/817.

At this time, the specific location and type of construction needed is not known and would be dependent upon a variety of market factors that are not within the control of CARB including: economic costs, product demands, environmental constraints, and other market constraints. Thus, the specific impacts from construction on utility and service systems cannot be identified with any certainty, and individual compliance responses could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impacts.

Thus, long-term operational-related effects to utilities and services systems, associated with the Proposed Program would be potentially significant.

Potential long-term operational-related utilities and service systems impacts could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of CARB and not within its purview.

Mitigation Measure 19-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to utilities and service systems. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation measures would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize utility and service-related impacts include:

- Proponents of new or modified facilities constructed because of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.
- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen potentially significant impacts on utilities and service systems. The definition of actions required to mitigate potentially significant utility or service-related impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Comply with local plans and policies regarding the provision of water supply, wastewater treatment, and storm water drainage utilities, and solid waste services.
- Where an on-site wastewater system is proposed, submit a permit application to the appropriate local jurisdiction.
- Where appropriate, prepare a Water Supply Assessment (WSA) consistent with the requirements of § 21151.9 of the Public Resources Code and § 10910 et seq. of the Water Code. The WSA would be approved by the local water agency/purveyor prior to construction of the project.
- Comply with local plans and policies regarding the provision of wastewater treatment services.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and this programmatic level of review does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, long-term operational-related effect to utilities and service systems associated with the Proposed Program would be **potentially significant and unavoidable**.

20. Wildfire

Impact 20-1: Short-Term Construction-Related and Long-Term Operational-Related Effects on Wildfire

Implementation of the Proposed Program would result in an increase in manufacturing of ZEVs and PHEVs, along with a corresponding decrease in the manufacturing and deployment of gasoline fueled vehicles. Manufacturing needs for new vehicles would largely be met by existing facilities, and no new infrastructure or plants would be required for vehicle manufacturing. Fleet turnover would be largely unaffected because the proposed sales requirement applies at time of new vehicle sales. This increase in ZEV and PHEV volumes would result in associated increases in lithium, nickel, cobalt, and possibly platinum mining and exports from source countries or other states. Increased demand for lithium-ion batteries could increase battery production and manufacture, which could result in the expansion of or construction of new battery facilities. Implementation of the Proposed Program would also result in the construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. Likewise, increased deployment of ZEVs would result in an increase in production and distribution of electricity and hydrogen fuel, while potentially

decreasing rates of oil and gas extraction and gasoline refining activities[139]. The Proposed Program would also result in the disposal of lithium-ion batteries that induce increased demand of refurbishing, reusing, and recycling of batteries and fuel cells, new facilities may be constructed or modifications to existing facilities may occur.

In the event of an emergency, such as a wildfire, evacuation coordination is dealt with at various levels of government through State, federal, or local agencies as appropriate. The California Department of Forestry and Fire Protection (CAL FIRE) is responsible for coordinating wildfire response and protection within State Responsibility Areas. CAL FIRE does not have responsibility for fire response in Local Responsibility Areas or Federal Responsibility Areas, which are defined based on land ownership, population density, and land use. These areas include densely populated areas, such as cities and towns; agricultural lands; and lands administered by the federal government. In densely populated areas, local fire departments respond to fires and emergencies. Fire response on federal lands is coordinated by the appropriate federal agency. For example, on National Forest System lands, the U.S. Forest Service coordinates fire response; on lands administered by the federal BLM, the BLM coordinates fire response.

Facilities and associated infrastructure, such as facilities for the use of alternative and hydrogen fuels, would be constructed and operated within response areas for various jurisdictions and would be dealt with in the same manner as existing infrastructure. Construction and operation activities as well as new or modified facilities would likely occur within footprints of existing manufacturing facilities, or in areas with appropriate zoning that permit such uses and activities; therefore, changes or modifications to existing fire response and evacuation plans would not be necessary. Likewise, the increase in use at battery or fuel cell manufacturing, refurbishing, and recycling facilities would occur at existing facilities that are already under an assigned jurisdiction for fire safety. As discussed under Impact 14-1, compliance responses implemented under the Proposed Program would not create growth substantial enough to impede emergency response or affect evacuation route capacity.

Overhead powerlines associated with new infrastructure, including those lines built to support increased energy demand to accommodate increased reliance on the electrical grid, could increase the risk of wildfire ignition; however, new safety initiatives, development standards, and regulatory oversight for electric utilities have been implemented in response to numerous devastating wildfires in California in recent years. These efforts aim to reduce the risk of wildfire ignition associated with such facilities and include implementation of wildfire mitigation plans, collaboration between utilities and CAL FIRE, and retention by CPUC of independent evaluators that can assess the safety of electrical infrastructure. Additionally, new facilities would be subject to the applicable chapters of the California Fire Code and any additional local provisions identified in local fire safety codes. These factors—adherence to local plans, policies, codes, and ordinances; adherence to the California Fire Code and the provisions of wildfire

[139] As noted earlier, grid demand response strategies and rate price signals can mitigate some of the new electricity generation needed to serve increased demand for plug-in electric vehicles.

prevention plans; and oversight by CPUC—would substantially reduce the risk of wildfire ignitions caused by infrastructure development.

As discussed above in Impact 9-2, lithium-ion batteries can rarely cause fires due to vehicular accidents. These explosions could be a source of ignition for wildland fires. The likelihood to overheat or ignite is increased if the batteries are poorly packaged, damaged or exposed to a fire or a heat source. However, when packaged and handled properly, lithium-ion batteries pose no environmental hazard (79 Fed. Reg. 46011, 46032). Additionally, the risk of explosion from gasoline-powered vehicles is much greater than that of ZEVs. As the Proposed Program would transition the mobile-source sectors to ZEVs and PHEVs, wildfire risk from ICEV explosion would be reduced. Thus, the increased use of lithium-based batteries in vehicles would not substantially increase the risk of wildland fire.

Thus, implementation of the Proposed Program would have a **less than significant** short-term construction-related and long-term operational impact on wildfire.

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5.0 CUMULATIVE AND GROWTH-INDUCING IMPACTS

A. Approach to Cumulative Analysis

This section satisfies requirements of CEQA to discuss how the project being analyzed would contribute to cumulative impacts. CARB's certified regulatory program (Title 17 CCR §§ 60000–60008) does not provide specific direction on a cumulative impacts analysis, and while CARB is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the CEQA Guidelines by virtue of its certified program, the Guidelines nevertheless contain useful guidance for preparation of a thorough and meaningful cumulative analysis. The CEQA Guidelines require a lead agency to discuss a cumulative impact if the project's incremental effect combined with the effects of other projects is "cumulatively considerable" (CEQA Guidelines § 15130(a)). The discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone (CEQA Guidelines § 15130). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

In considering cumulative impacts, an agency may choose from two approaches: it can prepare a list of past, present, and probable future projects that will produce related or cumulative impacts; or, it can rely on a summary of projections contained in an adopted planning document or an adopted or certified environmental document for the planning document (CEQA Guidelines § 15130(b)). Further, the CEQA Guidelines state that the pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference pursuant to provisions for tiering and program EIRs, and that no future cumulative analysis is required when the lead agency determines the regional and area wide impacts have already been addressed in the prior certified EIR for that plan (CEQA Guidelines § 15130).

The CEQA Guidelines state that a previously approved plan for the reduction of criteria and other air pollutant emissions may be used in cumulative impacts analysis; that the pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference (Title 14 CCR § 15130(d)). Furthermore, no further cumulative impacts analysis is required when a project is consistent with a general, specific, master or comparable programmatic plan where the lead agency determines that the regional or area wide cumulative impacts of the proposed project have already been adequately addressed, as defined in section 15152(f), in a certified EIR for that plan (14 CCR § 15130(d)). CEQA further directs that a tiered EIR focus on significant environmental effects that were not already analyzed in the previous environmental analysis. (PRC §§ 21068.5; 21093; see also 21094(c).)

Because of the statewide reach of Proposed Program and the longer-term future horizon for achievement of emission reductions, the impact analyses for the resource topics in Chapter 4 are programmatic, rather than site or project specific, to address the

statewide context. The document contains a description and analysis of a series of actions that are part of one large program. Recommended mitigation measures in Chapter 4 provide a series of generally recognized methods to reduce potentially significant impacts, but cannot offer details related to specific project locations. As a result, the impact conclusions and mitigation measures in the resource-oriented sections of Chapter 4 are cumulative by nature, because they describe the potential impacts associated collectively with the full range of reasonably foreseeable compliance responses.

Additional community-level strategies to reduce emissions and exposure, beyond the existing efforts, focuses on amending current State measures and implementing new State measures. For purposes of disclosure and broad consideration of the potential actions that address air quality, the California Air Resources Board (CARB or Board) has identified relevant projects that would result in related impacts. Related projects consist of the 2030 California Climate Change Scoping Plan (2030 Scoping Plan) and the 2016 State Strategy for the State Implementation Plan (2016 State SIP Strategy), both of which contain measures that reduce air pollutant and greenhouse gas (GHG) emissions and exposure within communities across the State.

Like the analysis presented in Chapter 4 of this Draft EA, the cumulative impacts analysis is described at a necessarily general level of detail, because information related to specific actions is not known at this time. This approach to a cumulative impacts analysis is "guided by the standards of practicality and reasonableness" (14 California Code of Regulations (CCR) § 15130 (b)) and serves the purpose of providing "a context for considering whether the incremental effects of the project at issue are considerable" when judged "against the backdrop of the environmental effects of other projects." (*San Joaquin Raptor/Wildlife Rescue Ctr. v. Cty. of Stanislaus* (1996) 42 Cal.App.4th 608, 623-624, citing 1 Kostka & Zischke, Practice Under the Cal. Environmental Quality Act (Cont.Ed.Bar 1995) § 6.55, pp. 298-299.) .)

B. Significance Determinations and Mitigation

Implementing the Proposed Program may have cumulatively considerable contributions to significant cumulative impacts in some resource areas, discussed in greater detail below. These contributions can be mitigated but doing so is under the authority of other agencies. Thus, it is uncertain whether that mitigation will occur. This means the significant impacts may not be avoided or made insignificant, and so the Draft EA recognizes the impacts as significant and unavoidable. The Board will need to adopt Findings and a Statement of Overriding Considerations for such impacts.

C. Projects Resulting in Related Effects

CEQA Guidelines (14 CCR § 15000 et. seq.) state that a previously approved plan may be used in cumulative impacts analysis; the pertinent discussion of cumulative impacts contained in one or more previously certified EIR(s) may be incorporated by reference; and in certain circumstances, no further cumulative impact analysis is required for a

project that is consistent with a plan that has a certified EIR (14 CCR § 15130 (d)). The related plans and programs considered for cumulative impacts of the Proposed Program include the 2016 State SIP Strategy and the 2030 Scoping Plan.

CEQA Guidelines allow for incorporating by reference all or portions of other documents. Incorporation by reference is useful for including long, descriptive, or technical materials that provide general background but do not contribute directly to the pertinent analysis (14 CCR § 15150). Therefore, the following documents for comprehensive programs that encompass the goals of the proposed project are incorporated by reference.

- Final EA for the 2030 Target Scoping Plan Update (CARB 2017b)
- Final EA for the State SIP Strategy (CARB 2017a)

The portions of these documents relevant to this discussion are summarized below and within the respective resource area analyses. These documents are available upon request from CARB. Notably, CARB is in the process of updating these documents (i.e., 2022 SIP Strategy and 2022 Scoping Plan Update), which are expected to be adopted midway through 2022. However, at the time of preparing this Draft EA, these documents have not yet been adopted. It is expected that the environmental impacts identified in the previous 2030 Scoping Plan and 2016 State SIP Strategy would be similar to those identified for the 2022 SIP Strategy and 2022 Scoping Plan Update.

1. 2030 Target Scoping Plan Update

Assembly Bill (AB) 32 requires CARB to update the State's Scoping Plan for achieving the maximum technologically feasible and cost-effective reductions of GHG emissions at least once every five years. (Health and Safety Code § 38561 (h).) The Scoping Plan was first approved by the Board in 2008 and was re-approved in 2011. The First Update to the Climate Change Scoping Plan (First Update) was approved by the Board in 2014.

In April 2015, Governor Brown issued Executive Order B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. In doing so, the Governor called on California to pursue a new and ambitious set of strategies, in line with the five climate change pillars from his inaugural address, to reduce GHG emissions, and prepare for the unavoidable impacts of climate change. To develop a clear plan of action to achieve the State's goals, the Executive Order called on CARB to update the AB 32 Climate Change Scoping Plan to incorporate the 2030 target. In the summer of 2016, the Legislature affirmed the importance of addressing climate change through passage of Senate Bill (SB) 32 (Pavley, Chapter 249, Statutes of 2016), which codified into statute the 2030 reduction target of 40 percent below 1990 levels by 2030 contained in the Governor's Executive Order. The update to the AB 32 Climate Change Scoping Plan to reflect the 2030 target serves as the framework to define the State's climate change priorities to 2030 and beyond. California's 2017 Climate Change Scoping Plan, reflecting the 2030 target, was adopted in December 2017.

Implementation of the measures to achieve the 2030 target in the Scoping Plan would result in two main types of reasonably foreseeable compliance responses: 1) construction of, or modifications to buildings, infrastructure, and industrial facilities; and, 2) new operations or changes to existing operational processes. These compliance responses are discussed in more detail below.

2. Construction of, or Modifications to, Buildings, Infrastructure, and Industrial Facilities

Implementation of the Scoping Plan would result in various construction projects. These projects would include infrastructure projects, such as natural gas and hydrogen refueling stations; collection, processing, and distribution of biomethane; wind, solar thermal, solar photovoltaic, geothermal, solid-fuel biomass, biogas, and small hydroelectric to generate electricity (i.e., renewable energy projects); collection of natural gas from landfills, dairies, and wastewater treatment plants; modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity); organic material composting and/or digesting facilities that would convert organic wastes diverted from landfills (e.g., yard waste, green wastes, food); vehicle fueling (e.g. renewable natural gas); vehicle charging stations; and upgraded and new transmission lines. Modifications may also be necessary at: industrial sources in compliance with the Cap-and-Trade Program; roadways and urban areas to reduce overall vehicle miles traveled (VMT); and oil and gas facilities (which may include modifications to existing facilities, pipeline replacement or reconstruction activities, inspection and monitoring, and disposal of methane vapors). In addition, manufacturing facilities may be necessary to produce lithium-ion batteries. Large-scale energy storage systems would also be installed throughout California, which would reduce energy production demands.

Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. Construction activities can be short-term and long-term. That is, after construction of a building is completed, it will stay on a project site until demolished or otherwise removed.

a) New Operations and Changes to Existing Operational Processes

Under the Scoping Plan there would be various methods to reduce GHG emissions that would result in new operations or changes to existing operational processes. New operations could include increased mining for lithium and increased recycling or refurbishment of batteries for on-road light-duty and heavy-duty vehicles. New operations would also include changes to methods of manure management at dairies, alterations to crop cultivation to meet feedstock demands related to fuels regulations, and improvements to transportation systems to reduce reliance on personal vehicles. In addition, offset protocols related to the Cap-and Trade Program would alter activities

at mines, agricultural operations, landfills, and U.S. forests. Linkage to Ontario and extension of the Cap-and-Trade Program could increase demand for offsets and increased compliance response activities for covered entities in Canada and the U.S. New operations and changes to existing operational processes are considered to occur over a long period of time (i.e., for the foreseeable future).

Potential environmental impacts associated with the Scoping Plan are summarized below in Table 18.

Table 18: Summary of Environmental Impacts for the Scoping Plan

Resource Areas and Impact Categories	Significance Determination
Aesthetics	
Impact 1-1: Short-Term Construction-Related Impacts	PSU
Impact 1-2: Long-Term Operational-Related Impacts	PSU
Agriculture and Forest Resources	
Impact 2-1: Short-Term Construction-Related Impacts	PSU
Impact 2-1: Long-Term Operational-Related Impacts	PSU
Air Quality	
Impact 3-1: Short-Term Construction-Related Impacts	PSU
Impact 3-2: Long-Term Operational-Related Impacts	LTS
Impact 3-3: Short-Term, Construction-Related and Long-Term Operational-Related Odors Impacts	PSU
Biological Resources	
Impact 4-1: Short-Term Construction-Related Impacts	PSU
Impact 4-2: Long-Term Operational-Related Impacts	PSU
Cultural Resources	
Impact 5-1: Short-Term Construction-Related and Long-Term Operational-Related Impacts	PSU
Energy Demand	
Impact 6-1: Short-Term Construction-Related Impacts	LTS
Impact 6-2: Long-Term Operational-Related Impacts	B
Geology and Soils	
Impact 7-1: Short-Term Construction-Related Impacts	PSU
Impact 7-2: Long-Term Operational-Related Impacts	PSU

Resource Areas and Impact Categories	Significance Determination
Greenhouse Gas	
Impact 8-1: Short-Term Construction-Related and Long-Term Operational-Related Impacts	B
Hazards and Hazardous Materials	
Impact 9-1: Short-Term Construction-Related Impacts	PSU
Impact 9-2: Long-Term Operational-Related Impacts	PSU
Hydrology and Water Quality	
Impact 10-1: Short-Term Construction-Related Impacts	PSU
Impact 10-2: Long-Term Operational-Related Impacts	PSU
Land Use Planning	
Impact 11-1: Short-Term Construction-Related Impacts	LTS
Impact 11-2: Long-Term Operational-Related Impacts	PSU
Mineral Resources	
Impact 12-1: Short-Term Construction-Related Impacts	LTS
Impact 12-2: Long-Term Operational-Related Impacts	LTS
Noise	
Impact 13-1: Short-Term Construction-Related Impacts	PSU
Impact 13-2: Long-Term Operational-Related Impacts	PSU
Population and Housing	
Impact 14-1: Short-Term Construction-Related Impacts	LTS
Impact 14-2: Long-Term Operational-Related Impacts	LTS
Public Services	
Impact 15-1: Short-Term Construction-Related Impacts	LTS
Impact 15-2: Long-Term Operational-Related Impacts	LTS
Recreation	
Impact 16-1: Short-Term Construction-Related Impacts	LTS
Impact 16-2: Long-Term Operational-Related Impacts	PSU
Transportation/Traffic	
Impact 17-1: Short-Term Construction-Related Impacts	PSU
Impact 17-2: Long-Term Operational-Related Impacts	PSU
Utilities and Service Systems	
Impact 18-1: Long-Term Operational-Related Impacts	PSU

Notes:
B = Beneficial; LTS = Less Than Significant; NA = Not Applicable; PSU = Potentially Significant and Unavoidable
Source: CARB 2017b.

3. State SIP Strategy

Under the federal Clean Air Act (CAA), CARB and local air districts are responsible for developing and submitting to the U.S. Environmental Protection Agency (U.S. EPA) clean air plans, known as SIPs. (See CAA, § 110; 42 U.S.C. § 7410.) SIPs are comprehensive plans that demonstrate how and when nonattainment areas within California would reach attainment of air quality standards. SIPs must identify both the magnitude of emission reductions needed and the actions necessary to achieve those reductions by the required attainment deadline.

Developing the SIPs is an immediate focus of CARB's planning efforts, with regional plans periodically due to U.S. EPA. The most recent SIP (2016 SIP) was due to U.S. EPA for ozone nonattainment in July 2016 and fine particulate matter ($PM_{2.5}$) nonattainment areas in October 2016. CARB noted that substantial emission reductions beyond those being achieved with current programs were needed to meet these standards. In addition to the most recent air quality standards, the South Coast and San Joaquin Valley must also continue to progress towards attaining earlier standards, which they have not yet achieved, including the 8-hour ozone standard of 80 parts per billion (ppb), and the 24-hour $PM_{2.5}$ standard of 35 micrograms per cubic meter. CARB released the draft State SIP Strategy and Draft EA for public review on May 17, 2016. The public comment period for the draft State SIP Strategy and Draft EA was from May 17, 2016 through July 18, 2016. CARB prepared written responses to comments received on the Draft EA and made revisions as necessary. On March 7, 2017, CARB released the Revised Proposed 2016 State SIP Strategy and in March 2017, the Board adopted the State SIP Strategy. As such, reasonably foreseeable future projects under the 2016 SIP Strategy will be used in relation to the Proposed Program.

CARB is currently in the process of updating the 2016 SIP Strategy with the 2022 State SIP Strategy. CARB has hosted several public workshops to gain insight from the public and stakeholders. The 2022 State SIP Strategy will address U.S. EPA's recently strengthened 8-hour ozone standard of 70 ppb. Nineteen areas in California were designated nonattainment in 2018. CARB will be considering regional SIPs for this standard in 2022. The 2022 State SIP Strategy will include measures and commitments to reduce emissions from State-regulated sources to support attainment of the 70 ppb standard in all nonattainment areas across California. At the time of authoring this Draft EA, CARB has not adopted the 2022 State SIP Strategy, therefore, the 2016 State SIP Strategy and its accompanying EA will be used in this analysis.

Notably, the ACC II (Proposed Program) would be included as a regulatory component of the 2022 State SIP Strategy as a mechanism to reduce criteria air pollutants from the

mobile source sector. The Proposed Program would be a necessary program in the 2022 State SIP Strategy to attain the NAAQS for ozone and $PM_{2.5}$.

Reasonably foreseeable compliance responses associated with the 2016 State SIP Strategy include construction and operation of new manufacturing facilities to support increased market penetration of plug-in hybrid electric vehicles (PHEV), non-combustion zero emission vehicles (ZEV) including battery electric vehicles (BEVs) and hydrogen fuel cell electric vehicles (FCEV) zero-emission technologies, and electric-powered equipment (e.g., forklifts). Increased use of ZEV and PHEVs may result in increased infrastructure for natural gas and hydrogen refueling and charging stations, and increased demand for lithium-ion battery manufacturing and associated increases in lithium mining and exports. New testing centers to monitor vehicle emissions may be constructed throughout the state. In addition, increased low-emission diesel (LED) demand may increase cultivation or imports of LED feedstocks, processing of LED fuels, and shipment of finished LED fuels and/or their feedstocks. Infrastructure to support collection, processing, and distribution of LED fuels and feedstock may also increase.

Potential environmental impacts associated with the 2016 State SIP Strategy are summarized below in Table 19.

Table 19: Summary of Environmental Impacts for the 2016 State SIP Strategy

Resource Area Impact Significance Before Mitigation	Significance After Mitigation
Aesthetics	
Impact 1-1: Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics	PSU
Agriculture Resources	
Impact 2-1: Short-Term Construction-Related and Long-Term Operational-Related Effects to Agricultural and Forest Resources	PSU
Air Quality	
Impact 3-1: Short-Term Construction-Related Effects to Air Quality	PSU
Impact 3-2: Long-Term Operational-Related Effects to Air Quality	B
Biological Resources	
Impact 4-1: Short-Term Construction-Related Effects to Biological Resources	PSU
Impact 4-2: Long-Term Operational-Related Effects to Biological Resources	PSU
Cultural Resources	
Impact 5-1: Short-Term Construction-Related and Long-Term Operational Effects to Cultural Resources	PSU

Resource Area Impact Significance Before Mitigation	Significance After Mitigation
Energy Demand	
Impact 6-1: Short Term Construction-Related Impacts on Energy Demand	LTS
Impact 6-2: Long-Term Operational Impacts on Energy Demand	B
Geology, Soils and Minerals	
Impact 7-1: Short-Term Construction-Related and Long-Term Operational Effects on Geology, Seismicity, and Soils	PSU
Greenhouse Gas Emissions	
Impact 8-1: Short-Term Construction-Related and Long-Term Operational Greenhouse Gas Impacts	B
Hazards and Hazardous Materials	
Impact 9-1: Short-Term Construction-Related Hazard Impacts	PSU
Impact 9-2: Long-Term Increased Transport, Use, and Disposal of Hazardous Materials	LTS
Hydrology and Water Quality	
Impact 10-1: Short-Term Construction-Related Hydrologic Resource Impacts	PSU
Impact 10-2: Long-Term Effects on Hydrology and Water Quality Related to Changes in Land Use	PSU
Land Use and Planning	
Short-Term Construction-Related and Long-Term Operational Impacts on Land Use and Planning	LTS
Mineral Resources	
Impact 12-1: Short-Term Construction-Related Impacts on Mineral Resource	LTS
Impact 12-2: Long-Term Operational Impacts on Mineral Resources	LTS
Noise	
Impact 13-1: Short-Term Construction-Related Noise Impacts	PSU
Impact 13-2: Long-Term Operational Noise Impacts	PSU
Impact 14-1: Short-Term Construction-Related and Long-Term Operational-Related Effects to Population and Housing	LTS
Impact 15-1: Short-Term Construction-Related and Long-Term Operational-Related Effects to Public Services	LTS

Resource Area Impact Significance Before Mitigation	Significance After Mitigation
Impact 16-1: Short-Term Construction-Related and Long-Term Operational-Related Effects to Recreation	LTS
Transportation and Traffic	
Impact 17-1: Short-Term Construction-Related Impacts on Traffic and Transportation	PSU
Impact 17-2: Long-Term Operational Impacts on Traffic and Transportation	PSU
Utilities and Service Systems	
Impact 18-1: Short-Term Construction Related and Long-Term Operational Impacts on Utilities and Service Systems	PSU

Notes: B = beneficial, LTS = less-than-significant, PSU = potentially significant and unavoidable after mitigation
Source: CARB 2017a.

D. Cumulative Impacts by Resource Area

1. Aesthetics

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could result in a significant impact to aesthetics from development of new facilities for the manufacture of ZEV and PHEV-related equipment, development of infrastructure, and increased mineral mining, including lithium. The exact location or character of these new facilities or modification of existing facilities is uncertain. However, new facilities could degrade scenic vistas or views from a State scenic highway due to the presence of heavy-duty equipment, glare, lighting, or disturbed earth. In addition, facility operation may introduce substantial sources of glare, exhaust plumes, and nighttime lighting for safety and security purposes. Increased lithium mining could result in harmful visual changes to the natural environment such as hillside erosion, contamination of surface waters, artificial drainage patterns, subsidence, night-time lighting, and deforestation.

These compliance responses could result in significant and unavoidable aesthetics impacts. Implementation of the Scoping Plan and State SIP Strategy would include the reasonably foreseeable compliance responses described above under Section 5.C. As summarized in Table 6, the Scoping Plan and State SIP Strategy environmental documents identified potentially significant and unavoidable impacts on aesthetics due to construction and operation of individual projects. Thus, implementation of these programs could result in a significant cumulative effect.

The Proposed Program's impacts to aesthetics would be significant and unavoidable on their own, as concluded in Chapter 4. Because the Proposed Program on its own would

result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** on aesthetics.

2. Agriculture and Forestry Resources

Implementation of the reasonably foreseeable compliance responses for the various measures, which includes the Proposed Program, could result in a significant impact to agriculture and forestry resources from construction and operational activities associated with new or modified facilities or infrastructure and increased lithium mining. The exact location or character of these new facilities or modification of existing facilities is uncertain. However, new facilities could be located on important farmland (i.e., Prime Farmland, Farmland of Statewide Importance Unique Farmland, and Farmland of Local Importance as defined by the Farmland Mapping and Monitoring Program), forest land, or timberland. Land use policies could generally avoid conversion of agricultural and forest lands, but the potential remains for conversion. Lithium extraction from brines occurs in desert areas that are generally not valuable for agriculture or forestry, but hard rock mining could result in the loss of agricultural or forest lands.

The Proposed Program's impacts to agriculture and forestry resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential for land conversion to non-agricultural and non-forest uses. Because the Proposed Program on their own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** on agriculture and forestry resources.

3. Air Quality

Implementation of the reasonably foreseeable compliance responses for the various measures under the Proposed Program could require construction activities that would generate emissions of criteria air pollutants and toxic air contaminants (TACs). Emissions from construction activities could occur from grading and site preparation, use of heavy-duty equipment, and construction worker commute trips. The exact location and state

of ambient air quality where construction activities may take place is uncertain. The Proposed Program's contribution to adverse air quality effects would be significant. The Proposed Program's contribution to adverse effects to air quality would also be cumulative considerable when combined with other construction-related activities occurring within the state. Implementation of the project-level mitigation identified in Chapter 4 could effectively reduce the incremental contribution from the Proposed Program to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** on air quality during construction.

However, these emissions would be greatly offset by the beneficial air quality impacts that would be realized under the Proposed Program.

The Proposed Program's long-term operational impacts to air quality would be beneficial on their own, as discussed in Chapter 4 of this EA. These impacts would be beneficial through the electrification of the on-road transportation sector resulting in a decrease in gasoline and diesel fuel combustion, which contributes greatly to the degradation of air quality in the state. Unlike other resource area, CARB can directly influence the composition of vehicles and emissions standards for the on-road mobile source sector, therefore, the beneficial long-term air quality effects would likely be realized. The Proposed Program would assist the state in meeting the NAAQS and CAAQS. This indicates that the Proposed Program **would not present a cumulatively considerable contribution to a significant cumulative impact** on air quality.

4. Biological Resources

Implementation of the reasonably foreseeable compliance responses for the various measures, which includes the Proposed Program, could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. The exact location of these new facilities or the modification of existing facilities is uncertain. Construction could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. These activities would have the potential to adversely affect biological resources (e.g., species, habitat) that may reside or be present in those areas. Because there are biological species that occur, or even thrive, in developed settings, resources could also be adversely affected by construction and operations within disturbed areas at existing manufacturing facilities or at other sites in areas with zoning that would permit the development of manufacturing or industrial uses.

The Proposed Program's impacts to biological resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of effects on habitat, special-status species, wildlife movement, and

other aspects. Because the Proposed Program on their own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** on biological resources.

5. Cultural Resources

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. The exact location of these new facilities or the modification of existing facilities is uncertain. Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist. Historic buildings and structures may also be adversely affected by demolition-related activities.

The Proposed Program's impacts to cultural resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential to damage and destroy cultural, prehistoric, historic, tribal cultural, and paleontological resources. Because the Proposed Program on their own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** on cultural resources.

6. Energy

Implementation of the Proposed Program could require construction and operation of new or modified facilities or infrastructure as well as increased lithium mining. While these compliance responses would require the consumption of energy resources, these actions would enable the transition to zero-emission technologies to comply with provisions of the Proposed Program and would not involve the wasteful or inefficient use of energy. While energy demand would increase during construction of future projects in response to implementation of the Proposed Program, these energy expenditures would be necessary to facilitate the actions that would result in environmental benefits such as reduced air pollution and GHG emissions. Therefore, short-term energy consumption would not be considered unnecessary. Use of ZEV and PHEVs would divert energy from fossil fuel-powered systems and engines to electrical systems, which, as mandated by the renewable portfolio standard, will become increasingly more renewable in the coming years. Arguably, through the use of alternative fuels and an increasingly more renewable energy grid, implementation of the Proposed Program would improve the efficiency of energy usage across the State. Therefore, the Implementation of the Proposed Program **would not result in a cumulatively considerable contribution to a significant cumulative impact related to energy**.

7. Geology and Soils

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. The exact location of these new facilities or the modification of existing facilities is uncertain. Construction could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Additional disturbance could result from the increased mineral ore extraction activities which would provide raw materials to these manufacturing facilities and energy projects. These activities would have the potential to adversely affect the geology and soils in construction or mineral ore extraction areas such that a rupture of a known earthquake fault, strong seismic ground shaking, liquefication, landslides, erosion, or the destruction of a unique paleontological resource or geographic feature could occur. Soil compaction, soil erosion, and loss of topsoil could occur during construction activities.

The Proposed Program's impacts to geology and soils would be significant and unavoidable on their own, as concluded in Chapter 4. Because the Proposed Program on its own would result in a significant and unavoidable impact, and because the project would combine with impacts across the state, the project's contribution to the significant cumulative impact would be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-

specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** related to geology and soils.

8. Greenhouse Gases

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require the construction and operation of new or modified facilities or infrastructure and mining activities. When these short-term construction GHG emissions associated with construction activities are considered in relation to the overall long-term operational GHG benefits, they are not considered substantial. Therefore, the Proposed Program would not have a cumulatively significant impact on GHG emissions. Compliance responses implemented in response to the Proposed Program were found to have a beneficial impact related to GHG emissions. Given the long-term benefits of the Proposed Program, the Proposed Program would have a **less than significant cumulative impact.**

9. Hazards and Hazardous Materials

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. Construction activities generally use heavy-duty equipment requiring periodic refueling and lubricating. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site. There would be a potential risk of accidental release during fuel transfer activities. Although precautions would be taken to ensure that any spilled fuel is properly contained and disposed, and such spills are typically minor and localized to the immediate area of the fueling (or maintenance), the potential still remains for a substantial release of hazardous materials into the environment.

The Proposed Program's impacts related to hazards and hazardous materials would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of effects of disposal of hazardous materials, the potential for hazardous materials spills, and exposure and environmental effects from lithium. Because the Proposed Program on their own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** related to hazards and hazardous materials.

10. Hydrology and Water Quality

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. Construction could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways, which could result in short-term adverse effects on water quality from potential erosion or waste discharge. Increased lithium mining could result in impacts on water quality from ground disturbance (i.e., hard rock mining) or groundwater overdrafting (i.e., continental brine mining). Most of these activities would be subject to state and federal regulations (e.g., Clean Water Act); however, lithium is obtained from areas outside of the United States, where these regulations are not enforced. CARB cannot determine with certainty that implementing mitigation measures would reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects.

The Proposed Program's impacts related to hydrology and water quality would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of potential adverse effects on water quality from construction activities and increased mining. Because the Proposed Program on its own would result in a significant and unavoidable impact, and because this impact would combine with other water quality impacts across the state, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** related to hydrology and water quality.

11. Land Use and Planning

Impacts related to land use and planning focus on potential conflicts with plans, policies, and regulations intended to minimize environmental impacts, as well as potential division of established communities. These impacts do not typically interact or combine with other impacts within the cumulative context such that a significant cumulative impact could occur with respect to land use and planning. Also, significant project-related impacts associated with land use and planning were not identified in Chapter 4. Therefore, the Proposed Program **would not result in a cumulatively considerable contribution to a significant cumulative impact** related to land use and planning.

12. Mineral Resources

Implementation of the Proposed Program could require construction and operation of new or modified facilities or infrastructure and increased lithium mining. While an increase in mining of lithium could occur, this increase would be generally small when viewed in the context of global lithium markets. Implementation of the Proposed Program would not affect the economic potential related to known mineral resources or substantially affect supply. Therefore, the Implementation of the Proposed Program **would not result in a cumulatively considerable contribution to a significant cumulative impact** related to mineral resources.

13. Noise

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. Noise and vibration associated with construction and operation of these facilities and mining operations would fluctuate depending on type, number, size, and duration of usage for the varying equipment. The effects of noise and vibration would depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Operational-related activities associated with mining or operation of manufacturing plants could produce new or ongoing sources of noise that could exceed applicable noise standards and result in a substantial increase in ambient noise levels.

The Proposed Program's impacts related to noise and vibration would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of potential increase in noise and vibration that could exceed applicable noise standards and result in a substantial increase in ambient noise levels. Because the Proposed Program on its own would result in a significant and unavoidable impact, and because these impacts would combine with other significant noise and vibration impacts across the state, the project's contribution to the significant cumulative impact would be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** related to noise and vibration.

14. Population and Housing

Implementation of the Proposed Program could require construction and operation of new or modified facilities or infrastructure. Activities related to the construction of these

facilities would require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project). Therefore, a substantial amount of construction worker migration would not be likely to occur, and a sufficient construction employment base would likely be available. Construction activities would not require new additional housing or generate changes in land use. It would be expected that the aforementioned facilities would be located within areas of consistent zoning and have sufficient employees and housing to support their operation. Therefore, the Implementation of the Proposed Program **would not result in a significant cumulative impact related to population and housing growth**.

15. Public Services

Implementation of the Proposed Program could include construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Construction activities would not require new additional housing to accommodate or generate changes in land use and, therefore, would not affect the provision of public services. It would be expected that the aforementioned facilities would be located within areas of consistent zoning and have sufficient public services to support their operation. Therefore, activities related to the Implementation of the Proposed Program would **not result in a significant cumulative impact related to public services**.

16. Recreation

Implementation of the Proposed Program could require construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact locations of potential new or modified facilities. These activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit their development. In addition, demand for construction of these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur. Thus, construction activities associated with reasonably foreseeable compliance responses would not be anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would be likely to occur. In addition, the demand for new (or expansion of existing) recreational-related facilities would not occur as a result of construction activities. It would be expected that the aforementioned facilities would be located within areas of consistent zoning and have sufficient recreational facilities to support their operation. Therefore, activities related to the Implementation of the 2022 Proposed Program would **not result in a significant cumulative impact related to recreational facilities**.

17. Transportation

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. Although detailed information about potential specific construction activities is not currently available, these activities could result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. Depending on the amount of trip generation and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. Locations of facilities with newly installed infrastructure to distribute and dispense alternative fuels cannot currently be known; therefore, the total change in VMT resulting from operation of these facilities cannot be assessed. Many activities, such as lithium battery manufacturing, recycling, and refurbishing, would take place at existing facilities; however, long-term operational-related activities associated with deliveries and distribution of goods (e.g., alternative fuels) could result in the addition of new trips, which could increase regional VMT.

The Proposed Program's impacts related to transportation would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of potential increase in VMT that could exceed applicable local and regional standards and potential issues related to traffic safety, including bicycle and pedestrian safety. Because the Proposed Program on its own would result in a significant and unavoidable impact, and because this impact would combine with other transportation-related impacts across the state, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** related to transportation.

18. Tribal Cultural Resources

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. The exact location of these new facilities or the modification of existing facilities is uncertain. Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways.

Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include tribal cultural resources. Properties important to Native American communities, including tangible properties possessing intangible traditional cultural values, also may exist.

The Proposed Program's impacts to tribal cultural resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential to damage and destroy tribal cultural resources. Because the Proposed Program on their own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** on tribal cultural resources.

19. Utilities and Service Systems

Implementation of the reasonably foreseeable compliance responses associated with the Proposed Program could require construction and operational activities associated with new or modified facilities or infrastructure and increased mining activities. As a result, there could be new demand for water, wastewater, electricity, and gas services for new or modified facilities. Generally, facilities would be cited in areas with existing utility infrastructure—or areas where existing utility infrastructure is easily assessable. At this time, the specific location and type of construction needed is not known and would be dependent upon a variety of market factors that are not within the control of CARB including: economic costs, product demands, environmental constraints, and other market constraints. Thus, the specific impacts from construction on utility and service systems cannot be identified with any certainty, and individual compliance responses could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impacts.

The Proposed Program's impacts related to utilities and service systems would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of potential impacts resulting from new demand for water, wastewater, electricity, and gas services. Because the Proposed Program on its own would result in a significant and unavoidable impact, and because the project impact would combine with other statewide impacts to utilities, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as

noted in Chapter 4, CARB's enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Program **could result in a cumulatively considerable contribution to a significant cumulative impact** related to utilities and service systems.

20.Wildfire

Implementation of the Proposed Program could require construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact locations of potential new or modified facilities. However, construction and operation activities as well as new or modified facilities would likely occur within footprints of existing manufacturing facilities, or in areas with appropriate zoning that permit such uses and activities; therefore, changes or modifications to existing fire response and evacuation plans would not be necessary. Additionally, new facilities would be subject to the applicable chapters of the California Fire Code and any additional local provisions identified in local fire safety codes, which would substantially reduce the risk of wildfire ignitions caused by infrastructure development. Finally, when packaged and handled properly, lithium-ion batteries pose no environmental hazard (79 Fed. Reg. 46011, 46032) and increased use of lithium-based batteries in vehicles would not substantially increase the risk of wildland fire. Therefore, activities related to the Implementation of the Proposed Program **would not result in a cumulatively considerable contribution to a significant cumulative impact** related to wildfire.

E. Growth Inducing Impacts

A project would be considered growth-inducing if it removes an obstacle to growth, includes construction of new housing, or establishes major new employment opportunities. The reasonably foreseeable compliance responses associated with the Proposed Program would not directly result in any growth in population or housing, as the Proposed Program is meant to spur emissions-reducing changes in the existing fleet of light and medium-duty vehicles operating in California, which would not require substantial relocation of employees.

6.0 MANDATORY FINDINGS OF SIGNIFICANCE

Consistent with the requirements of the California Environmental Quality Act (CEQA) Guidelines § 15065 and § 18 of the Environmental Checklist, this Draft Environmental Analysis (Draft EA) addresses the mandatory findings of significance for the Proposed Program.

A. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat for a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

A finding of significance is required if a project "has the potential to substantially degrade the quality of the environment (14 CCR § 15065(a))." In practice, this is the same standard as a significant effect on the environment, which is defined as "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance (14 CCR § 15382.)." As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level. For projects within California, all these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies or other regulatory bodies at such time the projects are proposed for implementation. Outside of California, other state and local agencies would consider the proposed projects in accordance with their laws and regulations. CARB would not be the agency responsible for conducting the project-specific environmental or approval reviews because it is not the agency with authority for making land use or project implementation decisions.

This Draft EA addresses and discloses potential environmental effects associated with implementation of the Proposed Program, including direct, indirect, and cumulative impacts. As described in Chapter 4, this Draft EA discloses potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures.

B. Does the project have impacts that are individually limited, but cumulatively considerable?

A lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has potential environmental effects that are individually limited, but cumulatively considerable (14 CCR § 15065). Cumulatively considerable means "that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (14 CCR § 15065(a)(3))." Cumulative impacts are discussed in Chapter 5 in the Draft EA.

C. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

A lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to cause substantial adverse effects on human beings, either directly or indirectly (14 CCR § 15065(a)(4)). Under this standard, a change to the physical environment that might otherwise be minor must be treated as significant if people would be significantly affected. This factor relates to adverse changes to the environment of human beings generally, and not to effects on particular individuals. While changes to the environment that could indirectly affect human beings would be represented by all of the designated CEQA issue areas, those that could directly affect human beings include air quality, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation/traffic, and utilities, which are all addressed in Chapter 4, "Impact Analysis" of this Draft EA.

7.0 ALTERNATIVES ANALYSIS

This chapter of the Draft Environmental Analysis (EA) provides an overview of the regulatory requirements and guidance for alternatives analyses under the California Environmental Quality Act (CEQA); a description of each of the alternatives to the Proposed Program; a discussion of whether and how each alternative meets the objectives of the Proposed Program; and an analysis of each alternative's environmental impacts.

A. Approach to Alternatives Analysis

CARB's certified regulatory program (Title 17 CCR §§ 60000 – 60008) requires that, where a contemplated action may have a significant effect on the environment, a staff report shall be prepared in a manner consistent with the environmental protection purposes of CARB's regulatory program and with the goals and policies of CEQA. Among other things, the staff report must address feasible alternatives to the proposed action that would substantially reduce any significant adverse impact identified.

The certified regulatory program provides that any project for which significant adverse environmental impacts have been identified during the EA review process shall not be approved or adopted unless certain factors are met, including that there are no feasible mitigation measures or feasible alternatives available which would substantially reduce such an adverse impact (Title 17 CCR § 60004.2(c)(2)). For purposes of this section, "feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors (Title 14 CCR § 15364).

While CARB, by virtue of its certified program, is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the CEQA Guidelines, the CEQA Guidelines nevertheless contain useful information for preparation of a thorough and meaningful alternatives analysis. CEQA Guidelines § 15126.6(a) speaks to evaluation of "a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of the alternatives analysis is to determine whether different approaches to, or variations of, the project would reduce or eliminate significant project impacts, within the basic framework of the objectives, a principle that is consistent with CARB's regulatory requirements.

Alternatives considered in an environmental document should be potentially feasible and should attain most of the basic project objectives. It is critical that the alternatives analysis define the project's objectives. The project objectives are listed below in section III of this chapter.

The range of alternatives is governed by the "rule of reason," which requires evaluation of only those alternatives "necessary to permit a reasoned choice" (Title 14 CCR §

15126.6(f)). Further, an agency "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (Title 14 CCR § 15126.6(f)(3)). The analysis should focus on alternatives that are feasible and that take economic, environmental, social, and technological factors into account. Alternatives that are remote or speculative need not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project as proposed.

B. Selection of Range of Alternatives

This chapter evaluates a range of alternatives to the Proposed Program that could reduce or eliminate significant effects on the environment, while still meeting basic project objectives (14 CCR § 15126.6(a)). Pursuant to CARB's certified regulatory program, this chapter also contains an analysis of each alternative's feasibility and the likelihood that it would substantially reduce any significant adverse environmental impacts identified in the impact analysis contained in Chapter 4 of this Draft EA (17 CCR § 60004.2(a)(5)).

CARB has identified five alternatives that allow the public and Board to consider different approaches. CARB has made a good faith effort to identify potentially feasible project alternatives.

For the purposes of this analysis, four alternatives are considered:

1. Alternative 1 (No-Project Alternative)
2. Alternative 2 (Less Stringent ZEV Sales Requirement in the Earlier Years)
3. Alternative 3 (Less Stringent Overall ZEV Sales Requirement with 70% by 2035)
4. Alternative 4 (No Low-Emission Vehicle Regulation Updates)

C. Project Objectives

The primary objectives of the Proposed Program include the following:

1. Accelerate the deployment of vehicles that achieve the maximum emissions reductions possible from light- and medium-duty vehicles to assist in the attainment of national ambient air quality standards for criteria air pollutants (Health & Safety Code §§ 43000.5(b), 43018(a)).

2. Develop a regulation that is consistent with and meets the goals of the State Implementation Plan (SIP), providing necessary emission reductions from vehicular sources for the federal ambient air quality standards to be met in all of California, which has the most extreme nonattainment areas in the nation and has for decades (Health & Safety Code §§ 39002, 39003, 39602.5, 43000, 43000.5, 43013, 43018).

3. Because California endures some of the most extreme effects of climate change and is acutely vulnerable to those impacts, decrease GHG emissions in support of statewide GHG reduction goals by adopting strategies to deploy light-duty zero-emission vehicles (ZEVs) in California as identified in the Scoping Plan, which was developed to reduce GHG emissions in California as directed by AB 32 (Ch. 488, Stats. of 2006, Nuñez). CARB's 2017 Climate Change Scoping Plan and 2020 Mobile Source Strategy aim to accelerate development and deployment of the cleanest feasible mobile source technologies and to improve access to clean transportation. Implementation of the Proposed Program would contribute to reducing GHG emissions through the electrification of the mobile source sector in a manner that minimizes costs and maximizes benefits for California's economy, maximizes environmental and economic co-benefits under Health and Safety Code § 38501, and would also provide further GHG reductions pursuant to AB 1493 (Ch. 200, Stats. of 2002, Pavley).

4. Maintain and continue reductions in emissions of GHGs beyond 2020, in accordance with AB 32 (Health & Safety Code §§ 38551(b), 38562, 38562.5), and pursue measures that implement reduction strategies covering the State's GHG emissions in furtherance of California's mandate to reduce GHG emissions to 40 percent below the 1990 level by December 31, 2030 in accordance with SB 32 (Health & Safety Code § 38566)

5. Lead the transition of California's light-duty transportation sector from internal combustion to zero-emission powertrains.

6. Reduce the State's dependence on petroleum as an energy resource and support the use of diversified fuels in the State's transportation fleet (Health & Safety Code § 43000(e), California Public Resources Code (PRC) § 25000.5). In addition, petroleum use as an energy resource contributes substantially to the following public health and environmental problems: air pollution, acid rain, global warming, and the degradation of California's marine environment and fisheries (PRC § 25000.5(b), (c)).

7. Complement existing programs and plans to ensure, to the extent feasible, that activities undertaken pursuant to the measures complement, and do not interfere with, existing planning efforts to reduce GHG emissions, criteria pollutants, petroleum-based transportation fuels, and TAC emissions.

8. Achieve emission reductions that are real, permanent, quantifiable, verifiable, and enforceable (Health & Safety Code §§ 38560, 38562(d)(1)).

9. Provide market certainty for zero-emission technologies and fueling infrastructure to guide the acceleration of the development of environmentally superior light-duty vehicles that will continue to deliver performance, utility, and safety demanded by the market.

10. Take steps to ensure all Californians can live, work, and play in a healthful environment free from harmful exposure to air pollution. Protect and preserve public health and well-being, and prevent irritation to the senses, interference with visibility, and damage to vegetation and property (Health & Safety Code § 43000(b)) in recognition that the emission of air pollutants from motor vehicles is the primary cause of air pollution in many parts of the State (Health & Safety Code § 43000(a)).

11. Spur economic activity of zero-emission technologies in the light-duty vehicle sector. Incentivize innovation that will transition California's economy into greater use of clean and sustainable zero-emission technologies and promote increased economic and employment benefits that will accompany this transition (AB 1493, § 1(g); Health & Safety Code §§ 38501(e), 43018.5(c)). Reduce emissions from vehicles in a manner that is equitable, does not disproportionately impact low-income communities, and minimizes the administrative burden of complying with the regulations. (Health and Safety Code §§ 38562, 38562.5, 44391.2.)

D. Alternatives Analysis

Detailed descriptions and analyses of each alternative are presented below. The analysis of each alternative includes a discussion of the degree to which the alternative meets the basic project objectives, the degree to which the alternative avoids a potentially significant impact identified in Chapter 4, and any environmental impacts that may result from the alternative.

1. Alternative 1: No-Project Alternative

a) Alternative 1 Description

Alternative 1, the "No-Project Alternative," is included to disclose environmental information that is important for considering the proposed ACC II Program. It is useful to include a "No-Project Alternative" in this analysis for the same reasons that this type of alternative is called for in the State CEQA Guidelines. As noted in the State CEQA Guidelines, "the purpose of describing and analyzing a no-project alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project" (Title 14 CCR Section 15126.6(e)(1)). The No-Project Alternative also provides an important point of comparison to understand the potential environmental benefits and impacts of the other alternatives.

Under Alternative 1, the proposed ACC II Program would not be implemented. Under the No-Project Alternative, amendments would not occur to the existing LEV and ZEV regulations. Thus, the emission requirements for criteria air pollutants in place for model year 2025, the final year of implementation of the existing LEV III regulation, would remain in effect for subsequent model years. There would be no requirement for newly manufactured light and medium-duty vehicles to meet a more stringent emission standards or better control for real world driving behavior. The existing requirements of

the ZEV regulation would continue without the additional requirement for light-duty vehicle auto manufacturers to fully transition to zero-emission technology by 2035. There would also be no requirement for ZEV assurance measures, which include new durability, warranty, serviceability, data standardization, and battery labeling requirements for ZEVs.

b) Alternative 1 Discussion

i) Objectives

The No-Project Alternative would fail to meet many of the project objectives listed in Chapter 2 (and reproduced above) because criteria pollutant and GHG reductions would not be accelerated in the manner necessary to achieve air quality standards and climate goals. First, there would be no further reductions in criteria air pollutants from light and medium-duty vehicles that would provide public health benefits, assist in the attainment of California and national ambient air quality standards (NAAQS), and meet the goals of the SIP. The No-Project Alternative would not fulfill the requirement of HSC Section 43018(a), which requires CARB to reduce vehicle emissions of criteria air pollutants to the maximum extent feasible. Similarly, the alternative would not further decrease GHG emissions in support of SB 32 or CARB's Scoping Plan. The No-Project Alternative would also significantly hamper California's ability to fulfill the AB 1493 mandate to achieve maximum feasible GHG reductions.

Under the No-Project Alternative, CARB would continue to implement other existing programs and regulations intended to reduce emissions of criteria air pollutants and GHGs in California, but without the proposed ACC II Program. Vehicle emissions of criteria pollutants and GHGs would continue to decrease as the vehicle fleet turns over under the existing LEV and ZEV regulations. This is because, typically, almost all the State's fleet of light- and medium-duty vehicles turns over in an approximately 15-year cycle. Thus, because 2025 is the last model year addressed by the existing LEV regulation, the vehicle fleet would continue to become incrementally cleaner and more efficient until approximately 2040. After that complete turnover cycle, the emissions of the vehicle fleet would not improve with subsequent fleet turnover, because new vehicles would no longer be cleaner than the older vehicles they replace. Under the No-Project Alternative, criteria pollutant and GHGs emissions would not decrease from the vehicles subject to the proposed regulatory requirements. The No-Project Alternative would therefore fail to meet CARB's goals of ensuring all Californians live, work, and play in a healthful environment free from harmful exposure to air pollution.

The No-Project Alternative would not result in improvements to zero-emission technologies, nor would it lead the transition of California's light-duty sector to zero-emission technology. The alternative also would not provide market certainty for ZEV technologies and therefore ZEV fueling infrastructure. Without regulatory requirements, development and use of ZEVs will not increase at the rate needed to meet CARB's air quality standards and GHG reduction targets. ZEV manufacturers would lack the regulatory incentive to build ZEVs, which would delay the transition to a sustainable zero-emission light-duty market. As a result, it is unlikely that ZEVs

manufacturers would increase production of ZEVs above existing requirements in response to market demand alone. Economies of scale in production costs would not be realized unless manufacturers commit to producing larger volumes of these alternative vehicles. Staff anticipate consumers may also hesitate to purchase ZEV technologies because of market challenges not being addressed with insufficient investment signals. Furthermore, the alternative would not reduce the State's dependence on petroleum for energy or support the use of diversified fuels.

In summary, the No-Project Alternative would not meet most of the basic project objectives.

ii) Environmental Impacts

There would be no new environmental impacts under the No-Project Alternative compared to baseline because compliance responses would be the same as under the existing regulatory environment. It is anticipated that the No-Project Alternative would not result in the development of new manufacturing plants that specialize in the production of propulsion batteries or fuel cells, or the modification or expansion of existing production facilities. The proportion of ZEVs in the statewide vehicle fleet would likely not increase beyond the existing regulatory baseline, therefore, no new hydrogen fueling stations and electric vehicle charging stations would be developed under the existing regulation. Additional lithium mining activities also would not occur. Thus, no impacts related to new or expanded facilities for precious metal mining, fueling, electricity distribution, or battery disposal would occur under the No-Project Alternative.

Without implementation of the proposed ACC II Program, the beneficial impacts resulting from the ACC II Program would not occur. This would include no reduction of criteria and GHG beyond what is required under existing regulations. There would be no further reductions in criteria air pollutants that would provide public health benefits, achieve NAAQS, and meet the goals of the SIP. Additionally, the No-Project Alternative would not further decrease GHG emissions in support of SB 32. Therefore, as described above, this alternative would fail to meet most of the basic project objectives.

2. Alternative 2: Less Stringent ZEV Sales Requirement in the Earlier Years

a) Alternative 2 Description

Alternative 2 is a less stringent alternative for the earlier years of the Proposed Program and applies to the same manufacturers. This alternative includes a lower starting ZEV and PHEV delivered for sale requirement in 2026 and a slower ramp rate of ZEV Regulation stringency from 2026 to 2031. However, the overall ZEV stringency still reaches a 100 percent ZEV and PHEV requirement by 2035 as proposed under the ZEV Regulation of the Proposed Program. Table 20 shows the Alternative 2 stringency trajectory compared to the Proposed Program stringency for delivered for sale requirements.

Table 20: ZEV Market Share Requirements for 2026 and Subsequent Model Years for Alternative 2 and the Proposed Program

Model Year	Alternative 2 Percentage Requirement	ACC II Program Percentage Requirement
2026	26%	35%
2027	34%	43%
2028	43%	51%
2029	51%	59%
2030	61%	68%
2031	76%	76%
2032	82%	82%
2033	88%	88%
2034	94%	94%
2035 and subsequent	100%	100%

This alternative is a feasible path for manufacturers based on model turnover and projections of manufacturer production of ZEVs and PHEVs. The LEV requirements and ZEV assurance measures would remain unchanged from the Proposed Program.

b) Alternative 2 Discussion

i) Objectives

Alternative 2 meets most of the basic project objectives, though it does so to a lesser extent than the Proposed Program in some cases because it would not require as quick of a transition to zero-emission light-duty vehicles. Emissions generated by the statewide fleet of light- and medium-duty vehicles would decrease because the LEV standards under this alternative would be more stringent than the existing LEV III regulation standards and the ZEV requirements are higher than what is required under the current ZEV regulation. However, the emissions reductions achieved under this alternative would not be as great as the reductions that would be achieved under the Proposed Program. Under Alternative 2, emissions are expected to reduce as the ZEV sales fraction increases over the years. However, since Alternative 2 allows for a higher proportion of conventional gasoline vehicles to be sold in the state from 2026 to 2030, NOx and $PM_{2.5}$ emissions are higher than the Proposed Program. This alternative's emissions reductions would not be the maximum feasible reduction that is mandated by HSC Section 43018(a).

Similarly, under Alternative 2, the statewide fleet of light-duty vehicles would eventually transition to zero-emission, which would help the State attain its GHG reduction goals; however, the extent of the reduction would be less than the reduction needed from an ACC II Program as identified in CARB's Scoping Plan. Thus, this could prevent California from achieving the GHG reduction goal of SB 32, particularly if CARB cannot develop other programs or regulations to reduce GHG emissions. In addition, this alternative

would not meet the maximum feasible emission reductions in furtherance of AB 1493. Alternative 2 would reduce GHG emissions, but not to the same degree as the Proposed Program because more light-duty vehicles would continue to use fossil fuels and for a longer period of time rather than transition to zero-emission technology.

Alternative 2 would also help the State become less dependent on petroleum as an energy source, but not to the extent that it would under the Proposed Program due to a slower transition to ZEVs. Additionally, with a slower transition to ZEVs in the earlier years of the program, less benefit is provided to communities with environmental justice concern that are often disproportionately exposed to vehicular pollution. However, because Alternative 2 requires a 100 percent transition to zero-emission technologies in the light-duty sector, it does meet the objectives of leading the transition to zero-emission powertrains and providing market certainty for ZEV technologies and therefore ZEV fueling infrastructure.

Alternative 2 would achieve the project objectives identified under the Proposed Program, but not to the same maximal degree as the Proposed Program.

ii) Environmental Impacts

The types of impacts under the less stringent Alternative 2 would be the same as the proposed amendments to the Proposed Program, including potentially significant adverse impacts related to aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation/traffic, and utilities and service systems. However, because many of the adverse environmental affects would be associated with manufacturing and new infrastructure, the degree of these impacts under Alternative 2 may occur later in time than under the Proposed Program. This is largely because Alternative 2 would result in slower penetration of ZEVs and PHEVs into the statewide vehicle fleet and associated lower ZEV production by manufacturers in the earlier years of the program from 2026 to 2030. Decreased environmental impacts from 2026 to 2030 would be related to fewer infrastructure installations, such as electric chargers and hydrogen fueling stations, to support a smaller ZEV and PHEV population, reducing construction related activities and therefore lessening short-term construction-related impacts. These reduced impacts are in areas of biological resources, geology and soil, cultural resources impact, and hydrology and water quality.

While Alternative 2 would produce fewer operational impacts in the earlier years as compared to the Proposed Program due to the reduced number of manufactured ZEVs, it would be expected that potentially significant and unavoidable impacts would still occur because the compliance responses to a less stringent ZEV sales requirement would still require similar infrastructure and facility development to serve the introduction of ZEVs into the marketplace. Additionally, Alternative 2 requires a full transition to 100 percent electrification by 2035 as does the Proposed Program.

Beneficial air quality, GHG, and energy effects would be anticipated to be less than those that would occur with implementation of the Proposed Program. Alternative 2 would result in fewer ZEVs being introduced to the light-duty fleet from 2026 to 2030,

therefore fewer cumulative ZEVs would be on the road under the same timeframe as the proposed program. This alternative would not avoid the impacts associated with the Proposed Program nor achieve the same level of environmental benefit.

3. Alternative 3: Less Stringent Overall ZEV Sales Requirement with 70 Percent by 2035

a) Alternative 3 Description

Alternative 3 is a less stringency requirement for ZEV sales with a minimum 70 percent ZEV and PHEV sales by 2035 instead of the proposal of 100 percent. This is based on survey data that shows 30 percent of survey respondents have rejected considering electric vehicle technology and show hesitation in purchasing ZEVs or PHEVs today.[140] Although CARB staff does think this will change over time as ZEVs become cheaper and the market broadens to become more familiar with this technology, cost and emissions impacts analysis for a lower bound of ZEVs and PHEVs with more gasoline vehicles meeting the proposed LEV standard is important for understanding the effect of electrification on the fleet. The LEV requirements and ZEV assurance measures would remain unchanged from the Proposed Program.

b) Alternative 3 Discussion

i) Objectives

Alternative 3 meets most of the basic project objectives, though it does so to a lesser extent than the Proposed Program in some cases because it would not require a full transition to zero-emission light-duty vehicles. Emissions generated by the statewide fleet of light- and medium-duty vehicles would decrease because the LEV standards under this alternative would be more stringent than the existing LEV III regulation standards and the ZEV requirements would be increased from the current ZEV regulation. However, the emissions reductions achieved under this alternative would not be as great as the reductions that would be achieved under the Proposed Program. Under Alternative 3 emissions are expected to reduce as the ZEV sales fractions increase over the years. However, since Alternative 3 assumes only 70 percent ZEVs from model year 2035 and beyond, NOx and $PM_{2.5}$ emissions are higher than the Proposed Program, which requires 100 percent ZEVs by model year 2035. This alternative's emissions reductions would not be the maximum feasible reduction that is mandated by HSC Section 43018(a). Thus, this alternative would limit the ability of various air districts throughout the state to attain the state and national ambient air quality standards in their respective air basins.

Similarly, under Alternative 3, the statewide fleet of light-duty vehicles would transition toward zero-emission, which would help the State attain its GHG reduction goals; however, the extent of the reduction would be less than the reduction needed from an

[140] Kurani, Kenneth, Nicolette Caperello, and Jennifer TyreeHapegeman. 2016. "New Car Buyers' Valuation of Zero-Emission Vehicles: California." Plug-in Hybrid & Electric Vehicle Center. March 21, 2016. https://ww2.arb.ca.gov/sites/default/files/2020-04/12_332_ac.pdf.

ACC II Program as identified in CARB's Scoping Plan. Thus, this could prevent California from achieving the GHG reduction goal of SB 32, particularly if CARB cannot develop other programs or regulations to reduce GHG emissions. In addition, this alternative would not meet the maximum feasible emission reductions in furtherance of AB 1493. Alternative 3 would reduce GHG emissions, but not to the same degree as the Proposed Program because new light-duty vehicles would continue to use fossil fuels rather than transition to zero-emission technology.

Alternative 3 would also help the State become less dependent on petroleum as an energy source, but not to the extent that it would under the Proposed Program. Because a transition to zero-emission technology and promoting zero-emission technology is a critical goal in addition to emissions reductions goals, Alternative 3 would not meet most of the basic project objectives.

Alternative 3 would partially achieve some of the project objectives identified under the Proposed Program, but not to the same degree as the Proposed Program.

ii) Environmental Impacts

The types of impacts under the less stringent Alternative 3 would be the same as the Proposed Program, including potentially significant adverse impacts related to aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation/traffic, and utilities and service systems. However, because many of the adverse environmental affects would be associated with manufacturing and new infrastructure, the degree of these impacts from these compliance responses under this less stringent alternative may be less, or occur later in time, than under the Proposed Program. This is largely because Alternative 3 would result in slower penetration of ZEVs and PHEVs into the statewide vehicle fleet and associated lower ZEV production by manufacturers. Decreased environmental impacts would be related to fewer infrastructure installations, such as electric chargers and hydrogen fueling stations, to support a smaller ZEV and PHEV population, reducing construction related activities and therefore lessening short-term construction-related impacts. These reduced impacts are in areas of biological resources, geology and soil, cultural resources impact, and hydrology and water quality.

While Alternative 3 would produce fewer operational impacts as compared to the Proposed Program because of the reduced number of manufactured ZEVs, it would be expected that, although such impacts would be less, potentially significant and unavoidable impacts would still occur because the compliance responses to a less stringent ZEV sales requirement would still require similar infrastructure and facility development to serve the progression of ZEVs into the marketplace as the development required from the Proposed Program.

Beneficial air quality, GHG, and energy effects would be anticipated to be less than those that would occur with implementation of the Proposed Program because fewer ZEVs would be introduced at a slower rate. Therefore, this alternative would not avoid

the impacts associated with the Proposed Program nor serve many of the objectives of the Proposed Program.

4. Alternative 4: No Low-Emission Vehicle Regulation Updates

a) Alternative 4 Description

Alternative 4 is a less stringent requirement for the combined ACC II Program where amendments to the Low-Emission Vehicle Regulation would not occur. This alternative would require no future updates to internal combustion engine vehicles as the vehicle fleet transitions to ZEVs and PHEVs. The existing LEV III program would still be effective, but the following LEV IV modifications would not be required: no removal of ZEVs from the existing NMOG+NOx fleet average standard; no improvements of emission control during aggressive driving; no improvements to cold-start emission controls; no improvements to the worst emitting evaporative systems; no lowering of the fleet average for medium-duty vehicles; no new standards for aggressive driving for MDVs; and no PEMS in-use standards for MDVs to control emissions during towing. The ZEV requirements and ZEV assurance measures would remain unchanged from the Proposed Program.

b) Alternative 4 Discussion

i) Objectives

Alternative 4 meets most of the basic project objectives, though it fails to maximize emissions reductions because it does not require additional reductions from conventional internal combustion engine vehicles in the light-duty and medium-duty fleet. Emissions generated by ICE light- and medium-duty vehicles would not decrease further because the LEV standards under this alternative would not change from the existing LEV III regulation standards. Meanwhile, the ZEV requirements continue to be significantly higher than the current ZEV regulation and are expected to reduce emissions as the ZEV sales fractions increase over the years. Since Alternative 4 assumes no additional reductions from conventional vehicles, NOx and $PM_{2.5}$ emissions are expected to be higher than the Proposed Program. This alternative's emissions reductions would therefore not be the maximum feasible reduction that is mandated by HSC Section 43018(a), and this alternative could limit the ability of various air districts throughout the state to attain ambient air quality standards in their respective air basins. Failure to reduce criteria emission to the maximum extent also provides less benefit to environmental justice communities that are often disproportionately exposed to vehicular pollution.

Given that the statewide fleet of light-duty vehicles would still transition toward zero-emission under this alternate at the same rate as the Proposed Program, this alternative meets the objective to help the state attain its GHG reduction goals. Alternative 4 would also help the State become less dependent on petroleum as an energy source and promotes zero-emission technology.

Alternative 4 would achieve most of the project objectives identified under the Proposed Program, but not to the same maximal degree as the Proposed Program.

ii) Environmental Impacts

The types of impacts under the less stringent Alternative 4 would be the same as the proposed amendments to the Proposed Program, including potentially significant adverse impacts related to aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation/traffic, and utilities and service systems. Because many of the adverse environmental effects are associated with manufacturing and new infrastructure for ZEVs, the degree of these impacts remains the same as the Proposed Program. However, not requiring ICE vehicle improvements would reduce the demand for precious metals in the earlier years of the program when there are still significant volumes of ICE vehicles being produced. Alternative 4 would therefore have a slightly lower geology and soils impact as compared to the Proposed Program because of the reduced demand for catalyst loadings and the mining of materials to achieve this.

Beneficial air quality effects would be anticipated to be less than those that would occur with implementation of the Proposed Program because no further reductions would occur from ICE vehicles. Alternative 4 would not avoid the impacts associated with the Proposed Program and would not achieve the same emissions benefits.

E. Alternatives Considered but Rejected

Additional alternatives were considered during development of the alternatives to the Proposed Project. The CEQA Guidelines Section 15126.6(c) includes three factors that may be used to eliminate alternatives from detailed consideration in an EIR: "i. failure to meet most of the basic project objectives; ii. Infeasibility, or iii. Inability to avoid significant environmental impact."

1. Low-Carbon Fuel Technology in lieu of ZEV Requirements

Alternative low-carbon fuels include those such as bio-based gasoline, renewable diesel, and renewable natural gas. These lower-carbon alternative fuels coupled with improved internal combustion engine technologies may be able to reduce GHG emissions in the near to mid-term. CARB staff considered requiring vehicles to be fueled with a minimum percentage of low-carbon fuels rather than requiring ZEV sales from manufacturers. This approach, however, is infeasible given that renewable gasoline as a liquid drop-in fuel has not been commercialized at scale. Fuel providers are instead focusing on renewable diesel for heavy-duty truck markets to comply with CARB's Low Carbon Fuel Standard. The low-carbon fuel pathway would also require a significant amount of biomass for the volume of renewable liquid fuels needed in the California light-duty vehicle fleet. CARB staff recognize biomass supplies are limited and will need to be focused on other mobile sectors that are harder to electrify.

Furthermore, while low-carbon fuels may reduce GHG emissions, this approach fails to meet most of the basic project objectives. First, low-carbon fuel technology fails to reduce criteria emissions needed to meet ambient air quality standards. Burning renewable gasoline would produce about the same amount of NOx as current internal combustion vehicles, and refineries would produce similar local toxics in communities. The transition to ZEVs moves away from both criteria emissions and dependence on petroleum as an energy resource in blended fuels. Second, adopting a new GHG performance regulation that credits the full lifecycle of renewable fuels would require tracking of individual driver fueling events by manufacturers for the millions of vehicles in the light-duty fleet. Manufacturers would only be given regulatory credit if they tracked all their customers and verified that they were fueling up on low-carbon renewable liquid fuels. This could result in a program that is not verifiable or enforceable. Lastly, this alternative does not accelerate the deployment of vehicles that achieve the maximum emissions reductions possible and fails to lead the transition to ZEVs. Considering the infeasibility of this approach and its failure to meet project objectives, CARB staff did not pursue further evaluation of this alternative.

F. Environmentally Superior Alternative

If the no project alternative is the environmentally superior alternative, CEQA requires that the EIR "…shall also identify an environmentally superior alternative among the other alternatives." (CCR § 15126[e][2]). The No Project Alternative (Alternative 1) would be environmentally superior for all environmental resource areas other than greenhouse gases and air quality. Because an environmental objective of the Proposed Program is to ultimately reduce air pollution and because the No Project Alternative does not deliver that substantial environmental benefit, it is not considered the environmentally superior alternative.

Alternative 2 would decelerate the turnover of ZEVs as compared to the Proposed Program due to less stringent requirements. While Alternative 2 would similarly reach the 100 percent ZEV requirement by 2035 as the Proposed Project and would meet the objectives of the Proposed Program, the transition would occur more slowly, thus shifting the early phases of the transition to ZEVs to a slower schedule. This change in schedule would ultimately result in similar adverse operational and construction impacts, but these impacts would occur at a later date. Alternatively, the environmental benefits to GHG emissions and air quality would also not be accomplished as quickly as compared to the Proposed Program.

Alternative 3 would decrease the stringency of the ZEV requirement to 70 percent by 2035 as compared to the Proposed Program, which includes 100 percent ZEV requirement by 2035. Alternative 3 would result in similar construction and operational impacts; however, because the ZEV requirement would ultimately be less under Alternative 3, fewer infrastructure improvements and new manufacturing, recycling, or processing facilities would be needed to support the transition to zero emission

technologies. However, under Alternative 3, fewer environmental benefits to GHG emissions and air quality would occur. Additionally, Alternative 3 would not achieve the objectives of the Proposed Program including goals at attaining the CAAQS and NAAQS for areas of the State that are in nonattainment.

Alternative 4 would require no future updates to internal combustion engine vehicles as the vehicle fleet transitions to ZEVs and PHEVs. Because Alternative 4 would not require ICE vehicle improvements, demand for precious metals would be reduced in the earlier years of the program when there are still significant volumes of ICE vehicles being produced. Alternative 4 would therefore have a slightly lower geology and soils impact as compared to the Proposed Program because of the reduced demand for catalyst loadings. Nevertheless, beneficial air quality effects would be anticipated to be less than those that would occur with implementation of the Proposed Program because no further reductions would occur from ICE vehicles. Alternative 4 would not avoid the impacts associated with the Proposed Program and would not achieve the same emissions benefits.

Given that the key environmental goals of the Proposed Program are related to achieving emissions reductions of GHG to meet the State's long-term GHG reduction goals as well as reduction in criteria pollutant emissions to promote health ambient air quality and attainment of the CAAQS and NAAQS, Alternative 2 is considered the environmentally superior alternative. Although Alternative 2 would not achieve as many benefits as the Proposed Program, it meets more of the environmental-related benefits than Alternatives 3 and 4. With additional weighting of the environmental benefits, which are a cornerstone of the Proposed Project, Alternative 2 is the environmentally superior alternative of the alternatives considered.

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