CALIFORNIA ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

CALIFORNIA AIR RESOURCES BOARD

California Energy Commission

Joint Agency Staff Report on Assembly Bill 126: 2025 Annual Assessment of the Hydrogen Refueling Network in California

December 2025|CEC-600-2026-022

California Energy Commission

Magdulin Dwedari, California Energy Commission
Tri Dev Acharya, California Air Resources Board
Primary Authors

Tomas Ortiz
Project Manager

Elizabeth John
Branch Manager
COMMERCIAL AND INDUSTRIAL ZEV TECHNOLOGIES BRANCH

Hannon Rasool
Director
FUELS AND TRANSPORTATION DIVISION

Drew Bohan
Executive Director

ACKNOWLEDGEMENTS

The following individuals and organizations contributed to this report:

California Energy Commission
- Magdulin Dwedari
- Mark Johnson
- Kristi Villareal
- Miki Crowell
- Tomas Ortiz

California Air Resources Board
- Tri Dev Acharya
- Natalie Reavey
- Joshua Cunningham
- Andrew Martinez

Governor's Office of Business and Economic Development
- Gia Brazil Vacin

ABSTRACT

The Joint Agency Staff Report on Assembly Bill 126: 2025 Annual Assessment of the Hydrogen Refueling Network in California, is prepared in accordance with Assembly Bill 126 (Reyes, Chapter 319, Statutes of 2023), which directs the California Energy Commission (CEC) and California Air Resources Board (CARB) to jointly report on progress toward establishing a hydrogen-fueling network that provides coverage and capacity for vehicles requiring hydrogen fuel.

As of September 2, 2025, CEC's Clean Transportation Program invested $174 million in light-duty hydrogen infrastructure, and 50 stations were open to the public. An additional 11 stations were temporarily non-operational, having been offline for at least 30 days. Due to maintenance issues, equipment failures, and hydrogen supply disruptions, the network's average availability over the past year was approximately 60 percent.

Despite these challenges, the average availability of the network can serve approximately 34,300 fuel cell electric vehicles (FCEVs), according to the National Renewable Energy Laboratory's Hydrogen Station Capacity Evaluation (HySCapE) Tool. This capacity is twice the fueling needs of the 14,128 light-duty FCEVs registered in California as of April 2025. However, while statewide fueling capacity exceeds demand, FCEV registrations are concentrated in areas such as San Francisco and Sacramento, where fueling access has declined.

Looking ahead, 51 additional stations are planned using CEC and private funding. By 2030, station developers forecast 112 stations, estimated to support up to 167,300 light-duty FCEVs. While this is nearly 10 times the number of vehicles auto manufacturers expect registered in California by 2028, this expanded capacity is intended to support future growth, improve regional access, and ensure network reliability as the market for FCEVs evolves.

As of July 2025, the CEC has also allocated nearly $120 million for medium- and heavy-duty hydrogen stations. Combined with public and private funding, California has 13 stations and 42 more planned.

Keywords: Assembly Bill 126, California Air Resources Board, California Energy Commission, Clean Transportation Program, fuel cell electric vehicle, hydrogen refueling station

Please use the following citation for this report:

Dwedari, Magdulin and Acharya, Tri Dev. 2025. *Joint Agency Staff Report on Assembly Bill 126: 2025 Annual Assessment of the Hydrogen Refueling Network in California.* California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2026-022.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

The *Joint Agency Staff Report on Assembly Bill 126: 2025 Annual Assessment of the Hydrogen Refueling Network in California* (2025 AB 126 Joint Report) describes the investment, planning, development, and use of hydrogen refueling stations to support fuel cell electric vehicles (FCEVs) in California as directed by Assembly Bill (AB) 126 (Reyes, Chapter 319, Statutes of 2023). AB 126 further directed the California Energy Commission (CEC) to allocate no less than 15 percent of the amount of funds appropriated by the Legislature under the Clean Transportation Program to fund hydrogen refueling stations until there is a sufficient network of stations to support existing and expected hydrogen vehicles until July 1, 2030. The bill removed the previous requirement for a joint assessment of the time and cost needed to attain 100 hydrogen refueling stations. Instead, the CEC and California Air Resources Board (CARB) must jointly review and report annually on progress toward establishing a sufficient hydrogen fueling network that provides the necessary coverage and capacity to fuel hydrogen vehicles placed into operation in the state.

Governor Gavin Newsom's Executive Order N-79-20 sets goals for all new passenger cars sold in California to be zero-emission by 2035, all medium- and heavy-duty trucks and buses operated in California to be zero-emission by 2045 everywhere feasible, and all drayage trucks to be zero-emission by 2035. These goals influence policies and investments planned by numerous California agencies and municipalities, including the CEC and CARB.

To achieve the state's goals, the CEC has allocated $174 million to fund public hydrogen infrastructure. This includes $153.6 million for capital expenditures and $20.4 million for operations and maintenance of hydrogen stations. As of September 2, 2025, California has 61 publicly available hydrogen refueling stations for passenger vehicles. This includes two additional hydrogen refueling stations that opened in 2025 and 11 stations that are temporarily non-operational (TNO). These are stations that previously achieved open retail status but have been unavailable for customer fueling for more than 30 days. Reasons for the inaccessibility include mechanical upgrades or repairs, hydrogen supply

KEY TAKEAWAYS

As of April 2025, DMV registration data show 14,128 light-duty FCEVs on California's roads, marking the first recorded decline in total number. Auto manufacturers have reduced their FCEV deployment projections for 2028 to 16,200 FCEVs.

California has 50 open retail stations that are available to the public and an additional 11 open retail stations that are nonoperational for more than 30 days. The average availability of open retail stations has improved to about 73 percent in the second quarter of 2025. However, due to hydrogen supply disruptions, maintenance and less FCEVs being driven, the average daily hydrogen dispensing between the third quarter of 2024 and the second quarter of 2025 decreased.

Based on current and projected FCEV numbers as of 2028, the state's existing fueling network is more than adequate to meet fueling needs. The fully operational network has the capacity to fuel 58,900 vehicles.

Alongside the Toyota Mirai and Hyundai NEXO, Honda introduced the CR-V e:FCEV in late 2024, bringing the number of publicly available light-duty FCEV models to three.

Global inflation, labor and material shortages, supply chain interruptions and low LCFS credit prices continue to affect station development.

High hydrogen prices and station reliability issues continue to affect the customer experience negatively.

disruptions, station testing, and reviews by local officials. Many of these TNO stations have been unavailable for more than a year.

The number of TNO stations has significantly decreased from the reported 20 TNO stations in the 2024 AB 126 Report to 11 TNO stations as of September 2, 2025. This decrease is partly because three TNO stations have closed permanently and partly due to CEC's strategy to allocate funding to support the operation and maintenance of stations.

If fully operational, the network of 61 stations has the capacity to support 58,900 light-duty FCEVs, more than four times the capacity needed for the existing FCEV population. CEC staff estimated the number of light-duty FCEVs that the 61 stations could support using the National Laboratory of the Rockies' (formerly National Renewable Energy Laboratory) Hydrogen Station Capacity Evaluation (HySCapE) tool. Where HySCapE results were unavailable, staff used the stated nameplate capacity of each station. To convert station capacity into vehicle support estimates, staff applied a consumption assumption of 0.7 kilograms of hydrogen per vehicle per day. Based on this methodology, the fully operational network has the capacity to fuel 58,900 vehicles.

However, the actual fueling capacity of the network, compared to the nameplate capacity, is lower due to station reliability challenges and hydrogen supply shortages. According to the data collected by the Hydrogen Fuel Cell Partnership's Station Operational Status System (SOSS), obtained by CARB staff, the average availability of open retail stations was around 63 percent from the third quarter of 2024 to the second quarter of 2025. This availability includes temporarily nonoperational stations as 0 percent available. The average availability of open retail stations in the second quarter of 2025 has improved to about 73 percent due to the reopening of five stations in Southern California.

Reducing the network capacity of open retail stations using the 63 percent availability percentage shows that the network can support about 34,300 FCEVs, exceeding the capacity needed for the existing FCEV population by 2.4 times. However, a regional analysis shows that the fueling capacity in San Francisco and the Sacramento Area cannot cover fuel demand. While most vehicles, as well as hydrogen stations are primarily concentrated in major metropolitan areas such as the San Francisco Bay Area, Greater Los Angeles, Sacramento, and San Diego, the coverage in Sacramento and San Francisco declined sharply in early 2023 after Shell permanently closed several stations, leaving only one in Sacramento and none in San Francisco.

According to CARB's analysis of California Department of Motor Vehicles (DMV) data, there are 14,128 light-duty FCEVs on California's roads as of April 2025, marking the first recorded decline of the number of registered FCEVs (14,429 FCEVs as of April 2024). Based on the latest survey responses from auto manufacturers, CARB reported in its *2025 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network* (2025 Annual Evaluation) that the light-duty FCEV population in California could grow to 16,200 FCEVs by 2028, which is less than what was reported in CARB's 2024 Annual Evaluation (18,400 FCEVs by 2027).

Station developers forecast that California will have a total of 112 hydrogen refueling stations for passenger vehicles by 2030. Of the 112 hydrogen refueling stations, 95 are funded through the Clean Transportation Program, and 17 were announced by private sector developers (8

stations by Chevron Products Company, one station by H2B2 USA, LLC, one station by Sunline Transit, one station by FirstElement Fuel Inc., and six stations by Iwatani). Thus far, 53 CTP funded stations, and 8 privately funded stations are open to the public. In the 2024 AB 126 Report, the Clean Transportation Program had allocated funding to support 129 stations; however, in 2025, stations located in Woodside, University of California (UC) Irvine, Santa Monica, and San Diego (Del Mar) closed. An additional 11 CEC-funded Iwatani stations, one station located in Galt, and one privately funded station were cancelled. For more details, Appendix B lists all the changes in the station network from 2017 to 2025.

CEC staff estimate that the planned network of 112 hydrogen stations could support up to 167,300 light-duty FCEVs. In comparison, auto manufacturer survey responses compiled by CARB project that only 16,200 light-duty FCEVs will be on California's roads by 2028, just under 10 percent of the network's estimated capacity.

This gap between infrastructure potential and vehicle deployment highlights ongoing challenges in station development and market conditions. Factors such as station location, reliability, hydrogen availability, fuel price, and the pace of new construction continue to affect the accessibility of hydrogen fuel for drivers.

Several setbacks in 2024 contributed to a reduction in the total number of planned stations. As documented in the 2024 AB 126 Report, 65 stations were removed from the statewide count. One grant applicant (Phillips 66 Company) that was proposed for an award to build four stations declined the award. Additionally, Iwatani cancelled 11 of its planned stations releasing $21 million in CEC grant funds, and Shell cancelled all of its 50 planned stations, releasing $41 million in CEC grant funds. Shell further announced the permanent closure of seven open retail stations in February 2024, which continues to impact Sacramento and San Francisco Counties.

According to station developers, the combination of the low price of Low Carbon Fuel Standards (LCFS) credits[1] and global inflation has increased both the cost of building hydrogen stations and the price of hydrogen itself, which averaged $35.47 in the second quarter of 2025. This hydrogen price is comparable to paying about $14.40 for a gallon of gasoline (when accounting for the improved efficiency of a FCEV compared to a gasoline-powered vehicle) and is more than a doubling of historical prices; the average price of hydrogen in the second quarter of 2022 was $14.95, which is equivalent to paying $5.98 for a gallon of gas.

The rise in hydrogen prices may be contributing to reduced fuel usage. The average daily hydrogen dispensing between the third quarter (July–September) of 2024 and the second quarter (April–June) of 2025 decreased by 30 percent. The drop in hydrogen dispensing could be due to FCEVs being driven fewer miles, fewer FCEVs on the road, or a combination of both factors.

In response to these challenges, the CEC released the solicitation GFO-24-601 (Light-Duty Hydrogen Infrastructure Build-Out) offering $10 million for developing new stations in the Sacramento and San Francisco Counties and $5 million to support capital expenditures and operation and maintenance for planned or temporarily nonoperational light-duty hydrogen refueling stations that have had open retail progress stall because of cost constraints. Out of

the three applicants, one applicant, FirstElement Fuel, Inc., received a passing score and is proposed for an award of $1.5 million. The grant award will support the completion of the construction of three stations previously awarded by the CEC. None of the applicants proposed the development of new stations in their applications, indicating that station developers are focusing on existing and planned stations.

In addition, CARB's proposed 2024 LCFS amendments have taken effect as of July 1, 2025, and may help recover LCFS credit prices and station development. New light-duty hydrogen refueling stations applying for Hydrogen Refueling Infrastructure (HRI) LCFS credits after July 1, 2025, will have a crediting factor of 62.5 percent, which means that a station with a dispensing capacity of 1,200 kilograms (kg)/day will be eligible to receive HRI credits for at least 750 kg of fuel sold.

As California works to expand and stabilize its hydrogen fueling network, ensuring equitable access remains a key priority. About 71 percent of California's residents who live in disadvantaged communities are within a 15-minute drive of an open retail or planned hydrogen station. This percentage is similar to 64 percent of the general statewide population being at the same driving distance to a station. However, rural disadvantaged communities and disadvantaged communities with lower population density still tend to be farther than a 15-minute drive to any hydrogen refueling station. These numbers could increase as addresses for stations funded by the CEC are announced.

In addition to light-duty FCEVs, the state is working to support the deployment of medium- and heavy-duty FCEVs. As of September 2, 2025, there are four heavy-duty refueling stations and an additional 32 stations planned for fuel cell electric trucks. At least 5 of the 112 projected light-duty stations will be capable of fueling heavy-duty vehicles in addition to medium- and light-duty vehicles, thereby leveraging infrastructure to address multiple markets and accelerating the development of commercial fuel cell electric trucks. There are also 9 private depot hydrogen stations for transit in operation, and an additional 10 stations are planned by transit agencies.

For more details on medium- and heavy-duty hydrogen infrastructure, the CEC published the *2023 Final Staff Report on Senate Bill 643: Clean Hydrogen Fuel Production and Refueling Infrastructure to Support Medium-and Heavy-Duty Fuel Cell Electric Vehicles and Off-Road Applications* on January 24, 2024, which discusses medium- and heavy-duty FCEVs, along with nonroad transport applications including off-road, aviation and rail that use hydrogen as fuel in depth. This AB 126 Joint Report provides a summary of medium- and heavy-duty vehicles and infrastructure in Appendix C.

CHAPTER 1: INTRODUCTION

Assembly Bill (AB) 118 (Núñez, Chapter 750, Statutes of 2007) created the California Energy Commission's (CEC) Clean Transportation Program.[2] Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013) reauthorized the Clean Transportation Program until January 1, 2024. AB 8 directed the CEC to allocate $20 million annually, not to exceed 20 percent of the amount of funds appropriated by the Legislature, toward at least 100 publicly available hydrogen refueling stations.[3]

In October 2023, Assembly Bill 126 (Reyes, Chapter 319, Statutes of 2023) reauthorized the Clean Transportation Program until July 1, 2035, and directed the CEC to allocate no less than 15 percent of the amount of funds appropriated by the Legislature to fund hydrogen refueling stations by July 1, 2030.[4] AB 126 removed the requirements that hydrogen refueling stations be publicly available and that there be at least 100 stations operating in the state. In addition, the new requirements under AB 126 are:

- The CEC releasing a competitive grant funding opportunity for annual hydrogen funding at least annually and 90 days after the start of the fiscal year.
- Fifty percent of the hydrogen funds being spent to benefit or serve residents of disadvantaged communities or low-income communities directly.
- Providing preference to applicants with the least carbon-intensive proposed fuel measured through the point of production.
- Requiring the awardees to provide the source and carbon intensity of the hydrogen dispensed[5] by stations.
- Collecting additional station operation data to monitor reliability and accessibility of the refueling infrastructure.

Furthermore, the CEC and California Air Resources Board (CARB) must jointly review and report annually on progress toward establishing a sufficient network of hydrogen refueling stations, which includes all types available, in operation in the state to support existing and expected vehicles requiring hydrogen fuel. The *Joint Agency Staff Report on Assembly Bill 126: 2025 Annual Assessment of the Hydrogen Refueling Network in California* (2025 AB 126 Joint

2 California Legislative Information. Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200720080AB118.

3 California Legislative Information. Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB8.

4 California Legislative Information. Assembly Bill 126 (Reyes, Chapter 319, Statutes of 2023), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB126.

5 The carbon intensity of hydrogen defines the quantity of greenhouse gases, usually expressed as kilograms of carbon dioxide equivalent (kg CO_2e), emitted during its entire life cycle (production, processing, and transportation) relative to the amount of hydrogen produced.

Report) is the eleventh annual report (second report under AB 126). CARB published the *2025 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network* (2025 Annual Evaluation) on December 27, 2024, also required by AB 126.[6] Appendix D lists references for previous reports.

This report reviews the development of California's hydrogen refueling station network and its ability to provide coverage and capacity for light-duty fuel cell electric vehicles (FCEVs) being placed into operation in the state. The report will also assess whether funding from the Clean Transportation Program remains necessary. This report is organized with five analytical chapters:

- Chapter 2: The Coverage, Capacity, and Public Accessibility of the Hydrogen Refueling Station Network
- Chapter 3: Fuel Cell Electric Vehicle Deployment
- Chapter 4: Time Required to Permit and Construct Hydrogen Refueling Stations
- Chapter 5: Amount and Timing of the Growth of the Hydrogen Refueling Network
- Chapter 6: Remaining Cost and Time Required to Establish a Sufficient Network of Refueling Stations

On September 23, 2020, Governor Gavin Newsom's Executive Order N-79-20 set goals that all new passenger cars and trucks sold in California be ZEVs by 2035, all medium- and heavy-duty trucks and buses operated in California be ZEVs by 2045 everywhere feasible, and all drayage trucks be ZEVs by 2035, to the extent consistent with State and Federal law.[7] This imperative strengthens California's focus and activities for electric vehicle charging infrastructure, hydrogen refueling infrastructure, and ZEVs.

In 2022, CARB adopted the Advanced Clean Cars II (ACC II) regulations to reduce pollution from light-duty vehicles, effective from the 2026 model year.[8] A key aspect is the ZEV regulation, which requires an increasing percentage of new light-duty vehicle sales to be ZEVs or the cleanest plug-in hybrids. This starts at 35% in 2026 and rises to 100% by 2035. ACC II also includes a suite of ZEV assurance measures to ensure that vehicles reliably and consistently meet the sales targets and secure permanent emissions reductions, including durability and warranty requirements, charging standards, and improved serviceability measures. Additionally, ACC II introduces the Low-Emission Vehicle Level IV emission standards to further reduce smog-forming emissions from new vehicles with tailpipe emissions.[9]

---

6 California Air Resources Board. December 2024. *2024 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development,* https://ww2.arb.ca.gov/sites/default/files/2024-12/AB-126-Report-2024-Final.pdf.

7 Office of Governor Gavin Newsom. September 23, 2020. Executive Order N-79-20, https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.

8 California Air Resources Board. "Advanced Clean Cars II Regulations: All New Passenger Vehicles Sold in California to be Zero Emissions by 2035," https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii.

9 California Air Resources Board. "Advanced Clean Cars II Regulations: All New Passenger Vehicles Sold in California to be Zero Emissions by 2035," https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii.

Following the adoption of an illegal congressional resolution purporting to revoke California's federal preemption waivers under the Clean Air Act for the Advanced Clean Cars II regulations, Governor Newsom responded by filing a lawsuit and issuing Executive Order N-27-25 on June 12, 2025, reaffirming California's commitment to accelerate the deployment of zero-emission technologies, including passenger, medium- and heavy-duty vehicles. The EO also directed CARB to develop and propose an Advance Clean Cars III regulation consistent with State and federal law, that reduces greenhouse gas, criteria pollutant, and toxic emissions from passenger cars and light-duty trucks, medium- and heavy-duty vehicles, to advance progress toward the deployment of clean air vehicles as an additional measure to build on existing regulations.

The CEC Fuels and Transportation Division and CARB program staff collaborate with experts, market participants, and stakeholders to plan and encourage development of hydrogen refueling infrastructure and deployment of fuel cell electric vehicles, including state agencies, local and regional partners, national labs, industry stakeholders, and environmental justice groups.

The CEC has a history of strong investments in hydrogen station infrastructure for well over a decade, releasing seven solicitations to support the development of hydrogen refueling infrastructure:

- GFO-24-601 in 2024 (no new stations, notice of proposed awards [NOPA] released in May 2025)
  - GFO-22-607 in 2022 (2 stations, NOPA released in April 2023)
- GFO-19-602 in 2019 (50 stations, first NOPA released in September 2020)
  - GFO-15-605 in 2016 (17 stations, NOPA released in 2017)
  - Public opportunity notice (PON)-13-607 in 2013 (25 stations, NOPA released in 2014)
  - PON-12-606 in 2012 (3 stations, NOPA released in 2013)
  - PON-09-608 in 2010 (7 stations, NOPA released in 2010)

The public is encouraged to visit the following web pages to become involved in CEC activities:

- Subscriptions: https://www.energy.ca.gov/subscriptions
- Events: https://www.energy.ca.gov/events
- Solicitations: https://www.energy.ca.gov/funding-opportunities/solicitations

The CEC and CARB staffs review the year's refueling trends and describe other hydrogen and fuel cell projects that are expanding the potential for FCEVs, including buses and trucks, to serve several functions in transitioning to a national and international zero-emission transportation system. The data this 2025 AB 126 Joint Report uses, unless otherwise noted, are:

- From the third quarter of 2024 through the second quarter of 2025 for hydrogen refueling station-related analyses.
- As of the end of April 2025, for the latest number of FCEVs.
- As of September 2, 2025, for reporting new station openings.

CHAPTER 2:
THE COVERAGE, CAPACITY, AND PUBLIC ACCESSIBILITY OF THE HYDROGEN REFUELING STATION NETWORK

This chapter discusses the progress toward establishing a hydrogen refueling network to provide the coverage (the placement of stations) and capacity (the number of FCEVs the stations and the network can support) needed to fuel FCEVs that are on the road in California. Further, the chapter discusses station statistics such as hydrogen dispensed, station utilization,[10] retail price of hydrogen, station reliability and accessibility, and hydrogen supply.

The following listed changes have occurred to the station network since last reported in the 2024 AB 126 report:

- Air Products has announced the permanent closure of two stations with a total capacity of 360 kg/day located in the Greater Los Angeles Area (UC Irvine and Santa Monica) funded under PON-09-608 and cancelled the development of a station in the Sacramento Area with a total capacity of 1,616 kg/day funded under GFO-22-607.
- One station in Woodside (San Mateo County) by HTEC Group Inc. funded under PON-13-607 never became open retail.
- Iwatani cancelled the development of a privately funded station in Chino Hills and 11 CEC-funded stations under GFO-19.
- FirstElement Fuel announced the permanent closure of a station in Del Mar in the San Diego Area funded under PON-13-607 with a capacity of 266 kg/day.
- A new heavy-duty station at the Port of Oakland that also offers light-duty fueling became open retail in July 2024.
- CARB's LCFS hydrogen refueling infrastructure (HRI) program has approved 9 privately funded stations (8 stations by Chevron Products Company, one station by H2B2 USA, LLC). Two of the Chevron stations have opened (Moreno Valley in April 2025 and Vacaville in June 2025). The rest of the HRI-approved stations already have addresses where the stations should be constructed.
- Sunline Transit Agency is building a station that includes a dispenser for public light-duty vehicles using match funding for a CEC agreement.

These changes result in 112 publicly accessible stations for passenger vehicles expected by 2030. The number of expected stations has decreased from the reported 129 stations in the 2024 AB 126 Joint Report due to the network changes listed above. The newest solicitation, GFO-24-601 released in September 2024, offered $10 million for developing new stations in Sacramento and San Francisco Counties. However, none of the applicants included the

10 Staff calculated the utilization rate of the network by dividing the total quarterly amount dispensed by the overall quarterly nameplate capacity of the open retail station network.

development of new stations in their proposals. Therefore, this AB 126 Joint Report uses the 112-station network for evaluating coverage and capacity. For more details, Appendix B lists all the changes in the station network from 2017 to 2025.

Hydrogen Refueling Station Locations Maps and Disadvantaged Communities

Figure 1 through Figure 3 show the locations of stations in the hydrogen refueling station network in California. Planned stations that do not have locations yet are not shown in these figures. The California network includes 61 open retail stations and 51 planned stations. Appendix A lists 103 stations with addresses.

The network of 61 open retail stations includes 50 stations that are available for customer fueling except for brief downtime events and an additional 11 stations that are considered temporarily nonoperational (TNO).[11] The TNO stations have previously achieved open retail status but have been unavailable for customer fueling for a period greater than 30 days for various reasons. These TNO stations are expected to become available for customer fueling again in the future and are shown as open retail stations in Figure 1 through Figure 3. However, station operators do not have estimated time frames for when these TNO stations will reopen.

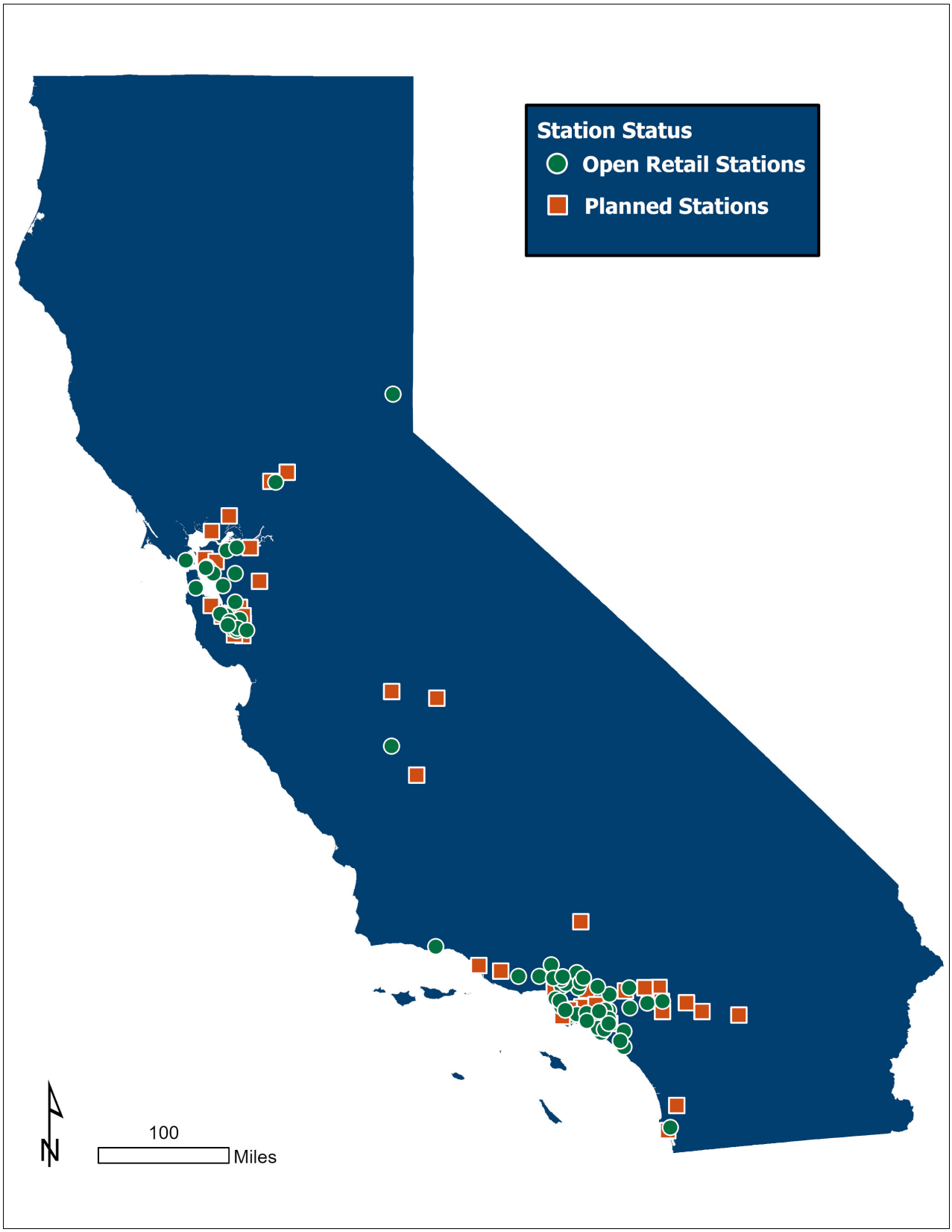
The CEC emphasizes the importance of serving disadvantaged communities in its solicitations.[12] The last solicitation, GFO-24-601, required at least 50 percent of new stations be in disadvantaged communities. Out of the three applicants, one applicant, FirstElement Fuel is proposed for an award of $1.5 million to complete the construction of three stations awarded under GFO-19-602, two of which are in disadvantaged communities. With all open retail stations and planned stations under GFO-19-602, GFO-22-607 and privately funded stations, 28 stations out of 103 stations with known addresses will be in disadvantaged communities.

The proposed refueling network will provide coverage so that 71 percent of the disadvantaged community population and 64 percent of the general population of California will be within a 15-minute driving distance to a hydrogen refueling station. These numbers could increase as addresses for stations in future batches funded under GFO-19-602 become available. Figures 2 and 3 show the station locations with respect to disadvantaged communities. The CEC and CARB will continue to promote equity in their investments and explore options to expand hydrogen refueling network benefits to as many disadvantaged communities as possible.

11 A TNO station in Riverside is available for FCEV drivers to fuel by reservation. TNO stations in Fairfax, Lawndale, CSULA, Anaheim, Ontario, Emeryville, Palo Alto, LAX, Hawaiian Gardens, and Santa Ana are either offline due to mechanical issues or a supply disruption.

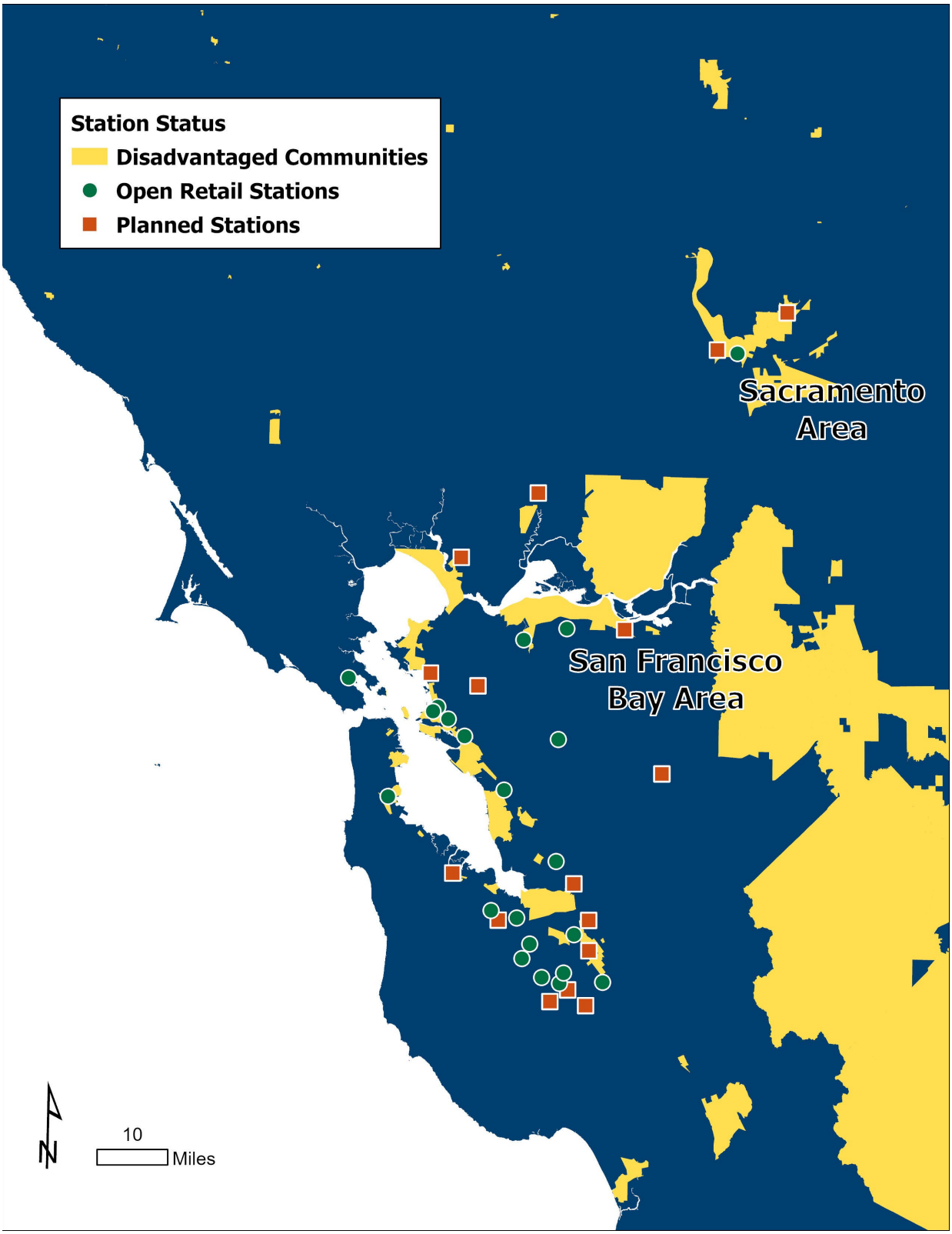
12 *Disadvantaged communities* are identified using the California Office of Environmental Health Hazard Assessment's CalEnviroScreen 4.0. Information is available at OEHHA, CalEnviroScreen. https://oehha.ca.gov/calenviroscreen.

Figure 1: Hydrogen Refueling Station Locations in California



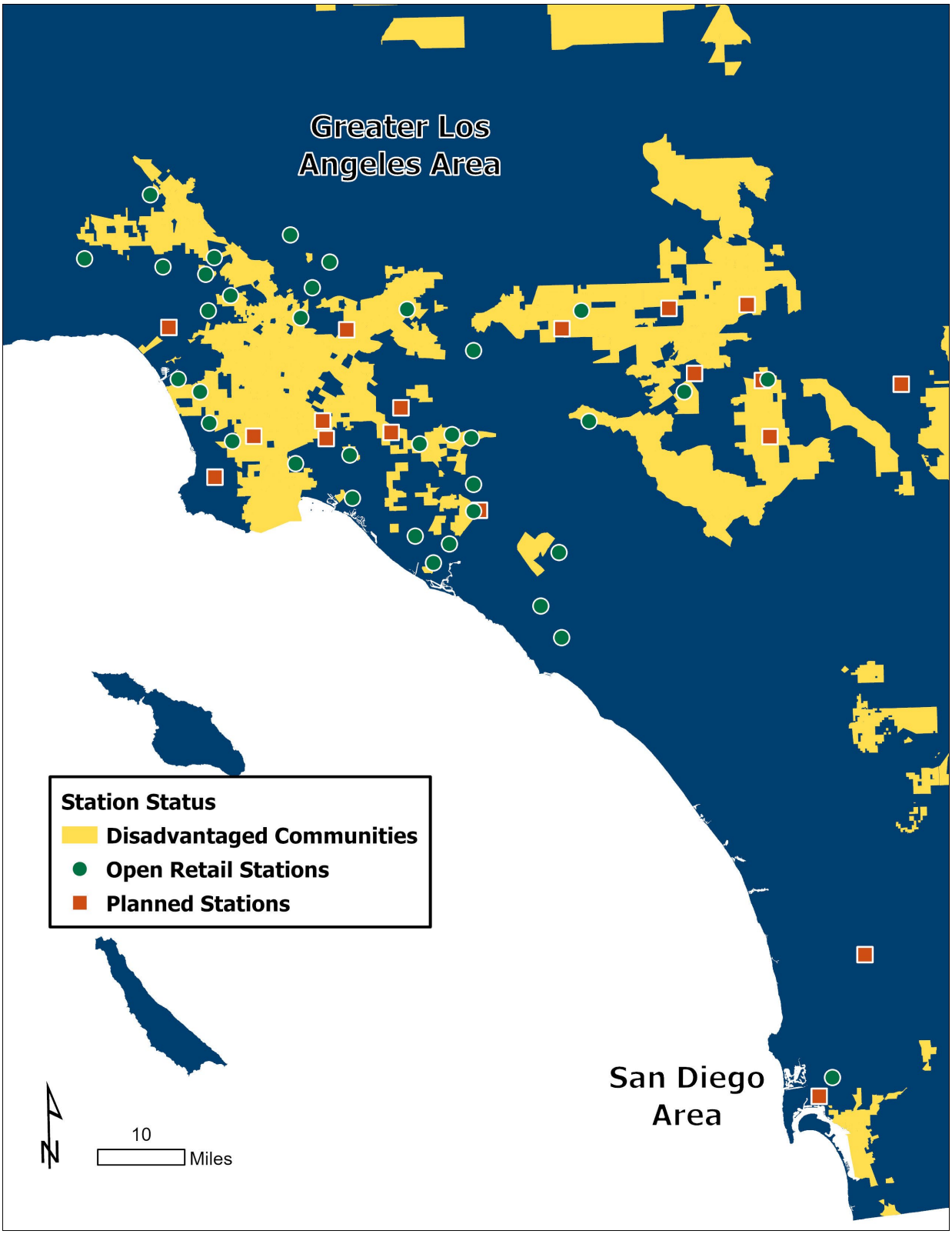
Source: CEC

Figure 2: Hydrogen Refueling Station Locations in Northern California With Disadvantaged Communities Highlighted



Source: CEC; Disadvantaged Communities data obtained from CalEnviroScreen 4.0

Figure 3: Hydrogen Refueling Station Locations in Southern California With Disadvantaged Communities Highlighted



Source: CEC; Disadvantaged Communities data obtained from CalEnviroScreen 4.0

Coverage Map Using California Hydrogen Infrastructure Tool

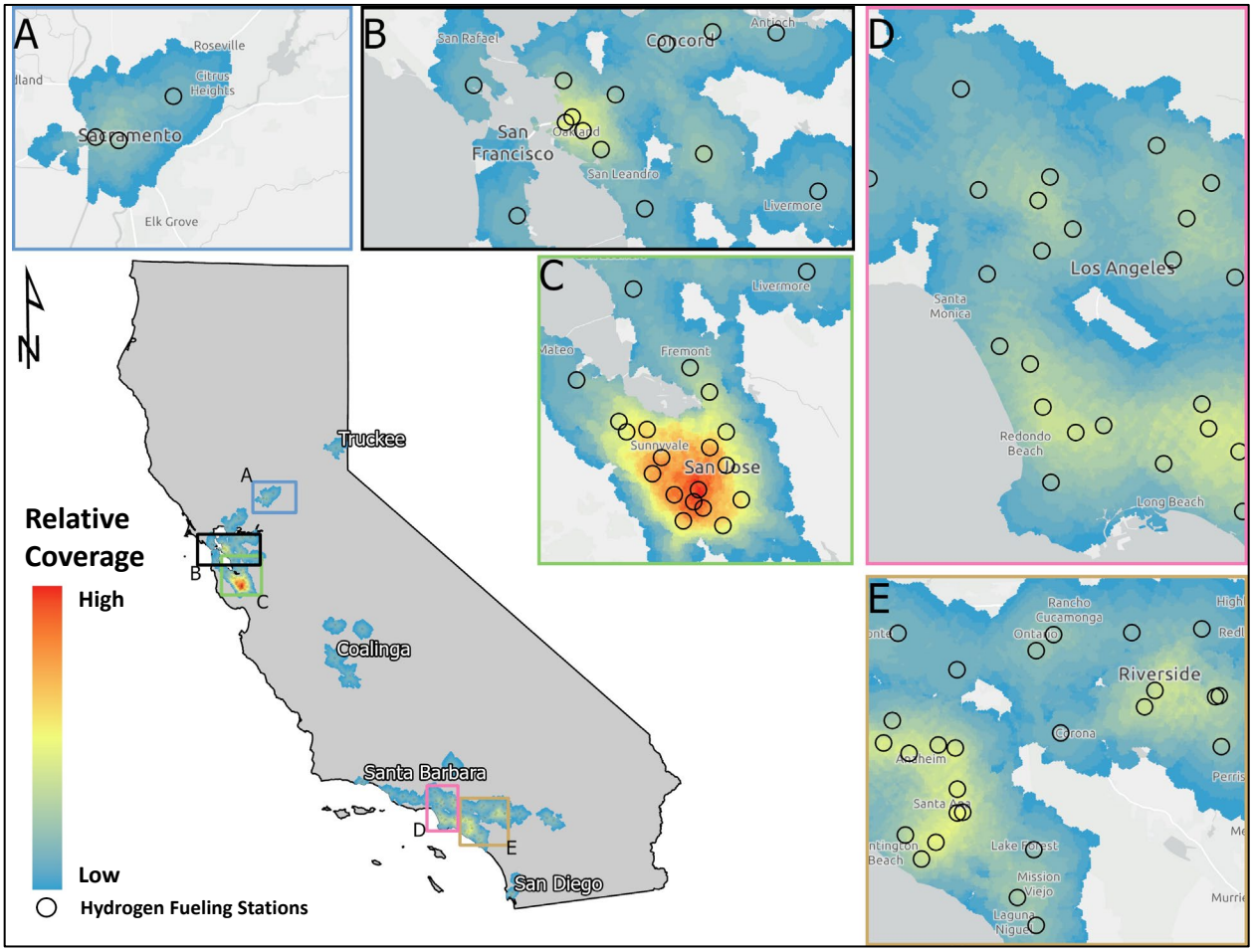
Figure 4 displays the coverage provided by all stations in the 103-station network with known addresses. Nine stations do not have identified addresses and therefore are not included in Figure 4. As awarded station developers notify the CEC of addresses for additional locations, or possible station relocations and other changes, the evaluation of coverage changes. The figure was produced by the CARB California Hydrogen Infrastructure Tool (CHIT).[13] Areas on the map without color are not within a 15-minute drive from any hydrogen refueling station. In the coverage map, the areas shown with the red shading have the highest degree of coverage. The blue areas have less station coverage; these areas typically have a small number of available stations or are farther away from the fueling station network.

The stations are generally concentrated in the San Francisco Bay Area, the Greater Los Angeles Area, the Sacramento Area, and the San Diego Area. There are a few connector stations in the Central Valley and a few destination stations. The highest degree of coverage is in the southwest side of the San Francisco Bay Area around San Jose. Good coverage is also achieved in Oakland, Orange County and in a few spots around Los Angeles County.

The current coverage decreased significantly in the Sacramento Area and in San Francisco due to Shell closing stations permanently in the beginning of 2023, leaving only one station in the Sacramento Area and no station within San Francisco. To combat that, the CEC released a solicitation, GFO-24-601, in September 2024 allocating $10 million to build stations in Sacramento and San Francisco Counties. However, none of the applicants included building new stations in their proposals. Out of the 42 planned stations with known addresses, two stations are in the Sacramento Area, and 13 stations are in the San Francisco Bay Area. Planned privately funded stations are also adding coverage in the future.

13 California Air Resources Board. "Hydrogen Refueling Infrastructure Assessments," https://ww2.arb.ca.gov/resources/documents/california-hydrogen-infrastructure-tool-chit.

Figure 4: Coverage Map



Source: CARB

Number of FCEVs Supported by Hydrogen Refueling Station Network

Table 1 summarizes the hydrogen refueling station network of all 112 stations expected to become open retail by 2030 in California by showing the number of open retail, TNO, and planned stations in the network. It also includes the fueling capacity in terms of the number of FCEVs that the network can support when operating at nameplate capacity or average operating capacity of 63 percent determined between the third quarter of 2024 to the second quarter of 2025.[14] All 112 stations will be accessible to the public.

14 The average operating capacity was determined using data collected by the Hydrogen Fuel Cell Partnership's Station Operational Status System (SOSS), obtained by CARB staff, and includes TNO stations as 0 percent.

Table 1: Hydrogen Refueling Station Network and Quantity of FCEVs Supported

Station Status	Station Quantity	Nameplate Capacity [kg/day]	FCEVs Stations Can Support at Nameplate Capacity	FCEVs Stations Can Support at 63 Percent Average Operating Capacity
Open Retail Available	50	38,115	54,450	34,304
Open Retail TNO	11	3,093	4,419	2,784
Planned	51	75,898	108,426	68,308
Total Funded	***112***	***117,106***	***167,295***	***105,396***

Source: CEC

CEC staff used the assumption of 0.7 kilogram per day of hydrogen consumed per FCEV to convert the station nameplate capacity into the estimated number of FCEVs supported (by dividing the fueling capacity by 0.7).[15]

The current network of 50 open retail stations can support 34,300 FCEVs when operating at 63 percent capacity, which is 2.4 times the number of FCEVs on the road (14,128 as of April 2025). The 112 planned stations will be able to support 167,300 FCEVs or 105,400 FCEVs when operating at 63 percent capacity, which is more than enough to support the projected 16,200 FCEVs by 2028, even if the availability did not improve.

Despite the seemingly good capacity of the network, FCEV drivers continue to suffer from lack of confidence in fuel availability because of stations being unavailable and unreliable. Most common reasons for station unavailability are maintenance, equipment failures, supply chain constraints, and hydrogen supply disruptions. Furthermore, a regional analysis in Chapter 5 shows that fuel demand in Sacramento and San Francisco is not covered by current capacity.

To help make the existing stations more reliable, in May 2024, the CEC awarded operation and maintenance grants to two station operators (FirstElement Fuel and Iwatani) under GFO-23-604 to improve the reliability of 45 open retail stations. The CEC requires the commitment to achieving 95 percent uptime as a condition for receiving these grants.

Hydrogen Dispensing and Station Utilization

The CEC requires grant recipients to report hydrogen dispensing data during the term of their grant agreements. Once an agreement term ends, some station operators continue reporting data voluntarily.

Figure 5 shows the average daily hydrogen dispensing in California based on the station operators' dispensing data. For stations that do not report, staff estimated the average daily dispensing based on the daily regional dispensing (Greater Los Angeles Area, San Francisco Bay Area, San Diego Area, Sacramento Area, and connector area outside the four other areas)

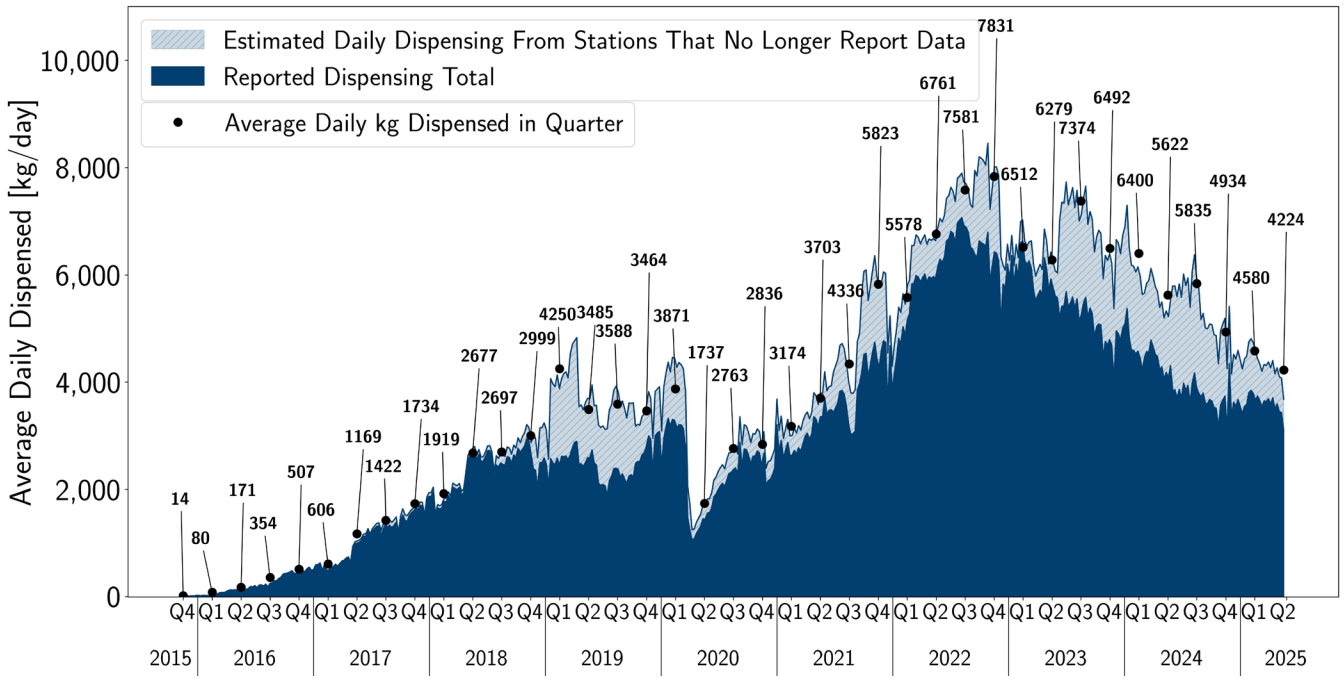
15 Pratt, Joseph, Danny Terlip, Chris Ainscough, Jennifer Kurtz, and Amgad Elgowainy. 2015. *H2FIRST Reference Station Design Task, Project Deliverable 2-2.* National Renewable Energy Laboratory and Sandia National Laboratories, https://www.osti.gov/biblio/1215215.

where each nonreporting station is located. Of the 50 open retail hydrogen refueling stations as of the end of the second quarter of 2025, CEC staff received data from 42 stations and estimated dispensing for 8 stations. Staff assumes the TNO stations have dispensed zero kilograms of hydrogen for the quarter that they are categorized as TNO.

The solid color in

Figure 5[16] shows the average weekly dispensed fuel reported by station operators. The patterned area shows the estimated dispensing for stations that do not report to the CEC.[17] The average daily dispensing is shown above each quarter. After the dip in the second quarter of 2020 due to the outbreak of COVID-19, the average daily dispensing recovered by the second quarter of 2021 and increased further at a higher rate than before the pandemic. The maximum average daily dispensing of 7,651 kg/day was reached in the fourth quarter of 2022, followed by a decrease since the beginning of 2023, which can be explained by the closing of the Shell stations in the San Francisco Bay Area and Sacramento Area. The average daily dispensing has been steadily decreasing, reaching 4,224 kg/day in the second quarter of 2025, which is 30 percent less than the average daily dispensing of 5,835 kg/day in the third quarter of 2024.

Figure 5: Average Daily Hydrogen Dispensing



Source: CEC

Figure 6 shows the quarterly hydrogen station utilization rates statewide. Staff calculated the utilization rate by dividing the total quarterly amount dispensed by the overall quarterly

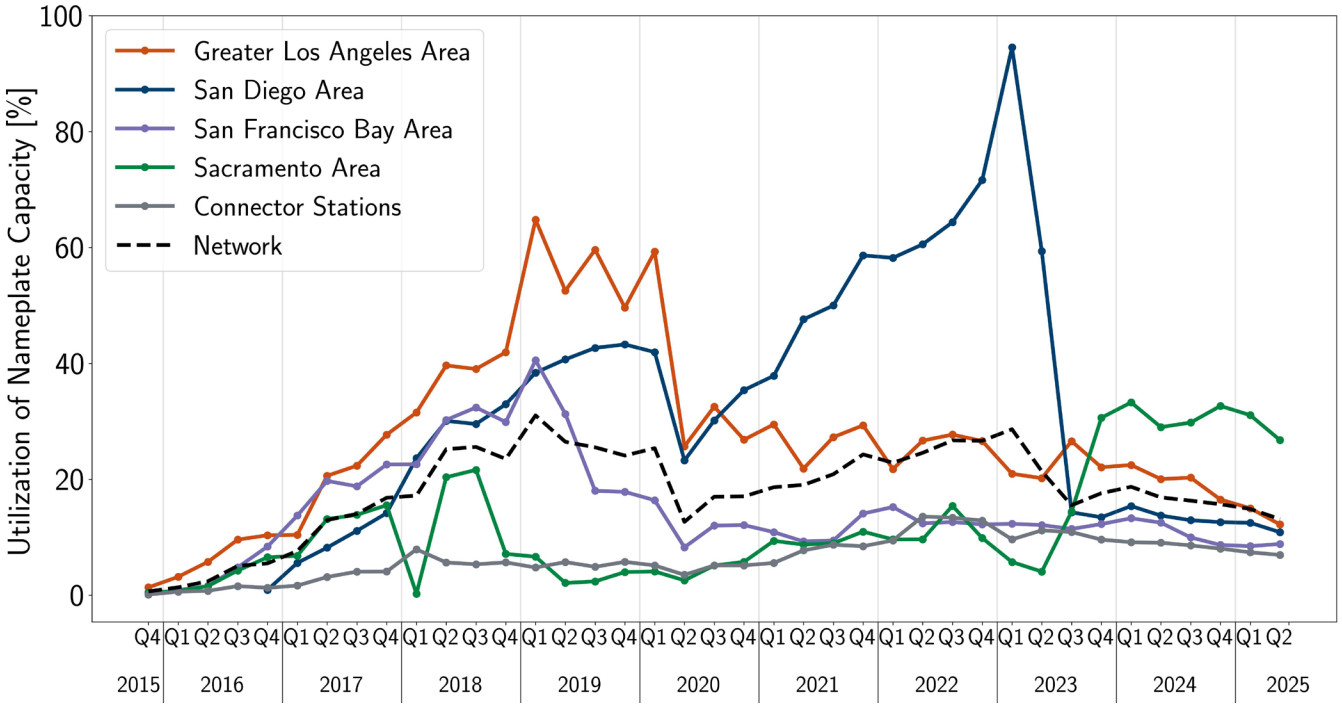
16 Estimated dispensing varies since reporting requirements vary according to CEC agreements.

17 In 2019, many agreements ended, and many of those stations discontinued reporting fueling data to the CEC; hence, the patterned line is larger in that year. Starting in 2020, many station operators have agreed to provide the CEC with an abbreviated amount of fueling data for stations that are no longer part of CEC agreements to allow the CEC to do this reporting.

nameplate capacity of the open retail station network. If a station is designated as TNO or down for maintenance, the station is considered to have dispensed zero for the period that it is offline.

The average utilization rate of the overall hydrogen refueling station network since the fourth quarter of 2015 has been around 18 percent. The overall network utilization was 13 percent in the second quarter of 2025, showing a slight decrease from 16 percent reported in the third quarter of 2024.

Figure 6: Hydrogen Station Utilization by Quarter



Source: CEC

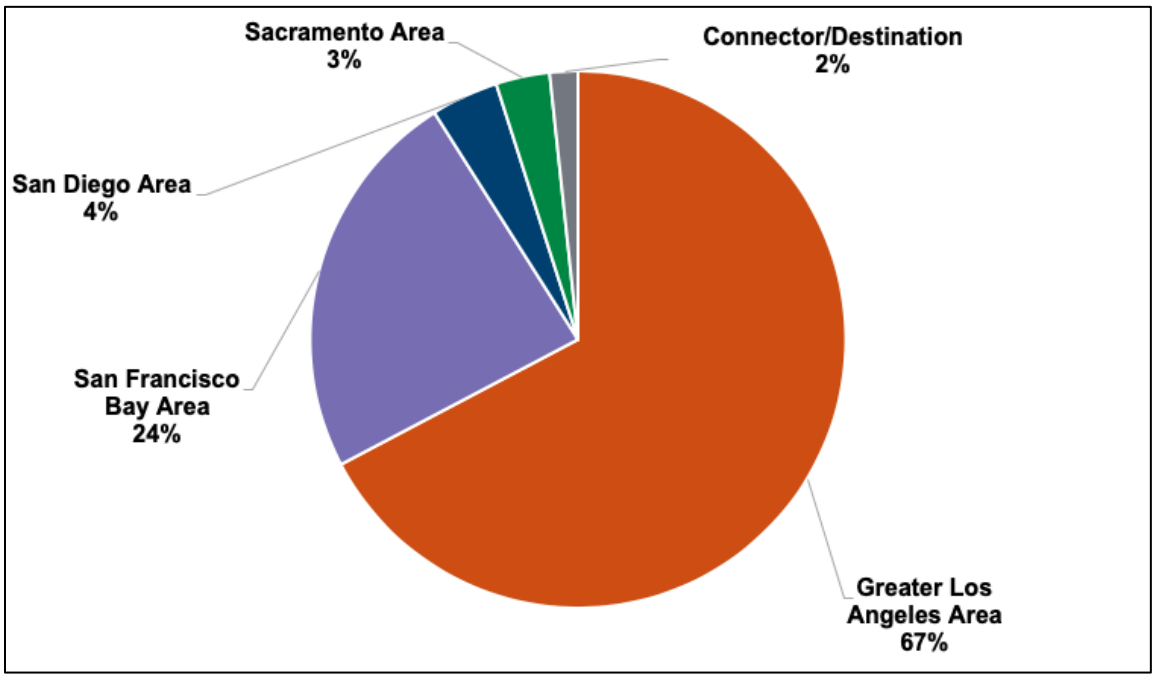
The decreasing average daily dispensing across the network and the low utilization rate of the network mean that a lot less hydrogen is being dispensed than the nameplate capacity of the stations. Reasons for that can be hydrogen supply disruptions, extended time frames for planned and unscheduled maintenance at the stations, and the decreasing demand of hydrogen due to less FCEVs being driven. CARB's 2025 Annual Evaluation reported that FCEV registrations show a decrease for the first time as the number of FCEVs on California roads decreased from 14,429 in April 2024 to 14,128 in April 2025.

The San Diego Area had the highest average utilization rate, more than 90 percent in the first quarter of 2023 because the area had only one station in Del Mar with the fueling capacity of 266 kg/day. In the second quarter of 2023, the San Diego Mission Center station opened with more than 1,200 kg/day capacity, causing the overall utilization rate in that area to decline to around 14 percent in the third quarter of 2023. San Diego is back to one operating station because the station in Del Mar was closed in the first quarter of 2024. The utilization rate was not affected by the closure of the small Del Mar station.

In the first quarter of 2024, the Sacramento Area had the highest utilization percentage because of the closure of two Shell stations. Currently, Sacramento relies on one station in West Sacramento. Although Shell stations also closed in the San Francisco Bay Area, the utilization rate in that area has not increased as much, which can be explained by fewer FCEVs on the road in that region.

Figure 7 shows the percentage of hydrogen dispensed (actual and estimated) in each region from the beginning of the third quarter of 2024 to the end of the second quarter of 2025. About two-thirds of all hydrogen dispensed in California was in the Greater Los Angeles Area, which is consistent with the fact that around 60 percent of the open retail stations are located there.

Figure 7: Percentage of Hydrogen Dispensing by Region



Source: CEC

The trends shown in Figure 6 and Figure 7 help inform stakeholders where future stations may be needed.

Retail Price of Hydrogen

Figure 8 shows the average LCFS credit price and the weighted average retail price of hydrogen per quarter for hydrogen stations that report dispensing data to the CEC.[18] The weighted average retail price of hydrogen is the quarterly revenue generated by hydrogen sales in the network divided by the total kilograms dispensed by the network in the quarter.

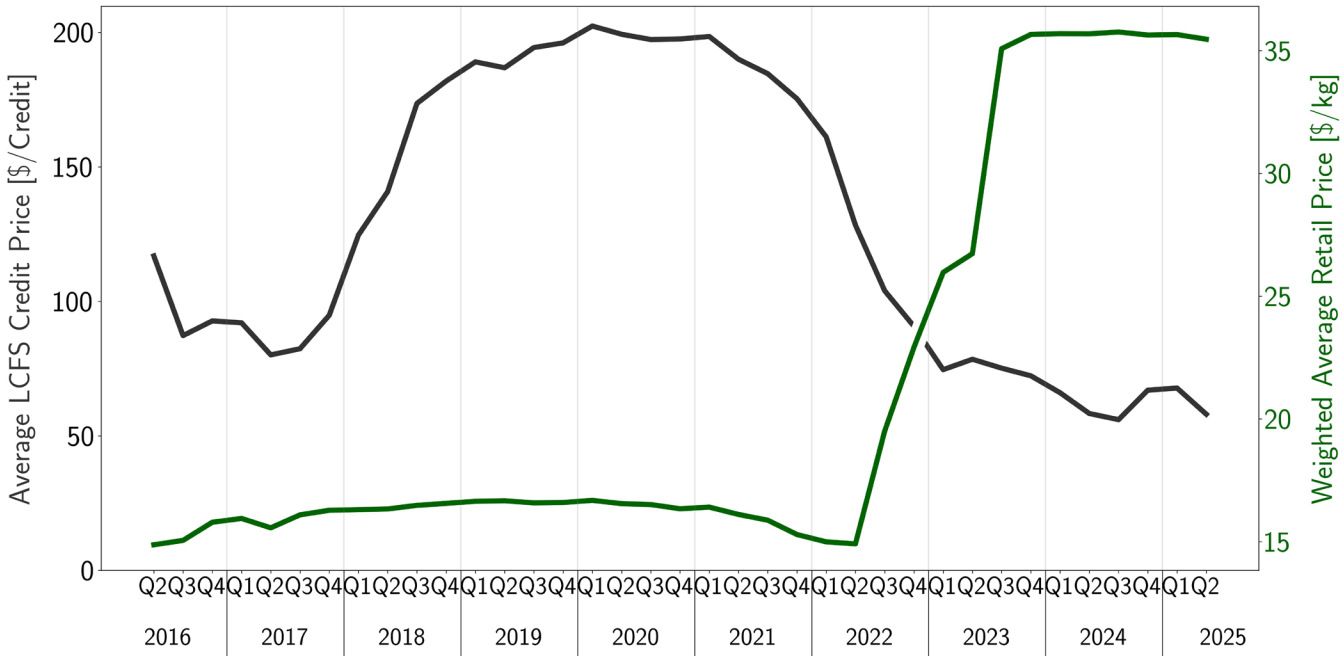
18 This sample represents all stations that have agreements with the CEC and are required to report their fueling data and stations that voluntarily submit data to the CEC. The samples for the latest quarter account for about 85 percent of open retail stations in the state.

The average price of dispensed hydrogen has largely remained the same since the sharp increase in the third quarter of 2023 and reached $35.47/kg in the second quarter of 2025, which is a slight decrease from the reported $35.8 kg/day in the third quarter of 2024. FCEVs are about 2.5 times more efficient than gasoline-powered vehicles.[19] Therefore, in terms of driving range obtained from the fuel, $36 per kilogram of hydrogen is equivalent to paying about $14.40 for a gallon of gasoline. FCEV drivers could be paying up to $180 to fill an empty tank at $36 per kilogram.

Station developers have cited that these price increases are due to increasing energy costs for natural gas, increasing labor and materials costs due to inflation, and the lower value of CARB LCFS credits traded on the market, meaning station operators are earning fewer dollars per credit.

LCFS revenue can help offset the costs of operations and maintenance of stations, which has helped keep prices paid by FCEV drivers at the pump lower in the past. When GFO-19-602 was released, the LCFS credit price was around $200 per credit, which decreased to around $48 per credit as of June 2025. The drop in LCFS credit price can be attributed to the increased supply of credits by biodiesel production.

Figure 8: Weighted Average Price of Hydrogen and Average LCFS Credit Price per Quarter



Source: CEC

The CEC, CARB, GO-Biz, and station developers have been searching for ways to improve the current situation and reduce the prices paid by FCEV drivers. The CEC awarded operations and maintenance grants to two station operators under GFO-23-604 (supporting 45 existing open

19 California Air Resources Board. July 2020. "Unofficial Electronic Version of the Low Carbon Fuel Standard Regulation," https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf.

retail stations total) in May 2024, which did not lower the prices paid by FCEV drivers. CARB's proposed 2024 LCFS amendments took effect July 1, 2025. The amendments include allowing only 20 percent of a company's annual volumes of biodiesel to generate credits, which may help recover LCFS credit prices.

Another strategy to lower the price of hydrogen is to increase California-based and dispersed hydrogen production. The CEC has awarded five projects under GFO-17-602 and GFO-20-609 that would result in a total of 23,000 kg/day of hydrogen production in California. However, those projects are facing major challenges including station developers pulling out of offtake agreements and lack of private funding.

The Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) is a public-private partnership focused on accelerating the development and deployment of hydrogen projects and infrastructure in California. In 2023, ARCHES was awarded by the U.S. Department of Energy (U.S. DOE) as one of seven regional clean hydrogen hubs across the country, receiving up to $1.2 billion in federal funding and $11.4 billion in private investment. One key goal of this effort is to lower the cost of hydrogen, connecting the supply with the demand to create a sustainable large-scale renewable hydrogen market. The initial federal funding of $30 million to begin the planning phase was awarded in July 2024. However, in September 2025, the DOE cancelled all seven hydrogen hubs, and as of March 2026 the remaining federal funds will not be disbursed. Upon this cancellation, the state and ARCHES issued a statement on October 1, 2025, emphasizing their continued commitment to building and scaling the renewable hydrogen ecosystem and market in California, despite the cancelled federal funds.[20] Following that, ARCHES announced pausing all hub activities on November 4, 2025.[21] On February 18, 2026, California, along with other states, has filed a lawsuit against the cancellation.[22]

Type of Hydrogen Dispensed

Most of the hydrogen dispensed in the California station network has been produced using fossil gas steam methane reformation (SMR). This means that most of the hydrogen being produced relies on carbon-emitting fossil fuels such as natural gas to create the hydrogen.

The CARB LCFS Program allows participants to meet the renewable requirements by using either direct renewable content or purchasing renewable attributes, or credits. The program defines renewable hydrogen as hydrogen derived from the electrolysis of water using renewable electricity, catalytic cracking or steam methane reforming of biomethane, or thermochemical conversion of biomass. Renewable electricity for electrolysis is defined in Code

20 Press release from ARCHES. October 1, 2025. "ARCHES CEO on DOE's decision to cut federal funding for California hydrogen hub." https://archesh2.org/arches-ceo-angelina-galiteva-on-does-decision-to-cut-federal-funding-for-california-hydrogen-hub/

21 Press release from ARCHES. November 4, 2025. "California pauses Hydrogen Hub activities amid federal changes." https://archesh2.org/california-pauses-hydrogen-hub-activities-amid-federal-funding-changes/

22 California et al. vs. Wright et al. (Case 3:26-cv-01417) https://oag.ca.gov/system/files/attachments/press-docs/DOE%20and%20OMB%20Complaint%20-%20Conformed.pdf

Sections 399.11–399.36 in the California Public Utilities Code[23] and includes sources like solar, wind, geothermal, biomass, landfill gas, and others.[24]

For stations reporting to the CARB LCFS Program under the HRI provision,[25] CARB estimates 33 percent renewable content in 2024 using data available through the LCFS program for all reporting hydrogen stations. Book and claim accounting[26] is likely used to reach those levels of renewable content. CARB's analysis shows that the renewable content continued to decrease, to even below the HRI crediting requirement of 40 percent. The CARB 2024 Annual Evaluation suspected that Shell's exit and the supply disruption in Southern California might be contributing to this decrease.

Reliability and Availability of the Refueling Infrastructure

Improving station reliability so that stations are available consistently is key to providing all stakeholders, most notably FCEV drivers and auto manufacturers, confidence in the FCEV market. Although on paper, the network of 61 stations has more fueling capacity than the demand, actual network fueling capacity depends on the reliability of hydrogen supply and station uptime.

According to the data collected by the Hydrogen Fuel Cell Partnership's SOSS, obtained by CARB staff, the average availability of open retail stations, was around 63 percent from the third quarter of 2024 to the second quarter of 2025 (including TNO stations as 0 percent available). Reducing the network capacity of open retail stations using the 63 percent availability percentage reported by CARB shows that the network can still support about 34,300 FCEVs. Although this number is more than 2.4 times higher than the 14,128 FCEVs currently on the road, the frequent downtime of stations significantly impacts customer experience and their confidence in the station network.

Figure 9 shows the average number of fueling events per station (black bars) and the total hydrogen dispensed per quarter (green bars) for stations that report data to the CEC. The total amount of hydrogen dispensed shown in Figure 10 has been steadily decreasing between the third quarter of 2023 and the fourth quarter of 2024, likely reflecting the effects of the high hydrogen price, the lacking reliability of the stations, and station closures. The total amount of hydrogen dispensed has stayed consistent since the fourth quarter (October–December) of 2024. The number of fueling events still decreased, indicating a larger amount of hydrogen dispensed per fueling event.

---

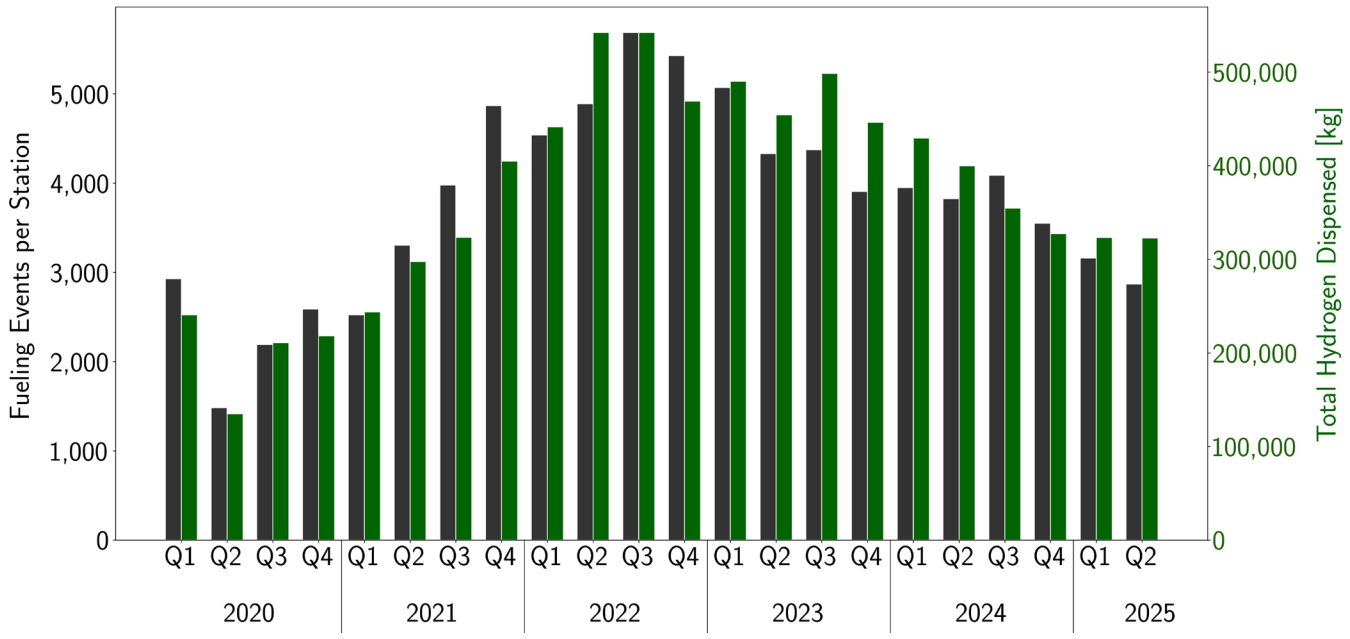
23 California Code of Regulations Title 17, Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 7, §95481.

24 California Public Utilities Code §§399.11–399.36 and California Public Resources Code §25741.

25 California Code of Regulations Title 17, Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 7, §95481.

26 CARB defines book and claim accounting as "the chain-of-custody model in which decoupled environmental attributes, such as Renewable Energy Certificates, are used to represent the ownership and transfer of transportation fuel under the LCFS without regard to physical traceability" in the LCFS Guidance. https://ww2.arb.ca.gov/sites/default/files/2022-12/19-01_updated%20for%20WREGIS%20changes_ADA.pdf.

Figure 9: Average Number of Fueling Events per Station and Total Hydrogen Dispensed per Quarter



Source: CEC

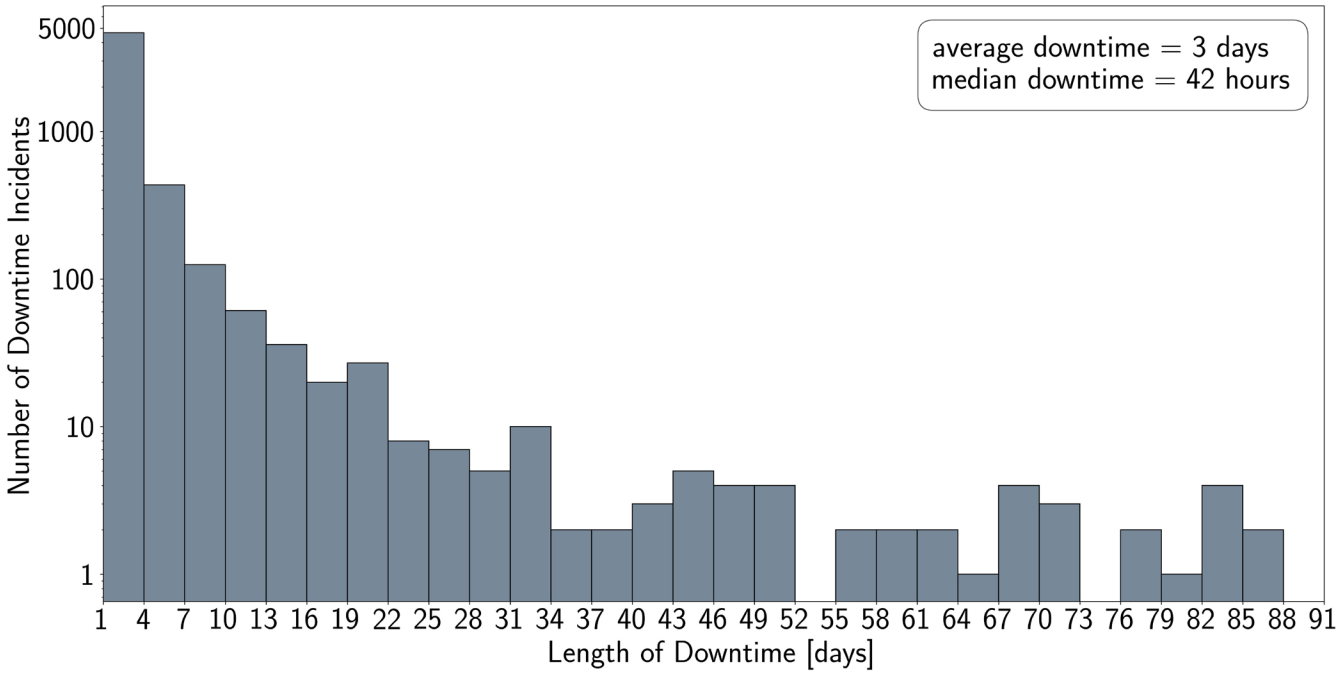
Out of the 61 open retail stations, 11 stations are TNO. The number of TNO stations has significantly decreased from the reported 20 TNO stations in the 2024 AB 126 Report. This is partly because three TNO stations have closed permanently and partly due to CEC's strategy to allocate funding under GFO-23-604, which allowed FirstElement Fuel to reopen five gaseous hydrogen stations in Southern California by deploying three gaseous hydrogen trailers to increase hydrogen supply. This increased the average availability of open retail stations in the second quarter of 2025 to 73 percent.

The funding opportunity GFO-23-604 awarded $9.4 million to two station operators (FirstElement Fuel and Iwatani) to further improve the reliability of 45 open retail stations. As a necessary condition to receive these grants, the CEC required a commitment of achieving 95 percent uptime. Projects to improve these existing stations include installation of new hardware components, developing new software tools and a customer-facing mobile app for SOSS, expansion of spare parts inventory, hiring additional staff, and point-of-sale interface improvements.

Open retail stations that are not TNO have downtime periodically because of maintenance, equipment failures, and hydrogen supply issues. Frequent downtime incidents are one of the main issues that lead to customer dissatisfaction. To better understand downtime incidents of stations that are not TNO, staff analyzed the fueling frequency and defined a station to be down when no fueling occurs within 24 hours at that station. This analysis is based on the reported station operators' dispensing data and does not include stations that do not report to the CEC. Figure 10 shows the number and duration of downtime incidents between the fourth quarter of 2015 and the second quarter of 2025. Most downtime incidents do not take longer than three days to resolve, indicating that maintenance is the main reason for downtime. A typical (median) downtime duration is around 42 hours.

Station developers have expressed difficulties finding reliable equipment that can ensure adequate station uptime. Therefore, the CEC awarded FirstElement Fuel $3.3 million to develop a high-capacity liquid hydrogen pump system with improved reliability that will be capable of 10 kilogram per minute fills for light-, medium- and heavy-duty vehicles. Ensuring that station developers have a range of suppliers when it comes to hydrogen refueling equipment is key to achieving CEC's goal of 95 percent uptime across the network.

Figure 10: Number and Duration of Downtime Incidents in the Hydrogen Refueling Network Since the Fourth Quarter of 2015



Source: CEC

Shell's decision to permanently close seven stations in February 2024 has left the Sacramento Area with one open station, which is one of the oldest stations in the state and cannot handle the increased demand. The closure also left San Francisco with no stations. Toyota has provided rental cars and reimbursement for fuel to affected drivers; however, these provisions mean many of these drivers could be driving cars with tailpipe emissions instead of ZEVs. The CEC released a solicitation, GFO-24-601, allocating $10 million to fund new stations in the Sacramento and San Francisco Areas. However, none of the applicants included the development of new stations in their proposals, which indicates the industry's focus on making existing and planned stations more reliable before committing to building new stations.

Expanding Options for Hydrogen Supply for California

Although various factors affect station uptime, ensuring a reliable and consistent supply of hydrogen fuel is essential to minimizing station downtime. Diversifying the supply of hydrogen for FCEVs will also be significant for increasing the reliability of refueling stations and decreasing the cost of hydrogen.

The Clean Transportation Program has funded three new renewable hydrogen production plants and two upgrade projects to existing plants, with a combined daily nameplate capacity

of nearly 24,000 kg/day.[27] One of these plants, operated by H2B2 Electrolysis Technologies, started its production of gaseous hydrogen in June 2023 in Fresno and produces 1000 kg/day using electrolysis.[28] The other projects are still in early stages of development and are facing major obstacles, such as off-taker agreements with station developers being canceled, lack of private funding, and equipment not being delivered.

The CEC's Energy Research and Development Division (ERDD) has a program called the Clean Hydrogen Program,[29] which was established by Assembly Bill 209 (The Energy and Climate Change budget bill, Chapter 251, Section 12, Chapter 7.6, Article 4, enacted in September 2022). The Clean Hydrogen Program intends to provide financial incentives to eligible in-state projects to demonstrate or scale-up hydrogen projects that produce, process, deliver, store, or use clean hydrogen. However, the program funding was reduced to $40 million from the initial $100 million and has been delayed to Fiscal Year 2025–2026.

Additional hydrogen production updates are summarized in the following list:

- The City of Lancaster (Los Angeles County) announced that Element Resources plans to build a renewable hydrogen production plant in the city that will use hydrocarbon feedstock from recycled mixed paper waste to produce 60,000 kg/day dedicated for use in transportation.[30]
- Chevron New Energies, a division of Chevron U.S.A. Inc., announced that it is developing a 5 MW hydrogen production project in the Central Valley, using electrolysis. The project is expected to produce 2000 kg/day, for the transportation market.[31]
- Avina Clean Hydrogen is constructing a hydrogen production facility along with a heavy-duty refueling station in Vernon just 10 miles from the Port of Long Beach. The facility will use water electrolysis to produce 4000 kg/day of clean hydrogen and is expected to open by the end of 2025.[32]

The total fueling capacity of the 112-station network is nearly 117,100 kg/day, or enough hydrogen fuel for nearly 105,400 light-duty FCEVs. The combined daily production capacity of existing and new production plants that will supply hydrogen to the transportation sector is

---

27 Two production plants were funded by GFO-17-602, Renewable Hydrogen Transportation Fuel Production Facilities and Systems, released December 2017. Two additional plants and a plant upgrade were funded by GFO-20-609, Renewable Hydrogen Transportation Fuel Production, released April 9, 2021.

28 H2B2. June 15, 2023. "H2B2's SoHyCal Project in California Has Started Hydrogen Production," https://www.h2b2.es/h2b2s-sohycal-project-in-california-has-started-hydrogen-production/.

30 The City of Lancaster. January 24, 2023. "Element Resources to Build One of California's Largest Renewable Hydrogen Production Facilities in the City of Lancaster, CA," https://www.cityoflancasterca.org/Home/Components/News/News/9889/.

31 Chevron Corporation. February 29, 2024. News release. "Chevron Announces Its First Solar-to-Hydrogen Production Project in California's Central Valley." https://www.chevron.com/newsroom/2024/q1/chevron-announces-its-first-solar-to-hydrogen-production-project-in-californias-central-valley#:~:text=alternative%20fuels-,chevron%20announces%20its%20first%20solar-to-hydrogen%20production%20project%20in,project%20in%20California's%20Central%20Valley.

32 Avina H2. November 4, 2024. Avina Clean Hydrogen Breaks Ground on Landmark Green Hydrogen Facility in Vernon, California. https://avinah2.com/avina-clean-hydrogen-breaks-ground-on-landmark-green-hydrogen-facility-in-vernon-california/

about 90,000 kg/day, most of which can be available to use in California. This amount is about 75 percent of the capacity of the future light-duty fueling network (though nearly eight times the anticipated demand of 11,340 kg/day from the latest light-duty FCEV projection by auto manufacturers of 16,200 FCEVs on the road by 2028). This production capacity is not necessarily dedicated to light-duty vehicles and continuing to focus on increasing hydrogen production for the California mobility market, with a focus on clean hydrogen and low-carbon intensities, should remain a priority. In addition, more hydrogen production projects, even the ones that will not supply the transportation sector, will help advance technologies and reduce the cost of hydrogen.

CHAPTER 3:
FUEL CELL ELECTRIC VEHICLE DEPLOYMENT

This chapter discusses the estimated number of FCEVs currently in the state and the projected FCEV population, along with barriers to widespread FCEV adoption.

Alongside the Toyota Mirai and Hyundai NEXO, Honda introduced the CR-V e:FCEV in late 2024, bringing the number of publicly available light-duty FCEV models to three.

Both the CEC and CARB publish FCEV deployment numbers. The CEC Energy Assessments Division collects and analyzes DMV data about the trends in ZEV sales and population and publishes the "Zero Emission Vehicle and Infrastructure Statistics,"[33] which offer a collection of dashboards for ZEV sales, ZEV population, school buses, and corresponding infrastructure information. CARB also collects and reports the estimated number of FCEVs on the road in April and October each year based on the analysis of DMV data, including removing vehicles that appear to be no longer registered in the state.

CARB's 2025 Annual Evaluation reports 14,128 on-road FCEVs as of April 2025. The CEC's "ZEV Population in California" dashboard reports 12,957 FCEVs at the end of 2024, and the "New ZEV Sales" dashboard reports 68 FCEVs through the end of the second quarter of 2025. With this information, staff estimates the total on-road FCEV population to be 13,025.[34] This marks a decrease in FCEV registrations for the first time, meaning that the number of FCEVs on the road is decreasing.

At the current FCEV sales rate, staff estimates that the cumulative FCEV sales in 2025 will be 272 FCEVs. The highest number of FCEVs sold in a year was in 2021 with 3,197 FCEVs. This significant reduction in the number of on-road FCEVs and new FCEV sales reflects the growing customer frustrations throughout the years due to the poor reliability of the stations and the sharp increase in hydrogen price, along with other factors.

The dashboard shows cumulative light-duty ZEV sales, including FCEV, BEV, and plug-in hybrid electric vehicles, as 2,242,716 in California as of the second quarter of 2025. The dashboard also shows 113 fuel cell electric buses and 139 fuel cell trucks at the end of 2024. The 2023 SB 643 report discusses medium- and heavy- duty vehicles in more detail, and Appendix C of this report provides updates on medium- and heavy- duty vehicles and stations.

Figure 11, reprinted from CARB's 2025 Annual Evaluation, shows data provided by auto manufacturers for estimates of vehicles on the road and projected for future deployment from all years of reporting in CARB's Annual Evaluations.[35] The yellow circles and red triangles show estimated numbers of vehicles on the road based on October and April DMV data, respectively.

---

33 California Energy Commission. "Zero Emission Vehicle and Infrastructure Statistics," https://www.energy.ca.gov/zevstats.

34 According to the CEC ZEV Dashboard, cumulative sales or leases of FCEVs in California were 18,149 in the second quarter of 2025; however, the cumulative sales number of FCEVs does not account for those FCEVs no longer in use due to replacement or attrition.

35 CEC staff notes that the material in Figure 12 are projections, per AB 126.

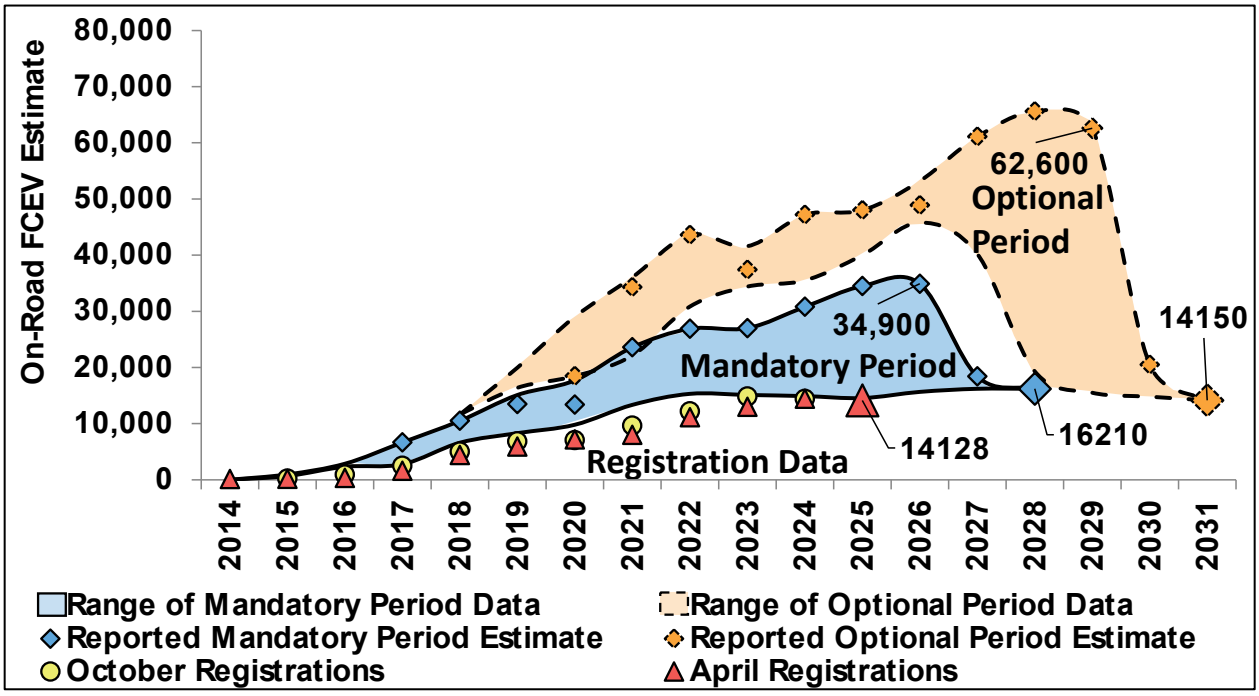
Two shaded areas in the figure represent projections made by auto manufacturers for future FCEV deployment in all annual evaluations to date. All auto manufacturers who seek to certify vehicles for sale in California must provide annual estimates for the mandatory period (blue-shaded area), which always covers the current model year and the next three model years. Auto manufacturers may also provide responses for the optional reporting period (orange-shaded area), which extends three further model years. For example, in the 2025 survey, the mandatory survey reporting period covers the Model Years 2025 through 2028, and the optional survey reporting period covers Model Years 2029 through 2031.

The information provided on the survey by auto manufacturers, represents projected FCEV sales or leases in terms of model years. CARB's analysis translates model year into calendar year by assuming that one-third of all vehicles of a given model year are sold or leased in the prior calendar year based on the historical DMV registration data from 2007 to 2012. For example, if an auto manufacturer responds with a projection of 900 FCEVs to be sold in Model Year 2025, CARB's analysis assumes 300 FCEVs will be sold in Calendar Year 2024 and the remaining 600 FCEVs in Calendar Year 2025.

CARB's analysis also assumes a standard rate at which FCEVs fall out of the fleet, such as vehicles being moved to another state, accidents, and other causes to estimate the on-road population.[36]

36 The standard rate at which FCEVs fall out of the fleet is calculated by assuming an exponential decline of vehicle numbers with a half-life of 15 years.

Figure 11: FCEV Projections Based on CARB Analysis of Responses to the Annual Auto Manufacturer Survey



Source: CARB

The 2025 annual survey of auto manufacturers' deployment plan resulted in an estimated 16,200 on-road FCEVs in California by 2028. This year, auto manufacturers did not include estimates for the optional period extending from 2029 to 2031. The estimated number of 14,150 FCEVs in 2031 includes only CARB's standard rate at which FCEVs fall out of the fleet and should not be used for further analysis.

In previous surveys, auto manufacturers estimated a higher FCEV deployment of up to 62,600 FCEVs by 2029. To better understand the lacking FCEV deployment, the CEC has entered into a contract with the University of California, Davis (UC Davis), to gain a better understanding of customer experiences with light-duty hydrogen refueling and hydrogen refueling market potential, which will help the CEC plan future efforts.

CHAPTER 4:
TIME REQUIRED TO PERMIT AND CONSTRUCT HYDROGEN REFUELING STATIONS

Chapter 4 covers the time needed to develop a hydrogen refueling station, shows how the development time has changed over the years, and discusses efforts to help reduce that time.

Overall station development has slowed down considerably in the last few years, since some developers have paused their station development until they secure more private funding or until the LCFS credit price recovers. Global inflation, along with the lower LCFS credit value, has made securing private funding commitments more difficult. Furthermore, finding equipment that ensures station uptime has been difficult; the equipment installed at existing stations either cannot maintain sufficient uptime or requires station operators to develop their own parts. Developers also spent more time trying to negotiate construction contracts in the last few years because of inflation leading to construction cost escalation.

Therefore, the time required to permit and construct hydrogen refueling stations observed since 2020 may not be an accurate representation of how long station development takes under optimal conditions. Until global inflation, labor and material shortages, equipment quality issues, supply chain interruptions, and the lower LCFS HRI credit value are resolved, staff expects overall station development time for remaining stations to continue to increase.

This report breaks down station development time into four phases to analyze the trend. Table 2 lists the phases of station development.

Table 2: Station Development Phases

Phases	Description	Responsible Entity(ies)
Phase One: From start of CEC grant-funded project to initial permit application filing	Begins when the grant-funded project agreement is executed and includes site selection and site control, station planning, participation in pre-permitting meetings for confirmation of station design consistency with local zoning and building codes and filing the initial permit application with the authority having jurisdiction (AHJ). Equipment ordering could occur during this phase.	Grant recipient and AHJ

Phases	Description	Responsible Entity(ies)
Phase Two: From initial permit application filing to receipt of approval to build	Consists of AHJ review of the application and potential site reengineering/redesign based on AHJ feedback. Minor construction work sometimes begins.	Grant recipient and AHJ
Phase Three: From approval to build to station becoming operational	Includes station construction and meeting operational requirements: fuel supply, hydrogen quality testing, dispensing per standard, successful refueling of one FCEV, and receipt of an occupancy permit from the AHJ.	Grant recipient and AHJ
Phase Four: From station becoming operational to becoming open retail	The station undergoes accuracy testing with the California Department of Food and Agriculture/Division of Measurement Standards (DMS) and protocol testing with auto manufacturers and the Hydrogen Station Equipment Performance (HyStEP) device. Once the station has been confirmed to meet the refueling protocol, the station is categorized as open retail.	Grant recipient, DMS, CARB (HyStEP), and auto manufacturers

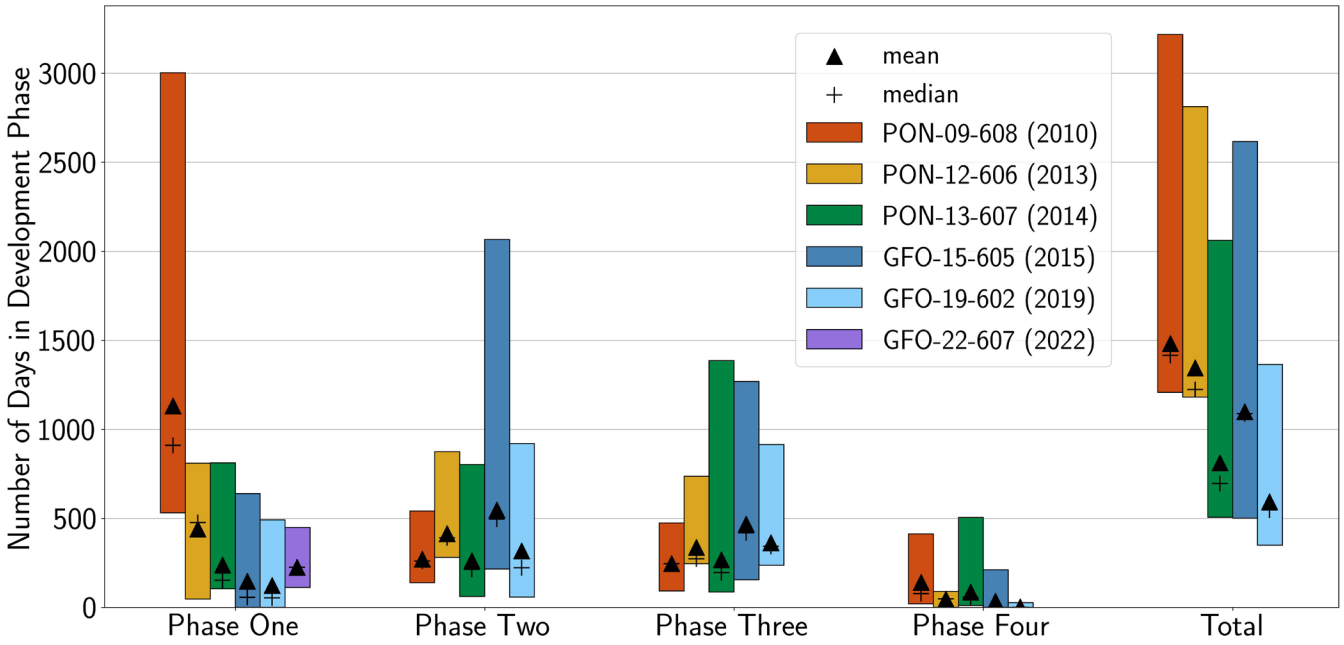
Source: CEC

Figure 12 presents station development time, showing mean, median, and range (minimum, and maximum number of days) of each phase with one bar representing all the stations that completed that phase per solicitation. The figure also includes data from stations that are not yet open retail and therefore haven't completed all phases yet. The bars on the far right in the figure show mean, median, and range of days for the total station development time for each solicitation and include only stations that have completed all phases.

The time spent in development phases includes data of stations that were canceled without completion or stations that have closed. For example, nine projects were either canceled or closed without completing during 2023, but these stations had completed Phase One (and one station project completed Phase Two), and the associated data are included in the corresponding solicitation bars for these phases. Phases One and Two development times from these stations are not represented in the total development time bars because the stations did not complete all phases.

The two stations that opened during 2025 were all privately funded stations; therefore, the CEC does not have information on the station development time. And because most of the station development has been on pause, there was little update to this year's analysis.

Figure 12: Mean, Median, Minimum, and Maximum Days of Each Station Development Phase by Solicitation



Sources: CEC and CARB

Overall, the time spent in Phase One decreased after 2010 for newer solicitations. Looking at the bars on the far right for total station development time, the median total station development time decreased from about four years (PON-09-608) to two years (PON-13-607) for stations that opened before the pandemic and increased to about three years for those stations that completed during the pandemic (GFO-15-605). The median total station development time for GFO-19-602 is lower than the other solicitations, but only 10 stations have completed all phases. Active agreements where stations are still being completed will continue to increase the mean, median and maximum of station development time. Only one station was funded under GFO-22-607, and it only completed Phase One.

Efforts to Help Reduce Station Development Time

CEC staff continues to work with station developers to explore ways to overcome the hurdles they are experiencing and expedite station development, including assessing an appropriate funding amount per station given inflation, supply chain challenges, and the uncertainty around the future fuel demand from light-duty FCEVs.

The CEC held the Staff Workshop for Medium- and Heavy-Duty Zero-Emission Vehicle Infrastructure Solicitation Concepts in July 2024 and solicited feedback on the appropriate funding amounts per station for capital expenses and operations and maintenance grants. As a result, the CEC released a solicitation, GFO-24-601, offering $10 million for developing new stations in Sacramento and San Francisco Counties and $5 million to support capital expenditures and operations and maintenance for planned or TNO light-duty hydrogen refueling stations that have had open retail progress stall because of cost constraints. As a result of this solicitation, FirstElement Fuel Inc. is proposed for an award of $1.5 million to advance the development of three light-duty hydrogen refueling stations previously awarded

under GFO-19-602 and located in San Bernardino, Riverside and Buena Park. The station developer is targeting the completion of all three stations by the end of 2026.

Furthermore, since finding equipment that ensures station uptime has been difficult and time-consuming, the CEC awarded FirstElement Fuel Inc. $3.3 million to develop a high-capacity liquid hydrogen pump system with improved reliability that will be capable of 10 kilogram per minute fills for light-, medium- and heavy-duty vehicles. Developing and manufacturing equipment in California will reduce the effects of supply chain interruptions on station development time and minimize station downtime due to maintenance.

Two station developers have mentioned waiting for LCFS credit prices to recover before continuing the development of new stations. CARB's proposed 2024 LCFS amendments to help recover LCFS credit prices took effect July 1, 2025, and might impact station development.

In the time between PON-13-607 and GFO-15-605, CARB, the CEC, GO-Biz, and DMS collaborated with public and private stakeholders to develop the HyStEP device and program. Stations are tested using the HyStEP device before becoming open for retail hydrogen sale. The HyStEP tests the ability of hydrogen refueling stations to adhere to the fueling protocols of the industry-adopted SAE J2601 standard. This standard protocol helps ensure fast, safe, and reliable fueling experiences for customers.

The HyStEP device verifies conformance to the protocol in one to two weeks. Prior efforts that relied on testing via multiple auto manufacturers using test vehicles could require months of scheduling, testing, adjusting, and retesting. However, there is only one HyStEP device in the state, which could slow station opening if the station development pace improves or if multiple stations are ready for testing simultaneously. Furthermore, the current HyStEP device can test only stations that fuel light-duty vehicles. In the future, a new device will be needed to test medium- and heavy-duty hydrogen stations. The HyStEP program is operated by CARB, with collaborative review of HyStEP testing results among state agencies, the station developer, and auto manufacturers.

CARB released a request for proposal October 18, 2023, with $1.05 million available to design, engineer, build, test, and validate the next generation HyStEP 2.0. When compared to the original HyStEP device, the HyStEP 2.0 device will include new hardware and capabilities, which lead to reduced testing time. These capabilities include simultaneous testing and venting, accommodating back-to-back fueling, and ability to test a larger variety of vehicle tank sizes (up to 25 kg). A contract with Powertech Labs to build HyStEP 2.0 was executed in July 2024, and the device is expected to begin testing hydrogen stations in California by mid-2026.

Senate Bill (SB) 1291 (Archuleta, Chapter 373, Statutes of 2022)[37] has also been helpful in improving station development timeline by streamlining hydrogen station permitting. SB 1291 requires every city and county to approve administratively an application to install hydrogen refueling stations unless there are documentable health and safety concerns. GO-Biz is the

37 California Legislative Information. Senate Bill 1291 (Archuleta, Chapter 373, Statutes of 2022), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB1291.

lead agency for ensuring jurisdictions' compliance and uses Hydrogen Fueling Station Readiness[38] to help station developers and jurisdictions. Senate Bill 1418 (Archuleta, Chapter 607, Statues of 2024)[39] requires every city and county to adopt a permit streamlining ordinance and a checklist that outlines all the requirements for permitting application.

Reducing the station development time is critical in ensuring that FCEV drivers and auto manufacturers feel confident about the refueling infrastructure. However, this effort requires state and industry stakeholders to collaborate as station development depends on several factors, including permit timing, public and private funding, the number of station equipment vendors and supply chain, and the number of station developers participating in the market available to deploy stations.

38 Governor's Office for Business and Economic Development. "Hydrogen Fueling Station Readiness," https://business.ca.gov/industries/zero-emission-vehicles/hydrogen-readiness/.

39 California Legislative Information. Senate Bill 1418 (Archuleta, Chapter 607, Statutes of 2024), https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320240SB1418.

CHAPTER 5:
AMOUNT AND TIMING OF THE GROWTH OF THE HYDROGEN REFUELING NETWORK AND INTERNATIONAL OVERVIEW

This chapter analyzes the amount and timing of the growth of the hydrogen refueling network by comparing the anticipated schedule of hydrogen refueling station openings over the next six years to the estimated schedule of FCEV deployment in California on a regional level. This analysis does not include TNO or closed stations, and it assumes that stations are operating at the respective nameplate capacities without significant downtime. Chapter 2 discusses challenges with station reliability due to various factors such as equipment failure, hydrogen supply and other factors that have at times significantly affected station network performance.

The objective of the Clean Transportation Program solicitations is for the fueling capacity of the station network to stay well ahead of hydrogen fuel demand so that consumers can have confidence in fuel availability if they choose to drive a FCEV. To determine that, a regional analysis of the network is necessary. This chapter also discusses contextual information about station and FCEV deployment in other parts of the world.

As of September 2, 2025, California's open retail hydrogen network of 50 available stations can fuel about 34,300 FCEVs, which is nearly 2.5 times more dispensing capacity than the demand needed to fuel the 14,128 FCEVs currently on the road. The station opening timelines provided to the CEC by hydrogen station developers suggest that by 2030, the network of 112 projected stations will have the capacity to serve nearly 105,400 FCEVs. This number is more than 6.5 times the amount of fuel needed to supply the projected 16,200 FCEVs by 2028 reported in CARB's 2025 Annual Evaluation, based on the latest auto manufacturer survey responses.

Even though the overall network nameplate capacity should still exceed fuel demand, there have been setbacks, such as proposed stations being canceled and existing stations experiencing reliability and availability issues.

Regional Analysis of Network Growth and FCEV Deployment

This section evaluates four major regions of the state: the Greater Los Angeles Area, the San Francisco Bay Area, the Sacramento Area, and the San Diego Area. The regions are defined in the glossary. This section also evaluates the rest of the state, composed of the North Region, Central Coast, Central Valley, Eastern Sierra, and Imperial County.

Table 3 presents the estimated FCEV registrations per region as of April 2025, the number of FCEVs that the regional capacity of open retail stations with TNO stations removed can support, and the additional number of FCEVs the regional capacity can support.[40]

Table 3: Regional FCEVs and Open Retail Minus TNO Station Capacity

Region	# of FCEV Registrations[41]	Estimated # of FCEVs Open Retail Stations Can Support	Additional # of FCEVs That Open Retail Stations Can Support
Greater Los Angeles Area	9,065	32,964	23,899
San Francisco Bay Area	3,032	18,051	15,019
Sacramento Area	1,251	563	(688)
San Diego Area	540	1732	1,192
Rest of State	250	1140	890
Total	**14,138**	**54,450**	**45,312**

Source: CEC

The region with the most urgent need for additional fueling capacity is the Sacramento Area since Shell permanently closed two stations at the beginning of 2024, leaving the area with one station with a nameplate capacity of 394 kg/day. The 2024 AB 126 Report anticipated three additional stations in the Sacramento Area to open in 2025, 2026, and 2028. However, the station anticipated to open in 2025 is canceled. The remaining two stations are anticipated to open by 2028 and will add a nameplate capacity of 3,230 kg/day, which can support close to 4,600 FCEVs.

Table 4 presents projections of vehicle and station rollout in 2030 using only 103 open and planned stations with known locations. These 103 stations alone are expected to have sufficient nameplate capacity to serve the maximum number of FCEVs projected to be sold by 2030 as reported in CARB's 2025 Annual Evaluation based on past auto manufacturer survey responses[42].

---

40 To calculate the projections presented in Table 3 and Table 4, as well as Figures 14 through 17, staff used the daily station capacity as determined by the Hydrogen Station Capacity Evaluation (HySCapE) tool (or the stated nameplate capacity, if HySCapE results are not available). Then, staff used the assumption of 0.7 kilogram per day of hydrogen consumed per FCEV to convert the station nameplate capacity into the estimated number of FCEVs supported.

41 Numbers of FCEVs determined by DMV registration data, April 2025.

42 In the 2025 survey, auto manufacturers only provided FCEV sales projections for the mandatory period (2025-2028) and did not provide any projections for the optional period (2029-2031). Therefore, FCEV sales projections for the year 2030 only include data from past surveys.

Table 4: Regional Projection of FCEVs and Station Network Capacity in 2030

Region	Maximum Projected # of FCEVs in 2030[43]	Estimated # of FCEVs Stations Could Support in 2030	Additional # of FCEVs That Stations Could Support in 2030
Greater Los Angeles Area	16,584	74,897	58,313
San Francisco Bay Area	2,570	45,754	43,184
Sacramento Area	1,015	5,180	4,165
San Diego Area	439	6,348	5,909
Rest of State	299	9,142	8,843
Total	**20,907**	**141,321**	**120,414**

Source: CEC

The regional analysis in this chapter evaluates all open retail stations, the planned stations under CEC solicitations with confirmed addresses, and planned stations that are privately funded with confirmed addresses. There are nine stations without addresses with about 14,500 kg/day of capacities total, which could support about 20,700 FCEVs.

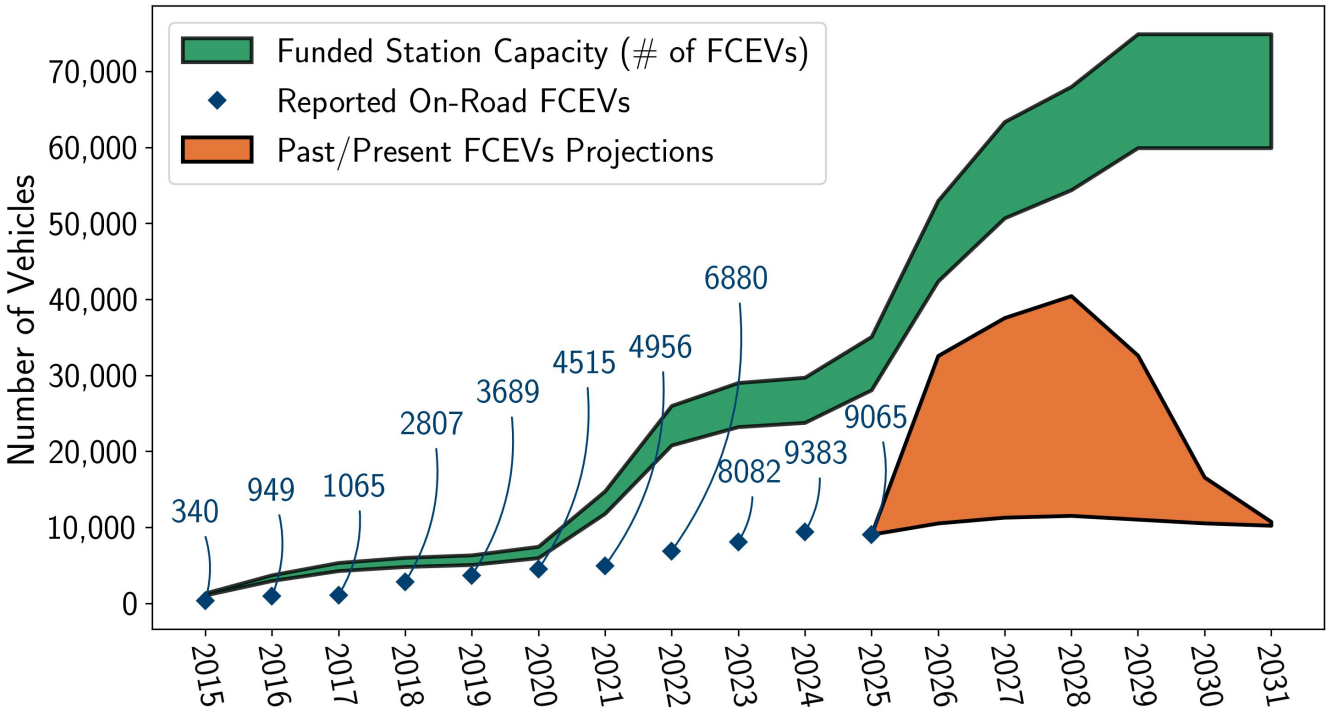
The orange areas in Figures 13 through 16 show the range of FCEVs projected from auto manufacturer surveys, which include results from this year's survey and previous years' surveys. This year, auto manufacturers provided estimates only for the mandatory period ranging from 2025 to 2028. The years 2029 and 2030 include only projections given in past years. The year 2031 does not include any projections and only includes CARB's standard rate in which FCEVs fall out of fleet. The green areas in the figures indicate the estimated number of FCEVs that could be supported by stations in each region. The width of the green area represents the difference between using 100 percent of the station nameplate capacity to determine the number of FCEVs supported (the upper bound) and using 80 percent (the lower bound, representing a more sustainable level of fueling).

The figures assume that stations will open according to station developers' timelines and include only open retail stations and planned stations with addresses (103 stations) and do not count TNO stations or stations that are closed permanently. The regional nameplate capacity of each year was determined using the average nameplate capacity over the four quarters.

43 CARB assigned the proportion of projected vehicles (based on the auto manufacturers survey responses) to each county based on the proportion of network capacity among stations located within the county. This method assumed the regional distribution of FCEV deployment will closely follow the regional distribution of the fueling network.

Starting with the Greater Los Angeles Area shown in Figure 13, the expected station capacity in the region could sustain projected FCEV deployment, with the ability to support nearly 75,000 FCEVs by 2030. The region has lost 318 FCEV registrations since 2024.

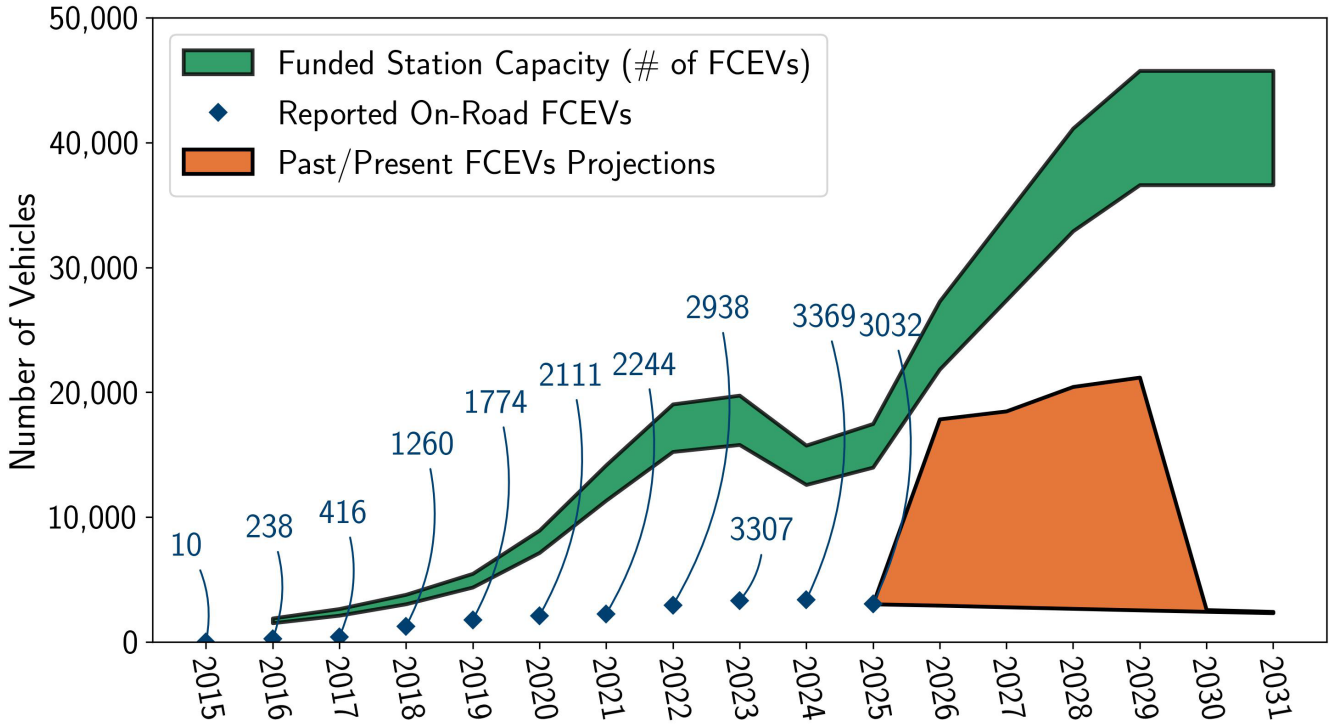
Figure 13: Greater Los Angeles Area Station Capacity and Number of Vehicles



Source: CEC

Figure 14 shows that network capacity in the San Francisco Bay Area maintains an excess capacity to serve FCEVs despite the permanent closing of three Shell stations in the area causing the dip in 2024. However, the closure of the Shell stations in February 2024 left San Francisco without any hydrogen refueling stations, which forces FCEV drivers to drive outside the city to fuel their cars. Currently, there are 223 registered FCEVs in San Francisco and no hydrogen refueling stations to refuel them. Consequently, the Bay Area has seen a reduction in FCEV registrations of 337 FCEVs. By 2030, the Bay Area will have enough capacity to fuel nearly 45,800 FCEVs.

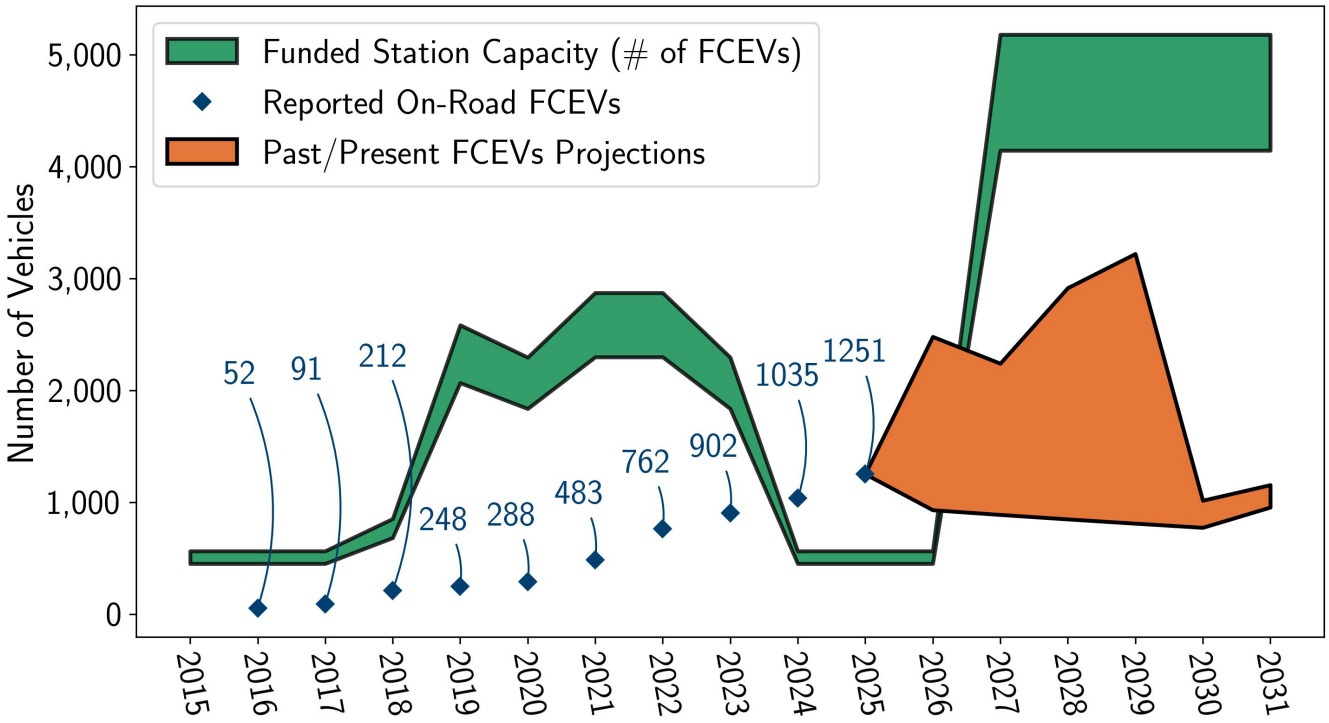
Figure 14: San Francisco Bay Area Station Capacity and Number of Vehicles



Source: CEC

As shown in Figure 15 and previously in Table 3, the current network capacity of the Sacramento Area is not enough to support existing FCEVs after the two Shell stations closed permanently. The two stations planned in this area are not expected until 2028. Despite the lack of capacity to support the fueling of FCEVs, this area has seen an increase in the number of FCEV registrations by 216 FCEVs.

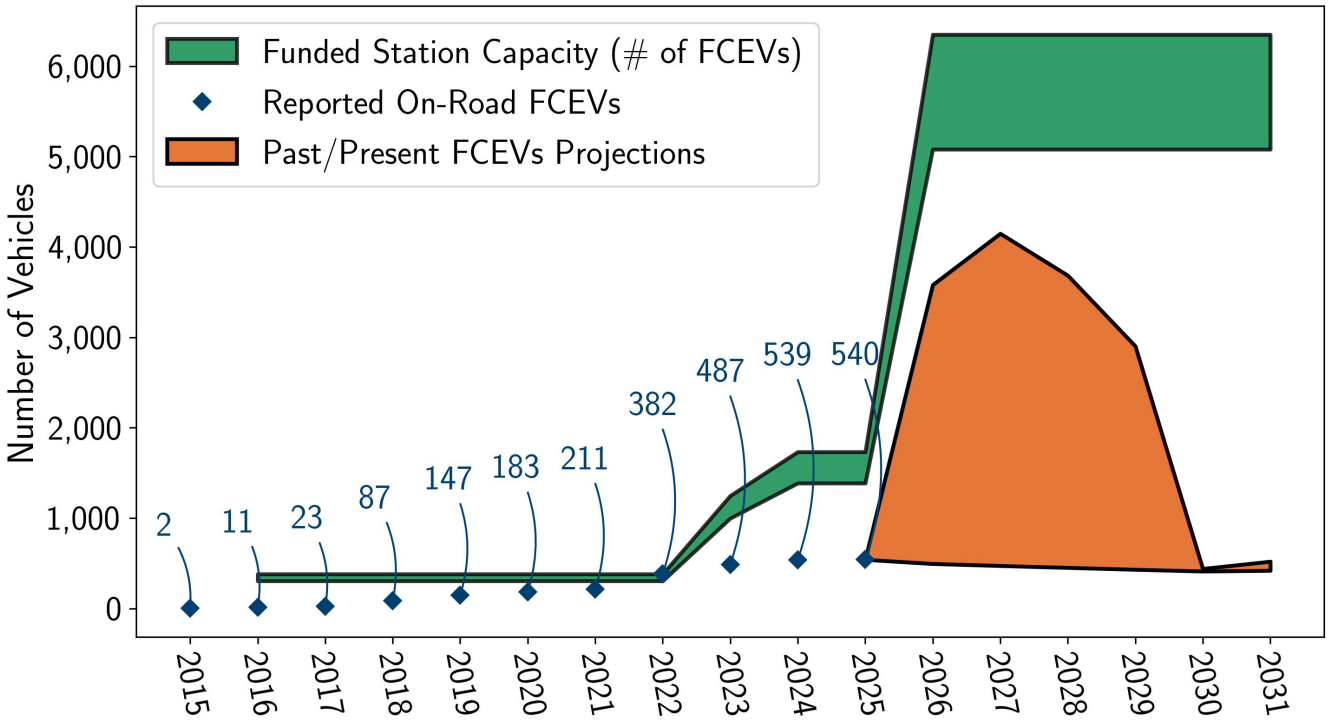
Figure 15: Sacramento Area Station Capacity and Number of Vehicles



Source: CEC

Figure 16 shows San Diego's network capacity increasing since the new San Diego Mission Center station with a capacity of 1,212 kg/day opened in May 2023, replacing the older station in Del Mar with a capacity of 266 kg/day. Two more stations are planned for the region by 2027, adding a total of 3,232 kg/day in nameplate capacities that can support an additional 4,600 FCEVs in the area. The figure shows that the number of FCEVs registered in the area has stayed consistent, with 540 FCEVs as of April 2025.

Figure 16: San Diego Area Station Capacity and Number of Vehicles



Source: CEC

FCEVs and Stations in Other Countries

For FCEVs and hydrogen infrastructure to scale and reduce costs, investments must be made globally. CEC staff asked representatives of national governments and organizations[44] about the investments from their governments in hydrogen refueling infrastructure, station development numbers, and FCEV population. This section presents the findings of the countries making the largest investments: China, Germany, Japan, and the Republic of Korea (South Korea).

Table 5 summarizes the registered passenger vehicles and nonpassenger vehicles (including buses, commercial vehicles, and trucks) in China, Germany, Japan, and South Korea compared to California. Table 6 summarizes the number of open hydrogen refueling stations (light-, medium-, and heavy-duty combined) in these countries. The number of nonpassenger FCEVs has increased for all countries. While the number of total FCEVs has decreased in California, Japan and South Korea saw a slight increase, and Germany increased their number of FCEVs by about 35 percent primarily due to 814 more registered light-duty FCEVs. The increase in the number of FCEVs occurred despite decreasing number of stations, as only South Korea increased the number of hydrogen refueling stations by 23 stations since last reported in the 2024 AB 126 report.

44 CEC staff communicated via email in May, June, July and August 2025 with representatives of national government agencies and organizations in Germany, Japan, and South Korea. China representatives did not respond to staff's inquiries this year.

Table 5: Registered FCEVs in California and Other Countries

Country	Passenger FCEV	Nonpassenger FCEV (buses, commercial vehicles, and trucks)	Total
California	14,128	275	14,403
China (2024)	509	9,289	9,798
Germany	3,026	263	3,289
Japan	8,479	512	8,991
South Korea	36,033	1,524	37,557

Source: CEC

Table 6: Open Hydrogen Stations in California and Other Countries

Country	Hydrogen Stations
California	61
China (2024)	274
Germany	75
Japan	151
South Korea	215

Source: CEC

Table 7 shows the cumulative hydrogen infrastructure investments through 2024 made by Germany, Japan and South Korea, based on responses CEC staff received about government funding for hydrogen refueling infrastructure.[45] While all countries reported an increase in investments in 2024, Germany has not invested any new funding into hydrogen refueling infrastructure in that year. On a per-capita basis, California ranks third after South Korea and Japan in terms of government funding for public hydrogen stations.

Table 7: Investments in Hydrogen Refueling Infrastructure in California and Other Countries

Country	Cumulative Hydrogen Infrastructure Investments Through 2024 in million dollars	Cumulative Investments per Capita Through 2025 in dollars
California	294	7.46
Germany	150	1.79
Japan	952	7.68

45 The funding amounts were converted in the U.S. dollar using currency conversion rates in September 2025. The conversion rates fluctuate over time and can affect the numbers significantly year to year.

South Korea	1,050	20.29

Source: CEC

CHAPTER 6:
REMAINING COST AND TIME REQUIRED TO ESTABLISH A SUFFICIENT NETWORK OF HYDROGEN REFUELING STATIONS

This chapter focuses on the remaining cost and time required to establish a sufficient network of hydrogen refueling stations.

Overall, the CEC's Clean Transportation Program has allocated nearly $174 million through Fiscal Year 2024–2025.[46] Private investment has included nearly $112 million committed to match public-sector funding to date, and GFO-19-602 grant recipients will commit an additional $12 million to build the remaining stations, making the total private investment about $124 million. The total reported public and private investment in hydrogen refueling stations is therefore nearly $298 million. The actual investment is higher since the investment in privately funded stations is not included. With the 112 stations funded by the combined spent and committed funds, the state has allocated sufficient funds to meet and exceed the former 100-station goal set by AB 8.[47]

Figure 17 shows the total estimated stations from the Clean Transportation Program (including $5 million from the Volkswagen Mitigation Trust Fund[48] allocated to GFO-19-602) that will result in 101 stations[49] and private investments that will result in 11 stations. The 11 privately funded stations include 8 stations by Chevron, 1 station at the Sunline Transit Agency station, 1 station at the Port of Oakland that offer light-duty fueling, and 1 station by H2B2 USA. Based on the most recent station development schedules shared by station developers, all 112 stations are estimated to be open retail by 2030. Out of the four stations anticipated to become open retail by the end of 2025, two stations have opened as of September 2, 2025.

The total estimated number of stations has decreased from 129 in 2024 to 112 as of September 2025. This is because three previously open retail stations have closed permanently, one award under PON-13-607 to build a station in Woodside has expired, Air Products has canceled the development of a station in Galt, and Iwatani has cancelled the

46 This amount does not include the cancelled Shell agreement (GFO-19-602), the cancelled stations by Iwatani (GFO-19-602), and the declined Phillips award (GFO-22-607).

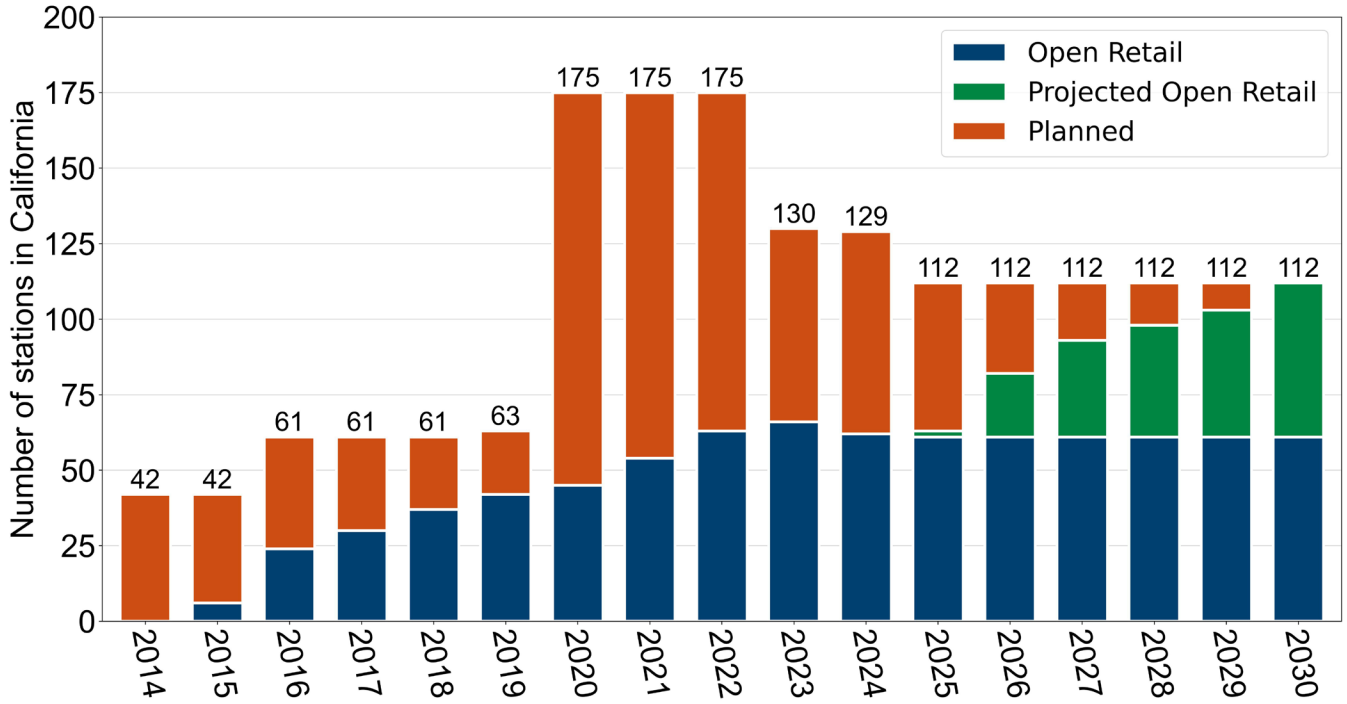
47 The 100-station goal was removed in AB 126.

48 Funding from the Volkswagen Environmental Mitigation Trust is the result of a settlement agreement among Volkswagen Group of America, Inc., the United States Environmental Protection Agency, and CARB following VW's admission that it used illegal software "defeat devices" in certain 2.0-liter and 3.0-liter diesel passenger vehicles sold in the United States and California, https://ww2.arb.ca.gov/our-work/programs/volkswagen-environmental-mitigation-trust-california.

49 This number includes 16 stations included in a CEC agreement with FirstElement Fuel funded fully under match share and 2 privately funded stations by Iwatani.

development of 12 stations. For more details, Appendix B lists all the changes in the station network from 2017 to 2025.

Figure 17: Open Retail, Projected Open Retail, and Planned Hydrogen Refueling Stations by Year



Source: CEC

The projected number of FCEVs has significantly reduced this year, and the fueling capacity of the planned 112-station network is more than sufficient when comparing the networkwide fuel demand and supply. However, there appear to be regional capacity constraints. Upcoming stations should help alleviate those constraints. It is difficult to state definitively if additional state funding for light-duty hydrogen stations is necessary or prudent until the currently funded stations show progress in development, construction, and reaching open retail status. Further, new light-duty FCEV sales and the on-road fleet are important considerations when determining how to use state funds.

As noted earlier, 61 stations have achieved open retail status, and an additional 51 stations are under development. Further details on the 51 stations that are in various stages of development are as follows:

- GFO-15-605 stations:
    - One station is under development.
- GFO-19-602 stations:
    - Twelve stations are under development.
    - Twenty-eight stations are pending for future batches.
- GFO-22-607 stations:
    - One station is under development.

- Iwatani private stations:
    - One station is under development.
- Other privately funded stations:
    - Six stations by Chevron are under development.
    - One station by H2B2 is under development.
    - One station is under development by Sunline Transit Agency using match funding for a CEC agreement.

Given inflation, supply chain challenges, and uncertainty around future fuel demand from light-duty FCEVs, supportive policies beyond CEC funding is important for the hydrogen refueling station network, including the CARB LCFS HRI, station operators' focus on reliability, and sales of light-duty FCEVs by original equipment manufacturers. Seventy-nine stations have been approved to generate LCFS credits through the HRI provision.[50]

50 California Air Resources Board. "LCFS ZEV Infrastructure Crediting — Approved HRI and FCI Applications." Accessed November 4, 2024, https://ww2.arb.ca.gov/resources/documents/lcfs-zev-infrastructure-crediting.

CHAPTER 7: CONCLUSIONS

California has allocated nearly $174 million to hydrogen infrastructure with 112 hydrogen refueling stations expected by 2030. As of September 2, 2025, California has 50 stations that are serving the public, with an additional 11 stations that are considered TNO. These stations, when operating at capacity, can fuel around 58,900 FCEVs, which far exceeds today's demand needed by FCEVs in California. However, a regional analysis showed that the fueling capacity in San Francisco and the Sacramento Area cannot cover the fuel demand. As of April 2025, the estimated number of on-road FCEVs is 14,128, marking the first decline in the number of registered FCEVs.

The hydrogen station network nameplate fueling capacity of today would also be sufficient to meet the 2028 projected fuel demand of 16,200 as reported in CARB's 2025 Annual Evaluation. The number of projected FCEVs has declined significantly from the previously anticipated 62,600 FCEVs by 2029. The CEC and CARB identified barriers that are affecting the customer experience in the past few years, and these barriers continue to exist. Common issues include high hydrogen prices and station downtime due to equipment failures, supply chain constraints, and hydrogen fuel supply issues. Addressing these barriers and improving station reliability and availability are critical to helping support existing FCEV drivers.

The number of TNO stations has significantly decreased from the reported 20 TNO stations in the 2024 AB 126 Report to 11 TNO stations. This is partly because three TNO stations have closed permanently and partly due to CEC's strategy to allocate funding under GFO-23-604 to support the operation and maintenance of stations, which led to the reopening of five gaseous hydrogen stations that were affected by hydrogen supply shortages in Southern California. The reopening of those stations has increased the average availability of open retail stations in the second quarter of 2025 to 73 percent. The two grants awarded under GFO-23-604 to FirstElement Fuel and Iwatani will improve the reliability of 45 open retail stations.

Open retail stations have downtime periodically because of maintenance, equipment failures, and hydrogen supply issues. According to CARB staff, the network of open retail stations has operated at around 63 percent of capacity on average from the third quarter of 2024 to the second quarter of 2025 (including TNO stations as 0 percent). When considering this availability percentage, the network of open retail stations can support about 34,300 FCEVs.

The current coverage decreased significantly in the Sacramento Area and San Francisco because of Shell closing stations permanently, leaving only one station with not enough fueling capacity to support existing FCEVs in the Sacramento Area and no station within San Francisco. The CEC allocated $10 million under GFO-24-601 to fund stations in those areas affected by the Shell closures. However, none of the applicants included building new stations in their applications, showcasing the industry's focus on improving the reliability of existing stations before committing to building new stations. Two stations are anticipated to open in the Sacramento Area by 2028, bringing the nameplate fueling capacity of the region to 3,600 kg/day capable of supporting at least 5,100 FCEVs in the region.

The funding opportunity GFO-24-601 also allocated $5 million for the operation and maintenance of existing and planned stations. One applicant (FirstElement Fuel) is proposed for an award of $1.5 million that will further support the construction of three planned stations funded under GFO-19-602, two of which are located in disadvantaged communities.

About 71 percent of California's residents who live in disadvantaged communities are within a 15-minute drive of an open retail or planned hydrogen station. This percentage is similar to 64 percent of the general statewide population being in the same driving distance to a station. These numbers could increase as addresses for stations in future batches funded under GFO-19-602 are announced. The CEC and CARB will continue to explore options to expand hydrogen refueling network benefits to as many disadvantaged communities as possible.

Station development time continued to suffer this year. Many stations in development are on pause until station developers secure more private funding to cover increased costs due to global inflation and until the LCFS credit price recovers. CARB's LCFS amendments are in effect since July 2025, which might impact LCFS credit price.

GLOSSARY

Term	Definition
American Institute of Chemical Engineers (AIChE)	A global organization of chemical engineers
Authority having jurisdiction (AHJ)	An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.
California Hydrogen Infrastructure Tool (CHIT)	A geographical information system-based tool developed using ArcGIS software to assess the spatial distribution of the gaps between the coverage and capacity provided by existing and planned stations and the potential first adopter market for fuel cell electric vehicles.
Disadvantaged community	Defined by Health and Safety Code 39711 as the most burdened census tracts in California. Burden scoring is determined by 20 pollution/health and socioeconomic factors.
Electrolyzer	A system or device that uses an electrochemical process that splits water into hydrogen and oxygen.
Energy Research and Development Division (ERDD)	A division within the California Energy Commission. ERDD helps California meet its energy and greenhouse gas reduction goals by investing in cutting-edge research.
Fuel cell electric vehicle	A zero-emission vehicle that runs on compressed hydrogen fed into a fuel cell "stack" that produces electricity to power the vehicle.
Greater Los Angeles Area	The counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura.
Hydrogen Refueling Infrastructure (HRI) credits	Low Carbon Fuel Standard (LCFS) credits that allow eligible hydrogen stations to generate infrastructure credits based on the capacity of the station minus the quantity of dispensed fuel.
Hydrogen Station Capacity Evaluation model (HySCapE)	A tool for verifying the dispensing capacity of a hydrogen refueling station, based on the Chevron profile. CARB uses HySCapE to verify station capacity for the LCFS HRI program, and the CEC used it to verify station capacity under GFO-19-602.
Hydrogen Station Equipment Performance (HyStEP)	A device that tests the ability of hydrogen refueling stations to adhere to the fueling protocols of the industry-adopted SAE J2601 standard.

Low Carbon Fuel Standard (LCFS)	Standard developed by CARB to reduce the carbon intensity of transportation fuel used in California.
Metric ton (MT)	A unit of mass and defined as 1,000 kilograms.
Nameplate capacity	Rated capacity, nominal capacity, installed capacity, or maximum effect, is the intended full-load sustained output of a hydrogen refueling station.
Sacramento Area	The counties of El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba.
San Diego Area	The area of San Diego County.
San Francisco Bay Area	The counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma.
Station Operational Status System (SOSS)	A customer-facing mobile app to report hydrogen station operational status information consistently and reliably to FCEV customers.
Steam methane reformation (SMR)	A process in which methane molecules are split to extract the hydrogen and carbon dioxide is released into the atmosphere.
Temporarily nonoperational (TNO)	A hydrogen refueling station that has previously achieved open retail status but has been unavailable for customer fueling for a period greater than 30 days for various reasons. A TNO station is expected to become available for customer fueling again in the future.
Utilization	The ratio of fuel throughput to the nameplate capacity of the station or the network of stations.
Zero-emission vehicle (ZEV)	A vehicle that emits no exhaust gas from the onboard source of power.

APPENIX A: HYDROGEN REFUELING STATIONS IN CALIFORNIA

Table A-1 lists the 61 open retail hydrogen refueling stations (50 stations available for customer fueling and 11 TNO stations) with street addresses and open retail dates. Table A-2 lists the stations in the process of becoming open retail. These lists include Clean Transportation Program-funded and privately funded stations. Real-time status is available to drivers via the Station Operational Status System, maintained by the Hydrogen Fuel Cell Partnership.[51]

Table A-1: Open Retail and Temporarily Nonoperational Stations

Station Address (A to Z by city)	Open Retail Date
2618 La Paz Road, Aliso Viejo, CA 92656	6/22/2021
3731 East La Palma Avenue, Anaheim, CA 92806	11/29/2016
1100 North Euclid Street, Anaheim, CA 92801	4/24/2023
14477 Merced Avenue, Baldwin Park, CA 91706	2/7/2022
800 North Hollywood Way, Burbank, CA 91505	8/20/2022
337 E. Hamilton Avenue, Campbell, CA 95008	5/24/2021
2855 Winchester Boulevard, Campbell, CA 95008	6/9/2016
24505 West Dorris Avenue, Coalinga, CA 93210	12/11/2015
605 Contra Costa Boulevard, Concord, CA 94523	5/28/2021
616 Paseo Grande, Corona, CA 92882	1/19/2024
2995 Bristol Street, Costa Mesa, CA 92626	12/29/2021
2050 Harbor Boulevard, Costa Mesa, CA 92627	1/21/2016
21530 Stevens Creek Boulevard, Cupertino, CA 95014	4/6/2022
21865 East Copley Drive, Diamond Bar, CA 91765	8/18/2015
1172 45th Street, Emeryville, CA 94608	11/19/2018
18480 Brookhurst Street, Fountain Valley, CA 92708	7/6/2020
41700 Grimmer Boulevard, Fremont, CA 94538	9/7/2017
391 West A Street, Hayward, CA 94541	4/27/2016
11807 East Carson Street, Hawaiian Gardens, CA 90716	3/21/2022
550 Foothill Boulevard, La Cañada Flintridge, CA 91011	1/25/2016
20731 Lake Forest Drive, Lake Forest, CA 92630	3/18/2016
15606 Inglewood Avenue, Lawndale, CA 90260	6/22/2017
3401 Long Beach Boulevard, Long Beach, CA 90807	2/22/2016
10400 Aviation Boulevard, Los Angeles, CA 90045	12/21/2018
5151 State University Drive, Los Angeles, CA 90032	11/20/2019

51 Hydrogen Fuel Cell Partnership. Station Operational Status System, https://m.h2fcp.org.

Station Address (A to Z by city)	Open Retail Date
5700 Hollywood Boulevard, Los Angeles, CA 90028	11/10/2016
7751 Beverly Boulevard, Los Angeles, CA 90036	5/2/2016
8126 Lincoln Boulevard, Los Angeles, CA 90045	8/18/2016
570 Redwood Highway, Mill Valley, CA 94941	6/16/2016
15544 San Fernando Mission Boulevard, Mission Hills, CA 91345	10/26/2020
12431 Heacock Street, Moreno Valley, CA 92553	4/21/2025
830 Leong Drive, Mountain View, CA 94043	2/28/2018
2450 Engineer Road, Oakland, CA 94607	7/3/2024
4280 Foothill Boulevard, Oakland, CA 94601	10/18/2023
350 Grand Avenue, Oakland, CA 94610	9/20/2019
1850 E. Holt Boulevard, Ontario, CA 91761	4/24/2018
615 South Tustin Street, Orange, CA 92866	3/23/2022
3601 El Camino Real, Palo Alto, CA 94306	12/20/2018
475 North Allen Avenue, Pasadena, CA 91106	12/16/2022
313 West Orangethorpe Avenue, Placentia, CA 92870	5/7/2021
8095 Lincoln Avenue, Riverside, CA 92504	3/8/2017
5494 Mission Center Road, San Diego, CA 92108	5/9/2023
2101 North First Street, San Jose, CA 95131	1/15/2016
3939 Snell Avenue, San Jose, CA 95136	5/27/2022
26572 Junipero Serra Road, San Juan Capistrano, CA 92675	12/23/2015
4475 Norris Canyon Road, San Ramon, CA 94583	7/26/2017
2120 East McFadden Avenue, Santa Ana, CA 92705	1/19/2024
150 South La Cumbre Road, Santa Barbara, CA 93105	4/9/2016
12600 Saratoga Avenue, Saratoga, CA 95070	3/14/2016
13980 Seal Beach Boulevard, Seal Beach, CA 90740	10/3/2022
14478 Ventura Boulevard, Sherman Oaks, CA 91423	12/2/2021
1200 Fair Oaks Avenue, South Pasadena, CA 91030	4/10/2017
248 South Airport Boulevard, South San Francisco, CA 94080	2/12/2016
3780 Cahuenga Boulevard, Studio City, CA 91604	4/26/2021
1296 Sunnyvale Saratoga Road, Sunnyvale, CA 94087	2/11/2021
3102 Thousand Oaks Boulevard, Thousand Oaks, CA 91362	3/30/2018
2051 West 190th Street, Torrance, CA 90501	8/18/2017
12105 Donner Pass Road, Truckee, CA 96161	6/17/2016
299 Orange Drive, Vacaville, CA 95687	6/11/2025
1515 South River Road, West Sacramento, CA 95691	7/7/2015
5314 Topanga Canyon Road, Woodland Hills, CA 91364	10/5/2016

Source: CEC

Table A-2 lists the locations of stations that are under development. The stations are listed in alphabetical order by city. If the station received Clean Transportation Program funding, the CEC solicitation or contract under which the station received funding is provided.

Table A-2: Stations Under Development

Station Address (A to Z by city)	Solicitation or Contract
2413 A Street, Antioch, CA 94509	Privately Funded
325 Luis Estrada Road, Beaumont, CA 92223	Privately Funded
9409 Alondra Boulevard, Bellflower, CA 90706	GFO-19-602
6392 Beach Boulevard, Buena Park, CA 90621	GFO-19-602
2911 Petit Street, Camarillo, CA 93012	GFO-19-602
111 East Victoria Street, Carson, CA 90746	Privately Funded
3160 Carlson Boulevard, El Cerrito, CA 94530	GFO-19-602
2595 North Texas Street, Fairfield, CA 94533	GFO-19-602
16880 Slover Avenue, Fontana, CA 92337	GFO-19-602
47700 Warm Springs Boulevard, Fremont, CA 94539	GFO-19-602
4163 South Chestnut Avenue, Fresno, CA 93725	GFO-19-602
24209 West Whitesbridge Avenue, Kerman, CA 93630	Privately Funded
33252 Hubert Way, Kettleman City, CA 93239	GFO-22-607
5500 South Street, Lakewood, CA 90713	GFO-19-602
13550 South Beach Boulevard, La Mirada, CA 90638	Privately Funded
43144 10th Street West, Lancaster, CA 93534	Privately Funded
7810 National Drive, Livermore, CA 94550	GFO-19-602
988 North San Antonio Road, Los Altos, CA 94022	GFO-19-602
10867 Santa Monica Boulevard, Los Angeles, CA 90025	GFO-19-602
666 North Santa Cruz Avenue, Los Gatos, CA 95030	GFO-19-602
4785 Bailey Loop, McClellan Park, CA 95652	GFO-19-602
12520 Graham Street, Moreno Valley, CA 92553	GFO-19-602
2160 South Euclid Avenue, Ontario, CA 91762	GFO-19-602
67 Moraga Way, Orinda, CA 94563	GFO-19-602
East Vista Chino & North Gene Autry Trail, Palm Springs, CA 92262	GFO-19-602
796 Ramona Expressway, Perris, CA 92571	Privately Funded
503 Whipple Avenue, Redwood City, CA 94063	GFO-15-605
3505 Central Avenue, Riverside, CA 92506	GFO-19-602
939 San Gabriel Boulevard, Rosemead, CA 91770	GFO-19-602
1930 South Waterman Avenue, San Bernardino, CA 92408	GFO-19-602
11030 Rancho Carmel Drive, San Diego, CA 92128	GFO-19-602
1832 West Washington Street, San Diego, CA 92103	GFO-19-602
510 East Santa Clara Street, San Jose, CA 95112	GFO-19-602
1898 North Capitol Avenue, San Jose, CA 95132	GFO-19-602
1331 Redmond Avenue, San Jose, CA 95120	GFO-19-602
3707 Union Avenue, San Jose, CA 95124	GFO-19-602

Station Address (A to Z by city)	Solicitation or Contract
32505 Harry Oliver Trail, Thousand Palms, CA 92276	Privately Funded
24505 Hawthorne Boulevard, Torrance, CA 90505	GFO-19-602
14244 Newport Avenue, Tustin, CA 92780	GFO-19-602
10 Sage Street, Vallejo, CA 94589	GFO-19-602
2121 Harbor Boulevard, Ventura, CA 93001	GFO-19-602
4900 West Capitol Avenue, West Sacramento, CA 95691	Privately Funded

Source: CEC

APPENDIX B: CHANGES IN THE PLANNED NETWORK

Since 2017, the planned network changed because of new funding solicitations, station replacements, stations that did not reach completion, and station closures. Table B-1 shows the changes in the planned network resulting from CEC agreements funded by the Clean Transportation Program and the associated number of FCEVs that could be supported. The 50 stations shown in the first row for 2017 were funded under solicitations and contracts before GFO-15-605, GFO-19-602, and GFO-22-607.

Table B-1: Changes in the Planned Station Network Since 2017

Year	Reasons for Changes	Number of Planned Stations	Number of FCEVs That Could Be Supported
2017	Clean Transportation Program provided Operations and Maintenance funds to CARB-funded CSULA station (60 kg/day), so the station was added to the collection of Clean Transportation Program-funded stations.	50	13,000
2017	The stations planned for Encinitas (180 kg/day), Foster City (350 kg/day), and Los Altos (350 kg/day) were canceled because of lack of clear path to completion, and they were removed from the list of Clean Transportation Program-funded stations.	47	12,000
2017	Sixteen new stations were approved under GFO-15-605 (5,180 kg/day) and added to the list of Clean Transportation Program-funded stations.	63	20,000
2017	Three HyGen Industries stations (130 kg/day each) were addressed at the October 2017 CEC Business Meeting and removed from the list of Clean Transportation Program-funded stations.	60	19,000
2017	Five additional stations (1,600 kg/day) were proposed for funding under GFO-15-605 and added to the list of Clean Transportation Program-funded stations.	65	21,000

Year	Reasons for Changes	Number of Planned Stations	Number of FCEVs That Could Be Supported
2018	FirstElement Fuel upgraded 12 stations from 310 kg/day to 500 kg/day liquid technology (+2,280 kg), and the Air Liquide Anaheim station capacity was adjusted in reporting from 100 kg to 180 kg to reflect more realistic operations.	65	25,000
2018	One of the five additional stations proposed for funding under GFO-15-605 did not move forward (360 kg/day) and was removed from the list of Clean Transportation Program-funded stations.	64	24,000
2019	Mobile refueler project (45 kg/day) and Santa Nella (180 kg/day) station ended without completion and were removed from the list of Clean Transportation Program-funded stations.	62	24,000
2019	Station capacities were updated with the numbers reported to the CARB LCFS HRI credit program.	62	35,000
2020	Two more stations (Concord and Redwood City) were approved for HRI credits and station capacities were updated, each using the numbers reported to the HRI credit program. (+1,400 kg/day)	62	37,000
2020	West Los Angeles station (180 kg/day) closed. The station operator lost lease because of redevelopment plans for the site.	61	36,000
2020	Thirty new stations were approved at the CEC business meeting in December. One of these stations is an upgrade to the station in Torrance.	90	98,000
2021	The station capacities were adjusted using the latest LCFS HRI approved capacities.	90	101,000
2022	Rancho Palos Verdes (180 kg/day) and Santa Clarita (180 kg/day) stations were canceled because the sites became unviable.	88	100,000
2022	Culver City (1,616 kg/day) station was canceled because of issues in obtaining site control.	87	98,000

Year	Reasons for Changes	Number of Planned Stations	Number of FCEVs That Could Be Supported
2022	Seven GFO-15-605 station capacities were adjusted from 1,616 kg per day to 1,212 kg/day because of an error in last year's reporting of the number of fueling positions each station contained.	87	94,000
2022	Seven privately funded Iwatani stations that are outside a CEC agreement were added to the total planned station count.	94	102,000
2022	Laguna Beach (808 kg/day) station was canceled because of issues in permitting.	93	101,000
2022	Six GFO-19-602 Iwatani Batch 2 stations were approved. (Locations to be determined, but two of six are planned to be upgrades of existing stations.)	97	110,000
2023	Fourteen GFO-19-602 FirstElement Fuel Batch 2 stations were approved.	111	142,000
2023	Two new stations were approved under GFO-22-607 at the CEC Business Meeting in August 2023.	113	147,000
2023	Seven Shell stations and an upgrade to the Torrance station through GFO-19-602 were cancelled. All future batch stations proposed under the agreement were also cancelled.	106	139,000
2023	Chino (100 kg/day) station agreement expired. The station will not be completed.	105	139,000
2023	Twenty-five stations (21 GFO-19-602 future batch stations and 4 GFO-22-607 stations) are pending and not in CEC agreements yet.	130	188,000
2024	Seven existing Shell stations funded under GFO-15-605 closed.	123	183,000
2024	Burbank (100 kg/day) station agreement expired. The station will not be completed.	122	183,000
2024	One grant applicant that was proposed for an award to build four stations under GFO-22-607 declined.	118	180,000

Year	Reasons for Changes	Number of Planned Stations	Number of FCEVs That Could Be Supported
2024	One station located at the Port of Oakland was privately funded.	119	182,000
2024	Eight privately funded Chevron stations that are outside the CEC agreement were added to the total planned station count.	127	194,000
2024	One privately funded H2B2 USA station that is outside the CEC agreement was added to the total planned station count.	128	195,000
2024	One SunLine Transit station that is using match funding for a CEC agreement was added to the total planned station count.	129	195,000
2025	One station located in Woodside had a hydrogen supply contract fall through and is not expected to open.	128	195,000
2025	One station located at the University of California, Irvine closed.	127	194,000
2025	One station located in Santa Monica closed.	126	194,000
2025	Eleven Iwatani stations funded under GFO-19-602 are no longer expected to be built.	115	170,000
2025	One privately funded Iwatani station located in Chino Hills is no longer expected to be built.	114	169,000
2025	One Air Products station located in Galt is no longer expected to be built.	113	167,000
2025	One station located in San Diego (Del Mar) closed	112	167,000

Source: CEC

APPENDIX C: BRIEF UPDATES ON MEDIUM- AND HEAVY-DUTY FUEL CELL ELECTRIC VEHICLE DEPLOYMENT AND REFUELING INFRASTRUCTURE

SB 643 staff reports are published every three years.[52] The first report was published in January 2024,[53] and the next report will be published in 2026. Meanwhile, the AB 126 joint reports will include brief updates on medium- and heavy-duty fuel cell electric vehicle deployment and refueling infrastructure.

Before the U.S. DOE cancelled their award to ARCHES in September 2025, California expected to have more than 60 hydrogen fueling stations that will serve more than 5,000 Classes 6–8 [54] and 1,000 fuel cell electric buses because of ARCHES' project. More than 13 regional transit agencies have partnered with ARCHES[55] ARCHES has paused all Hydrogen Hub activities amid federal changes and it is unclear to what extent the cancelled award will affect the objectives and timeline of the planned projects. While the partnering transit agencies have not been publicly disclosed yet, there are transit agencies that have refueling infrastructure on-site, including Orange County Transportation Authority, SunLine Transit Authority, Alameda-Contra Costa Transit District, Golden Empire Transit, and others that have been awarded funding for infrastructure. According to a voluntary survey issued by CEC staff in July 2025, an additional 10 transit agencies plan to install refueling infrastructure for new fuel cell electric buses (FCEB), some of which have already been ordered. Funding sources for this infrastructure include the CEC, the Federal Transit Administration, and other agencies.

Vehicle Deployment

At the end of the second quarter of 2025, 135 FCEBs and 140 fuel cell electric trucks were registered in California, according to CEC staff. Additional fuel cell electric trucks may be operating under a special permit from CARB.

Refueling Infrastructure

52 California Legislative Information. Senate Bill 643 (Archuleta, Chapter 646, Statutes of 2021), https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB643.

53 Villareal, Kristi. 2023. *2023 Final Staff Report on Senate Bill 643: Clean Hydrogen Fuel Production and Refueling Infrastructure to Support Medium-and Heavy-Duty Fuel Cell Electric Vehicles and Off-Road Applications.* California Energy Commission. Publication Number: CEC-600-2023-053-SF, https://www.energy.ca.gov/publications/2023/senate-bill-643-clean-hydrogen-fuel-production-and-refueling-infrastructure.

54 Class 6 vehicles are between 19,501 to 26,000 lbs. and include large step vans and medium school buses; Class 7 vehicles are between 26,001 to 33,000 lbs. and include transit buses and drayage tractors; Class 8 vehicles are 33,001 lbs. and over and include large transit buses, large straight trucks, and refuse trucks.

55 U.S. DOE. Office of Clean Energy Demonstrations. "California Hydrogen Hub (ARCHES)" https://www.energy.gov/oced/california-hydrogen-hub-arches?utm_medium=email&utm_source=govdelivery.

California has four completed publicly available medium- and heavy-duty hydrogen refueling stations intended for refueling trucks, with 32 additional stations in various stages of development as of the end of the second quarter of 2025. In addition, nine transit bus stations are refueling FCEBs with an additional 10 stations planned by transit agencies.

The CEC has developed an interactive dashboard displaying medium- and heavy-duty ZEV hydrogen refueling and charging infrastructure development in California.[56]

California Energy Commission Investments

The CEC has allocated $120 million to fund medium- and heavy-duty hydrogen refueling infrastructure as of July 2025.

56 California Energy Commission. "MDHD ZEV Station Development in California – Beta Version," https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/mdhd-zev.

APPENDIX D: REFERENCES

Berner, Jane, Miki Crowell, and Andrew Martinez. 2022. *Joint Agency Staff Report on Assembly Bill 8: 2022 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California.* California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2022-064. https://www.energy.ca.gov/sites/default/files/2022-12/CEC-600-2022-064.pdf.

Baronas, Jean, Belinda Chen, et al. 2021. *Joint Agency Staff Report on Assembly Bill 8: 2021 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California*. California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2021-040. https://www.energy.ca.gov/sites/default/files/2021-12/CEC-600-2021-040.pdf.

Baronas, Jean, Gerhard Achtelik, et al. 2020. *Joint Agency Staff Report on Assembly Bill 8: 2020 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California.* California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2020-008. https://www.energy.ca.gov/sites/default/files/2021-05/CEC-600-2020-008.pdf.

Baronas, Jean, Gerhard Achtelik, et al. 2019. *Joint Agency Staff Report on Assembly Bill 8: 2019 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California.* California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2019-039. https://www.energy.ca.gov/sites/default/files/2021-05/CEC-600-2019-039.pdf.

Baronas, Jean, Gerhard Achtelik, et al. 2018. *Joint Agency Staff Report on Assembly Bill 8: 2018 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California.* California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2018-008. https://www.energy.ca.gov/sites/default/files/2021-04/CEC-600-2018-008.pdf.

Baronas, Jean, Gerhard Achtelik, et al. 2017. *Joint Agency Staff Report on Assembly Bill 8: 2017 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California.* California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2017-011. https://www.energy.ca.gov/sites/default/files/2021-04/CEC-600-2017-011.pdf.

Baronas, Jean, Gerhard Achtelik, et al. *Joint Agency Staff Report on Assembly Bill 8: 2016 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California*. California Energy Commission. Publication Number: CEC-600-2017-002. https://www.energy.ca.gov/sites/default/files/2021-04/CEC-600-2017-002.pdf

McKinney, Jim, et al. 2015. *Joint Agency Staff Report on Assembly Bill 8: Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California.* California

Energy Commission. Publication Number: CEC-600-2015-016. https://www.energy.ca.gov/sites/default/files/2021-04/CEC-600-2015-016.pdf.

Biomass Magazine. July 12, 2023. "Yosemite Clean Energy receives $5 million grant." https://biomassmagazine.com/articles/20207/yosemite-clean-energy-receives-5-million-grant.

California Air Resources Board. "Advanced Clean Cars II Regulations: All New Passenger Vehicles Sold in California to be Zero Emissions by 2035." https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii.

California Air Resources Board. December 2024. *2024 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development,* https://ww2.arb.ca.gov/sites/default/files/2024-12/AB-126-Report-2024-Final.pdf

California Air Resources Board. December 2023. *2023 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development.* https://ww2.arb.ca.gov/sites/default/files/2023-12/AB-8-Report-2023-FINAL-R.pdf

California Air Resources Board. September 2022. *2022 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development.* https://ww2.arb.ca.gov/sites/default/files/2022-09/AB-8-Report-2022-Final.pdf

California Air Resources Board. September 2021. *2021 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development.* http://ww2.arb.ca.gov/resources/documents/annual-hydrogen-evaluation.

California Air Resources Board. September 2020. *2020 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development.* http://ww2.arb.ca.gov/resources/documents/annual-hydrogen-evaluation.

California Air Resources Board. July 2019. *2019 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development*. https://ww2.arb.ca.gov/sites/default/files/2019-07/AB8_report_2019_Final.pdf.

California Air Resources Board. July 2018. *2018 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development*. https://ww2.arb.ca.gov/sites/default/files/2018-12/ab8_report_2018_print.pdf.

California Air Resources Board. August 2017. *2017 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development*. https://ww2.arb.ca.gov/sites/default/files/2018-12/ab8_report_2017.pdf.

California Air Resources Board. Hydrogen Refueling Infrastructure Assessments. https://ww2.arb.ca.gov/resources/documents/california-hydrogen-infrastructure-tool-chit.

California Air Resources Board. 2020. *Unofficial electronic version of the Low Carbon Fuel Standard Regulation*. https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf.

California Air Resources Board. "LCFS ZEV Infrastructure Crediting — Approved HRI and FCI Applications." Accessed November 6, 2023. https://ww2.arb.ca.gov/resources/documents/lcfs-zev-infrastructure-crediting.

California Air Resources Board. Volkswagen Environmental Mitigation Trust for California. https://ww2.arb.ca.gov/our-work/programs/volkswagen-environmental-mitigation-trust-california.

California Code of Regulations Title 17, Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 7, §95481. https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf

California Energy Commission. Clean Hydrogen Program. https://www.energy.ca.gov/programs-and-topics/programs/clean-hydrogen-program.

California Energy Commission. April 2016. *GFO-15-605: Light Duty Vehicle Hydrogen Refueling Infrastructure.*

California Energy Commission. December 2017. *GFO-17-602: Renewable Hydrogen Transportation Fuel Production Facilities and Systems*.

California Energy Commission. December 2019. *GFO-19-602: Hydrogen Refueling Infrastructure*. https://www.energy.ca.gov/solicitations/2019-12/gfo-19-602-hydrogen-refueling-infrastructure.

California Energy Commission. April 2021. *GFO-20-609: Renewable Hydrogen Transportation Fuel Production.* https://www.energy.ca.gov/solicitations/2021-04/gfo-20-609-renewable-hydrogen-transportation-fuel-production.

California Energy Commission. October 2022. *GFO-22-607: Light Duty Vehicle and Multi-Use Hydrogen Refueling Infrastructure*. https://www.energy.ca.gov/solicitations/2022-10/gfo-22-607-light-duty-vehicle-and-multi-use-hydrogen-refueling-infrastructure.

California Energy Commission. "Zero Emission Vehicle and Infrastructure Statistics." https://www.energy.ca.gov/zevstats.

California Legislative Information. Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB8.

California Legislative Information. Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200720080AB118.

California Legislative Information. Assembly Bill 126 (Reyes, Chapter 319, Statutes of 2023). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB126.

California Legislative Information. Senate Bill 1291 (Archuleta, Chapter 373, Statutes of 2022). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB1291.

California Legislative Information. Senate Bill 1418 (Archuleta, Chapter 607, Statutes of 2024). https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320240SB1418.

California Legislative Information. Senate Bill 643 (Archuleta, Chapter 646, Statutes of 2021). https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB643.

California Office of Environmental Health Hazard Assessment. CalEnviroScreen. https://oehha.ca.gov/calenviroscreen.

California Public Utilities Code sections 399.11-399.36 and California Public Resources Code section 25741.

Chevron Corporation. January 9, 2023. "raven SR, chevron and hyzon motors collaborate to produce hydrogen from green waste in northern california." https://www.chevron.com/newsroom/2023/q1/raven-sr-chevron-hyzon-motors-collaborate-to-produce-hydrogen-from-green-waste.

Chevron Corporation. February 29, 2024. "chevron announces its first solar-to-hydrogen production project in california's central valley." https://www.chevron.com/newsroom/2024/q1/chevron-announces-its-first-solar-to-hydrogen-production-project-in-californias-central-valley#:~:text=alternative%20fuels-,chevron%20announces%20its%20first%20solar-to-hydrogen%20production%20project%20in,project%20in%20California's%20Central%20Valley.

Crowell, Miki and Martinez, Andrew. 2023. *Joint Agency Staff Report on Assembly Bill 8: 2023 Annual Assessment of the Hydrogen Refueling Network in California*. California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2023-069. https://www.energy.ca.gov/sites/default/files/2023-12/CEC-600-2023-069.pdf

Governor's Office for Business and Economic Development. Hydrogen Fueling Station Readiness. https://business.ca.gov/industries/zero-emission-vehicles/hydrogen-readiness/.

H2B2. June 15, 2023. "H2B2's SoHyCal Project in California has started hydrogen production." https://www.h2b2.es/h2b2s-sohycal-project-in-california-has-started-hydrogen-production/.

Hydrogen Fuel Cell Partnership. Station Operational Status System. https://m.h2fcp.org.

Office of Governor Gavin Newsom. Executive Order N-79-20. https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.

Pratt, Joseph, Danny Terlip, Chris Ainscough, Jennifer Kurtz, and Amgad Elgowainy. 2015. H2FIRST Reference Station Design Task, Project Deliverable 2-2. National Renewable Energy Laboratory and Sandia National Laboratories. https://www.osti.gov/biblio/1215215.

The City of Lancaster. January 24, 2023. "Element Resources to Build One of California's Largest Renewable Hydrogen Production Facilities in the City of Lancaster, CA." https://www.cityoflancasterca.org/Home/Components/News/News/9889/.

U.S. Department of Energy. October 13, 2023. "Biden-Harris Administration Announces $7 Billion For America's First Clean Hydrogen Hubs, Driving Clean Manufacturing and Delivering New Economic Opportunities Nationwide." https://www.energy.gov/articles/biden-harris-administration-announces-7-billion-americas-first-clean-hydrogen-hubs-driving.

U.S. Department of Energy. Office of Clean Energy Demonstrations. "California Hydrogen Hub (ARCHES)." https://www.energy.gov/oced/california-hydrogen-hub-arches?utm_medium=email&utm_source=govdelivery.

Villareal, Kristi. 2023. *2023 Final Staff Report on Senate Bill 643: Clean Hydrogen Fuel Production and Refueling Infrastructure to Support Medium-and Heavy-Duty Fuel Cell Electric Vehicles and Off-Road Applications.* California Energy Commission. Publication Number: CEC-600-2023-053-SF. https://www.energy.ca.gov/publications/2023/senate-bill-643-clean-hydrogen-fuel-production-and-refueling-infrastructure.