DOCKETED	
Docket Number:	23-SB-02
Project Title:	SB X1-2 Implementation
TN #:	269790-1
Document Title:	Draft Transportaton Fuels Transition Plan
Description:	N/A
Filer:	Bryan Hsieh
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	5/1/2026 5:09:03 PM
Docketed Date:	5/1/2026

Draft California Transportation Fuels Transition Plan

May 1st, 2026

Executive Summary

California is undergoing a transportation fuels transition, driven by shifting consumer interests and the State's bold climate, air quality, and public health goals. California's peak demand for transportation fossil fuels occurred 20 years ago with gasoline demand in 2024 down 16 percent since 2004, resulting in significant reductions in air and climate pollution over this same time period. Demand for gasoline and fossil diesel are projected to further decrease due to the continued increase in zero-emission vehicle (ZEV) adoption, increased use of low carbon fuels, and other strategies that reduce fuel demand (e.g., vehicle miles traveled [VMT] reduction strategies, Federal fuel economy improvements, and others). Governor Newsom's letter to California Energy Commission Vice Chair Gunda in April 2025 states: "California will continue to lead the way in this transition, but it is imperative that we continue to ensure a safe, affordable and reliable supply of transportation fuels over the next two decades."

Other countries have undergone similar large-scale energy or industrial transitions, including the shift away from coal power in Europe and shifting of domestic automotive manufacturing in Australia.[1,2] Lessons learned from these examples provide key insights for California policymakers to consider during its transportation fuels transition, such as supportive strategies to realize workforce, environment, and regional economic benefits, and the need for a coordinated approach across multiple affected parties (e.g., governments, communities, and industry).

The reduction in fossil fuel demand and the overall diversification of the fuels/energy market brings health, environmental, and economic benefits. It also gives consumers cost-effective energy choices and will result in reducing transportation fuel costs for consumers in the coming decades. As consumers continue to make this shift, the demand and the associated need for fossil fuel supply is also declining.

There are, however, challenges and opportunities that emerge during this transition. With over 30 million vehicles in California, the decline of fossil fuel demand for these vehicles will happen gradually over decades. By contrast, eight refineries in California and several facilities outside of California can currently produce these fuels, and each conversion or closure of a refinery leads to a step-change of in-state supply. Absent proactive planning, these factors, in addition to the current structure of California's fuel system, have the potential to create short but concentrated periods of supply and demand imbalances that introduce volatility risks. That is why California is acting now to build the governance planning and frameworks that a well-managed transition requires.

---

[1] *The 10 Countries Phasing Out Coal Power the Fastest | World Resources Institute*

[2] *Just transition out of coal-fired power: Policy lessons from Australia's automotive sector closure - ScienceDirect*

While California has made great progress in cleaning the air, there is still more to do, especially in communities that have suffered from the highest levels of air pollution. We have a legal and moral obligation to protect public health – nearly 18 million Californians breathe unhealthy air and 1,500 die from air pollution every year in Southern California alone. Legally, under the Clean Air Act and Federal law, California is obligated to reduce air pollution and meet ambient air quality standards. costs Poor air quality and the devastating impacts of climate change have already cost Californians billions in health and climate disaster-related costs (Figure ES-1). As just one example, fueled by record drought conditions linked to climate change,[3] the January 2025 Southern California wildfires caused widespread losses including at least 440 deaths, with 31 direct deaths and 409 indirect fatalities from smoke or healthcare disruptions.[4] This included an approximately 110-fold increase in fine particulate matter ($PM_{2.5}$) lead levels that was recorded locally.[5] These losses and impacts also included over 37,000 acres that burned and the destruction of more than 16,000 structures in the Palisades and Eaton fires.[6] The economic impacts from these fires alone is estimated to be more than $30 billion.[7] And despite the decreasing demand for fossil fuels in California (Figure ES-2), the transportation sector remains the largest source of the state's greenhouse gas (GHG) and criteria pollutant emissions.

This reality underscores the importance of the transition in achieving the State's ambitious climate and air quality goals. Transportation emissions reductions not only help meet California's climate goals of carbon neutrality by 2045, they also produce public health co-benefits of reducing criteria and toxic air pollutants resulting from production and combustion of these fuels.

Recognizing the need for a managed fuels transition, the legislature and Governor acted. Senate Bill X1-2 (SB X1-2, Skinner, Chapter 1, Statutes of 2023 First Extraordinary Session) is designed to increase petroleum market transparency and protect consumers against gasoline price spikes. SB X1-2 directs the California Air Resources Board (CARB) and the California Energy Commission (CEC) to, among other priorities, develop a Transportation Fuels Transition Plan (TFTP or Plan).

---

[3] NOAA. (February 2025). *The weather and climate influences on the January 2025 fires around Los Angeles | NOAA Climate.gov*

[4] Boston University School of Public Health. (August 2025). *Death Count for 2025 LA County Wildfires Likely Hundreds Higher than Official Records Show | SPH*

[5] Center for Disease Control and Prevention. (February 2025). *Notes from the Field: Elevated Atmospheric Lead Levels During the Los Angeles Urban Fires — California, January 2025 | MMWR*

[6] CAL FIRE, 2025 Fire Season Incident Archive. (undated). *2025 Fire Season Incident Archive | CAL FIRE*

[7] Doug Smith and Sandhya Kambhampati. (February 21, 2025). *Real estate losses from fires may top $30 billion, from old mobile homes to $23-million mansions - Los Angeles Times*

Figure ES-1. Health Impacts of Air Pollution

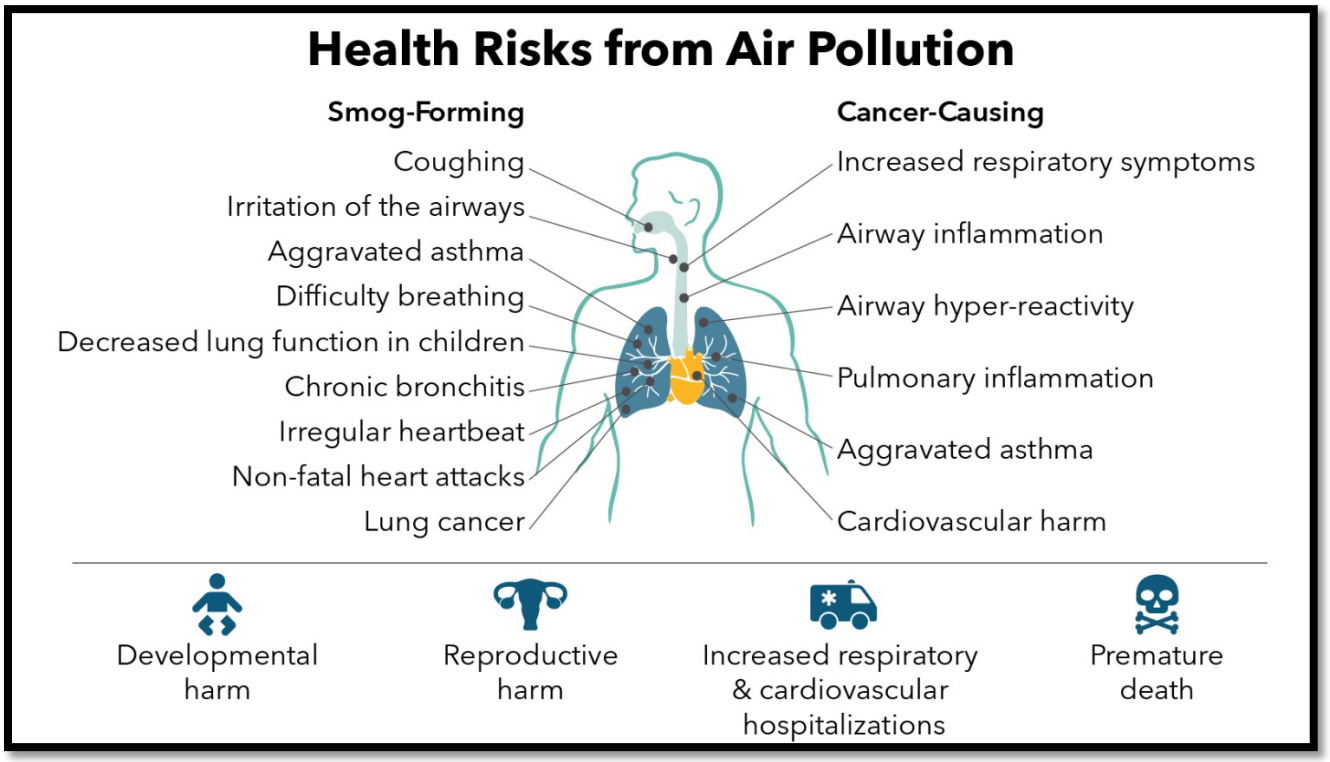
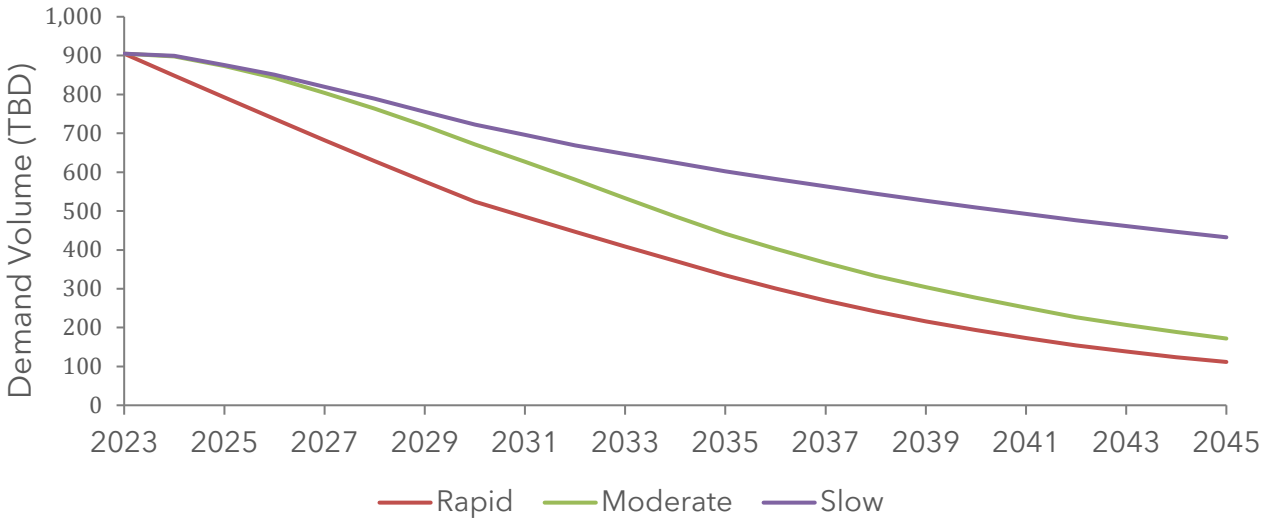


Figure ES-2. Projected Future California Total Gasoline Demand Based on the Three Modeling Scenarios Utilized in this Report



The TFTP outlines important considerations for both the public and private sectors as California's transportation sector transitions away from fossil fuels. The goal of the TFTP is to be a resource to support a managed transition over the coming decades that brings

environmental, economic, health, and equity benefits to Californians. This document cannot address every challenge that will come with transitioning away from over a century of reliance on fossil fuels and its associated infrastructure, but it is a resource for policy makers and the public that focuses on: the supply and demand changes that could unfold over the coming decades, the barriers the State and the energy sector may face in phasing down the production of fossil transportation fuels in California, and the strategies that can support a successful transition that ensures the supply of petroleum and alternative transportation fuels is affordable, reliable, equitable, and adequate to meet demand. In doing so, the Plan examines fuel demand, hypothetical declining fuel supply scenarios from California's refineries, changing infrastructure needs, regional and local considerations (which includes community needs and labor), and gaps in existing statutory and regulatory requirements for reliable and affordable fuel supply. While the TFTP discusses some short- and medium-term options to manage California's changing fuel supply, overall, it takes a longer-term view, identifying strategies to consider during the mid-late-transition (e.g., 2030s and 2040s). The TFTP provides California with several possible paths forward to maintain a reliable and affordable fuel supply that also prioritizes California's health, community, and environmental needs.

The key strategies presented in this document cover three topic areas and cover varying time horizons (i.e., the mid and late phases) of the transition. The three topic areas include: Regional and Local-Based Strategies; Fossil Demand Reduction Strategies; and Supply Stabilization Strategies (Figure ES-3). The 2022 Scoping Plan, 2024 Transportation Fuels Assessment, CEC Vice Chair Siva Gunda's response to Governor Newsom's April 2025 letter, and insights from other literature provide a starting point for framing the fuels transition and informing the strategies outlined in this document. Additionally, workgroup meetings (members included environmental justice, labor, environmental protection, land use, and public health, fuel producers and refiners, and state, regional, and local agencies), and multiple community meetings held throughout California, further refined the focus of the TFTP, while providing valuable insights to community concerns regarding the fuels transition and the impacts to communities already bearing the burden of the environmental impacts of industry and vehicle emissions.

Each strategy has environmental, legal, and economic implications that must be considered before implementation, and further study may be required. The fuels transition is happening in California and long-term planning, including these strategies and other considerations detailed in the TFTP, provides several possible paths forward to manage issues arising during the state's transition in a way that ensures the supply of petroleum and alternative transportation fuels is affordable, reliable, equitable, and adequate to meet demand.

Figure ES-3. TFTP Strategies listed by topic area and approximate time horizon

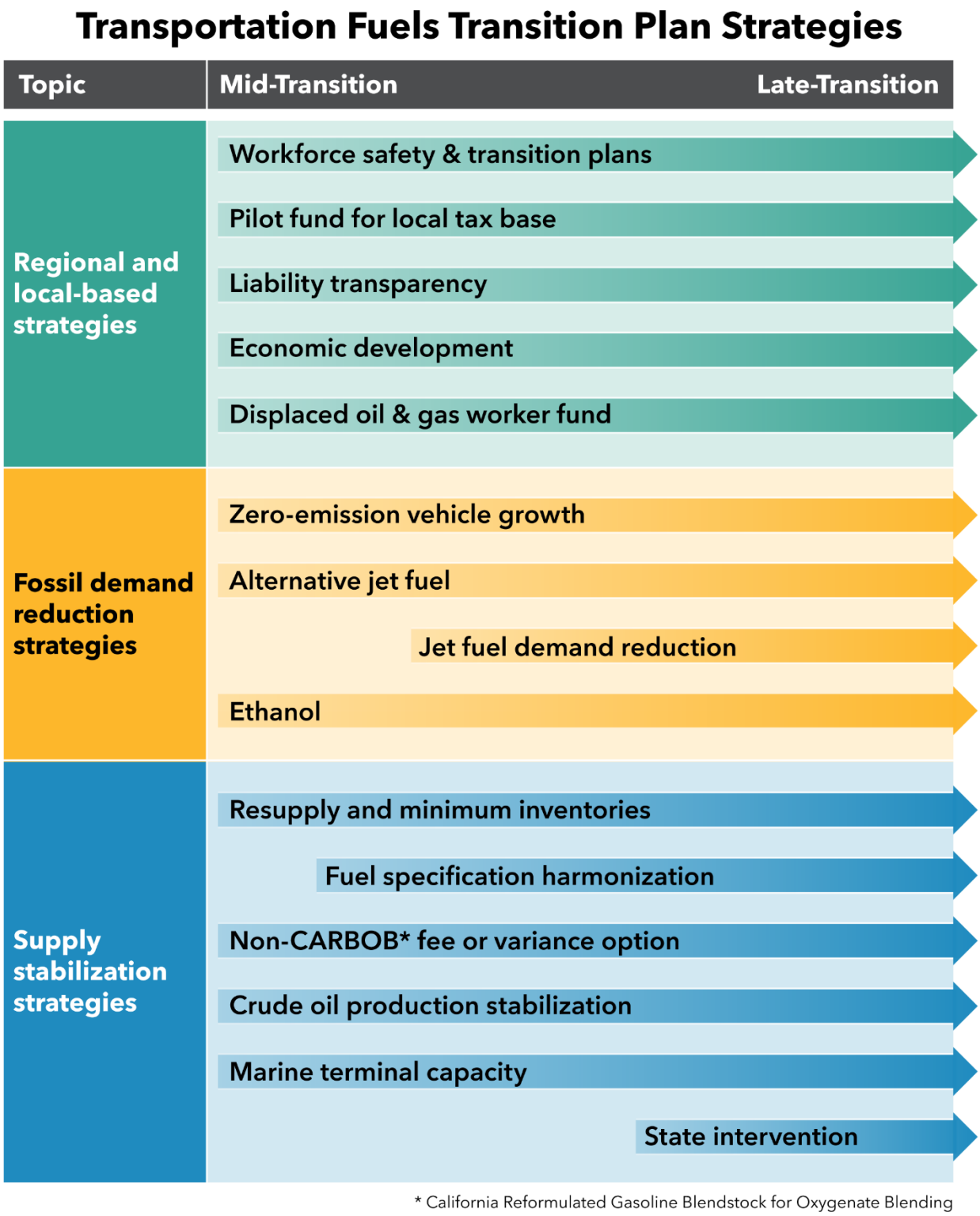


Table of Contents

List of Figures

List of Tables

Abbreviations

AB	Assembly Bill
ACC II	Advanced Clean Cars II
A4A	Airlines for America
APEN	Asian Pacific Environmental Network
BEV	Battery Electric Vehicle
CARB	California Air Resources Board
CAFE	Corporate Average Fuel Economy
CEC	California Energy Commission
CalEPA	California Environmental Protection Agency
CALSTA	California State Transportation Agency
CARBOB	California Reformulated Gasoline Blendstock for Oxygenate Blending
CaRFG	California Reformulated Gasoline
CBE	Communities for a Better Environment
CCRTP	Contra Costa Refinery Transition Partnership
CEQA	California Environmental Quality Act
CI	Carbon Intensity
CO	Carbon Monoxide
CO2	Carbon Dioxide
CPL	Credit for Prior Learning
CPUC	California Public Utilities Commission
CWDB	California Workforce Development Board

DAC	Disadvantaged Community
DAS	Division of Apprenticeship Standards
DOGWF	
DPMO	Division of Petroleum Market Oversight
EDD	Employment Development Department
emLab	Environmental Markets Laboratory
EO	Executive Order
EPA	Environmental Protection Agency
FCEV	Fuel Cell Electric Vehicle
GEZ	Green Empowerment Zone
GHG	Greenhouse Gas
HRTP	High Road Training Partnership
IBB	International Brotherhood of Boilermakers
IBEW	International Brotherhood of Electrical Workers
LAEDC	Los Angeles Economic Development Corporation
LAJTF	Los Angeles Just Transition Task Force
LCFS	Low Carbon Fuel Standard
LIC	Low-Income Community
LWDA	Labor and Workforce Development Agency
MME	Multimedia Evaluation
MPO	Metropolitan Planning Organization

NAAQS	National Ambient Air Quality Standards
NOx	Nitrogen Oxide
PADD	Petroleum Administration for Defense District
PERI	University of Massachusetts Amherst Political Economy Research Institute
PHEV	Plug in Hybrid Electric Vehicle
PLA	Prior Learning Assessments
PM	Particulate Matter
RBOB	Reformulated Blendstocks for Oxygenate Blending
RTP	Regional Transportation Plan
SAF	Sustainable Aviation Fuel
SB	Senate Bill
SCS	Sustainable Communities Strategy
SSREIR	Second Supplemental Recirculated Environmental Impact Report
TA	Technical Assistance
TFA	Transportation Fuels Assessment
TFTP	Transportation Fuels Transition Plan
TBD	Thousand Barrels per Day
UA	United Association of Plumbers and Pipefitters
UC	University of California
VMT	Vehicle Miles Traveled

WSPA	Western States Petroleum Association
WSTA	Workforce Safety and Transition Plan
ZEV	Zero Emission Vehicle

Chapter 1: Introduction

California is undergoing a transportation fuels transition. The State's bold climate, air quality, and public health goals focused on protecting the air, combined with recent legislation and shifting consumer interests, have prompted a decline in fossil fuel demand. This decline requires a long-term plan to ensure the supply of transportation fuels is affordable, reliable, equitable, and adequate to meet the demand for transportation fuels. This draft Transportation Fuels Transition Plan (TFTP) discusses potential supply, affordability, equity, and workforce impacts, and provides holistic strategies California could consider to support a managed process while the transition is underway from fossil-based transportation fuels.

California's Air Quality and Climate Goals

California has worked to improve air quality and public health with motor vehicle policies that reduce the release of the pollutants associated with the combustion of fossil fuels for nearly 60 years. California was the first state in the nation to set tail pipe emission standards for hydrocarbons and carbon monoxide (CO), oxides from nitrogen (NO_x), and particulate matter (PM) from diesel powered vehicles.[8] These actions have successfully improved the State's air quality, while California's population and economy have continued to grow. While California is broadly recognized as an economic powerhouse and global environmental leader, more work remains to reduce pollution. A majority of Californians live in regions that do not meet Federal and State clean air standards, and the transportation sector remains California's largest source of climate and air pollution.[9]

California also leads the nation and the world in combating climate change. The passage of Assembly Bill 32 (AB 32, Núñez and Pavley, Chapter 488, Statutes of 2006) in 2006 mandated that the State work to reduce greenhouse gas (GHG) emissions to 1990 levels by 2020.[10] This legislation is grounded in decades of internationally accepted science that climate change is a real threat and was passed three years before the U.S. Environmental Protection Agency's (EPA's) 2009 Endangerment Finding, which determined that greenhouse gases are a danger to public health, demonstrating California's leadership in reducing greenhouse gas emissions and protecting the public.[11] AB 32 was followed by Senate Bill 32 (SB 32, Pavley, Chapter 249, Statutes of 2016) in 2016, which mandated that

---

[8] California Air Resources Board. (2025). History. *History | California Air Resources Board*

[9] The six commonly found air pollutants: Ozone, Particulate Matter, Carbon Monoxide, Lead, Sulfur Dioxide, Nitrogen Dioxide.

[10] Health & Saf. Code § 38500

[11] Environmental Protection Agency. *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act | US EPA*

the state reduce greenhouse gas emissions 40% below 1990 levels by 2030.[12] In 2022, Assembly Bill 1279 (AB 1279, Muratsuchi, Chapter 337, Statutes of 2022) expanded upon these efforts by directing the state to reach carbon neutrality and reduce anthropogenic emissions to 85% below 1990 levels by 2045.[13] With its AB 32 mandate, California became the first state in the nation to require greenhouse gas emissions reductions with the aim of preventing further climate change. California's requirements to reduce climate forcing greenhouse gases have the added benefit of reducing exposure to criteria and other pollutants, providing additional health benefits for Californians.

The 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan) describes a technologically feasible and cost-effective path to achieve the State's climate goals.[14] The Scoping Plan strategies cover all economic sectors of California, including transportation and energy production, and identify ambitious levels of greenhouse gas reductions and carbon dioxide removal needed to achieve carbon neutrality by 2045. The Scoping Plan identifies increased deployment of zero-emission vehicles (ZEVs), increased deployment of low carbon fuels, and additional vehicle miles traveled (VMT) reductions as critical strategies to reduce emission from the transportation sector in pursuit of carbon neutrality. Reducing combustion emissions from the transportation sector, as well as coordinating California's supply of liquid fossil fuels with declining fuel demand, is projected to reduce GHG emissions, NO_x emissions, and PM emissions. This will create billions in future health savings that comes from reducing the health impacts of poor air quality, including respiratory hospitalization, asthma onset and symptoms, impaired cognitive development, and preterm birth.

Despite decades of progress, illegal federal efforts to attack a handful of California's clean air regulations threaten the State's ability to meet clean air and climate goals,[15] disregarding scientific consensus on the impacts of climate change and health damages caused by poor air quality. Five of the ten cities with the worst air pollution nationwide are in California, and the San Joaquin Valley and South Coast air basins are classified as areas with "extreme nonattainment"[16] conditions for ozone, meaning that about half of all Californians live in the worst air quality conditions for that pollutant. People in these areas suffer unusually high rates of asthma and cardiopulmonary disease. Clean cars are a critical part of the plan to protect Californians. Over the last 50 years, the state's clean air efforts have saved $250 billion in health costs through reduced illness including reducing diesel-related cancer risk

---

[12] Health & Saf. Code § 38566

[13] Health & Saf. Code § 38562.2

[14] California's 2022 Climate Change Scoping Plan for Achieving Carbon Neutrality. (2022).

[15] Governor of California (June, 2025) *Governor Newsom signs executive order doubling down on state's commitment to clean cars and trucks, kickstarts next phase of leadership | Governor of California*

[16] A non-attainment area is any area that does not meet national ambient air quality standards for one of the six criteria pollutants as identified and required by the Clean Air Act

nearly 80%. If upheld, the illegal federal attack on California's ability to enforce some of its most protective clean air vehicle emission standards would cost Californian taxpayers an estimated $45 billion in health care costs. The targeted regulations would also provide $91 billion in cumulative net relief and economic benefits to Californians between 2026 and 2040.

To address these public health and economic risks, Governor Gavin Newsom signed Executive Order (EO) N-27-25,[17] which directed CARB to develop programs consistent with State and federal law that reduce greenhouse gases, criteria air pollutants, and toxic emissions from passenger cars and trucks, and medium and heavy-duty vehicles.[18] It also directs CARB to continue to advance the adoption of light, medium, and heavy-duty zero-emission vehicles.

Technological Progress in Reducing Emissions

Reducing and avoiding emissions from California's vehicles is a key component of the State's efforts to achieve the climate targets set by the Legislature, reduce air pollution, and meet ambient air quality standards. The uptake of new technologies, such as battery electric vehicles (BEV)s, hydrogen fuel cell electric vehicles (FCEVs), and plug-in hybrid electric vehicles (PHEVs), lowers overall demand for fossil fuels for transportation and reduces the total amount of energy need for transportation. Driving ZEVs, especially BEVs, also could benefit individual vehicle owners. For example, CARB's analysis for the Advanced Clean Cars II (ACC II) regulation estimated that by the 2035 model year, the initial savings will be nearly immediate and cumulative savings over ten years will exceed $7,500.[19] In 2025, CARB launched the Drive Forward Light-Duty Program to move forward to a cleaner future which includes strategies for infrastructure development, fuel pricing, regulations, and procurement.[20] These strategies, as well as others, are discussed further in the strategies section of this plan and are collectively meant to continue the State's ZEV deployment progress and other efforts that further reduce climate and air pollution from the transportation sector.

---

[17] Exec. Order NO. N-27-25 (June 12th, 2025).

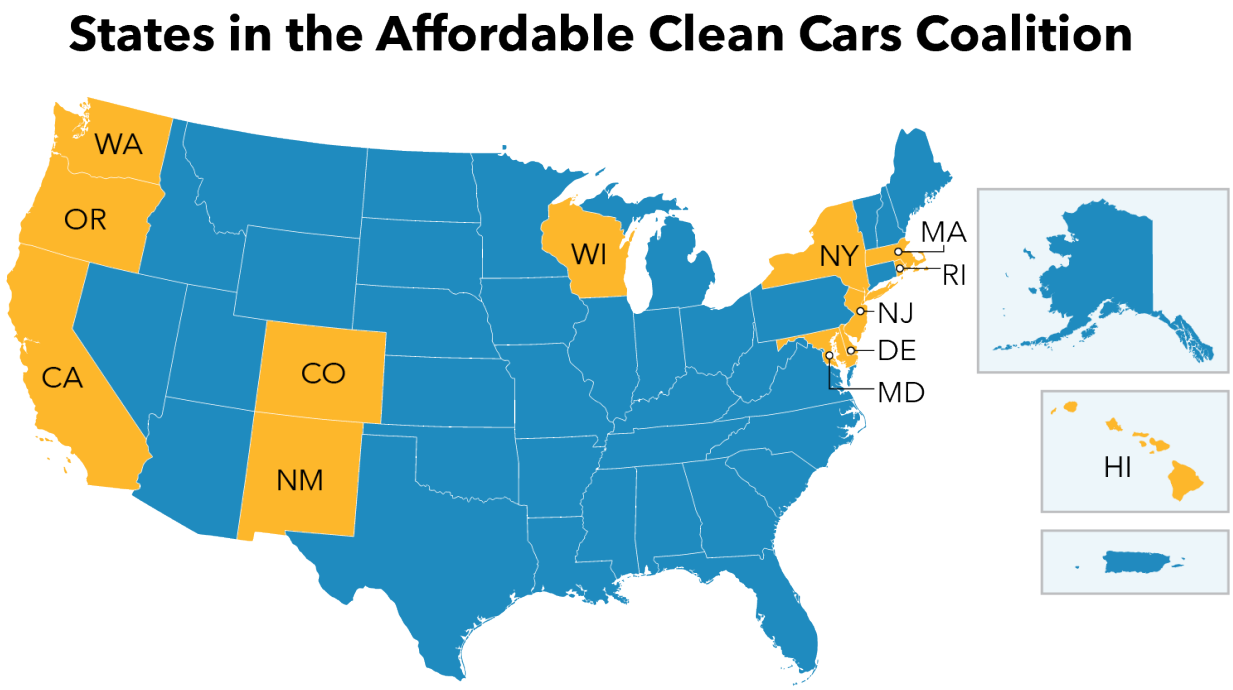
[18] Light duty vehicles include passenger cars and trucks, medium duty vehicles include lighter weight trucks used for delivery and transportation of goods, as well as school busses. Heavy duty vehicles include heavier trucks such as big rigs, garbage trucks, and city transit busses.

[19] California Air Resources Board (2022). Public Hearing to Consider the Proposed Advanced Clean Cars II Regulations. Staff Report: Initial Statement of Reasons. *ACC II ISOR*

[20] *Report to the Governor in Response to Executive Order N-27-25 on Zero-Emission Vehicle Deployment* (August, 2025). *Report to Governor on Executive Order N-27-25 on Zero Emissions Vehicle Deployment | California Air Resources Board*

California is not alone in this effort. In 2025, the Affordable Clean Cars Coalition, a partnership of 13 states was formed.[21] These states are collaborating to sustain America's market for cleaner and more affordable cars, support U.S. automotive manufacturers and workers, and preserve states' clean air authority (Figure 1).

Figure 1. Affordable Clean Cars Coalition



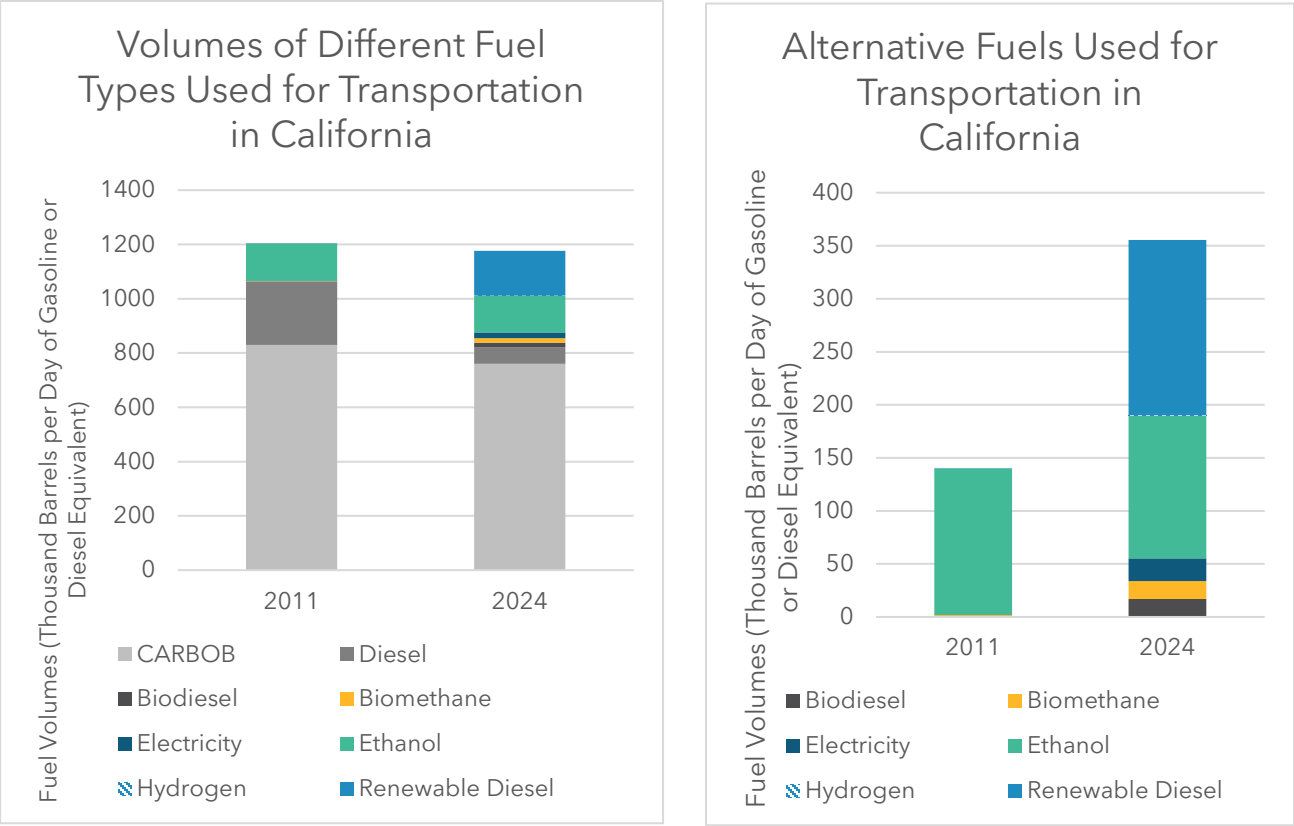
Diversification of California's Fuel Supply

In addition to efforts to reduce combustion emissions, California has also developed programs to increase the availability of and incentivize the use of low carbon transportation fuels, such as ethanol, biodiesel, renewable natural gas, renewable diesel, sustainable aviation fuel (SAF) and others. These fuels, in addition to zero emission options like electricity or hydrogen fuel cells, provide the transportation sector with multiple low carbon fuel options that displace traditional fossil fuels. More recently, as total transportation fuel demand has gradually declined, California has also experienced significant growth in low carbon fuels in the transportation sector, particularly electricity and renewable diesel (Figure 2).

---

[21] United States Climate Alliance (2025). Affordable Clean Cars Coalition. *Affordable Clean Cars Coalition | Initiatives | U.S. Climate Alliance*

Figure 2. Graphics Depicting California's Declining Gasoline and Fossil Diesel Demand and Increasing Alternative Fuel Use from 2011 to 2024



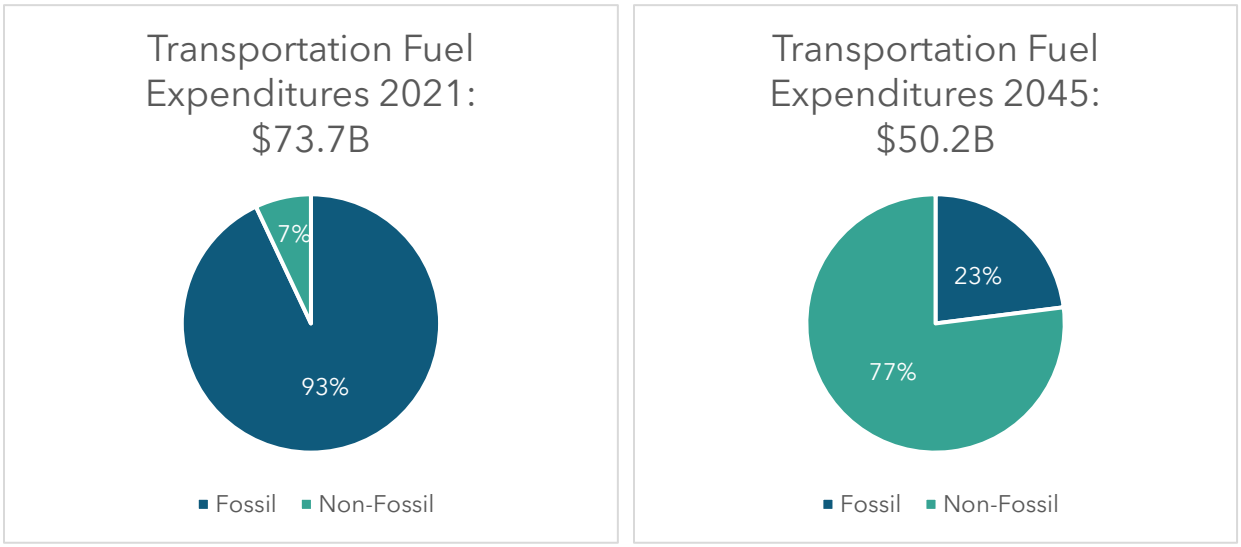
The Low Carbon Fuel Standard (LCFS) is one of the State's key policies helping to promote supplies of clean fuels and is a foundational program of California's fuels strategy.[22] Since the LCFS benchmarks first took effect in 2011, the overall lifecycle carbon intensity (CI) of California's transportation fuel pool has been reduced by 19.8%, as of 2024. The program has generated three to four billion dollars annually in private sector investments in cleaner transportation options. These investments have served to increase consumer choices, driving competition in transportation fuel prices; to reduce dependence on petroleum, protecting consumers from its associated supply and cost volatility; and to make electric vehicles more accessible and more affordable.

Reducing the carbon intensity of petroleum-based combustion fuels is also expected to save consumers money. Estimates from CARB, as well as numerous studies, have shown that transitioning to low carbon fuels and zero-emission vehicles will reduce the amount of

[22] California Air Resources Board. (2025). *Low Carbon Fuel Standard. Low Carbon Fuel Standard | California Air Resources Board*

money consumers spend to travel the same distance and that these costs will keep declining over time.[23,24] Figure 3 provides a comparison of the estimated transportation costs paid by California consumers in 2021, compared to the estimate for overall transportation costs in 2045.[25] This estimate from CARB shows that in 2045, over 75% of the State's transportation fuel expenditures are expected go to non-fossil fuels like electricity, hydrogen, and low-carbon biofuels, and that Californians will be paying $0.12 per mile traveled, for an overall 42% savings in fuel costs per mile statewide. For the light-duty sector, the fuel savings will be even more pronounced, with costs going from $0.19 per mile to $0.08 per mile by 2045 for fuel expenses, a reduction of over 50%, as the light-duty sector reduces emissions through ZEVs that are fueled by electricity and hydrogen..

Figure 3. Fossil and Non-Fossil Transportation Fuel Expenditures in 2021 Compared to Predicted Expenditures in 2045



In addition to the on-road fleet, California is also supporting the expansion of low carbon fuels in other sectors, including marine, off-road, and aviation. CARB's Commercial Harbor Craft Regulation[26] required harbor craft to use renewable diesel starting in 2023, while

---

[23] Woody, M., Adderly, S., Bohra, R., and Keoleian, G. (2024). Electric and gasoline vehicle total cost of ownership across US cities. *Electric and gasoline vehicle total cost of ownership across US cities - Woody - 2024 - Journal of Industrial Ecology - Wiley Online Library*

[24] Burnham, A. et al. (2021). Comprehensive total cost of ownership quantification for vehicles with different size classes and powertrains. *Argonne National Laboratory. https://publications.anl.gov/anlpubs/2021/05/167399.pdf*

[25] California Air Resources Board (2024). Low Carbon Fuels Standard Fuel Prices FAQ. *Microsoft Word - LCFS_Fuel_FAQ2024v2*

[26] California Air Resources Board. (2025). *Commercial Harbor Craft. Commercial Harbor Craft | California Air Resources Board*

CARB's Off-Road Vehicle Regulation[27] required off-road vehicles, such as construction vehicles, to use renewable diesel starting in 2024. In October 2024, CARB and Airlines for America (A4A), an industry group representing over a dozen major airlines, entered into a voluntary partnership to achieve shared goals, including a goal to increase the availability of SAF for use in California to 200 million gallons by 2035.[28] This volume would be a tenfold increase from current SAF production levels and would cover 40% of intrastate jet fuel demand. Achieving the shared goals outlined in the partnership cooperation is vital as jet fuel demand is projected to increase through 2045 (see Chapter 2) so the state must pursue strategies such as alternative jet fuels to reduce GHG emissions and provide non-fossil alternatives to meet jet fuel demand.

Given the success of the LCFS and the global threat posed by climate change, other states are following in California's footsteps. States with active programs and/or enacted legislation establishing fuels programs similar to California's LCFS include Oregon, Washington, and New Mexico. Hawaii and some states in the Midwest and the Northeast have discussed developing similar programs (Figure 4).[29]

Development of these clean fuels programs in other States will also result in a broader market for alternative low carbon fuels, further expanding supply and demand of cleaner fuels throughout North America.

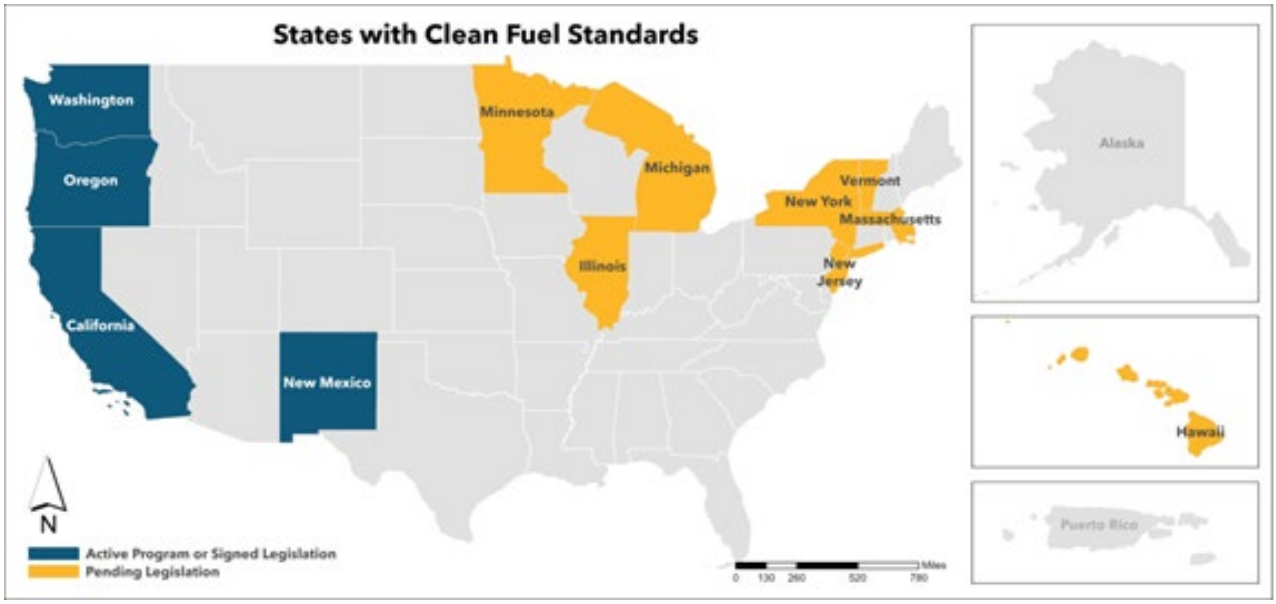
---

[27] California Air Resources Board. (2025). *In-Use Off-Road Diesel-Fueled Fleets Regulation*. *In-Use Off-Road Diesel-Fueled Fleets Regulation | California Air Resources Board*

[28] California Air Resources Board. (October 30, 2024*). CARB and nation's leading airlines announce landmark partnership for a sustainable aviation future*. *CARB and nation's leading airlines announce landmark partnership for a sustainable aviation future | California Air Resources Board*

[29] McCullough, D., Morrison, M., Sallah, E., Brenner, S. (2024). Revving Up: Eight States in Gear with Low-Carbon Fuel Standard Legislation. *Pillsbury Law. https://www.pillsburylaw.com/en/news-and-insights/eight-states-low-carbon-fuel-standard-legislation.html*

Figure 4. Map of US States That Have Adopted or Are Considering Clean Fuel Standards



Reducing Fuel Demand

California's policies to transition automotive technologies and fuels and promote alternative modes of transportation are already reducing fossil fuel demand and are expected to continue reducing fuel demand into the future. For example, in 2011, Californians burned almost 3.6 billion gallons of fossil diesel annually. By 2024, that number declined by approximately 74%.[30] Gasoline burning dropped during this time as well: in 2011, Californians used 13.1 billion gallons of gasoline annually, while in 2024, Californians used about 8% less gasoline annually (Figure 2).

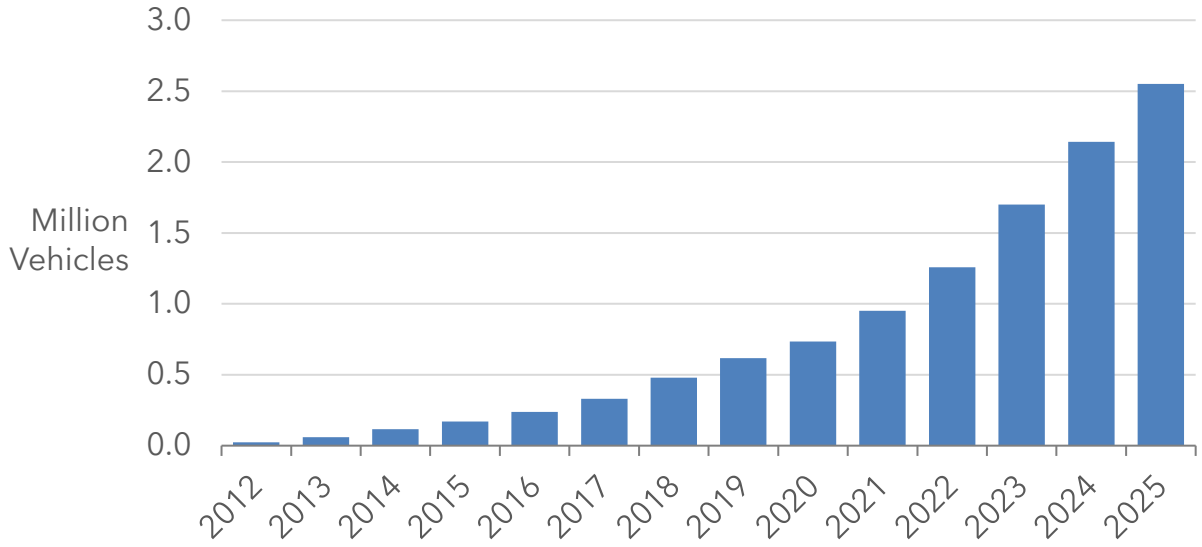
These fuel demand declines have occurred despite growth in economic activity and population, demonstrating that the demand changes are impacted by technology and fuel changes. In fact, electric vehicles represent a growing market in California: from 2008 to 2025, 2.5 million zero-emission light-duty vehicles were sold (Figure 5). California also leads the nation in electric vehicle chargers with almost 200,000 chargers in operation to date, which means the State has 48% more public and shared private EV chargers than the number of gasoline nozzles.[31] California also leads the nation in ZEV manufacturing jobs with 56 ZEV and ZEV-related manufacturers operating in California.

---

[30] California Air Resources Board. (2025). *LCFS Quarterly Data Summary and Spreadsheet.* *Low Carbon Fuel Standard Reporting Tool Quarterly Summaries | California Air Resources Board*

[31] Governor of California (2025). *California now has 48% more EV chargers than gasoline nozzles in the state | Governor of California*

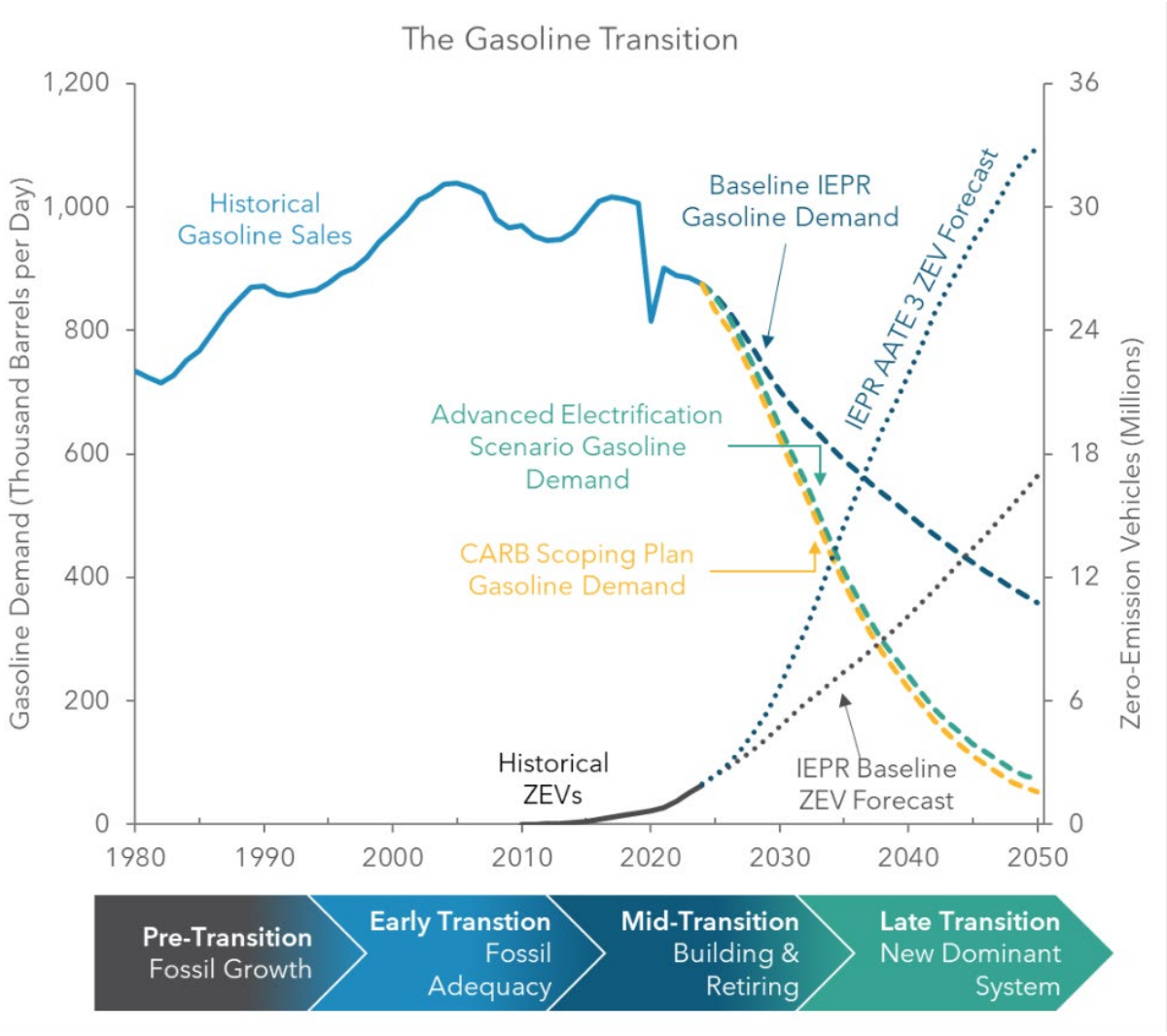
Figure 5. Cumulative Zero-Emission Sales of New Light-Duty Vehicles from 2012- 2025



California's higher adoption levels of ZEVs and low carbon fuels is evidence that the state has entered the mid-transition phase of decarbonization (Figure 6).[32] This means that demand for fossil-based transportation fuels, while declining, remains substantial while zero emission technologies and low-carbon option continue to grow. The mid-transition represents a unique and challenging time period, whereby the State is in two distinct energy systems/paradigms at the same time. One system is the existing fossil fuel energy system, which must still be supported and relied upon to provide energy for consumers and companies who have not yet transitioned to zero-emission vehicles or low carbon fuels. The other system is the growing alternative and zero-emission transportation sector. At this point, low carbon fuels and zero-emission technology deployment are growing and have not yet reached the scale to effectively meet all the transportation sector's energy needs. Therefore, during the mid-transition phase, the State must meet demand for both fossil and low emission infrastructure to provide stable fuel supplies, while the transition to zero and low emission technologies and fuels continues to grow. This way the state can maintain stable fossil supply while ensuring that the low carbon fuels and zero-emission technology sector can continue to grow.

[32] California Energy Commission (2025). CEC Vice Chair Gunda's Response to Governor Newsom's Letter June 27, 2025. *CEC's_Response_to_Governor_Newsom's_Letter_June-27-2025*

Figure 6. Phases of California's Fuel Transition



The pace of California's mid-transition will depend on the rate of ZEV adoption, technology development, and the continued build-out of clean fueling infrastructure. However, given that the useful life of vehicles is 15 years and some vehicle types (e.g., heavy-duty trucks and offroad equipment) are still in the early stages of ZEV deployment, it's likely that combustion vehicles (e.g., gasoline and diesel-powered vehicles) will remain on the road past 2045. Aviation and long-range marine transport also have few alternatives to combustion and primarily rely on liquid fuels for their decarbonization efforts. Since these fuels are less readily available than those for light- and heavy-duty ZEVs, aviation and ocean-going vessels may rely on fossil-based transportation fuels past 2045. Therefore, it is essential California has access to a reliable, affordable supply of liquid fuels that can meet demand over the coming decades, even as demand for fossil-based fuels continues to decline.

Developing a Transportation Fuel Transition Plan

Recent legislation prioritized planning for a smooth transition away from fossil-based transportation fuels in both SB X1-2, or the California Gas- Price Gouging and Transparency Law,[33] and AB X2-1.[34] Governor Gavin Newsom also requested that California Energy Commission (CEC) Vice Chair Gunda provide the Governor's Office with additional information as to how the State can ensure adequate transportation fuel supplies during the energy transition.[35] The following paragraphs describe the content in both pieces of legislation, as well as CEC Vice Chair Gunda's June 2025 response to the Governor.[36]

SB X1-2 directs CEC to expand data collection and monitoring on refineries and mandates the CEC to write a Transportation Fuels Assessment (TFA) every three years. The first assessment was adopted and submitted to the legislature in August 2024. SB X1-2 also directs CARB and CEC to develop a Transportation Fuel Transition Plan (TFTP). This report describes how to ensure the supply of petroleum and alternative transportation fuels is affordable, reliable, equitable, and adequate to meet the demand for the transportation fuels described in the 2022 Scoping Plan. It also calls for a workgroup comprised of interested parties from various sectors, including:

- Environmental justice
- Labor
- Environmental protection
- Land use
- Public health
- Fuel producers and refiners

Lastly, it calls for refinery maintenance, monitoring, and the determination of a need for a maximum gross refining margin and establishes the Division of Petroleum Market Oversight (DPMO), an independent division of the CEC responsible for market oversight, investigations, economic analysis, and policy recommendations regarding the transportation fuels market. Per SB X1-2, DPMO provided guidance and recommendations during the development of this report.

---

[33] California Energy Commission (2025). *Senate Bill X1-2 Implementation. Senate Bill X1-2 Implementation | California Energy Commission*

[34] AB-1 Energy: transportation fuels: inventories: turnaround and maintenance. *https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320242AB1*

[35] Office of the Governor (April 2025). "Newsom-Gunda Letter". *https://www.gov.ca.gov/wp-content/uploads/2025/05/Newsom-Gupta-Letter-4.21.pdf*

[36] California Energy Commission (June, 2025). "CEC's Response to Governor Newsom's Letter". *https://www.energy.ca.gov/sites/default/files/2025-07/CEC%27s_Respone_to_Governor_Newsom%27s_Letter_June-27-2025_ada.pdf*

AB X2-1 allows the state to require oil refiners to maintain a minimum inventory of fuel to avoid shortages that create higher prices. It authorizes the CEC to require refiners to plan for resupplies during refinery maintenance outages and requires refinery maintenance regulations protect the health and safety of employees, local communities, and the public. It also mandates that future TFAs evaluate California's future petroleum product and crude oil import needs by:

- Requiring the CEC to identify steps that can ensure that marine infrastructure and port facilities will be adequate to accommodate the efficient movement of petroleum products to meet those needs
- Requiring the CEC to evaluate ways to maximize use of existing infrastructure and minimize cumulative pollution burdens and analyze the effects of state regulations on transportation fuel supply and alternative compliance pathways that should be considered to mitigate these supply impacts

In April 2025, Governor Newsom directed CEC Vice Chair Gunda to make recommendations to any changes to the State's approach needed to ensure adequate fuel supply during the energy transition. CEC Vice Chair Gunda responded to the Governor in a letter in June 2025, outlining the need for concurrent actions to support an orderly, managed transportation fuels transition that achieves the State's climate and air quality goals and mandates and safeguards California consumers, workers, communities, and the environment. These actions are to:

1) Address near-term vulnerabilities of the petroleum transportation fuels system to support stable fuel supply and prices
2) Provide confidence for appropriate infrastructure investment for safe and reliable operations to meet fuel demand
3) Implement a holistic strategy with environmental, public health, labor, economic, and consumer protections for a successfully managed transportation fuels transition.

The purpose of the TFTP is to outline important considerations for both the public and private sector throughout this transition. While the TFTP does discuss some short- and medium-term options to manage the impacts of California's changing fuel supply, overall, it takes a longer-term view, discussing strategies that may not be needed until the State moves into the late-transition (e.g., 2030s and 2040s). This document helps identify the supply and demand dynamics that could occur during the transition over the coming decades; barriers the State and energy sector will face in phasing down production of fossil fuels; and strategies that can support a successful transition that ensures the supply of petroleum and alternative transportation fuels is affordable, reliable, equitable, and adequate to meet demand. The TFTP works as a compliment to other similar efforts like the

2024 Transportation Fuels Assessment, CEC Vice Chair Siva Gunda's response to Governor Newsom's April 2025 letter, and CEC's SB 237 Assessment, and is meant to serve as a resource for California and help support a managed transition that brings environmental, economic, and health benefits, as well as equitable outcomes for all Californians.

Chapter 2: The Transition of California's Fuel Supply

California's transportation fuel supply system has been described as an island: the only way California currently receives crude oil or transportation fuels from outside California is by ship. A detailed description of California's transportation fuel system is outlined in the TFA.[37] Limited outside connectivity, terminal, storage, and pipeline access all impact the nature and speed of changes that can be accommodated within the fuel supply system. Refineries rely on additional marine imports to balance supply during events such as refinery outages, planned and unplanned maintenance, and demand surges. The context of California's isolation, market concentration, refining capacity, constrained import and export infrastructure, and limited supply flexibility set the tone for additional consideration in the TFTP.

As a part of the development of the 2022 Scoping Plan Update and the TFA, CARB and CEC received a number of questions about how the State's transportation sector would respond to demand changes in the future. These questions included:

- What are some possible ranges of gasoline demand in the future based on different rates of technology adoption?
- How will California refiners respond to changes in future gasoline demand? Will more refineries transition to alternative fuel production or close?
- Will California refiners look to export fuels to other States or countries as California demand declines?
- What are limitations to either importing or exporting finished fuels?

Given the context of California's fuels market and to help evaluate these questions, CARB and CEC worked with ICF International to develop a model (ICF model or model) to quantify California refinery production needs and supply and fuel flows through pipelines and ports. This model allowed CARB and CEC staff to assess how these fuel production and transportation infrastructure assets may respond to a range of future transportation fuel demand scenarios.

ICF Model Assumptions and Considerations

The ICF model addresses supply of gasoline, diesel, and jet fuels that can be produced by California's refineries and estimates the level of imports and exports of these fuels needed to ensure that fuel demand is balanced with fuel supply. The model incorporates constraints on the volume of fuels that can be moved through California's Northern and Southern ports

[37] *California Energy Commission Transportation Fuels Assessment - Staff Report*; the TFA describes the dynamic fuel market, and its complex fuel flows in and out of California via marine and pipeline, in addition to a need for a Transportation Fuels Transition Plan to address significant logistical issues.

as well as pipelines to neighboring states. ICF analyzed three potential demand scenarios, based on scenarios in the TFA, to estimate the change in fuel supply during the mid- to late phases of California's fuel transition, shown in Figure 6.[38] These scenarios each provide assumptions related to the future demand for gasoline, fossil diesel, and jet fuel, and vary based on assumptions related to the rate of ZEV uptake and transition to alternative modes of transportation. More information on modeling inputs and assumptions can be found in Appendix B.

California refineries are currently the primary source for gasoline, diesel, and jet fuel consumed in the state. However, as California moves through the phases of the fuel transition (Figure 7), the fuel system may change. As the State moves through this fuel transition and demand for gasoline declines, in-state production of fossil transportation fuels will decrease, as illustrated in Figure 7. Transportation fuel imports and exports will also be needed to ensure that demand is met each year, and infrastructure at the ports to manage these fuel volumes may need to be modified. Since 2024, increased marine imports of jet fuel or gasoline have been needed to accommodate demand that exceeds the production capacity of California refineries. Export markets for California-produced fuels may also be critical to maintain refinery margins (during discrete times of supply excess) but may be similarly limited due to cost and competitiveness constraints. In addition, limited export infrastructure to blend, test, and load tanker cargos of gasoline at a high daily frequency may constrain refineries' ability to maintain production levels and utilize an export strategy.

The modeling analysis illustrates how the discrete nature of refineries, and the closure of a refinery, can change the market from one of excess supply to one of excess demand. This modeling also helps to illustrate how supply can be aligned with demand in a coordinated way for each of the three demand scenarios, as well as the importance of planning and managing the overall transportation fuel system to reduce supply volatility and the impacts of closures. Note that this model is subject to limitations based on the assumptions and inputs. Other factors such as financial drivers are not reflected in this analysis. For more information, see discussion on uncertainty in fuel demand below, and Appendix B.

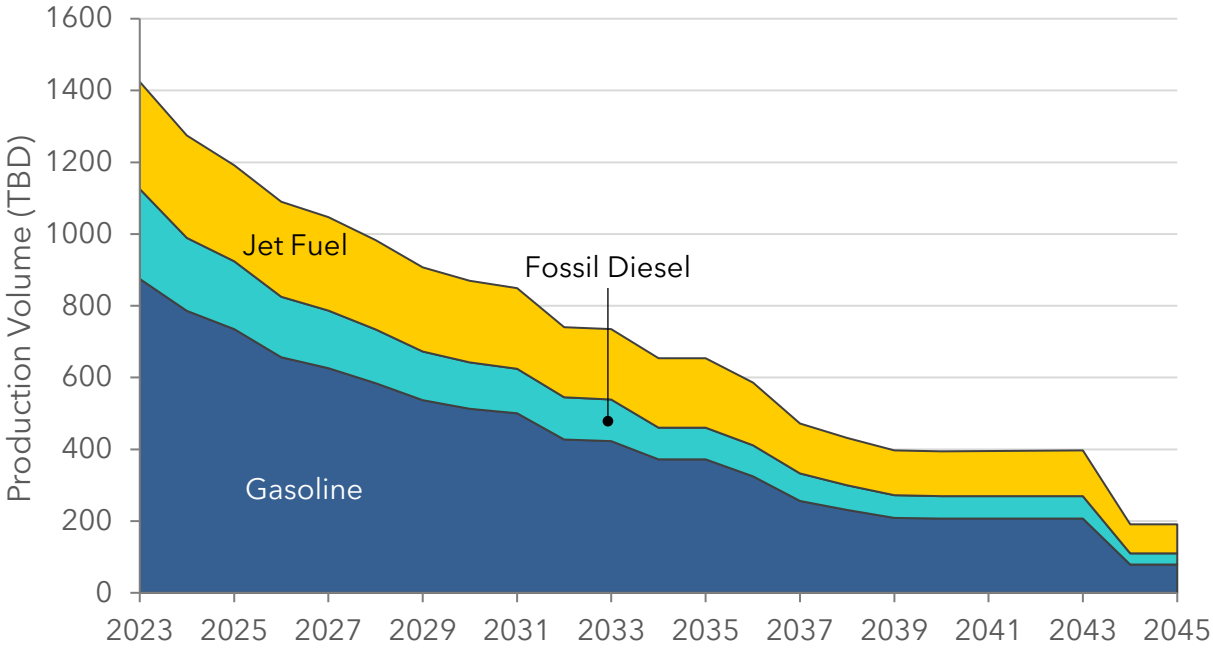
Strategies and a coordinated approach are necessary to be able to anticipate and respond to market dynamics that indicate potential changes in refinery operations. Individual refiners will make independent decisions based on a number of factors beyond production volumes. If a refiner decides to close a facility rather than reduce output in line with demand, the resulting reduced refining capacity would abruptly increase the need for imported gasoline and will also reduce supply of jet fuel and diesel. The size of the refinery and the specific yields of jet fuel and diesel will dictate the impact on supply and changing needs for

[38] *California Energy Commission Transportation Fuels Assessment - Staff Report*; the TFA included three scenarios for gasoline demand, and this analysis expands the scenarios to include demand for diesel and jet fuels.

imports. Abrupt loss of supply may increase the risk of price spikes, particularly during unplanned outages or maintenance events. As refining capacity drops, there is potential for further in-state market concentration and market power in the refining sector that could influence prices.

Planning this transition will require adaptability and strategies that can accommodate a number of uncertainties, including variability in demand for transportation fuels, price volatility, individual refiner changes that can occur abruptly (e.g., outages, closures), global market changes, access to imported gasoline and jet fuel, and other uncertainties.

Figure 7. In-State Production Volumes of Petroleum Fuels from ICF Modeling to Align with Demand in the 2022 Scoping Plan



Fuel System Dynamics

Existing fuel infrastructure includes in-state refineries, pipelines for transporting refinery production, terminals that distribute fuel by truck along the pipeline system, and bulk liquid fuel infrastructure at Northern and Southern ports to facilitate imports and exports of finished fuels and blendstocks. As noted in the TFA, California is unique in that it operates with minimal connectivity to fuel sources from East of the Rockies, and State regulations require a cleaner blend of gasoline to support the achievement of air quality standards.[37] Some companies have responded to recent refinery closure announcements by proposing westward pipeline capacity (including to California); one or more of these potential projects

could be operational as soon as 2029.[39] Additionally, California has received an increasing amount of refined petroleum products via marine terminals in recent years.

At the end of 2025, there were eight refineries in California capable of producing California Reformulated Gasoline Blendstock for Oxygenate Blending (CARBOB), a unique gasoline blendstock exclusive to California's gasoline market that must meet regulatory standards established to reduce air pollution emissions. These are illustrated in Figure 8, along with their estimated gasoline refining capacity (55% of stated crude processing capacity), remaining capacity, and the maximum monthly demand by year.

By mid-2026, in-state refineries are expected to meet 70% of the annual gasoline demand in California, significantly lower than during the pre-COVID period. This is largely due to refinery conversions and closure announcements. Phillips 66 in Wilmington ceased operations in late 2025, and Valero in Benicia announced plans to close by mid-2026. Two other refineries (Marathon Martinez and Phillips 66 Rodeo in Northern California) stopped processing crude oil in 2020 and 2024 and were modified to produce renewable fuels, demonstrating the success of climate and clean fuel policies such as California's LCFS. These converted refineries, however, are no longer producers of gasoline.

Many large U.S. states, including Florida, Georgia, and others, source their transportation fuels entirely through imports and pipeline deliveries without in-state refining capacity, demonstrating that reliable fuel supply does not require local production. Imports and exports also play a vital part in the fuel system dynamics in California. When in-state production is not sufficient to meet demand, the gap is met through marine and, to a lesser extent, rail imports. Fuel produced that does not meet California specifications, exceeds the total demand for California, and/or is more profitably sold in other states based on prevailing market conditions is exported through marine or pipeline transportation. Although marine imports and exports are a vital part of the fuel system dynamics, existing port infrastructure to accommodate vessels carrying liquid fuels may limit how much fuel is able to be imported and exported. The total volume of bulk liquid fuel imports and exports shipped in the Bay Area ports and the Los Angeles area ports from 2019 to 2024 were about 225 TBD.[40] Extending the historic record to 2007, at its peak, the Southern port total capacity has been as high as 400 TBD. For this analysis, CARB, CEC, and ICF assumed that the total annual volume of bulk liquid fuel imports and exports was limited to 225 TBD.

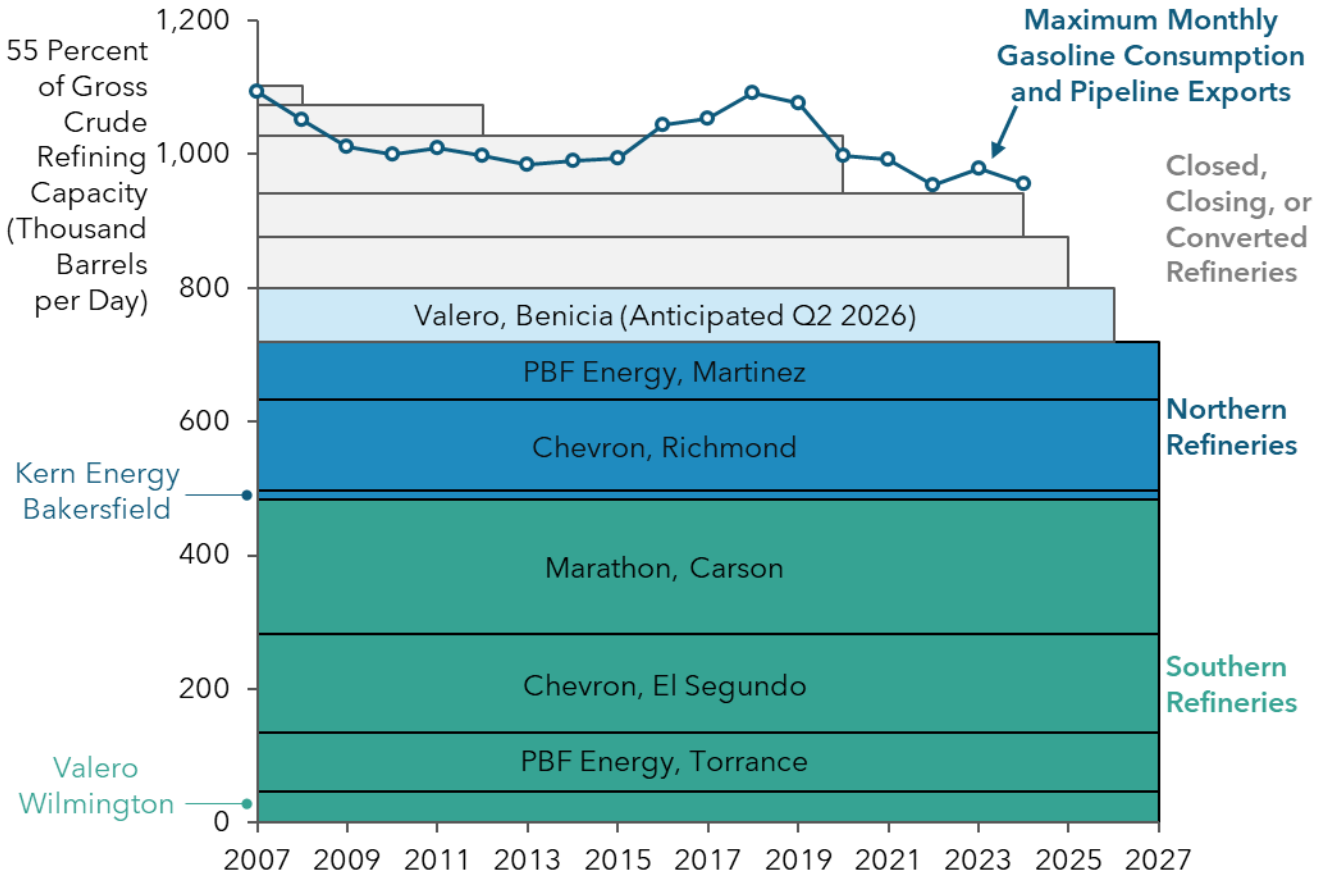
---

[39] *https://westerngatewaypipeline.com/*, *https://investor.hfsinclair.com/investor-relations/press-releases/press-releases-details/2025/HF-Sinclair-Evaluates-Strategic-Pipeline-Expansion-to-Western-Markets/default.aspx*, *https://rbnenergy.com/daily-posts/blog/oneok-launches-open-season-proposed-refined-products-pipeline-phoenix*

[40] From 2019-2024 Stillwater/CEC Data

Infrastructure to collect cargo-sized fuel volumes at a port constrains fuel exports. CARB, CEC, and ICF assumed that exports from each of the Northern and Southern California ports are constrained to 50 TBD.[41] Additional details on import and export constraints can be found in Appendix B.

Figure 8. Approximate Peak California Gasoline Refinery Capacity Compared to Maximum-Monthly Consumption



Some gasoline produced at California refineries is non-CARBOB and exported out of the state by pipeline, all of it going to Arizona and Nevada. Exports via pipeline to Arizona and Nevada are included in the total California demand. California pipeline exports supply approximately 75% of Nevada's and 35% of Arizona's gasoline demands.[42] The majority of

[41] There are practical limitations of assembling, testing, and loading 250,000 to 300,000 barrel cargos every 5-6 days which restricts fuel exports to about 50 TBD in each of the Northern and Southern ports.

[42] These percentages were used to represent a typical proportion of each state's demand for gasoline for modeling purposes. The actual fraction of each state's demand for gasoline supplied from California varies with market conditions.

the remaining demand for Nevada and Arizona is supplied via pipeline from Utah and Texas.

Total gasoline and fossil diesel demand is currently met by a combination of primarily in-state refinery production and a small portion of imports. Over 95% of the total gasoline demand for California (inclusive of volumes supplied to Arizona and Nevada) in 2023 was met through in-state production, with the remaining demand met by marine imports. Diesel demand is currently met through in-state production of fossil fuel-based diesel and renewable diesel, and primarily domestic freight imports of renewable diesel. As demand and production for renewable diesel have increased in recent years, in-state production of fossil diesel has exceeded California's fossil diesel demand, leading to exports of fossil diesel and imports of renewable diesel.

Jet fuel demand is met by a combination of in-state refinery production and an increasing amount of marine imports. The majority of jet fuel demand in Arizona and Nevada is supplied by pipeline from California, with a small amount supplied to Arizona from Texas.

Refinery Dynamics

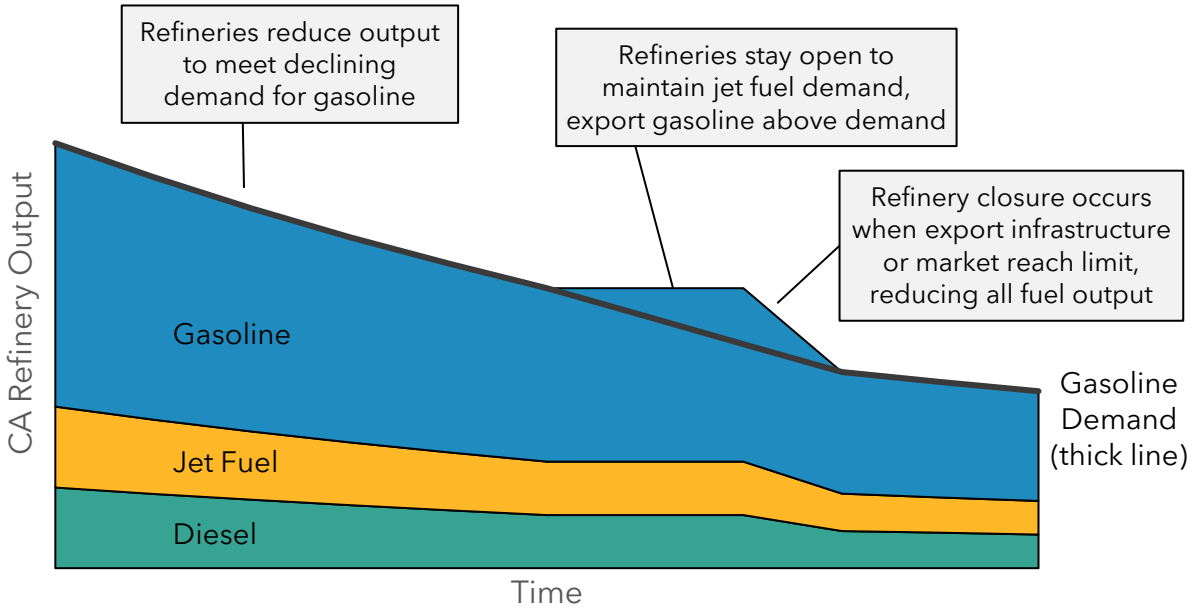
Refineries process crude oil, obtained from both in-state production and marine imports, into gasoline, diesel, and jet fuel in generally fixed proportions with gasoline as the primary product. The approximate breakdown of finished fuels produced from refineries is 60% gasoline, 20% diesel, and 20% jet fuel.[43] Refineries typically operate at their maximum stated capacity when possible and as market conditions allow. Refineries can adjust overall utilization to accommodate changes in demand, but the generally fixed proportions of fuel products produced cannot be significantly altered due to the refining process. For example, if utilization declines due to a decrease in gasoline demand, jet fuel and diesel production also decreases.

The modeling analysis suggests that as demand for jet fuel rises and demand for gasoline and fossil diesel decreases through and beyond 2045, the balance of refined petroleum product imports and exports will depend on in-state refining capacity, utilization, and import/export capacity. If in-state capacity and utilization decrease in line with declining gasoline demand, then increased jet fuel imports will be required. If in-state capacity and utilization remain consistent with robust jet fuel demand, the modeling results also suggest that there may be an excess of refined gasoline available than what is needed to meet California demand. The modeling analysis assumes that in order to maintain refining

[43] This breakdown is independent from the crude refining capacity and is an approximation of the generally fixed proportions of fuel produced by a typical refinery for modeling purposes.

margins, fuel suppliers will look to export the excess gasoline supplies. The latter hypothetical scenario is illustrated in Figure 9.

Figure 9. Schematic Describing How ICF Model Aligns California Fuel Supply with Demand



ICF's model assesses in-state refinery production necessary to meet California, Arizona, and Nevada demand. The model reflects fuel flows in the existing pipelines to Arizona and Nevada, which are expected to be maintained at current market share proportions. It also evaluates the flow of fuels through the northern and southern ports needed to ensure that the demand for gasoline, diesel, and jet fuel is met in all three states. More details regarding the ICF model can be found in Appendix B.

Planning Considerations

The ICF modeling analysis done for the TFTP illustrates how refiners may make decisions to decrease supply as demand declines and that this dynamic may result in discrete time periods of supply excess or demand excess. The modeling also provides insights that inform strategies to accommodate these time periods of supply/demand imbalances and strategies that can help manage the overall long-term transition. Independent of the rate of declining demand for fossil transportation fuels, maintaining an adequate supply of transportation fuel will likely require an ability to accommodate increased gasoline imports in the near term and increased jet fuel imports or alternatives in the long term. Port, pipeline, and other fuel distribution infrastructure may need to change to increase capacity, both in terms of physical investments and operational adjustments, and strategies must be considered to ensure adequate fuel supply and to mitigate price volatility. These strategies

must take into account future uncertainties in fuel demand, refinery output and capacity reductions, port and fuel distribution infrastructure, and other petroleum product sourcing.

Uncertainty in Fuel Demand

California refineries produce gasoline, fossil diesel, and jet fuel to meet demand in California, Arizona, and Nevada. The ICF model suggests that during some periods, imports may be required to balance supply, while during other periods, exports may be needed. Uncertainty in demand for these fuels will likely lead to varying levels of imports and exports, which makes planning challenging. The remainder of this section describes the various levels of demand used to support the estimates of future supply.

California's policies to transition automotive technologies and fuels and promote alternative modes of transportation collectively reduce demand for gasoline and diesel. The model explored three scenarios reflecting different perspectives on the level of implementation of policies based on the TFA.[44]

- *Rapid* - 2022 Scoping Plan: Based on the 2022 Scoping Plan, this demand scenario represents a rapid market expansion of ZEVs from cars to passenger trucks to heavy-duty highway and off-road vehicles. It also reflects widespread use of alternative modes of transit to reduce dependence on passenger vehicles. Electrification and use of low carbon fuels in all sectors of the economy reduce demand for diesel outside of the transportation sector.
- *Moderate* - Advanced Electrification: This demand scenario is an extension of the CEC's 2024 transportation energy demand forecast scenario: Additional Achievable Transportation Electrification Scenario 3 (AATE 3). It represents a broad market expansion of ZEVs for all vehicle types.
- *Slow* - Baseline: An extension of the CEC's transportation energy demand baseline forecast, this scenario represents ZEV uptake driven primarily by market trends and current consumer preferences. Uncertainty introduced by the current federal administration's policies could slow ZEV uptake in all vehicle types.[45]

Gasoline and fossil diesel demand is projected to decline in all three scenarios, but at different rates, providing a range of possibilities, shown in Table 1. The estimated future demand volumes listed through 2045 are projections illustrating the range of uncertainty for gasoline and diesel demand in the years to come.

---

[44] *California Energy Commission Transportation Fuels Assessment - Staff Report*; the Transportation Fuels Assessment focused on gasoline demand while this Transportation Fuels Assessment considers demand for gasoline, diesel, and jet fuels.

[45] The gasoline and diesel demand reductions in the Baseline scenario may not be sufficient to meet air quality standards in State Implementation Plans.

Although California provides a significant share of Arizona's and Nevada's total demand for transportation fuels, the volume of fuel exported by pipeline is a smaller share of California's fuel demand. Gasoline and fossil diesel demand is projected to decline in Arizona and Nevada in response to federal programs, including CAFE standards, multi-pollutant emissions standards, and Phase 3 diesel.[46]

Table 1. In-State Fuel Demand Projections for Each Scenario

In-State Fuel Demand (TBD)	*2023*		**Year** *2030*	*2035*	*2040*	*2045*
CARB Gasoline	787	**Rapid**	426	257	130	56
		Moderate	573	364	213	117
		Slow	625	524	446	377
Total Diesel	266	**Rapid**	238	201	143	74
		Moderate	221	177	125	79
		Slow	230	204	188	180

Table 2. Demand for Jet Fuel and Pipeline Exports

In and Out of State Fuel Demand (TBD)		**Year** *2023*	*2030*	*2035*	*2040*	*2045*
In-State Jet Fuel	**Jet Fuel**	271	306	324	348	378
Exports to Arizona - Pipeline	**Gasoline**	58	48	38	31	27
	Fossil Diesel	29	26	23	21	20
	Jet Fuel	29	30	32	34	37
Exports to Nevada - Pipeline	**Gasoline**	60	50	40	32	28
	Fossil Diesel	55	50	44	40	38
	Jet Fuel	34	36	37	40	43

As discussed previously, the ICF model suggests jet fuel demand is expected to grow over the next few decades, posing a challenge for decarbonization.[47] California's jet fuel demand is the highest in the nation due to being home to some of the busiest airports in the country

[46] Although the demand declines in these states may not be as large due to less stringent federal actions in the near term, it's likely that there will be continued reduction in gasoline and diesel demand due to improved fuel economy in vehicles and some consumer preference uptake of zero-emission vehicles.

[47] Federal Aviation Administration (2025). *FAA Aerospace Forecast Fiscal Years 2025–2045*

for both passenger travel and air freight, and it is expected to grow with expansions in both passenger travel and air freight. Jet fuel demand in Arizona and Nevada is also expected to increase. Jet fuel demand projections are based only on the CEC baseline forecast, as a range of statewide jet fuel demand is not modeled by the CEC or CARB. Projected pipeline exports and in-state jet fuel demand are shown in Table 2. More information regarding the demand scenarios and assumptions incorporated in these projections can be found in Appendix B 3.2.1.

The volume of gasoline, diesel, and jet fuels needed to meet demand in California, Arizona, and Nevada comprise the three integrated fuel demand scenarios. The ICF model estimated the volume of each fuel that could be produced by California refineries in each year, as well as the volume of marine imports and exports needed to align the supply with demand. The differences between the scenarios reflect variations in the pace of California's fuel transition from the mid- to the late-transition phase. While the actual future demand for these fuels will differ from these projections, this range can be used to inform a set of management strategies that accommodates uncertain gasoline and diesel demand while providing flexibility to adapt during the mid- and late-transition phases of the fuel transition.

Gasoline

Reduced refining capacity in the near-term, due to the announced refinery closures in late 2025 and early 2026 and renewable diesel conversions in 2020 and 2024, will result in gasoline demand greater than what remaining California refineries are able to produce. Figure 10 shows the projected change in total California gasoline demand, including the projected in-state demand for all scenarios as well as the pipeline exports necessary to fulfill a portion of Arizona and Nevada demand. Gasoline exports via pipeline to Arizona and Nevada accounted for 13% of California total gasoline demand in 2023. The volume of gasoline exported to these states is projected to decline approximately 52% from 2023 to 2045. The decline in total California gasoline demand for the same time period ranges from 52% to 87% depending on the projection scenario.

The volume of gasoline imports will vary depending on the demand for gasoline. A more rapid transition to ZEVs reduces the need for imported gasoline in the near term. A less rapid transition will result in extended dependence on gasoline fuels and the need for greater volumes of imported gasoline over the next several years. Additionally, as demand falls over the course of the transition, gasoline imports may rise considerably if in-state refineries close.

As illustrated in Figure 9, above, California refineries may refineries may also seek opportunities to export gasoline as in-state demand drops as shown in Figure 10, below. Exports may be used to prolong refinery output when demand drops below minimum utilization levels, but this option may be limited by export infrastructure and market conditions.

Figure 10. Projected Future California Total Gasoline Demand

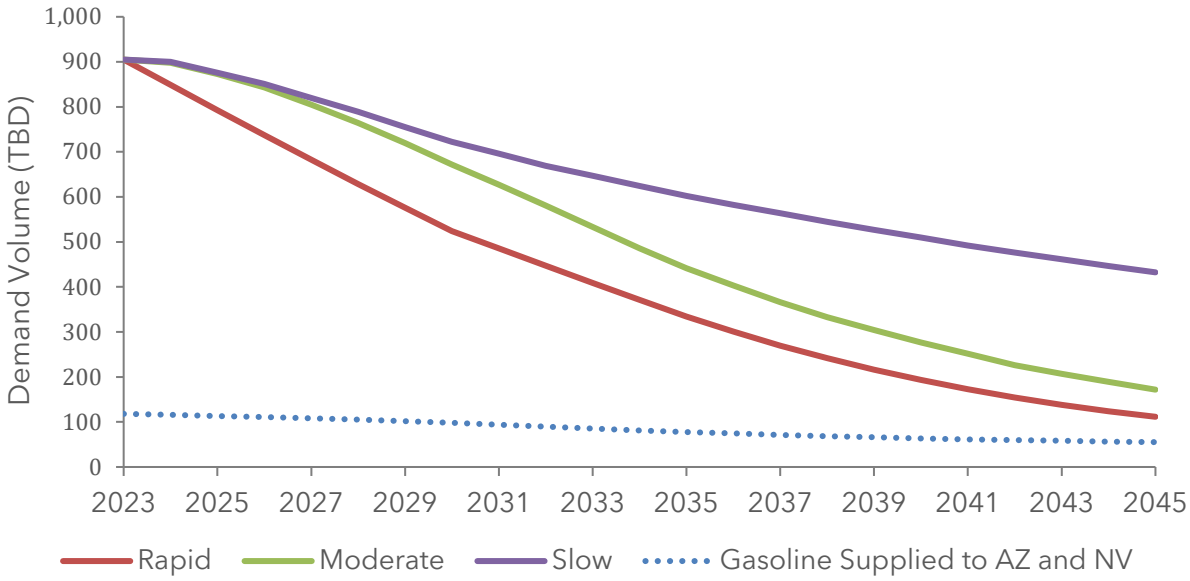


Table 3. Hypothetical Gasoline Flow Volumes Necessary to Balance Demand

Gasoline (TBD or Thousand Barrels per Day)			**Year**			
	2023		*2030*	*2035*	*2040*	*2045*
In State Fuel Production	875	**Rapid**	513	372	207	79
		Moderate	617	428	262	207
		Slow	644	558	515	429
Gasoline Imports - CA Ports	36	**Rapid**	19	12	6	73
		Moderate	32	17	10	5
		Slow	52	24	20	17
Gasoline Exports - CA Ports	48	**Rapid**	30	60	24	40
		Moderate	7	20	4	44
		Slow	7	7	48	32

Based on these modeled scenarios, limited export markets and infrastructure may result in reduced refinery utilization to better align supply with demand. When gasoline demand declines by roughly 25% below 2024 levels, refinery utilization may be low enough to motivate changes to operation to accommodate declining gasoline demand and increasing jet fuel demand. Hypothetical gasoline volumes necessary to balance in-state production

and port movements with each demand scenario are shown in Table 3. Volumes from pipeline exports and rail movement can be found in Appendix B.

Jet Fuel

Because refineries produce fuels in generally fixed proportions, the amount of jet fuel that can be produced is dependent on refinery utilization and capacity. California refineries already produce almost double the jet fuel yield of refineries in the rest of the country. Declining gasoline production will also decrease the amount of jet fuel that can be produced as crude oil processing will decline. Limited production capacity combined with growing demand enhances the need for jet fuel imports, which could present challenges to port infrastructure as demand for imports of other finished fuels rises. Jet fuel imports, with the majority being supplied from Asia, will become critical to meet growing aviation demand. Jet fuel imports in 2024 were 16% of the total California jet fuel demand. The volume of future imports will depend on the in-state refining capacity. Hypothetical jet fuel volumes necessary to balance supply with demand are listed below in Table 4.

The TFTP includes strategies to address the expected increases in jet fuel imports through the late-transition phase. Producing or importing sustainable aviation fuel (SAF) could help lower market costs and reduce GHG emissions. Based on announced refinery conversions, SAF production in California is set to increase from 3 TBD in 2023 to 28 TBD in 2045. Expanding SAF production also presents an economic opportunity for California: existing renewable fuel facilities are already producing SAF or well-positioned to produce SAF with additional retrofits, and state incentives could help attract the private investment needed to scale production while reducing aviation emissions.

Table 4. Hypothetical Jet Fuel Flow Volumes Necessary to Balance Demand

Fossil Jet Fuel (TBD)	*2023*	**Year**	*2030*	*2035*	*2040*	*2045*
In State Jet Fuel Production	299	**Rapid**	228	194	125	81
		Moderate	263	198	143	129
		Slow	272	246	236	206
Jet Fuel Imports - CA Ports	27	**Rapid**	132	183	277	353
		Moderate	97	179	258	304
		Slow	87	130	165	227

Diesel

Diesel demand in California is projected to follow distinct trajectories depending on the pace of ZEV adoption, with very little variance seen between scenarios until 2035. Projected in-state diesel demand (including petroleum-based and bio-based diesel) volumes for each

scenario are listed in Table 5.[48] Additional details on how alternative diesel is incorporated in the model can be found in Appendix B 3.3.

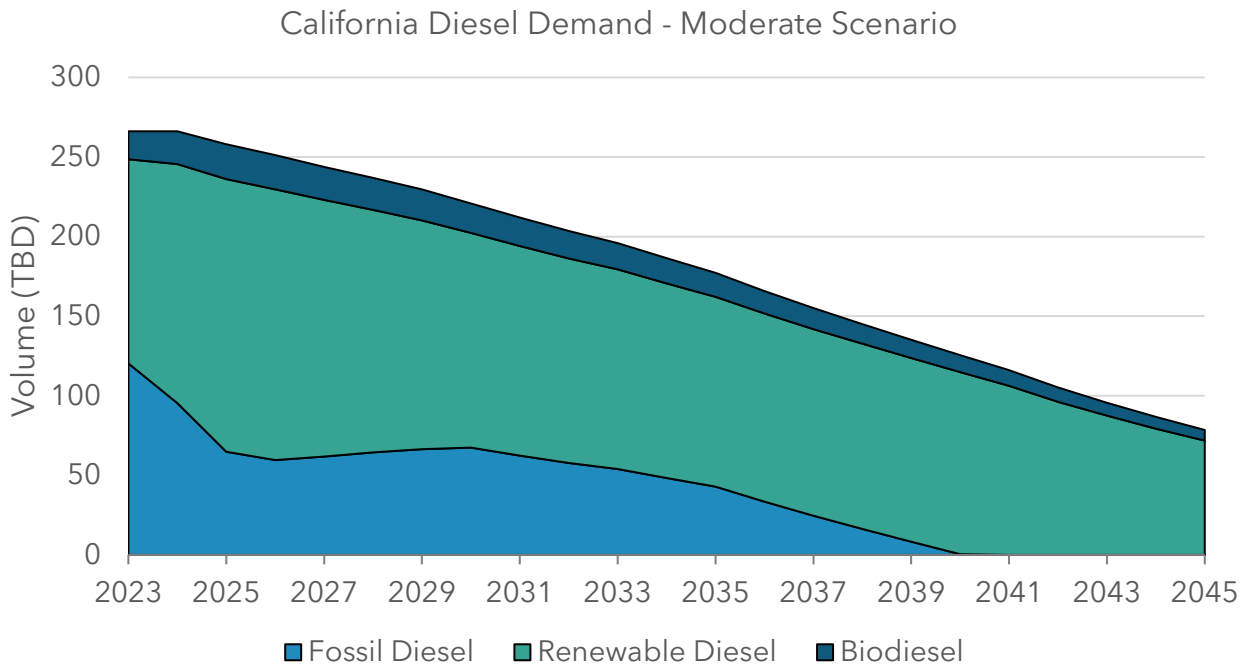
For all scenarios, diesel demand is projected to decline gradually at a similar pace through 2035. The Slow scenario then diverges, seeing very little demand reduction through 2045, while the Rapid and Moderate are projected to continue steadily declining to approximately 70% of 2023 demand. The Slow scenario, which projects a 34% demand reduction from 2023 to 2045, assumes a slower rate of electrification and transition away from diesel, resulting in a relatively stable diesel consumption over the next two decades. Because renewable diesel demand is assumed to be the same in all scenarios, based on the renewable diesel demand in the 2022 Scoping Plan Update, the fossil diesel demand is different in the Slow scenario versus the Rapid and Moderate scenarios. By 2045, the Rapid and Moderate scenarios both project a complete phase-out of fossil diesel, whereas modeling results derived from the Slow scenario suggest fossil diesel will still make up 40% of the 2045 in-state diesel demand.

Table 5. In-State Diesel Demand

Diesel Demand (TBD)	*2023*		**Year** *2030*	*2035*	*2040*	*2045*
Fossil Diesel	120	**Rapid**	85	66	17	0
		Moderate	68	43	0	0
		Slow	77	69	58	73
Biodiesel	18	**Rapid**	18	16	12	6
		Moderate	18	15	11	7
		Slow	18	16	16	13
Renewable Diesel	128	**Rapid**	135	119	114	68
		Moderate	135	119	114	72
		Slow	135	119	114	94

[48] Diesel volumes in Table 5 do not include demand for NV and AZ.

Figure 11. In-State Diesel Demand – Moderate Scenario



Renewable diesel use in California, deployed in California because of the Low Carbon Fuel Standard, has surpassed fossil diesel and is expected to continue to be the main diesel fuel for the state moving forward. This trend is illustrated in Figure 11 using the Moderate scenario diesel demand projections. Based on ICF modeling, renewable diesel and biodiesel use are not estimated to drastically decline or grow from 2025 levels. Instead, these fuels are projected to maintain steady consumption and serve as alternatives as the state transitions away from fossil diesel. As California transitions from fossil diesel to alternatives, diesel supply to Arizona and Nevada may be affected. As a result, Arizona and Nevada may also begin transitioning to alternatives or find other sources of fossil diesel, such as increased imports from Texas and Utah.

ICF modeling estimates for renewable diesel and biodiesel production are aligned with base year 2023 LCFS volumes. These volume estimates include in-state production of renewable diesel due to the additional production capacity from the Phillips 66 and Marathon Martinez renewable diesel conversions. Biodiesel production is estimated to continue at the base 2023 LCFS volumes, meeting approximately 8% of California in-state diesel demand. Additional details regarding diesel production and supply assumptions can be found in Appendix B 3.3.

Similar to jet fuel, the amount of fossil diesel able to be produced is dependent on refinery utilization and capacity. Declining gasoline production will decrease the amount of fossil

diesel that can be produced. Hypothetical fossil diesel volumes necessary to balance supply with demand are shown in Table 6.

Table 6. Hypothetical Fossil Diesel Flow Volumes Necessary to Balance Demand

Fossil Diesel (TBD or Thousand Barrels per Day)			**Year**			
	2023		*2030*	*2035*	*2040*	*2045*
In-State Production	251	**Rapid**	129	88	62	31
		Moderate	159	118	78	62
		Slow	166	142	129	118
Diesel Imports - CA Ports	0	**Rapid**	40	51	20	37
		Moderate	6	7	5	9
		Slow	8	13	7	30
Diesel Exports - CA Ports	57	**Rapid**	19	17	14	21
		Moderate	21	19	27	24
		Slow	19	19	19	19

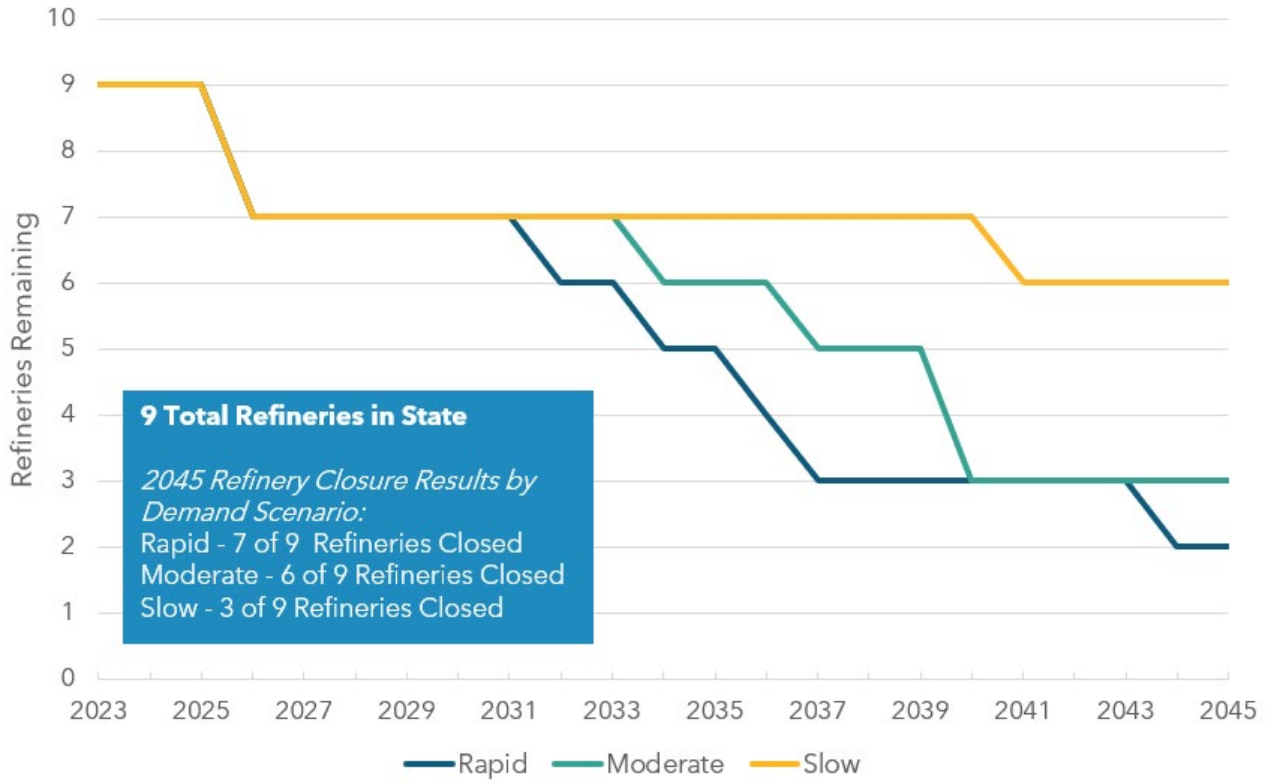
There is considerable variability between imports and exports of fossil diesel from the present to 2045, which is mainly a result of gasoline and jet fuel dynamics, which are bigger drivers. Exports of fossil diesel are expected to follow the same trend regardless of the demand scenario.

Refinery Output and Capacity Reduction

As mentioned previously, as gasoline demand declines, refineries may choose to reduce utilization. Because demand for jet fuel is projected to continue to increase, refineries may seek opportunities to export gasoline in order to minimize utilization reductions which will also help maintain jet fuel production for the California market. However, finished fuel export infrastructure and markets for California-produced finished gasoline have capacity and market limitations. When export volumes approach the infrastructure and market limitations, refinery profits may be adversely impacted and refineries may elect to cease production. ICF's analysis suggests that when gasoline demand drops to around 600 TBD, refinery utilization is reduced to a point where decisions that could impact timing of refinery closures, based on production volumes, may occur. Figure 12 shows the ICF modeling results estimating the number of operating refineries in each year based on the modeled demand scenario. The timing of refinery closures depends on the demand scenario, but the general progression is similar in all scenarios and is likely to extend beyond 2045. As California moves through the fuel transition, it is important to develop strategies to prepare for refinery closures and to anticipate the late-transition phase where the majority of the

state's refineries are closed. In the modeled scenarios, all refineries reduce utilization in line with fuel demand to a minimum level; in practice, refinery operations are likely to occur in a less coordinated or predictable manner.

Figure 12. Hypothetical Transition-Driven Scenarios: Operating Refineries through 2045



Port and Fuel Distribution Infrastructure

While refineries have been the primary source of petroleum products in California, there is also extensive infrastructure in place, from ports to storage facilities to pipelines and rail assets, that is used to deliver fuel to consumers. This infrastructure was built over decades and based on historic conditions of California's refinery system, crude oil production, and demand for transportation fuels in California, Arizona, and Nevada. Modifications to this infrastructure will be needed to support the fuel transition.

Port infrastructure in the North and South will be key to ensure liquid fuel supply reliability and resiliency during this transition. The total annual volume of finished fuels that move in and out of the ports for all the modeled demand scenarios is less than the total annual volume observed from 2007 to 2023. The combination of rising jet fuel imports and gasoline exports could push port capacity close to historic maximum levels by the 2040s. This suggests that the existing port infrastructure is flexible enough to accommodate the

range of bulk liquid finished fuels anticipated, but strategic planning and potential prioritization of fuel imports over gasoline exports may become necessary based on the timing of modeled refinery closures.

By the late transition phase, port and fuel distribution infrastructure modifications will likely be needed to support the volumes of imported gasoline and jet fuel that are expected to change over time. Port access, discharge capability, storage capacity for delivered cargos, and piping capacity to move products away from the ports will need to accommodate gasoline and jet fuel imports. Some refinery sites have strong connectivity to dock and pipeline infrastructure that could potentially be re-purposed to import and blending hubs. As refineries close, storage tanks currently used for crude oil at ports could be converted to store fuels like gasoline and jet fuel. Specific infrastructure constraints will require evaluation throughout the transition based on the unique attributes of each refinery closure. Strategic planning is needed to minimize stranded assets while ensuring that reliable infrastructure exists to accommodate growing fuel imports. Open access to import infrastructure (for marketers and traders, not just refiners) is needed to keep the fuels market competitive and mitigate the market power of incumbent firms.

Community Considerations

Communities near port and freight hubs already experience some of the worst air quality and are disproportionately impacted by air pollution from goods movement. Any expansion of port infrastructure to manage imports and exports of fuels should be deployed in ways that does not worsen air quality and increase cumulative health impacts in port-adjacent communities. Potential strategies include on-site air pollution mitigation (e.g. electrification or zero-emission equipment) as well as transporting drop-in alternatives, like ethanol, SAF, and renewable diesel to California by pipeline, rail, or truck to lower marine imports and reduce congestion at ports. Increasing production of SAF that can be transported via pipeline or other options, as opposed to marine imports, or reducing jet fuel demand with alternative technologies such as electricity, hydrogen fuel cell, and high-speed rail are also potential long-term strategies to reduce port congestion, particularly in the late-transition phase.

Other Petroleum Product Sourcing

Refineries produce other vital products in addition to transportation fuels, such as propane, residual fuel oil, lubricants, aviation gasoline, and asphalt. As fewer refineries remain, there will be limited capability to produce these products across California refineries, creating a need to source these products elsewhere. Strategies to ensure that these products remain available or to find suitable alternatives will need to be considered.

Decreased production of these products will likely lead to increased imports by rail for some products and marine imports for others. Propane is currently supplied from both in-state production and rail imports from Canada. Decreased propane production would likely lead to an increase in rail imports. The demand for residual fuel oil could potentially be transitioned to hydrogen-based fuels over time, while in the near term, demand may need to be met with imports.

Aviation gasoline is a specialty product used for small aircraft, such as personal and crop-dusting planes. It is currently produced at one California refinery. If in-state aviation gasoline production decreases or stops completely due to refinery closures, supply would need to be supplemented by rail imports. A similar situation exists for lube oil production.

Summary

Achieving the State's climate and air quality goals means reducing emissions, including from fossil fuels and combustion technology more broadly. A managed fuel supply plan includes phase-down of refining capacity as demand for gasoline decreases and an increased use of imports for remaining fossil demand. While ICF's modeling is not a forecast or prediction, it provides valuable insights to aid planning and develop coordinated strategies.

By the end of the2030s, the ICF modeling suggests that additional f supply phase downs might occur, depending on the transitions of technology, fuel, and alternative modes of transportation. Marine imports will likely be the primary source of jet fuel, unless more alternative jet fuel production comes online or jet fuel demand can be reduced. Expanded marine imports and exports of gasoline will be likely, depending on the level of remaining demand and production. Port and distribution infrastructure may need to be repurposed or reconfigured to accommodate marine imports.

The current mid-transition phase provides an opportunity to establish strategies that adapt to changing fuel demand and are poised to align with the late-transition phase of the fuel supply. These strategies, discussed in Chapter 4, include: facilitating increased volumes of marine imports of gasoline in the near term and jet fuel in the long term; increasing use of rail transport for low carbon fuels like ethanol; and deploying alternatives for fossil jet fuel, such as electric and hydrogen fuel cell airplanes and production of SAF and/or other synthetic fuels. In addition to addressing fuel supply, these strategies address the impacts of refinery closures, including the repurposing and environmental remediation of assets as well as other potential regional and community considerations.

Chapter 3: Regional and Community Transition

The complexity of the fuel supply discussed in the last chapter is only one consideration of the mid-late transition phases. This chapter focuses on the communities and workforce most impacted by the fuels transition. Equity and workforce considerations are companion efforts that serve to uplift communities and the labor force that resides in them. Community voices provide thoughtful and important context for the current mid-transition phase.

As noted previously in this plan, oil and gas refineries have a long legacy in California communities: Chevron Richmond Refinery established in 1902; Chevron, El Segundo Refinery established in 1912; Kern Oil and Refining Company established in 1934; Phillips 66 Rodeo Refinery established in 1896; and Marathon Martinez Refinery established in 1915.[49] Although this legacy includes economic benefits, refinery-adjacent communities and regions continue to suffer from harmful air pollution that has persisted for decades.

Refinery-adjacent communities in the state are composed of populations that have experienced disproportionate environmental, economic, and health burdens (Table 7). [50] Additionally, the environmental impacts resulting from refinery activity pose significant[51] and deadly health outcomes. People with lived experiences and first-hand knowledge of their communities expressed these and similar sentiments in working groups and community meetings associated with the TFTP public process.[52]

Refinery workers are either directly employed or are contract workers. Most directly employed refinery workers in California are represented by a labor union, allowing them to collectively bargain over wages, benefits, and working conditions. All refinery construction, maintenance, and turnaround work completed by contractors is required by SB 54 (2013)[53] to employ "skilled and trained"[54] labor that has graduated from a Division of Apprenticeship Standards (DAS) registered apprenticeship program.[55] Contract workers may not work permanently at one refinery, resulting in movement between refineries. In major refinery regions such as Contra Costa County and Los Angeles County, refinery maintenance and

---

[49] *California Oil Refinery History*

[50] Refers to communities that are especially vulnerable to environmental, economic, and health burdens that include disadvantaged communities, low-income communities, and low-income households.

[51] *FBI, EPA investigating release of toxic dust from Martinez refinery*

[52] Appendix A (UCB CLEE)

[53] *SB 54 Senate Bill – Chaptered*

[54] *Public Contract Code Chapter 2.9*

[55] The International Brotherhood of Electrical Workers (IBEW), the United Association of Plumbers and Pipefitters (UA), the International Brotherhood of Boilermakers (IBB), The International Association of Heat and Frost Insulators and Allied Workers (IAHFIAW), Sheet Metal Workers (SMART), and others.

turnaround work can constitute as much as 30 percent of the annual work hours[56] for some of these unions, particularly the International Brotherhood of Electrical Workers (IBEW), the United Association of Plumbers and Pipefitters (UA), the United Steelworkers, and the International Brotherhood of Boilermakers (IBB).

Figure 13. A United Steelworker[57]

Potential closures of refineries and the associated infrastructure create local employment and economic development risks for communities and so it is appropriate to advance policies that provide for a transition that realizes both future environmental and economic benefits for the local communities. It is critical that policies and programs demonstrate that fossil fuel workers will not be left behind in the energy transition. It is equally important to review the requisite worker infrastructure to prepare for future refinery closures, as well as future contractions and transitions,[58] keeping worker and community safety top priority. State policies and plans as well as refinery actions to support a successful transition should identify and pursue necessary steps to support worker priorities and movement into other jobs and require deliberate engagement with labor and the adjacent communities.

Literature

In addition to public testimony and shared, lived-community and labor voices associated with the TFTP public process, there is a significant and important body of work about the transition from a fossil fuel economy. The TFTP acknowledges this recent body of thinking and the findings of some of the key reports, which include:

- Before the Last Drop: Lessons from the Phillips 66 Los Angeles Refinery Closure[59] - Analysis of the Phillips 66 Refinery closure serves to address questions, issues, and recommendations of what refinery communities should expect when a closure occurs and what they can do to prepare for it.

[56] This estimate is based on discussions with Building Trades locals in Contra Costa County during CCRTP development.

[57] *Oil and Petroleum - United Steelworkers*

[58] *The Employment Impact of Curtailing Fossil Fuel Use – CEPR*

[59] *apen-before-last-drop-full-report-final-web-1292025.pdf*

- Los Angeles Just Transition Strategy[60] - The Just Transition[61] Task Force developed a Just Transition Strategy for workers and communities impacted by the proposed phase out of oil drilling and extraction activities. The three goals identified in the strategy highlight providing the requisite worker support to transition skills into jobs, oversight of refinery site remediation/re-use with input from communities and sovereign Native Nations[62] on whose ancestral homelands Los Angeles is built – Tongva, Tataviam, Serrano, Kizh, and Chumash, and leveraging funding to finance recommended implementation strategies.
- Report and Recommendations of the Contra Costa Refinery Transition Partnership[63] - The Contra Costa Refinery Transition Partnership (CCRTP) is a labor and environmental justice partnership facilitated by the BlueGreen Alliance[64] Foundation, with funding from the California Workforce Development Board's (CWDB) High Road Training Partnership (HRTP) Program.[65] The report is based on the premise that refinery transition is already here and will be escalating.
- Fossil Fuel Layoff: The Economic and Employment Effects of a Refinery Closure on Workers in the Bay Area[66] - The study captures and analyzes post-layoff experiences of workers at the Marathon refinery in the Bay Area.
- A Program for Economic Recovery and Clean Energy Transition in California[67] - The proposed program is based on California's climate and emissions-reduction goals that are established in state policy.[68]
- Oil and Gas In California: The Industry, Its Economic Contribution and Major Use Industries[69] - This Western States Petroleum Association (WSPA)-commissioned report through the Los Angeles Economic Development Corporation (LAEDC) highlights key economic contributions, workforce dynamics, and policy

---

[60] *Los Angeles Just Transition Strategy*

[61] Just transition refers to integrated policy approaches offering protection, support, and compensation for displaced workers and communities in specific industries or regions. See Putting California on the High Road: A Jobs and Climate Action Plan for 2030. *Putting California on the High Road: A Jobs and Climate Action Plan for 2030*

[62] The Strategy identifies that "Out of respect for Tribal sovereignty the term 'Native Nations' is used throughout this document". Ancestral homelands include Tongva, Tataviam, Serrano, Kizh, and Chumash.

[63] *Report and Recommendations of the Contra Costa Refinery Transition Partnership: An Initiative of the California Workforce Development Board's High Road Training Partnership Program*

[64] *BlueGreen Alliance Website*

[65] *Contra Costa Harnessing Change: Refinery Transition Partnership*

[66] *Fossil fuel layoff: The economic and employment effects of a refinery closure on workers in the Bay Area - UC Berkeley Labor Center*

[67] *A Program for Economic Recovery and Clean Energy Transition in California*

[68] *Executive Order B-55-18; Executive Order N-79-20*

[69] *Economic Report Archives - Los Angeles County Economic Development Corporation*

considerations the industry faces as the state balances environmental priorities, economic resiliency, and community health.

Equity in the Mid-Transition

During the TFTP public process, members of the public emphasized the harm to community, labor, and environmental impacts of refinery operations, and the need for equity was a recurring theme throughout. Refinery-adjacent areas have long borne the brunt of pollution and health burdens. Residents want transition strategies to prioritize these communities by ensuring their equitable access to clean energy, affordable transit, and economic opportunities. To that end, environmental justice principles[70] and recognitional, procedural, and distributional equity[71,72] should be a continuous practice through and after the mid-late transition implementation.

California's diverse communities and people, especially in fence line and refinery-adjacent communities, can be identified and prioritized using the state's California Communities Environmental Health Screening Tool, CalEnviroScreen 4.0.[73] This information (Table 7) is currently used and should continue to be used to prioritize these communities for an equitable transition as the state seeks to close existing health and opportunity gaps.[74]

---

[70] *The Principles of Environmental Justice*

[71] EV-ChargingEquityWorkgroupReport.pdf

[72] California Strategic Growth Council: Strategic Plan 2024-2027

[73] *CalEnviroScreen 4.0 – Office of Environmental Health Hazard Assessment*

[74] Low income community are census tracts that are either at or below 80% of the statewide median income, or at or below the threshold designated as low-income by the *California Department of Housing and Community Development's (HCD) Revised 2021 State Income Limits*. *Disadvantaged communities* CES, based on CalEPA's identification using *CalEnviroScreen* and includes census tracts receiving the highest 25% of overall scores in CES 4.0. *Disadvantaged communities* tribal is based on CalEPA's identification of lands under the control of federally recognized Tribes. A Tribe may have a single land area represented or may be a multipart feature. A Tribal land may be wholly or partially within a census tract.

Table 7. Analysis of Refinery Impacted Communities Using CalEnviroScreen 4.0[75]

Refinery	CES Score[76] (percentile)	Pollution Burden Score (percentile)
Chevron U.S.A. Inc., Richmond Refinery	79	79
Chevron U.S.A. Inc., El Segundo Refinery	73	73
PBF Energy, Martinez Refinery	65	65
PBF Energy, Torrance Refinery	92	92
Valero Energy, Benicia Refinery	46	46
Valero Energy Wilmington Refinery	88	88
Marathon Petroleum Corp., Los Angeles Refinery	93	93
Kern Energy, Bakersfield	84	84
Phillips 66, Los Angeles Refinery	84	84

Environmental Considerations

Refineries in Los Angeles, Kern, Solano, and Contra Costa counties are recognized as supplying fossil fuels that have driven local and regional economies for over 100 years before current environmental regulations[77] were adopted. The refineries and refinery industry are one of the single largest sources of toxic pollution in their respective regions, contributing to a century of harmful impacts on the health of workers and local communities, particularly disadvantaged communities/low-income communities (DAC/LIC) and communities of color.

Most of the state's refineries are located near water, waterways, and coastal areas. As a result, sea level rise and associated groundwater rise threaten to spread toxic chemicals from refinery lands into waterways and surrounding communities. It is critical to understand the extent to which refinery and refinery-adjacent lands are already polluted, as well as the

---

[75] CES 4.0, CARB staff analysis

[76] The CES Score and the Pollution Burden Score highlight the relationship of refinery communities and pollution which is made up of indicators from the Exposures and Environmental Effects components of the CalEnviroScreen ***model***. Pollution Burden represents the potential exposures to pollutants and the adverse environmental conditions caused by pollution. CES Score is for refinery adjacent communities.

[77] *Summary of the Clean Water Act | US EPA; Superfund: CERCLA Overview | US EPA; Overview of the Clean Air Act and Air Pollution | US EPA*

current regulatory requirements around facility decommissioning and clean-up. It is equally critical to work to prevent these toxic lands from being abandoned or inadequately remediated, which would lead to impacts on land and water quality and the community's ability to reuse the lands for future purposes. For many people in refinery-adjacent communities and regions, the closure of refineries brings a long-awaited sense of hope for relief from this health impact and hope for the opportunity to revitalize communities that have long felt left behind by the state's economic progress."[78]

There are many air quality issues near refineries that have public health consequences.[79,80,81] Key refinery pollutants with resultant impacts include particulate matter (respiratory and cardiovascular disease), sulfur dioxide (respiratory irritation), nitrogen oxides (hastens asthma and other pulmonary conditions), volatile organic compounds (including carcinogens and impacts on cardiovascular health).[82] A California legislature commissioned study from the Environmental Markets Laboratory (emLab) at UC Santa Barbara[83] identified public health benefits of phasing out refining in California including an estimated cumulative health economic benefit from $PM_{2.5}$ reduction between $0.3 billion to $8.1 billion by 2045.

The CCRTP commissioned an analysis by the Asian Pacific Environmental Network (APEN) and Communities for a Better Environment (CBE) regarding the regulatory framework around refinery clean-up. A companion report[84] analyzed how levels of contamination and clean-up responsibilities may shape refinery companies' decisions regarding closure and reuse. Additionally, the Before the Last Drop report articulates environmental, community, and workforce issues that should be addressed.[59] The closure of the Philadelphia Energy Solutions refinery in Philadelphia also offers some lessons[85] including a) an expectation that refinery lands currently contain significant contamination; b) there are real public health impacts of unabated contamination; c) there are existing state and federal laws around the cleanup of contaminated industrial lands that will govern the cleanup of refinery lands when facilities close; d) remediation cost is anticipated to be significant and is a potential major factor for refinery owners to seek to delay or postpone full facility closures; and e) there are

---

[78] *Report and Recommendations of the Contra Costa Refinery Transition Partnership: An Initiative of the California Workforce Development Board's High Road Training Partnership Program*

[79] *As documented by the Asian Pacific Environment Network and Communities for a Better Environment during TFTP development.*

[80] *AB 617: Wilmington/Carson/West Long Beach Community Profile*

[81] *Wilmington, Carson, West Long Beach Community Emissions Reduction Program Staff Report 2020*

[82] *Review of Air Pollution from Petroleum Refining and Petrochemical Industrial Complexes: Sources, Key Pollutants, Health Impacts, and Challenges*

[83] *Enhancing equity while eliminating emissions in California's supply of transportation fuels* (page 85)

[84] *San Francisco Bay Area Refinery Transition Analysis*

[85] "*An Unrefined Ending: Lessons Learned From the Creation and Closure of the Philadelphia Energy Solutions Refinery" (Union of Concerned Scientists, March 2023)*.

significant concerns for oil companies seeking to avoid or minimize clean-up responsibilities.[86,87]

Refinery Safety Considerations

To keep California's refineries online and safely operating, ongoing maintenance as well as planned intensive refurbishment and replacement projects, which are referred to as turnarounds,[88] are required. These activities are critical for safe refinery operations, regulatory compliance, long-term reliability of fuel supply, and community health. Refineries can go offline temporarily for unplanned maintenance or shutdowns[89] to address specific issues, outages that are typically shorter in duration than a turnaround. Turnarounds are generally scheduled more than a year in advance and timelines can range from a matter of weeks to months, depending on the complexity of the planned projects. Planned and unplanned refinery maintenance can lead to wholesale and retail gasoline price spikes, particularly when those maintenance events are not accompanied by adequate resupply planning or sufficient inventory drawdowns. Understanding requisite labor practices for refinery maintenance purposes is critical.

A risk that workers and communities share is the possibility of refineries cutting back on planned maintenance as a cost-cutting strategy as sales of refinery products decrease in the state. This poses risks to workers, communities, the environment, and the transportation fuels supply. This was noted in a recent analysis of economic decline, bankruptcy, and the ultimate explosion and closure of the Philadelphia Energy Solutions refinery in Philadelphia, Pennsylvania[90] and detailed in the Union of Concerned Scientists' 2023 report:

> *In January 2019, as the refinery's financial position deteriorated, the owners made a remarkable decision: they abandoned a major maintenance turnaround one week before its planned execution. Then, in June, the breach of a metallurgically deficient pipe carrying toxic hydrofluoric acid resulted in an explosion and a 24-hour fire. City officials reassured neighboring communities that neither presented a threat to public health, but subsequent analyses put those claims into doubt.*

Recent incidents at California refineries have highlighted concerns to worker and community safety. In Northern California, these included the 2023 incident at PBF Martinez

---

[86] *After the shutdown, what comes next for the former Philadelphia Energy Solutions refinery? | Penn Today; Warehouse construction starts at former South Philly refinery site*

[87] *Warehouse construction starts at former South Philly refinery site*

[88] *Refinery turnarounds 101: What are turnarounds and why do we need them?*

[89] *Understanding the Differences: Shutdowns, Turnarounds, and Outages in Refinery Operations - AMACS*

[90] *An Unrefined Ending: Lessons Learned from the Creation and Closure of the Philadelphia Energy Solutions Refinery*

that covered much of the city in heavy metal-laden dust,[91] the November 2023 fire at the Marathon Martinez renewable fuel facility that injured a refinery worker,[92] the February 2025 PBF Martinez fire that required local residents to shelter-in-place,[93] and the May 2025 Valero Benicia fire.[94] In Southern California, Philips 66 in Carson experienced multiple fires in 2019,[95] Marathon in Carson experienced a fire in 2020,[96] and most recently the 2025 Chevron Refinery fire (Figure 14).

Figure 14. Fire at Chevron Refinery Outside of Los Angeles[97]

There is a history in the state of collaboration between labor, local municipalities, and environmental groups to address refinery safety, including the establishment of the Contra Costa Industrial Safety Ordinance in 1999[98] and the 2017 statewide effort to pass Process Safety Management regulations by the California Occupational Health and Safety Standards Board and CalEPA following the 2012 Chevron Richmond fire.[99] There are current deliberations around components of the Process Safety Management standard related to the concerns of labor, community groups, and others regarding the state's transportation fuel supply.[100]

A solution to addressing worker and overall refinery safety is to develop transparency in how a trained workforce will be maintained during the transition. Worker transition plans developed between labor and management are critical. Plans that are periodically revisited during closure announcements can help to mitigate safety risk and ensure that trained

---

91 *FBI, EPA investigating release of toxic dust from Martinez refinery*

92 *A faulty furnace. A blast of fire. And a man's life, shattered*

93 *10 Days After Martinez Refinery Fire, New Details of Toxic Chemicals Released*

94 *Valero Refinery Fire in Benicia Is Under Control After Warnings to Stay Indoors*

95 *Fire at Phillips 66's L.A. refinery could crimp gasoline supplies*

96 *Carson refinery fire contained, after explosion at center of Marathon facility sends raging flames shooting into night sky - ABC7 Los Angeles*

97 *Massive Fire at Chevron Refinery Outside of Los Angeles*

98 The Contra Costa Industrial Safety Ordinance was established in response to eight major "Level 3" incidents at local oil refineries, that resulted in six workers killed, 50 injuries and more than 23,000 residents seeking medical attention between 1993 and 1999. *https://www.eastbaytimes.com/2008/12/06/industrial-safety-law-celebrates-10-years/*

99 *BlueGreen Alliance | After Five-Year Effort, California Adopts the Nation's Strongest Refinery Safety Regulations*

100 *'Secret Deal' in California Would Weaken Regulations for Oil Refineries - Public Health Watch*

workers are on the job and in quantities that don't risk plant, worker, or community safety. These plans are discussed in more detail in Chapter 4.

Employment Considerations

Table 8 provides a summary of independent studies that identify direct, indirect, and induced job estimates for state refineries.[101] California's total labor force is approximately 20 million strong, with direct, indirect, and induced jobs from the refining sector comprising approximately 0.05% to 0.10% of overall California employment.[102] For the refining sector, the estimates range from 11,203 to 25,446 jobs statewide; with the largest employment in Los Angeles County (21,022 total), followed by Contra Costa County (3,045-18,000),[103] Solano County (848), and Kern County (531). Study variation is due to a different methodology as it relates to indirect and induced jobs. While individual refineries provide significant direct employment, the broader refinery industry supply chain and associated services[104] provides significantly more total employment, as well as most of the tax revenue for local jurisdictions, as detailed in the University of California, Berkeley (UCB) Labor Center report, which is cited in the University of California, Santa Barbara (UCSB) emLab study,[105] and by the University of Massachusetts Amherst's Political Economy Research Institute (PERI).[106]

---

[101] A direct job is employment created to fulfill the demand for a product or service. An indirect job exists to produce goods and services needed by the workers with direct jobs. Induced jobs are employment created by the additional personal spending by both direct and indirect workers. *Guidelines for California Workforce Development Board-Administered Greenhouse Gas Reduction Fund Administration*

[102] Analysis of published reports/studies on oil and oil refinery industry employment in California (2025). Personal communications Josh Sonnefield, BlueGreen Alliance.

[103] The significant study variation in Contra Costa County, is likely due to different methodology as it relates to calculating indirect and induced jobs. While individual refineries provide significant direct employment, the broader refinery industry supply chain and connected services provide significantly more total employment, Personal communications Josh Sonnenfeld.

[104] The UCB Labor Center describes these indirect jobs as the refinery industry supply chain and connected services that include activities like construction maintenance (including regular refinery turnaround work), truck transportation, machinery repair and maintenance, building services, and others.

[105] *How California can decarbonize oil production equitably - UCSB emLab*

[106] *A Program for Economic Recovery and Clean Energy Transition in California – University of Massachusetts Amherst*

Table 8. Summary of Independent Job Estimates for California Refinery Industry[107]

Region/Study	Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs
Los Angeles County				
emLab (UCSB - 2019)	3,148	11,308	6,567	21,022
Kern County				
emLab (UCSB - 2019)	127	280	124	531
Solano County				
emLab (UCSB - 2019)	402	309	137	848
Contra Costa County				
UCB Labor Center	3,000	15,000	N/A	18,000
emLab (UCSB - 2019)	1,895	797	353	3,045
Statewide				
emLab (UCSB - 2019)	5,571	12,694	7,181	25,446
PERI (UMA – 2021)	N/A	N/A	N/A	11,203

Oil and gas industry employment has historically provided a pathway to high-quality jobs with average annual wages in the oil gas industry exceeding $70,000 per year.[108] As the

[107] Analysis of published reports/studies on oil and oil refinery industry employment in California (2025). Personal communications Josh Sonnefield, BlueGreen Alliance.

[108] *Economic Report Archives | Los Angeles County Economic Development Corporation*

overall oil and gas workforce faces potential contraction in the future,[109] transitioning the workforce to alternative high-quality employment will also be an important public policy priority. CARB modeling completed as part of the 2024 LCFS rulemaking suggests the ongoing fuels transition will allow California's employment to continue to grow, especially in low carbon industries. This model projects growth in industries such as chemical manufacturing, natural gas distribution, and electrical power generation, transmission, and distribution, which are related to the increase in low carbon fuels use expected to result from the LCFS. Overall California employment is projected to grow by over 2 million jobs over the course of the coming decades.[110]

As the transportation fuel system changes, some of these employment transitions are already occurring. UC Berkeley Labor Center recently conducted a survey of laid-off Marathon workers[111] that sheds some light on post-refinery transition employment changes. The survey found that two-thirds of all laid-off workers were employed at the time of the survey. The survey found that of all laid-off workers,10 percent had retired. Of the workers who did not retire, 74 percent of workers had found new jobs after the layoff, 19 percent of workers responded that they were not employed but looking for a job, 4 percent were not employed but not looking for a job. The remaining 2 percent were temporarily laid off from their current job. The relatively high post-layoff employment rate among Marathon refinery workers likely reflects their competitive position in local hiring options, as they are highly skilled industrial workers with experience working in highly regulated, complex, and dynamic industrial environments.

However, the study also found post-layoff jobs did not compare in pay or working conditions to Marathon refinery jobs. Former Marathon workers found themselves in jobs that paid $12 per hour less than their Marathon jobs. The median hourly wage at Marathon was $50, compared to a post-layoff median of $38. Wage inequality defines the post-layoff wages of Marathon workers. Workers reported benefit packages comparable to their pre-layoff Marathon benefits.[112]

Workers found jobs in a range of sectors, although the oil and gas sector was the most common sector of re-employment, accounting for 28 percent of all employed workers. With four other refineries in the Bay Area, some workers were able to vie successfully for open positions given skill set matches. The utility sector was the second most common sector of

---

[109] *A Program for Economic Recovery and Clean Transition in California*

[110] California Air Resources Board (2023). *Initial Statement of Reasons*. *LCFS ISOR*

[111] The survey of employees was conducted between December 2021 and March 2022. See *Fossil fuel layoff: The economic and employment effects of a refinery closure on workers in the Bay Area*

[112] The survey of employees was conducted between December 2021 and March 2022. See *Fossil fuel layoff: The economic and employment effects of a refinery closure on workers in the Bay Area*

re-employment, where interviews revealed that jobs in this sector were highly sought after by workers and a good match for worker skills and experience.

With many workers chasing existing job openings in the same sector for a given area, many laid-off workers sought jobs in other sectors.[113] Some workers leveraged their experience on the refinery fire crew and safety response teams to secure work as firefighters or emergency management technicians. Others were successfully hired into emergency services jobs with the local public safety, noting the security of unionized, public-sector employment.

In a different study, the UC Berkeley Labor Center conducted a job match analysis[114] that compared refinery occupations to other Bay Area regional occupations, finding that refinery workers were at the highest risk of being unable to find a job with a comparable skillset, wages and benefits. A key finding was that comparable occupations outside of the refinery industry are not currently expected to grow in sufficient numbers to absorb expected job losses from refinery closures, and that wages for these comparable occupations and industries are currently around half of refinery worker wages. In addition to the worker and community support programs, successful workers also require strong high-road economic development strategies for refinery regions with industries that create high-quality jobs that utilize the skillset of refinery workers, support local economies, and provide tax revenue for essential public services.

Many occupations with skill sets that correspond to at-risk refinery occupations are found in other production/manufacturing industries. Table 9 shows the median hourly wage for top high-risk refinery occupations in Contra Costa County and the median hourly wage for occupations with corresponding skill sets that have projected employment growth. For some occupations, median wages in corresponding occupations have a wide range below 50 percent (less than half). Several corresponding occupations have similar or higher pay given union density.

---

[113] The survey of employees was conducted between December 2021 and March 2022. See *Fossil fuel layoff: The economic and employment effects of a refinery closure on workers in the Bay Area*

[114] Hammerling, Jessie HF, et al. "Refining Transition: A Just Transition Economic Development Framework for Contra Costa County, California," Appendix B: Refinery worker job match analysis." Page 109.

Table 9. Median Wages for High-Risk Refinery Occupations and Matching Occupations Expected to Grow in Contra Costa County[115]

Top at-risk refinery occupations	Median hourly wage*	Related occupation	Median hourly wage
Petroleum Pump System Operators, Refinery Operators, and Gaugers	$49.53	Chemical Equipment Operators and Tenders	$28.71
		Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	$24.44
Mixing and Blending Machine Setters, Operators, and Tenders	$24.16	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	$24.44
		Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	—
		Food Batchmakers	$18.39
Industrial Machinery Mechanics	$37.77	Maintenance and Repair Workers, General	$29.24
		Mobile Heavy Equipment Mechanics, Except Engines	$36.98
		Maintenance Workers, Machinery	$34.58
		Electrical and Electronics Repairers, Commercial and Industrial Equipment	$37.09
		Machinists	$29.38
		Stationary Engineers and Boiler Operators	$50.36
		Millwrights	$49.85
Chemical Plant and System Operators	$49.43	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	$24.44
		Chemical Equipment Operators and Tenders	$28.71
		Mixing and Blending Machine Setters, Operators, and Tenders	$24.16

Refinery skill sets align with occupations in food and beverage manufacturing, chemical manufacturing, pharmaceutical manufacturing, clean and renewable energy, and machinery and plastics manufacturing. Skill alignment, however, does not always translate into occupational transfer. Refinery workers have extensive training and experience working with complex technologies and industrial systems as well as substantial health and safety training. Displaced refinery workers may be overqualified for certain aligned occupations and industries. They may also have difficulty obtaining skills recognition and verification by new employers given the lack of industry-recognized skill certifications. Fostering job

[115] Median wages include workers in the occupation employed in other industries in the region, in addition to refineries. Refinery industry wages tend to be higher compared to other industries. Source: Employment Development Department Regional Planning Unit data, 2018-2028 (updated Q1 2022), for Contra Costa and Alameda Counties; O*Net Career Changers Matrix (2023); Bureau of Labor Statistics Office of Employment and Wage Statistics 2021 and Quarterly Census of Employment and Wages 2021.

growth that aligns with high-risk workers' skills is an important strategy for facilitating swift employment post-layoff.

Economic Considerations

Direct and indirect tax revenue from oil refineries, their supply chains, and associated services is derived from property and sales taxes, special assessments, and other taxes. While there has not been an independent statewide tax analysis completed on the oil refining industry and its contribution to local government and services,[116] there are regional studies that offer insight. Table 10 below from the UCB Labor Center report summarizes the revenue amounts across cities, special districts, and Contra Costa County in 2022.

Table 10. Refining Industry Estimated Tax Impacts in Contra Costa (Millions)

Impact	Cities	Special Districts	Contra Costa County	Total local impact
Direct *Petroleum refining industry*	$33.6	$60.0	$42.7	$136.3
Indirect *Petroleum refining input activities*	$206.0	$368.9	$261.2	$836.1
Cumulative local impact	$239.6	$428.9	$303.9	$972.4

Table 10 also highlights the importance of tax revenue and refinery supply chain company links. Inequities exist between local taxes collected from the refineries compared to their share of total economic output.[117] Additionally, special district revenue is critical as funding is used for essential public services (i.e. fire protection, water, transportation, sanitation, etc.).

In Los Angeles County, refinery tax revenue impacts could potentially be larger than Solano County's[118] and Kern County's tax impacts, due to the larger number of refineries, supply chain companies, and associated services in Los Angeles County. There has been public discussion within refinery communities (including at TFTP workgroup and community meetings) regarding the level of direct taxes paid by the refineries and responses by communities to pursue local tax measures to increase the taxes paid by refineries to support municipal services.

A 2020 WSPA-commissioned report identifies the Valero Wilmington and Phillips 66 Wilmington refineries as the fourth and seventh largest property taxpayers to the City of Los

---

[116] *UC Merced Labor Center* is currently completing a statewide oil industry tax analysis.

[117] *Refining Transition: A Just Transition Economic Development Framework for Contra Costa County, California - UC Berkeley Labor Center*

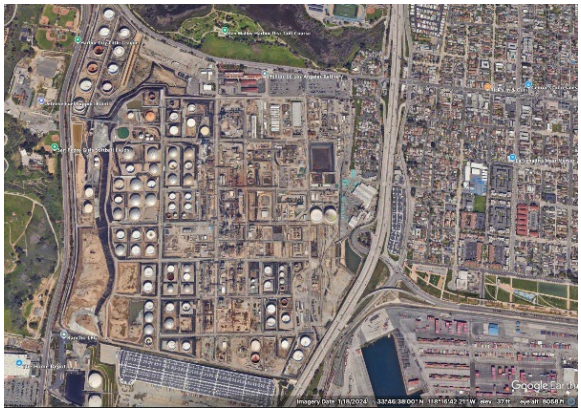
[118] Based on draft unreleased job and tax analysis completed by Inclusive Economics on behalf of the CCRTP.

Angeles in 2019,[119] and the Marathon and Phillips 66 Carson refineries as the largest and second largest property taxpayers, respectively, to the City of Carson. The report identified that 11.9 percent of jobs and 37 percent of Carson's general fund budget were connected to the oil and gas industry in the city.[120]

Environmental and Land-Use Mid-Transition Strategies

Given the trajectory of California's climate policies and fuel transition, recommendations from reports and public testimony indicate the need to address responsible cleanup and reuse of refinery lands. Additionally, there is the need to pursue policies to ensure proper labor, community, and environmental standards for the cleanup process while guaranteeing robust community engagement and discussion. These policies must furthermore ensure that in the event of a facility closure announcement, the community can collaboratively re-envision land use/reuse to balance the competing constraints, needs, and opportunities for refinery lands.

Figure 15. Satellite view of the Phillips 66 refinery in Wilmington and adjacent property[121]



Repurposing or reuse properties and regions requires collaborative and coordinated land use planning and development activities that are consistent with and advance State planning priorities.[122] Elements of this vision were articulated by communities through feedback received during the public TFTP development process.

---

[119] *Contributions of the Oil and Gas Industry to Los Angeles County*

[120] IBID.

[121] *There's a 'lake' of oil under LA's soon-to-close refinery. Who's going to clean it up?*

[122] The State Planning Priorities generally include (1) promoting infill development, (2) protecting natural and working lands, and (3) encouraging efficient development patterns and investments that are consistent with adopted plans in areas appropriately planned for growth. The State Planning Priorities are "intended to promote equity, strengthen the economy, protect the environment, and promote public health and safety in the state, including in urban, suburban, and rural communities". *California Government Code, § 65041.1*.

Refinery facilities and adjacent lands hold significant acreage of local refinery communities. There is a strong desire in refinery communities to re-envision and reshape future refinery lands once facilities close. The potential to meet multiple economic, job, tax revenue, parks, and open space needs from redevelopment is real and relies on significant cleanup and proactive steps. There are also community concerns that closures could lead to displacement of residents given that the refinery source of pollution (see key pollutants above) would be going away. Anti-displacement policies could help stem fears from long-time residents that they would be forced out.

Employment Mid-Transition Responses

As shifts in the energy industry continue to drive demand for cleaner technologies and jobs in California, thousands of skilled fossil fuel oil and gas workers face the risk of displacement. The mid-transition presents a critical opportunity to support these workers and their families while building a more resilient, future-ready workforce. Labor organizations and facilities can play a vital role in this transition,[123] especially in partnership with workforce development organizations, educational entities, and new employers. Understanding worker dilemmas, such as the lack of defined skill sets and assessments of those skills for those currently employed by the refineries, is fundamental. This information is useful as clean energy generation facilities do not always exist next to refinery facilities, and impacted workers and families must make decisions that could affect job relocation. Additionally, workers' knowledge that the next employment opportunity is likely to be significantly lower in wages than their current jobs (see studies previously noted) can delay transition assistance until the last moment.

Federal and state workforce agencies have developed policies, programs, and fiscal structures/strategies to support displaced workers and workers in transition. Through a tiered framework of support, labor organizations and facilities should partner with workforce development organizations, educational entities, and potential employers to maximize new employment opportunities. A tiered structure for displaced workers is constructed on different levels depending on the needs of the worker.

Level 1 Support

Labor organizations and facilities partner with workforce development and/or educational entities to ensure workers receive verified training records. This enables credit for prior learning and prior learning assessment based on on-the-job experience, accelerating their path to new credentials and reducing barriers to a new career pathway.

Prior learning assessments (PLA) are used to determine whether a worker's existing knowledge, skills, and competencies—gained outside of traditional academic settings—can

[123] *Employment Training Panel Approved Chevron Training Proposal January 2025 Panel Packet*

be recognized for academic or training credit. Credit for prior learning (CPL) is the academic or training credit awarded through a PLA process. It acknowledges that learning is acquired through work experience - not just in classrooms - and gives workers a head start toward their next credential or career. PLAs and CPLs empower workers to move forward faster knowing that their experience is valued and recognized

Level 2 Support

In addition to the above, organizations actively support worker transitions by hosting or participating in job fairs and placement events, offering skills assessments, career counseling, sharing information on training and certification opportunities, and connecting workers to supportive services and local workforce agencies.

Level 3 Support

Level 3 support includes previous levels of support and adds direct funding or resource support for workers to build new skills aligned with career paths that offer long-term growth and economic mobility, require similar skill stacks to their previous roles, and provide wages and benefits comparable to those in the oil and gas sector.

Level 4 Support

This level encompasses all prior levels and adds comprehensive, wrap-around resources for workers and their families. These may include:

- Childcare and housing assistance
- Mental health and wellness services
- Stipends to support cost beyond tuition and equipment cost while in training
- Relocation support
- Financial planning, support, incentives, and stability services

Regional studies and publications with direct labor and community input and other interested parties provide invaluable perspectives used to inform mid- and late-transition planning. Given the state's current mid-transition status, state agencies have focused on investing in key sectors that drive economic growth and good paying-jobs,[124] direct dialogue with labor on solutions, establishment of new programs and funding, implementation of federally funded programs, and other efforts.

Discussed below are some key existing efforts and labor-supported efforts that address the mid-transition and prepare for further refinery closures. Chapter 4 of the TFTP builds on these efforts, detailing additional community and workforce strategies.

---

[124] *California Jobs First*

1. California Displaced Oil and Gas Worker Pilot Fund (DOGWF) – Established through a $36.5 million General Fund allocation in the fiscal year 2022-2023, the fund is administered by the Employment Development Department (EDD), in consultation with the Labor and Workforce Development Agency (LWDA) and unions. The program assists displaced refinery workers by supporting their movement into other sectors that match their skills and experience and offer comparable wages.
2. CCRTP HRTP - The project addresses the critical need to plan for economic conversion of a Bay Area refinery through community engagement and shared visioning led by impacted workers and community members with results noted above. CCRTP continues to meet to implement recommendations with a focus on local and county actions in Contra Costa County.
3. SB X1-2 Transportation Fuels Transition Plan Development Docket[125] - The CEC and CARB held numerous workgroup meetings and community hearings throughout the state in 2024 and 2025. Extensive public comments were provided and documented (Appendix A). CEC and CARB also relied on extensive public comments on the development of the TFA.
4. Los Angeles Just Transition Task Force (LAJTF)[126] – The LAJTF was established in 2021, funded by a non-profit,[127] and has developed strategies to support oil workers in Los Angeles who would be impacted by refinery closures.
5. Green Empowerment Zone[128] - The Green Empowerment Zone for the Northern Waterfront Area of the County of Contra Costa directs the governing board to identify projects and programs and make policy recommendations to improve the economic vitality of the industrial area including leveraging opportunities to grow the clean energy economy.

Refinery workers bring valuable experience, discipline, and technical expertise that can be redirected into California's safe and clean-energy growth and expansion. Understanding the framework and the current body of study can reduce unemployment and economic disruption in vulnerable regions, accelerate the development of a skilled clean energy workforce, and promote equity and inclusion in the state's economic transformation. Collaborative and collective discussion of labor strategies with existing refinery employers, with new and emerging employers, with local municipalities, and with regional, state, and federal and workforce entities is critical. Moreover, labor and communities should harness

---

125 *CEC 23-SB-02 Docket Log*
126 *Los Angeles County-City Just Transition Task Force*
127 *Just Transition Fund - Supporting Resilient Local Economies*
128 *AB 844 (Grayson, Chapter 377, Stats. 2021*

studies and lived experiences to provide clarity on the vision and re-imagining of their communities for the next century.

Chapter 4: Strategies and Management of the Transition

The previous chapters have detailed various aspects of the fuels transition, including California's air quality, public health, and climate goals, and shifting consumer preferences, driving the need for intentional planning through the transition; the ICF modeling work underpinning some of the strategies discussed here; and how to embed equity for impacted communities and the transition of the labor force. There are also future uncertainties associated with the transition, including changes in fuel demand, the pace of refinery closures, the availability and scalability of fossil fuel alternatives, and the development and adoption of new technologies. These topics highlight the need for ongoing and proactive management of the transition away from fossil-based transportation fuels. There are many interrelated findings and strategies discussed in the TFTP workgroup and community meetings, the TFA, CEC Vice Chair Gunda's response to Governor Newsom's April letter, and CEC's SB 237 Assessment.[129,130] These strategies primarily address a holistic fuels transition. In this longer-term holistic and equitable approach, the TFTP categorizes community and workforce strategies, fossil demand reduction strategies, and supply stabilization strategies as all having interrelated roles. The TFTP also presents some additional considerations for encouraging fuel infrastructure investment.

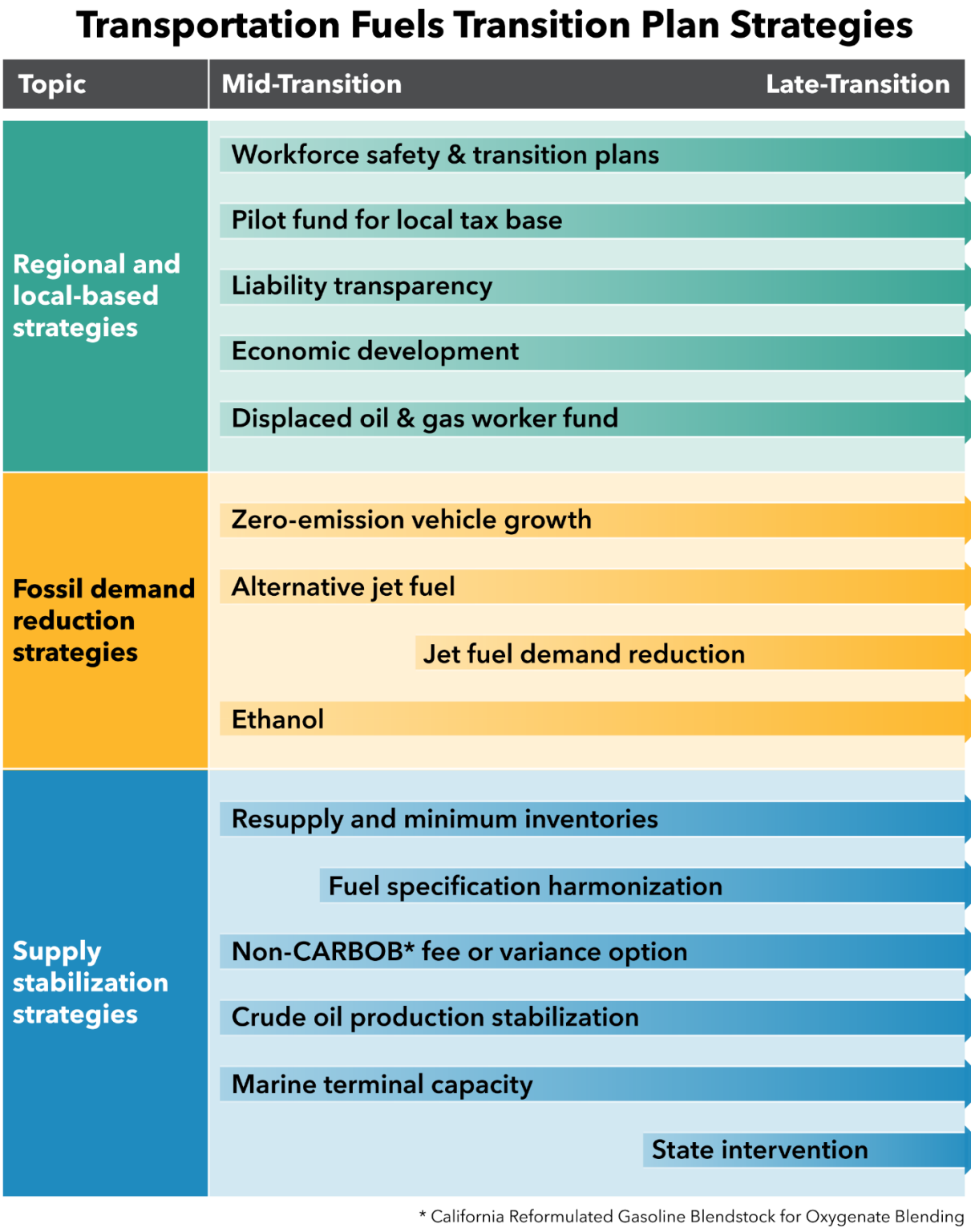
Some of these policy strategies are designed to address challenges and opportunities in the nearer-term mid-transition phase, with strategy development needing to happen simultaneously and starting soon (Figure 16). Others will require longer development times and are best suited to address challenges in the late-transition phase, though these strategies might require consideration sooner than anticipated given the amount of uncertainty ahead for the State during this transition. Please note that some policies may require legislative action or regulatory changes to implement, while others may be pursued at the local level. Each policy strategy has environmental, legal, and economic implications that must be considered before implementation, and ongoing planning and implementation is required to ensure a smooth, managed transition away from fossil-based transportation fuels in California.

---

129 *CEC Response to Governor Newsom Letter - June 2025*

130 *Governor Newsom Letter to CEC - April 2025*

Figure 16. TFTP Strategies listed by topic area and approximate time horizon



Mid-Transition Strategies

Equitable Community and Workforce Transition Strategies

As described in Chapter 3 (Regional and Community Transition), refinery communities and the incumbent workforce are directly impacted by all fuel transition phases. A key highlight is the recent refinery closure in Philadelphia, which has faced significant environmental remediation challenges, associated community impacts, and workplace safety concerns leading up to the closure.[131] Addressing and minimizing the impacts of refinery closures in an equitable manner on communities, workers, and the environment requires a concerted effort across many different groups. These groups include public agencies, labor organizations, environmental and community-based organizations, public health entities, refineries, oil production facilities, and new employers. Public engagement for the TFTP was an important step in this process, including public comments, TFTP workgroup meetings, TFTP public meetings, and direct engagement with interested parties. The results of this public engagement informed the following holistic transition management strategies. These strategies emphasize healing and recovery of refinery and other fenceline communities across the State, with equity as a key element at each stage.

Workforce Safety and Transition Plans by Refineries

Maintaining refinery safety standards is critical for the mid-transition phase. Facility safety risk to workers and communities is considerable, and transition planning should start immediately and well before public closure announcements are made. While refineries are already required to submit planned turnaround schedules for the upcoming year, these reports should be extended to include staffing plans and schedules to the appropriate state agencies to ensure safe staffing levels and successful completion of regular and necessary maintenance.

Refineries should each consider the collaborative development of a Workforce Safety and Transition Plan (WSTP) with impacted labor organizations that include appropriate standards and practices to ensure safe operations while refineries continue to operate.[132] WSTPs should contain, for example, identification of number/classification of employees impacted by a potential closure or reduction in workforce, as well as the following:

1. Identification of the number and type of employees needed to safely close or convert the facility and potential incentives[133] to keep employees on through closure.

---

[131] *An Unrefined Ending: Lessons Learned From the Creation and Closure of the Philadelphia Energy Solutions Refinery" (Union of Concerned Scientists, March 2023)*.

[132] *Colorado Workforce Transition Plan*

[133] At community meetings, participants expressed that a risk of advanced refinery closure announcements is the potential for staff shortages in a facility prior to closing. In the past, refiners have withheld severance benefits and access to employment records to discourage workers from leaving early.

2. A collaborative Worker Safety and Transition Assistance Program funded by the employer between the employer, labor representatives, and case management/transition navigator organization(s) identified by the labor representatives. This program would provide workers with job search and retraining support, worker relocation to operational refineries, access to benefits, access to mental health and financial counseling, and additional resources.
3. Require WSTP to be updated annually or immediately after deviations from WSTP are noted.
4. Require refineries meet with impacted labor representatives on WSTP annual reports to ensure safe staffing levels and maintenance activity following closure announcement.

Assessment of a Pilot Fund for Local Tax Base Support

Chapter 3 (Regional and Community Transition) describes the tax revenue impacts to communities once refineries close and the adverse aftermath to community quality, safety, and essential services due to the loss of revenue. There is a significant lag in the time in which municipal budgets can cover the costs of essential services while site remediation and new development or economic diversification come online. Therefore, it is critical to assess a potential pilot fund to support local municipalities in addressing major budget gaps due to lost tax revenue from refinery closures. Immediate strategies include the analysis of options for pilot fund design, based on established models from within California and other states,[134] identifying a funding source(s) to support the refinery communities of Benicia and Wilmington in maintaining public services following refinery closures, and an evaluation of longer-term industry or other funding mechanisms to make the tax base support fund permanent.

Transparency of Refinery Retirement Liabilities

Transparency in the planning and implementation processes surrounding asset and land transference is critical for refineries during this fuels transition. The responsibility to clearly identify and make available refinery retirement liabilities (e.g. safety, environmental, financial, and other liabilities) and their associated costs may fall on multiple parties, including but not limited to refiners, municipalities, and developers, but doing so will allow for private and public entities to more appropriately plan, manage, and finance refinery transitions. The importance of this strategy is outlined below in more detail. However,

---

[134] Examples of tax remediation funds include the PG&E settlement with the County of San Luis Obispo in anticipation of the planned closure of Diablo Canyon nuclear power plant ($85M for a community impact fund, along with a $350M worker fund), the State of Illinois Clean Energy Empowerment Zones (up to five years of tax base replacement for communities that lose a power plant or coal mine, up to $100M annually statewide), and State of New York legislation to support the community of Tonawanda, NY anticipation of the closure of the Huntley Generating Station coal-power plant ($45M)

development of concrete actions including information gaps are in its early stages and ongoing.

Refineries should meet their community obligation in the transference of assets and remediated lands by doing so in a manner that does not adversely impact environmental quality and quality of life. Local municipalities should address shifts in land use development and approve the requisite zoning requirements that will accommodate new uses. Developers should transparently identify and discuss with the public opportunities to use refinery assets and lands as well as mitigate negative impacts with intentional mitigations. These parties should include and make impacted communities aware of the various public processes so that the public can stay informed and engaged in public decisions. The consequence of not addressing these liabilities is that without a comprehensive plan for asset transition, communities and municipalities may bear the brunt of cleanup costs.

Proactive planning for clean-up, decommissioning, and transference of assets and lands is critical. Key takeaways from the literature (Chapter 3), public comments provided at numerous TFTP associated meetings (Appendix A), and the experience of the State in addressing these issues include an expectation that refinery lands and assets are polluted and contaminated. Existing state and federal laws around the clean-up of contaminated industrial lands and groundwater will govern, with numerous agencies involved with interrelated jurisdiction. Ensuring communities and municipalities are not left with the cost of cleanup is important. Refineries must dispose of legacy assets and clean up lands so that communities can repurpose property for new development and community needs. Refinery transition planning and oversight by the state and local entities is an important strategy through all transition periods.

Local Economic Development Initiatives that Diversify Fossil-Fuel Based Economies

The Green Empowerment Zone (GEZ) in Contra Costa and Solano counties is an example of a local economic model that can diversify previously fossil-fuel based economies, and similar models should be considered by other localities during this transition. Recognizing the region's significant economic reliance on the refinery industry, AB 844 (Grayson, Chapter 377, Statutes of 2021)[135] established this GEZ. The GEZ's Governing Board is composed of local, state,[136] and federal officials, as well as labor, community, and other groups. The Governing Board is tasked with identifying projects and programs, completing research, and making policy recommendations to improve the economic vitality of the industrial waterfront corridor, including leveraging opportunities to grow the clean energy economy. The Governing Board has contracted with the UC Berkeley Labor Center to

---

135 *AB-844 Green Empowerment Zone*

136 The Governing Board of the Green Empowerment Zone includes representatives from both CARB and CEC

advance a strategy to grow the clean energy manufacturing industry in the region,[137] which includes research, technical assistance for employers and other groups pursuing projects, and an action plan with concrete recommendations. The GEZ demonstrates a proactive and regional economic development effort focused on advancing worker and community transition. Regional efforts, particularly those focused on a high road[138] model of economic development like the GEZ are important for building consensus among key groups, identifying barriers, and advancing collaborative action to promote economic resilience.

California Displaced Oil and Gas Worker Fund

The California Displaced Oil and Gas Worker Pilot Fund (DOGWF) provided $40 million in Fiscal Year 2022-2023 to support workers displaced in the oil and gas industries by supporting their transition into sectors that match their skills and experience and offer comparable wages. In 2024, an additional $1.0 million was awarded to an evaluation and technical assistance (TA) provider, which will serve a key role in terms of communication, compliance and monitoring, and in tracking results. The DOGWF program is an important and positive step during the mid-transition in reducing the impacts to refinery workers and other workers in the oil and gas sector. In the near-term, DOGWF should be evaluated further to gather results from this investment and understand lessons learned, while considering additional strategies that can inform the impacts on labor during this transition period.

Fossil Demand Reduction Strategies

The supply modeling in Chapter 2 (The Transition of California's Fuel Supply) shows that continued reductions in gasoline and diesel demand will lead to the loss of in-state refining capacity over time. Combined with the state's isolated fuel market, increasing options for fossil fuel independence is a valuable approach to maintain fuel price stability. These options should cover a variety of fuel and transportation service types to promote market resilience. Adaptively coordinating these demand-reduction strategies will help meet transportation fuel needs and decrease reliance on traditional gasoline and diesel.

Zero-Emission Vehicle Growth

Executive Order N-27-25 issued in June 2025 strengthens the state's commitment to reducing harmful air pollution from transportation and directs several state agencies, including CARB and the CEC, to recommend ways to expand the use of Zero-Emission

---

[137] "High Road Sector Strategy for Clean Energy Manufacturing, UC Berkeley Labor Center presentation to the Green Empowerment Zone Governing Board". *https://www.contracosta.ca.gov/AgendaCenter/ViewFile/Agenda/_04192024-6182*

[138] *Putting California on the High Road: A Jobs and Climate Action Plan for 2030*

Vehicles (ZEVs) across all vehicle types and in all communities. The goal is to make clean transportation more affordable, reliable, and accessible. As discussed in Chapter 1 and 3 of the TFTP, there is an opportunity for Californians to reduce their overall transportation costs through ZEV utilization, a strong skills nexus to new employment opportunities for refinery workers in the ZEV space (e.g., manufacturing, service, and operations), and an opportunity for communities to accrue the benefits of ZEV investments such as reduced air pollution and employment opportunities.

In the Report to the Governor In Response[139] to Executive Order N-27-25 Zero-Emission Vehicle Deployment, recommended strategies to continue growing adoption of ZEVs in California are grouped into six categories: private investment, incentives, infrastructure, fuel pricing, regulations, and procurement. The response to the Governor's Executive Order suggests other methods to support affordable low carbon transportation options as well given the distribution of internal combustion engine vehicles on the road in future decades may present equity challenges. The TFA identifies the share of new ZEV sales by county and notes that rural areas do not have as many sales as more urban areas.**Error! Bookmark not defined.** As internal combustion engine vehicles will remain on the road, sales data show that more attention needs to be paid to those in underserved communities – equity is, and needs to be, a consideration. Rural, DAC/LIC, and tribal residents still driving internal combustion engine vehicles will be heavily impacted by gasoline price spikes and expose them to transportation price disparities. Supporting equitable ZEV deployment will help to minimize the impacts of gasoline price spikes for Rural, DAC/LIC, and tribal communities.

Examples of these strategies include:

- Sustain the LCFS program to ensure private investment continues to support the ZEV market. Over 200 private companies participate in CARB's LCFS program that attracts investment from clean fuel producers (electricity, hydrogen, renewable diesel) and fueling infrastructure companies to generate credits that help subsidize clean fuels used in ZEVs, reducing ZEV ownership costs.
- Support ZEV market deployment incentive and rebate programs. Reliable and consistent funding to CARB and CEC for the state's ZEV deployment and ZEV infrastructure incentive programs supports the expansion of existing and growing light-, medium-, and heavy-duty markets (including transit), and increases access to ZEVs for DAC/LIC consumers and small businesses.
- Create an education pathway and pipeline for good paying careers/jobs. The LWDA, in consultation with CARB, CEC, and others should develop additional educational pathways and ensure equitable access to apprenticeships, college courses, and certification programs in the clean transportation industry.

---

[139] California Air Resources Board. 2025. *Report to the Governor in Response to Executive Order on ZEV Deployment*

- Increase electric vehicle (EV) charger reliability and access. Increase EV charger reliability through regulations. Provide flexibility to payment methods at public chargers, accelerate Plug and Charge implementation, ensure transparent charger price, and navigate data access. Expand at-residence charging installation, both for single family and multi-family properties especially in DAC/LICs.
- Explore options to utilize the California Climate Credit[140] to support more affordable EV charging. Incorporate this option into the California Public Utilities Commission (CPUC) rulemaking 25-07-013 to improve the distribution of the California Climate Credit.
- Support local government fleet deployment of zero-emission vehicles. Update funding guidelines for state programs supporting local government and transit vehicle procurement to require or incentivize ZEV purchases. Develop statewide cooperative purchasing strategies to aid local governments in procuring ZEVs at the lowest cost.

In October of 2025, CARB launched the new Drive Forward Initiative. Drive Forward reaffirms California's leadership in clean air and climate policy and charting the next phase of the State's light-, medium-, and heavy-duty vehicle programs and includes many of the strategies on the list above. Building on the foundation established through ZEV Forward,[141] and guided by Executive Order N-27-25, the Drive Forward initiative continues California's commitment to meeting both state and national air quality standards, achieving climate and clean air goals, and protecting public health through strong vehicle standards. Drive Forward will advance this work by supporting the development of light-, medium- and heavy-duty vehicle regulations, incentive programs, outreach and education, and complementary programs and policies that enable clean vehicle deployment. This effort will build on existing tools and resources essential to accelerating the advancement of clean technologies.

Regardless of ZEV types and uses, California will continue to develop strategies that accelerate ZEV adoption and growth with an emphasis on equity to help reduce fossil fuel consumption, improve public health, and achieve other socioeconomic benefits.**Error! Bookmark not defined.**

Alternative Jet Fuel Production

As identified by the supply model analysis, the transportation fuels transition involves an anticipated increasing demand for jet fuel alongside the potential closures of in-state refineries in the future. Given this tension, the expanded production of alternative forms of jet fuel could play a critical role in addressing ongoing jet fuel demand, with actions already

---

140 *California Climate Credit*

141 *ZEV Forward | California Air Resources Board*

being considered by the State. The Governor's Proposed 2026-27 Budget includes a tax credit to incentivize the production of sustainable aviation fuel (SAF), a lower-carbon alternative to petroleum-based jet fuel.[142] This investment could advance California's climate and air quality goals by reducing emissions from the aviation sector, one of the most difficult sources to decarbonize, while supporting innovation and private investment in clean transportation fuels.

SAF is typically blended with traditional jet fuel, ranging from 10 to 50 percent depending on the SAF type. Facilities that produce renewable diesel can typically produce SAF if they install additional processing retrofits. Thus, some existing renewable diesel facilities may also be well suited to produce SAF. The other alternative for aviation fuels is e-fuel. This type of fuel is not produced by biological feedstocks, but instead is produced primarily by electricity, water, and carbon dioxide sourced either from the ambient air or other carbon dioxide sources. Electricity is the energy input, creating hydrocarbons with water and carbon dioxide molecules. The simple hydrocarbons must be combined in industrial processes that create jet fuel.

In-state alternative aviation fuel production may provide the opportunity for transferable job skills to new employment, including at existing refineries should they produce SAF. Potential environmental risks and other impacts to communities should be analyzed as the State considers the use and production of alternative jet fuels.

Beyond existing policies and the proposed tax credit, more State action facilitating the expanded supply and demand of SAF and e-fuels production facilities may be warranted.

Jet Fuel Demand Reduction

California can support the development and use of alternative technologies that would help reduce demand for jet fuel or at least reduce the rate of growth in demand, particularly as these technologies develop and the State approaches later stages of the fuels transition. The supply model (refer to 2.3.1 California Fuel Demand; Appendix B) indicates increased demand for jet fuel associated with increased air travel demand throughout the 2030s and 2040s. Alternative technologies, such as electric aviation, hydrogen fuel cell aviation, hydrogen combustion, and some aviation service substitution with high-speed rail, provide a valuable role in diversifying transportation modes.

Zero-emission aviation technologies are at an early stage of development, but they hold some promise for future commercial applications. Battery electric aircraft are limited primarily by the weight of the battery, so current prototypes have limited range and may not allow for aircraft that can handle many passengers. Fuel cell-powered aircraft may allow for

[142] *2026-27 GB Budget Summary*

medium-to-long range aviation, as the hydrogen fuel provides more energy per unit of weight than fossil fuels. Each technology, however, is at an early stage of development.[143]

Hydrogen combustion technology is at an earlier stage of development compared to previously discussed zero-emission technologies. While theoretically capable of delivering a very similar experience and range compared to conventional jet aviation, significant re-designs of aircraft components and frames may be necessary at the current stage of development.[144]

As alternative aviation technologies approach broader adoption, California should consider incentives and policies that encourage their use to reduce emissions and reduce demand for jet fuel.

Ethanol as Gasoline Alternative

Gasoline demand may be partially satisfied by increasing the ratio of ethanol in the baseline composition of California Reformulated Gasoline (CaRFG).[145] Currently, ethanol is blended with CARBOB at terminals by a process called oxygenate blending, resulting in a finished product, CaRFG. Currently, CaRFG uses up to 10 percent ethanol by volume (E10). Increased ethanol use may occur by allowing 15 percent ethanol by volume (E15) or encouraging more flex fuel vehicles that can use 85 percent ethanol by volume (E85). Assembly Bill 30 (Alvarez, Chapter 247, Statutes of 2025), signed into law in October 2025, immediately allows blends of gasoline containing 10.5 percent to 15 percent ethanol by volume to be sold in the state for use as a transportation fuel. CARB, CDFA, and other State agencies have released guidance on E15 implementation and will proceed as needed to align fuels regulations with AB 30.

Increased volumes of E15 may help to lower fuel costs. According to the United States Department of Agriculture, E15 contains 1.75 percent less energy than E10. At 2018 prices, E15 must be priced 4.3 cents per gallon lower than E10 to be competitive with E10 on a per mile-driven basis.[146] While there may be some benefit to the higher octane in E15, this benefit is limited to a small set of vehicle technologies; most vehicles would experience a slightly lower fuel economy (i.e., miles per gallon) when using E15. However, as ethanol receives federal subsidies and LCFS credits due to its lower carbon footprint, it generally

---

[143] The International Energy Agency regularly publishes its Energy Technology Perspectives Clean Energy Technology Guide. This guide evaluates the Technology Readiness Levels of various clean energy technologies. Key entries that inform the evaluation in this report include battery electric planes, hydrogen fuel cell aircraft propulsion, and direct hydrogen combustion in a jet turbine. See *https://www.iea.org/data-and-statistics/data-tools/etp-clean-energy-technology-guide?layout=trl&selectedTechID=all*

[144] See *https://www.iea.org/data-and-statistics/data-tools/etp-clean-energy-technology-guide?layout=list&selectedTechID=18b6f172*

[145] https://www.eia.gov/todayinenergy/detail.php?id=26092

[146] https://www.usda.gov/sites/default/files/documents/e15-market-opportunities.pdf

costs less than CARBOB. Programs such as LCFS increase the likelihood that fuel producers will increase ethanol supplies to California to generate LCFS credits, increasing volumes of E15.

There are mediating effects to E15 adoption that should be considered. First, it is not clear if AB 30's allowance of E15 will encourage higher sales of E15 due to retailer or consumer hesitance. Second, although equipment at most gas stations can support E15, some stations either require equipment upgrades[147] or have insurance requirements that would require the upgrades. Next, E15 is not recommended for some engines, such as engines in motorcycles, lawnmowers, chainsaws, motorboats, snowmobiles, vehicles with heavy-duty gasoline engines, and pre-2001 light-duty vehicles.

Additionally, adoption of higher ethanol blends may help advance environmental goals for seaport communities by not contributing to port congestion and traffic, as ethanol is primarily imported via rail. As such, rail lines would also need to be able to support additional imports. Air quality and equity impacts on rail communities in seaports and in warehouse and distribution center regions, however, should also be considered.

Supply Stabilization Strategies

One of the objectives for managing issues arising in the transition is the maintenance and stabilization of the supply of transportation fuels. This involves the retention of in-state refining capacity where appropriate and enabling supply of imported refined fuels for the needs of Californians. Various approaches may be pursued to these ends while at the same time addressing equity concerns. Some of the following strategies are recommended for the mid-transition phase while some are in need of detailed study and development for the mid- to late-transition period.

Resupply and Minimum Inventory Tools

Under AB X2-1, the CEC may consider resupply and minimum inventory requirements for in-state refineries, with the goal of supporting supply and price stability. The CEC is

[147] A recent report submitted to CARB indicates that some gaps of E10 for some equipment. "Some equipment currently in use in California is… listed [by Underwriters Laboratories] only for E10. Equipment with a UL listing of E10 could be considered compatible with E15 with a manufacturer's statement of compatibility, however research and previous requests show that not all manufacturers will provide this document for blends above E10." See CARB's Multimedia Evaluation Report, page 31. Available online at: *California Multimedia Evaluation of E11 - E15 Gasoline-Ethanol Blends Tier I Report*

currently evaluating these policies, alongside other supply stabilization tools, in an informational proceeding.[148]

Any resupply or minimum inventory requirement should be developed carefully, with consideration of compliance flexibility. AB X2-1 prescribes additional guardrails: in implementing any resupply or minimum inventory requirement, the CEC must ensure that the regulation protects the health and safety of employees, local communities, and the public. In implementing any minimum inventory requirement, the CEC must also show that the likely benefits to consumers from avoiding price volatility outweigh the potential costs.

Fuel Specification Harmonization

CARBOB is a unique gasoline blendstock exclusive to California's gasoline market that must meet regulatory standards established to reduce air pollution emissions. When CARBOB is blended with ethanol to create a fuel ready for retail sale, the resulting CaRFG must comply with the U.S. EPA's strictest standards for sulfur content, Reid Vapor Pressure (RVP), and benzene (a known carcinogen) content.[149] This specification has resulted in positive impacts on public health and the environment.

As part of implementing SB 237 (Grayson, Chapter 118, Statutes of 2025), CEC and CARB will coordinate on a more complete assessment of alternative fuel specifications. Passed in 2025, Senate Bill 237 requires two separate fuel analyses to take place in coordination with CARB as part of the CEC's next iteration of the TFA. The first is an evaluation of allowing the sale in California of gasoline with alternative specification to CaRFG. Aligning with other fuel specifications used in other parts of the U.S. could allow for a larger gasoline market by opening new markets for import of California gasoline. The second is an evaluation of development of a western region gasoline specification as an alternative to a California-specific specification. A new western region gasoline specification could align with other western states, including Arizona, Nevada, Washington, and Oregon, and allow for a larger gasoline market with a commonly applicable fuel standard. Together, these states currently comprise the continental states within the fifth national Petroleum Administration for Defense District (PADD 5). Greater connection between these states' markets could increase geographic connections via short marine connections, some pipeline flows, and production infrastructure that could support fuel availability and cost stability.

Harmonizing California's fuel specifications or establishing a western region fuel specification could create a broader gasoline market that could help to stabilize supply and prices. Such stabilization could also benefit regions outside of California during the mid- to

---

[148] The proceeding is established in the Informational Proceeding 25-OIIP-02. The docket page of documents in this proceeding can be found at: *https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=25-OIIP-02*

[149] Special Gasoline Blends Reduce Emissions and Improve Air Quality, but Complicate Supply and Contribute to Higher Prices

late-transition phase, but implementation of such harmonization would take time. No outcome is guaranteed, and developing a standard and following necessary legislative or regulatory pathways would require considerable time and resources. Despite the potential benefits of this strategy, there are significant challenges in developing and implementing a shared standard. There are logistical challenges of aligning multiple states on an issue which each state may have differing views. Aligning priorities with those of neighboring states may be difficult, as California's environmental standards are often more rigorous than those in other states due to California-specific conditions (e.g., nonattainment status for federally designated air pollutants).

Alignment with other states could impact air quality for Californians. A specification that is more relaxed than California's current standard may have a higher chance of agreement across states but could increase the pollution profile. Such air quality impacts for the state must be considered. Areas of California designated to be in nonattainment for one or more National Ambient Air Quality Standards (NAAQS) are required under the federal Clean Air Act to develop plans to meet the standards. These areas include most of the regions where the majority of the state's population exists, including the greater Los Angeles metropolitan area, San Diego, Sacramento, and the San Joaquin Valley, as well as several other densely populated areas. CaRFG helps California to meet NAAQS and if such specifications did not exist, non-attainment regions would be required to use federal RFG, which is currently the strictest fuel specifications used in the U.S. outside of California. Geography also impacts fuel harmonization, as the closest regions to California that use federal RFG are Denver, Houston, and Dallas. No PADD 5 region states use federal RFG.

Among other legal and procedural requirements, CARB must conduct a multimedia evaluation (MME) of any new fuel specification. As previously discussed, the MME process is used to identify and evaluate any significant adverse impact on public health or the environment that may result from the production, use, or disposal of fuels used to meet proposed fuel specifications.[150] An MME will need to be conducted for any newly proposed fuel specification, followed by a proposed rulemaking, both of which could span many years. given the requirements that exist under current law Vehicle testing to compare evaporative and exhaust emissions on vehicles using CaRFG and any new fuel specification will likely be required within the scope of those processes

Non-CARBOB Fee or Variance Option

A non-CARBOB fee option or variance allows gasoline suppliers to pay a fee to add non-CARBOB gasoline into the state's fuel system to boost overall supply and help stabilize prices. This program may result in air quality or health impacts, particularly if non-CARBOB fuels are sold during time periods where the state is already experiencing poor air quality.

---

[150] *https://ww2.arb.ca.gov/our-work/programs/fuels-multimedia-evaluation/fuels-multimedia-evaluations*

The CaRFG Regulation currently contains a mechanism that allows variance from certain fuel standards or compliance requirements during specific circumstances, including cases of emergency.[151,152] This mechanism distinguishes between emergency and non-emergency variances, with an emergency variance only allowable with a duration of 45 or fewer days. While 45 days is sufficient to handle many outages, it may not be able to address sustained outages that the state has seen in the past. For a non-emergency variance to gain approval, the applicant must demonstrate a need and CARB must assess the impact of the variance on air quality and to all parties, including the public. In most cases, CARB would establish alternative specifications for the variance fuel to minimize emissions. Only one emergency variance application has been made and granted to date (July 1999), though it was never utilized.

SB 237 requires the CEC in coordination with CARB to add into its next iteration of the TFA an evaluation and possible recommendations for a strategy to allow the sale of alternative gasoline specifications under specific circumstances. This could include the non-CARBOB fee option as put forward in the first TFA.[153] As part of the next TFA, the CEC and CARB will engage in detailed analysis on the framework and expected impacts of such a program. CARB and CEC will need to consider the potential additional non-CARBOB fuel that could be supplied, the air quality and other environmental risks of non-CARBOB fuel utilization, the potential fee amounts that should be considered, whether fuel suppliers would utilize a voluntary fee-based option, and if so, how much anticipated additional supply would be available and the anticipated impact to the market.

Crude Oil Production Stabilization

Crude oil production in California in recent years has declined faster than the demand for petroleum fuels.[154] The rate of decline of in-state production has resulted in additional marine imports of crude oil from foreign and Alaskan sources to supply refineries,[155] which presents operational and economic challenges to many Californian refineries. Most crude

---

[151] Cal. Code Regs., tit. 13, § 2271.

[152] For additional detail on CaRFG variances, visit the Variances from California Gasoline Specification FAQ. See *https://ww2.arb.ca.gov/sites/default/files/2026-03/Fuel_Variance_FAQ_3_12_2026.pdf*

[153] The general concept of a non-CARBOB fee option was introduced in the original TFA, which derived the concept from Severin Borenstein, James Bushnell, and Matthew Lewis (2004). See the Fee-Based Variance discussion in "Market Power in California's Gasoline Market," *https://bushnell.ucdavis.edu/uploads/7/6/9/5/76951361/csemwp132.pdf*

[154] Crude oil production data is available at the California Department of Conservation's Geological Energy Management Division's WellSTAR Data Dashboard. See *https://wellstar-dashboard.conservation.ca.gov/* Petroleum fuels data is available from the California Tax and Fee Administration. See *https://cdtfa.ca.gov/taxes-and-fees/spftrpts.htm*

[155] *https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/annual-oil-supply-sources-california*

oil produced in California tends to be heavier than imported crude and many refineries are generally better suited to process, and/or access California crude oil. Stabilization of in-state crude oil production- as advanced in SB 237 - is likely to encourage certain refiners to continue to stay in operation in the mid-transition phase and help to maintain price stability.

Another concern regarding the stability for crude production is state crude oil pipelines. Decreased throughput for these pipelines transporting California crude oil to refineries results in upward pressure on per barrel costs and potential operational viability. A pipeline that does not operate at a sufficient capacity may be faced with additional challenges that may risk premature closure. Pipelines are engineered for a minimum fluid flow to maintain certain conditions, such as crude oil viscosity. Pipeline retirement resulting from economic and/or operational viability challenges can have significant consequences to refineries, including logistical challenges and increased costs, elevating risk of refinery closure, and necessitate alternative transportation for crude oil, likely by truck or marine vessel, with notable emissions impacts.

With SB 237, the Legislature enacted immediate measures to stabilize the California transportation fuels market while also recognizing that communities located near oil and gas extraction infrastructure bear the brunt of pollution in the state and have disproportionate negative health outcomes. SB 237 deemed the Second Supplemental Recirculated Environmental Impact Report (SSREIR) for Kern County's adopted oil and gas permitting ordinance sufficient under the California Environmental Quality Act (CEQA) and allows 2000 new well permits to be issued per year in Kern County, ending in 2036. The SSREIR imposes measures to address potential environmental impacts associated with oil and gas production. The California Geologic Energy Management Division maintains lead agency status for drill or rework permits within a health protection zone in Kern County, with health protection zones being areas within 3,200 feet of a sensitive receptor, such as residences, hospitals, etc.[156] The State will need to continue to assess the need for crude oil production and a phase out plan as the transition advances.

Marine Terminal Throughput Capacity

As shown in the supply model, imports of refined fuels are set to increase as statewide refinery capacity decreases, while demand reductions do not offset that loss. On balance, there is a net decrease of liquid petroleum and product flow into the state, but a refinery ceasing operations results in a abrupt decrease in in-state fuel supply. In addition to the decrease in refining capacity, infrastructure that allows for imports will also be impacted, as refineries function as logistical facilities for petroleum and petroleum products.

---

[156] For more information on Health Protection Zones, see Public Resources Code Article 4.6 (commencing with Section 3280) of Chapter 1 of Division 3. *https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=3280&lawCode=PRC*

An optimization and potential increase in marine terminal throughput and distribution capacity for refined fuels will be an important strategy to minimize potential supply and demand imbalances and price volatility. The state should consider pathways to optimize marine terminal infrastructure, including but not limited to berths, storage tanks, and pipelines to handle larger and/or more frequent fuel cargoes. Import, storage, and distribution infrastructure may need to support increased gasoline, associated blendstocks, and jet fuel imports as in state refineries cease operations, with the proportion of jet fuel imports expected to grow as demand is projected to increase while gasoline demand falls. As such infrastructure is often subject to various state, regional, and local regulations and permit requirements, coordination between governmental entities will help support efficient progress of critical projects and enhance public engagement.

Broad policy options that may be considered include supporting confidence in investments to retrofit facilities (e.g., refined fuels in lieu of crude oil); increasing offloading, storage, and distribution capacity; streamlining operations; and ensuring ample access to import infrastructure for traders, importers, and marketers, not just incumbent firms. Additionally, efficient regulatory pathways for permitting these projects should also be prioritized and evaluated. Some facilities may currently be capable of importing more fuel but might not be permitted to do so. Identification of where such opportunities exist to quickly support needed import capacity should be priorities for evaluation and operationalization where appropriate.

Late-Transition Strategies

State Intervention

Additional state intervention could be appropriate in the late stage of the transition to support a managed transition. It is prudent for the state to engage in further research, analysis, exploration, and public discussion now to better prepare for the transition's later stages. A comparative analysis with other feasible policy responses would be most effective in guiding decision-making.

Conclusion

Planning during the mid-late transition will require adaptability and a continued investigation of the strategies detailed in this document, including potential environmental, legal, and economic implications. The transition must accommodate a number of uncertainties, including variability in demand for transportation fuels, price volatility, individual refiner changes that can occur abruptly (e.g., outages, closures), global market changes, fuel exports, and access to imported gasoline and jet fuel alongside downstream impacts on communities and workers. The TFTP provides California with several possible paths forward to manage issues arising during the transition in a way that ensures the supply

of petroleum and alternative transportation fuels is affordable, reliable, equitable, and adequate to meet consumer demand.