

California Energy Commission (CEC)

ZEV Role: Lead state agency on zero-emission vehicle (ZEV) infrastructure planning and deployment. The CEC sets the direction for California's multi-agency ZEV infrastructure deployment and ZEV-related manufacturing efforts. This includes efforts to expand charging and hydrogen fueling, vehicle-grid integration, and planning for resilient transportation systems powered by renewable energy. This CEC also funds research, development, and demonstration of ZEV technologies and workforce development. On October 7, 2023, Governor Newsom signed Assembly Bill (AB) 126, extending the Clean Transportation Program through July 1, 2035. In February 2024, the CEC adopted a \$1.9 billion Investment Plan for the Clean Transportation Program to continue the state's transition to zero-emission transportation. The 2023 – 2024 Investment Plan¹ breakdown for the following four years is as follows:

- \$383 million for light-duty charging infrastructure
- \$375 million for school bus ZEV infrastructure
- \$364 million for clean truck, bus, and off-road equipment infrastructure²
- \$275 million for equitable at-home charging infrastructure
- \$230 million for drayage truck zero-emission vehicle infrastructure
- \$130 million for port zero-emission vehicle infrastructure
- \$48 million for medium- and heavy-duty infrastructure
- \$46 million for emerging zero-emission vehicle opportunities
- \$5 million for workforce training and development

Equity Focus: The CEC's Investment Plan goal last year of investing at least 50 percent of funds for benefiting Californians in low-income and disadvantaged communities is now codified with the extension of the Clean Transportation Program per AB 126. The CEC is continuing to define, measure, track and increase benefits to communities through a robust public process and inter-agency engagement. Benefits to priority communities include increased access to ZEV infrastructure (including at multi-family dwellings and rental homes), ZEV-focused pathways to high-road jobs, increased zero-emission mobility options (e.g., through transit infrastructure investments), and improved air quality in priority communities.

CEC ZEV MARKET DEVELOPMENT OBJECTIVES

1. **Analysis:** Develop and maintain analysis on ZEV infrastructure needs and progress, as well as data and shared analytical understanding of the integration of transportation into the energy system, in collaboration with the California Air Resources Board

¹ CEC 2023 – 2024 Investment Plan:

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=254963&DocumentContentId=90648>. The investment plan is an annual activity and subject to future state appropriations.

² Clean trucks, buses, and off-road equipment infrastructure includes the traditional medium- and heavy-duty ZEV infrastructure investments but can also fund a broader set of vehicle infrastructure investments.

(CARB), California Public Utilities Commission (CPUC), Governor's Office of Business and Economic Development (GO-Biz), California Independent System Operator (CAISO), and other agencies. Forecast transportation energy demand for all vehicles, including ZEVs. Analyze and publicize data on California ZEV sales, ZEV on-road fleet, and ZEV infrastructure. Maintain database of California's ZEV-related manufacturing companies.

Direct Pillar Connection: Vehicles, Infrastructure, End Users

Indirect Pillar Connection: Workforce

Key Collaborators: CARB, CPUC, CAISO and grid operators, GO-Biz, local air districts, California Department of Transportation, California Department of Motor Vehicles, national labs and universities, non-governmental organizations (NGOs) including equity and environmental justice, and private entities including vehicle and infrastructure manufacturers.

Key Results & Actions:

- a. **AB 2127 Charging Infrastructure Assessment.** The AB 2127 Second Electric Vehicle Charging Infrastructure Assessment Commission Report was published on March 6, 2024.³ The analysis presented in this report projects that California will need about 1 million chargers to support approximately 7 million light-duty plug-in electric vehicles in 2030. By 2035, the state will need about 2.1 million chargers to support approximately 15 million light-duty plug-in electric vehicles. To support medium- and heavy-duty plug-in electric vehicles, California will need about 114,500 chargers for 155,000 vehicles in 2030, and about 264,000 chargers for 377,000 vehicles in 2035.
 - **Progress in 2023:** The AB 2127 Second Electric Vehicle Charging Infrastructure Assessment draft report was published in August 2023. The draft report and results were presented in a public workshop in September 2023. Stakeholder feedback from the draft report and workshop was addressed in revising the report.
 - **Action for 2024:** In early 2024, publish the final report to present during a CEC Business Meeting and then publish a commission report.
 - **Action for 2024:** Update all infrastructure models for AB 2127 third assessment. Coordinate with CEC Energy Assessment Division to align scenarios with Integrated Energy Policy Report (IEPR). Hold workshops on preliminary model results to solicit feedback on scenarios and assumptions. Produce draft report for publication in early 2025.
- b. **SB 1000 Report on Equitable Distribution of Charging Infrastructure.** Continue activities under SB 1000 to assess equitable distribution of charging

³ Second Electric Vehicle Charging Infrastructure Assessment Commission Report
<https://www.energy.ca.gov/publications/2024/assembly-bill-2127-second-electric-vehicle-charging-infrastructure-assessment>.

infrastructure.

- **Progress in 2023:** Updated previous years' findings of geographic public charger distribution and drive time results with recent charger data and designations of disadvantaged, low-, middle-, and high-income, and urban and rural communities.
 - **Progress in 2023:** Developed a contract to improve insights into home charging.
 - **Action for 2024:** Coordinate with CARB and University of California, Los Angeles on analysis of charging infrastructure. Staff anticipates releasing the SB 1000 report on home charging potential in 2024.
- c. **AB 126 CEC/CARB Joint Report.** Analyze and coordinate for the AB 126 report on progress toward establishing a hydrogen refueling network that provides the coverage and capacity to fuel hydrogen fuel cell electric vehicles (FCEVs) in the state.
- **Progress in 2023:** As of November 2023, 66 retail stations were open in California providing hydrogen refueling. The network of 66 stations could support as many as 58,000 light-duty FCEVs when operating at full capacity.
 - **Progress in 2023:** At the end of the third quarter in 2023, an estimated 14,809 FCEVs were on the road.
 - **Progress in 2023:** Continue expanding the hydrogen refueling network across California, which is on track to meet the former 100-station goal pursuant to AB 8 with expended and committed funds.
 - **Action for 2024:** Continue coordination and analysis for the AB 126 report on hydrogen infrastructure. The process will also continue to explore ways to improve reliability and availability of existing stations to improve FCEV drivers' experience and to support current and future light-, medium-, and heavy-duty FCEV population in the state.
- d. **Charging Infrastructure Modeling Tool Maintenance.** Continue updates to charging infrastructure modeling tools such as the new version of Electric Vehicle Infrastructure Projections (EVI-Pro) model tool; continue updates to the EVI-Pro RoadTrip model tool for long distance travel; continue to develop and update the Medium- and Heavy-Duty Electric Vehicle Infrastructure Load, Operations, and Deployment (HEVI-LOAD) model.
- **Progress in 2023:** Finalized modeling refinements and scenarios for the AB 2127 Second Assessment based on stakeholder and market feedback.
 - **Progress in 2023:** Incorporated charging load results from HEVI-LOAD and EVI-Pro into the CEC's EVSE (i.e., charger) Deployment and Grid Evaluation (EDGE) tool to perform a site-specific comparison between expected vehicle charging load and available capacity based on historical circuit load profile data.

- **Progress in 2023:** Harmonized total energy demand estimates from infrastructure models with results of similar models from the CEC's Energy Assessments Division.
 - **Action for 2024:** Identify areas needing improvement for light-duty vehicle modeling and medium-/heavy-duty modeling to incorporate into AB 2127's third assessment. Coordinate with CEC Energy Assessments Division to further align scenarios and assumptions with IEPR.
 - **Action for 2024:** Work with modeling teams at Lawrence Berkeley National Laboratory (LBNL) and the National Renewable Energy Laboratory (NREL) to produce preliminary charging infrastructure and load results for third AB 2127 assessment. Hold workshops on preliminary model results to solicit feedback on scenarios and assumptions.
- e. **Maintain and Update a ZEV-Related Manufacturing Database.** Meet monthly with CARB and GO-Biz to identify in-state manufacturers of zero-emission transportation technologies. Develop a public-facing mapping tool for easy access to information on ZEV and ZEV-related manufacturers in California.
- **Progress in 2023:** Created and maintained a public-facing CEC mapping tool that identifies California's ZEV and ZEV-related manufacturers.
 - **Action for 2024:** Continue collecting and analyzing data on ZEV and ZEV-related manufacturers in California. Semiannually add or subtract manufacturers from the mapping tool as needed.
- f. **ZEV and Infrastructure Statistics Website.** Update the ZEV and Infrastructure Statistics website with quarterly ZEV sales, ZEV populations, and ZEV infrastructure counts. Expand the website to include MDHD ZEVs. Compile MDHD ZEV counts from relevant funding programs in the state through cross-agency collaboration. At the end of each year, reassess whether California Department of Motor Vehicles (DMV) data can be used to accurately track MDHD ZEVs going forward.
- **Progress in 2023:** Updated the ZEV and Infrastructure Statistics website with ZEV sales, annual ZEV populations, and infrastructure counts.
 - **Action for 2024:** Continue annual updates of the ZEV and Infrastructure Statistics website. Add a new dashboard for MDHD ZEV infrastructure.
- g. **Transportation Energy Demand Forecast (TEDF).** Complete the TEDF annually as part of the Integrated Energy Policy Report (IEPR). Review results as an indicator of whether the state is on track to meet its goals with current market conditions. Results will feed into the biennial AB 2127 assessments as well as the IEPR.
- **Progress in 2023:** Continued the TEDF framework known as "Additional Achievable Transportation Electrification", consisting of scenarios that add on to the TEDF by incorporating supply-side regulations into the

- demand forecast.
 - **Progress in 2023:** Added a new approach to capture the Clean Miles Standard and made improvements to the geographical distribution of energy demand for EVs.
 - **Progress in 2023:** Completed the California TEDF for 2023 IEPR update.
 - **Action for 2024:** Propose several modifications and updates to travel modeling to assign vehicle miles traveled or other variables relating to passenger travel.
 - **Action for 2024:** Develop a new Vehicle Survey with support from the CEC's Fuels and Transportation Division.
- h. **Transportation Energy Demand Scenarios.** Develop exploratory scenarios for the IEPR that build from the Transportation Energy Demand Forecast to assess potential impacts of proposed plug-in electric vehicle (PEV) policies, incentives, or other trends.
- **Progress in 2023:** Developed initial transportation demand scenarios for SB 100, with continued efforts on developing others.
 - **Action for 2024:** Complete all 13 demand scenarios with their GHG implications. For some scenarios, transportation component variables may not significantly change.
- i. **Vehicle-Grid Integration (VGI) Simulation Studies.** Visualize electric grid readiness to host projected EV charging demand using visualization tools, as well as modeling software with assistance from a national laboratory via a contract. (This activity also supports work in Objective 4, "Infrastructure Resilience".)
- **Progress in 2023:** Finished work on the initial version of the EVSE (i.e., charger) Deployment and Grid Evaluation (EDGE) tool.⁴ Hosted a public workshop in October 2023 highlighting the EDGE tool's functionality and potential benefits.
 - **Progress in 2023:** Approved a new contract with a Pacific Northwest National Laboratory for analysis of distribution grid impacts from EV charging, especially medium- and heavy-duty vehicles.
 - **Action for 2024:** Continue to coordinate with utilities, in particular POUs, and incorporate additional data and informational resources into the EDGE framework and visualization tool. This data could assist users in identifying candidate locations for hosting charging infrastructure.
 - **Action for 2024:** Leverage the new distribution grid analysis contract to expand the geographic coverage of the EDGE tool, and to support partnerships with California utilities, particularly POUs, with respect to

⁴ EVSE Deployment and Grid Evaluation (EDGE) Tool - <https://www.energy.ca.gov/data-reports/reports/electric-vehicle-charging-infrastructure-assessment-ab-2127/evse-deployment>.

planning for EV adoption.

- j. **SB 643 Report.** Conduct the first statewide assessment of the fuel cell electric vehicle (FCEV) infrastructure, fuel production, and distribution needed to meet California's zero-emission truck, bus, and off-road vehicle goals as set in Executive Order N-79-20, as well as any CARB regulation that requires or allows zero-emission heavy-duty and off-road vehicles.
 - **Progress in 2023:** Published the inaugural SB 643 Draft Staff Report in September and held a public workshop in October to solicit feedback.
 - **Progress in 2023:** Executed an amendment to the HEVI-LOAD agreement with Lawrence Berkeley National Lab to incorporate hydrogen, off-road, and non-road ZEV infrastructure analysis into the model.
 - **Actions for 2024:** Publish the SB 643 Final Staff report in January 2024 and deliver to California State Legislature.
 - **Actions for 2024:** Present the final staff report to the Commissioners at the March Business Meeting.
 - **Actions for 2024:** Continue assessing developments in medium- and heavy-duty refueling infrastructure, and in hydrogen applications for the off-road and non-road sectors.
 - **Actions for 2024:** Continue collaborating with Lawrence Berkeley National Lab to incorporate MDHD hydrogen and off-road/non-road into future scenarios into the HEVI-LOAD model.
2. **Infrastructure Development:** Develop and deploy ZEV infrastructure, with focus on gaps in access for California's most impacted communities. Enable public and private sector investment in ZEV infrastructure, with focus on freight transport given disproportionate and growing pollution burden. Oversee publicly owned utilities' electricity resource planning, including plans for transportation electrification through investments and rates.

Direct Pillar Connection: Infrastructure, Workforce

Indirect Pillar Connection: End Users

Key Collaborators: CPUC, CARB, GO-Biz, CAISO and grid operators, local air districts, California Department of Transportation, California Department of Motor Vehicles, utilities, the Disadvantaged Communities Advisory Group, the Clean Transportation Program Advisory Committee, electricity and hydrogen providers, federal, regional, local and tribal governments, NGOs, fleets, universities and research entities, and other external stakeholders who have an interest in zero-emission transportation including vehicle manufacturers and infrastructure manufacturers and companies.

Key Results & Actions:

- a. **Fund Infrastructure through Grants, Loans, and Interagency Agreements.** The Clean Transportation Program administers funding through block grant

incentive programs and targeted solicitations to support development of charging and refueling ZEV infrastructure for passenger vehicles, medium- and heavy-duty vehicles, and off-road equipment.

- **Progress in 2023:** Launched multiple light-duty EV charging block grant projects.
- **Progress in 2023:** Developed and published four light-duty EV charging solicitations.
- **Progress in 2023:** Released a solicitation for Innovative Charging Solutions for MDHD Electric Vehicles.
- **Progress in 2023:** Developed and released multiple solicitations that focus on electric and hydrogen MDHD ZEV infrastructure and planning, including technical assistance for implementing completed MDHD zero-emission vehicle infrastructure blueprints, and funding for the demonstration of innovative solutions for electric vehicle charging and hydrogen refueling infrastructure.
- **Progress in 2023:** Released a VGI school bus solicitation.
- **Progress in 2023:** Launched a block grant project for ZEV school bus infrastructure.
- **Progress in 2023:** Released a solicitation targeting the development and deployment of VGI-focused charging opportunities.
- **Progress in 2023:** Released a solicitation targeting corridor ZEV infrastructure to support MDHD vehicles, both battery electric and hydrogen fueling.
- **Progress in 2023:** Prepared the second National Electric Vehicle Infrastructure (NEVI) Deployment Plan to the Federal Highway Administration (FHWA) to maintain eligibility for federal formula funding.
- **Progress in 2023:** Released the first solicitation for NEVI funding of DCFC stations along Alternative Fuel Corridors, such as I-5 and SR 99.
- **Progress in 2023:** Submitted a joint application with Caltrans and the States of Oregon and Washington for a tri-state border-to-border truck charging corridor. The application was submitted to the Federal Highway Administration as part of the NEVI / Charging and Fueling Infrastructure (CFI) program. The application was not funded.
- **Progress in 2023:** Submitted a joint application with Caltrans for federal funding to repair and replace broken EV chargers in California through the Electric Vehicle Charger Reliability and Accessibility Accelerator (EVC RAA) NOFO issued through the NEVI Program. Caltrans and CEC were awarded \$63.7 million to repair, replace, or upgrade over 1,300 charging ports.
- **Action for 2024:** Launch a MDHD ZEV and Infrastructure Loan Pilot Project, in collaboration with CARB.
- **Action for 2024:** Release four new light-duty EV charging solicitations.
- **Action for 2024:** Consider releasing a solicitation to establish a space for EV charging interoperability testing and collaboration.
- **Action for 2024:** Develop and release additional funding projects for MDHD ZEV infrastructure.

- **Action for 2024:** Release a solicitation for ZEV infrastructure deployment, workforce development, and similar activities in tribal communities.
 - **Action for 2024:** Prepare and release the second NEVI solicitation; update the NEVI Deployment Plan for 2024.
 - **Action for 2024:** Prepare an application for Charging and Fueling Infrastructure federal funding opportunity.
 - **Action for 2024:** Prepare a solicitation for distribution of the \$63.7 million awarded through the Federal Highways Administration for broken charger repairs and upgrades.
- b. **Equitable Access to Infrastructure for all Californians.** Ensure all Californians have access to infrastructure by including equity objectives in all funding opportunities and by designing programs to provide benefits to underserved communities.
- **Progress in 2023:** Developed GFO-23-607 – Tribal Electric Vehicle Infrastructure, Planning, and Workforce Training and Development released on January 18, 2024. The solicitation provides funding to Tribes, Tribal organizations, and Tribally-owned businesses for EV charging infrastructure, EV infrastructure planning, and EV workforce and development activities.
 - **Progress in 2023:** Held public workshops and engaged with Disadvantaged Communities Advisory Group on the Clean Transportation Program's Community Benefits Framework.
 - **Action for 2024:** Make awards from GFO-23-607 to support charging opportunities for Tribal communities.
 - **Action for 2024:** Implement the Clean Transportation Program's Community Benefits Framework in at least one initial funding solicitation and incorporate into future Clean Transportation Program solicitations.
 - **Action for 2024:** Develop and release a Community Charging in Urban Areas solicitation to focus deployment of charging infrastructure in disadvantage and low-income communities in urban areas that have fewer than the state average for public chargers per capita.
- c. **Strive for Equipment Standardization.** Fund efforts and solicitations covering topics such as equipment testing and certification to encourage interoperability.
- **Progress in 2023:** In February 2023, conducted a joint workshop with ElaadNL, an EV charging innovation organization led by a coalition of Dutch grid operators, to discuss V2G implementation, regulation, and grid requirements. The workshop supported an international memorandum of understanding, and focused on grid code requirements across regions, communication protocols, and current implementation challenges.
 - **Progress in 2023:** Released the V2G Equipment List, which had been developed based on workshop feedback from industry, utilities, and

other stakeholders to understand market and utility needs. A March 2023 workshop introduced and demonstrated the list, which is a voluntary information resource to assist utilities with bidirectional charger interconnection processes.

- **Progress in 2023:** In March 2023, released a solicitation focused on VGI and titled Responsive, Easy Charging Products with Dynamic Signals (REDWDS) to support development and deployment of charging products that conform to relevant standards and enable flexible EV charging that can respond to grid signals and save customers money.
- **Progress in 2023:** In May 2023, conducted the Vehicle Interoperability Testing Symposium (VOLTS) event to convene key EV stakeholders to conduct collaborative, low-risk interoperability tests, develop and finalize products, conduct implementation testing, and test tool development for charging standards and protocols, and discuss the means to overcome common technology barriers facing the industry.
- **Progress in 2023:** In May 2023, hosted a workshop introducing and seeking stakeholder comment on a Charging Interoperability and Collaboration Yard funding concept. If implemented, it would fund an open and neutral industry facility designed to support charging interoperability, implementation of global standards, advancement of next generation charging features, and industry collaboration.
- **Progress in 2023:** In late 2023, released a Statement on Charging Interoperability and hosted a workshop overviewing EV charging interoperability in North America, a vision for broad interoperability, and steps to achieve broad interoperability including possible CEC actions.
- **Action for 2024:** Formally execute the ten REDWDS projects proposed for awards by the CEC.
- **Action for 2024:** Refine policies and actions relating to broad EV charging interoperability. These efforts will stem from the CEC's Statement on Charging Interoperability and collaboration with CEC leadership and industry stakeholders.

d. **Use Data and Analysis to Inform Investments.** Use the results of the AB 2127 analysis, SB 1000 analysis, SB 643 analysis, and ongoing AB8 hydrogen studies to inform solicitation design.

- **Progress in 2023:** Developed SB 1000, AB 2127, AB 8 reports. The CEC has published the SB 1000 and AB 8 reports. These reports, along with stakeholder feedback, continue to drive the evolution of funding strategies.
- **Action for 2024:** Continue to develop and publish SB 1000, AB 8, SB 643, and AB 2127 reports. The AB 2127 report was published on March 6, 2024. CEC staff are also utilizing data from CEC-funded chargers and historical station development data from NREL. These efforts, along with stakeholder feedback, will further refine the above reports and continue to drive the evolution of funding strategies.

e. **Demonstrate Emerging Technologies for Sectors that are Difficult to Electrify.**

Demonstrate hydrogen fuel cell and electric vehicle technologies and fueling infrastructure for zero-emission locomotives and harbor craft serving California ports and other sectors. Focus deployments in or near priority communities whenever feasible.

- **Progress in 2023:** Offered up to \$276 million in infrastructure incentives, the block grant project EnergIZE Commercial Vehicles launched four main “funding lanes” (EV Fast Track, Hydrogen, EV Jump Start, Public Charging), in addition to three specific set-aside funding lanes for public school buses, transit buses, and drayage trucks. These set-aside lanes are complimentary to the CARB’s Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).
- **Progress in 2023:** Awarded \$3.4 million to one project from GFO-22-502 “Innovative Hydrogen Refueling Solutions for Heavy Transport” to develop a high capacity and improved reliability liquid hydrogen pump system.
- **Progress in 2023:** In July 2023, CARB released a competitive solicitation for “Advanced Technology Demonstration and Pilot Projects” offering \$175 million in CARB funds for innovative zero-emission projects in multiple categories. This solicitation will support a wide array of zero-emission off-road equipment and vessel projects as well as “Green Zones,” which are focused on a city or group of cities. The Green Zones category is very broad, with possible examples including zero-emission construction, waste collection, and landscaping equipment for schools and parks. The CEC offered up to \$50 million in funding to support infrastructure, such as charging and hydrogen refueling, for certain awarded projects. Awards are expected to be announced in Spring 2024.
- **Progress in 2023:** Released a competitive solicitation GFO-23-603 titled “Implementation of Medium- and Heavy-Duty Zero-Emission Vehicle Infrastructure Blueprints” that offered \$20 million in grant funding to support implementation of zero-emission vehicle charging and/or hydrogen refueling infrastructure projects developed and identified in the final blueprint planning documents resulting from GFO-20-601, “Blueprints for Medium- and Heavy-Duty Zero-Emission Vehicle Infrastructure.”
- **Action for 2024:** The medium- and heavy-duty infrastructure block grant project, EnergIZE Commercial Vehicles, will launch a third year of funding for projects in all four standard funding lanes, as well as each of the set-aside funding lanes for public school bus, drayage, and transit infrastructure incentives.
- **Action for 2024:** Award and kick-off two additional projects from GFO-22-502 totaling \$8 million to develop innovative hydrogen refueling stations to support heavy-duty on-road vehicles.
- **Action for 2024:** The Notice of Proposed Award (NOPA) from the “Advanced Technology Demonstration and Pilot Projects” solicitation is expecting to post Spring 2024 and awarded proposals are tentatively set

to go to the July Business Meeting.

- **Action for 2024:** Award and kick-off five projects totaling nearly \$33.4 million identified in the NOPA for GFO-22-615, "Innovative Charging Solutions for Medium- and Heavy-Duty Electric Vehicles."
- **Action for 2024:** Award and kick-off five projects totaling nearly \$25 million from the "Implementation of Medium- and Heavy-Duty Zero-Emission Vehicle Infrastructure Blueprints" solicitation.
- **Action for 2024:** Conduct various workshops on emerging opportunities and medium- and heavy-duty infrastructure funding to propose various concepts and solicit feedback from the public.

f. **ZEV Infrastructure Plan.** The statewide ZEV Infrastructure Plan (ZIP) supports decision-making by State agencies and stakeholders, and public discussions of ZEV infrastructure policies and funding needs. The ZIP incorporates State agency plans and information needs for future decisions. CEC will engage the public for feedback and input.

- **Progress in 2023:** Began development of 2024 ZIP. The first ZIP focused on the state's near- and long-term actions. The second ZIP will be a deployment plan.
- **Action for 2024:** Publish a draft report for public review. Conduct a public workshop for stakeholder input and incorporate public comment into the final report.

3. **Research, Development & Demonstration:** Support wide range of innovative technologies to accelerate deployment of ZEV infrastructure, facilitate vehicle-grid integration, and increase benefits for all residents and markets, with focused attention to disadvantaged and low-income communities.

Direct Pillar Connection: Vehicles, Infrastructure, End Users

Indirect Pillar Connection: Workforce

Key Collaborators: CPUC, CARB, CAISO, Caltrans, federal, tribal, local, and regional governments, vehicle manufacturers, grid operators, utilities, hydrogen providers, clean energy technology developers, NGOs, universities and other research entities, and fleets.

Key Results & Actions:

a. **Electric Program Investment Charge (EPIC).** Fund research leading to technological advancements and scientific breakthroughs supporting California's clean energy goals, with a focus on providing ratepayer benefits, including reliability, lower costs, and safety. EPIC awards funding through competitive grants to advance pre-commercial clean energy technologies and approaches, including those related to achieving California's transportation electrification goals, for the benefit of electricity ratepayers of California's three electric investor-owned utilities.

- **Progress in 2023:** Conducted a workshop in May 2023 to solicit feedback on EPIC 4 Transportation Electrification research funding concepts.
 - **Progress in 2023:** Held the annual EPIC Symposium in October 2023 which included a panel highlighting active EPIC projects developing innovations in bidirectional charging and infrastructure solutions for medium- and heavy-duty vehicles.
 - **Progress in 2023:** Developed a \$21 million solicitation for Grid-Supportive Transportation Electrification research, development, and demonstration projects with funding through the EPIC 4 Investment Plan.
 - **Progress in 2023:** Awarded \$1.5 million to Smartville, Inc. leveraging \$5.9 million of federal funds to scale up production and demonstrate a grid-scale second-life EV battery system.
 - **Progress in 2023:** Established Strategic Goals for the EPIC 5 Investment Plan, including one on Transportation Electrification.

 - **Action for 2024:** Award and kick-off projects under the Grid-Supportive Transportation Electrification solicitation, which was released in January 2024.
 - **Action for 2024:** Continue overseeing active R&D projects to demonstrate technologies that enable electric vehicles to provide resilient back-up power to buildings and facilities during outages or intentional islanding events.
 - **Action for 2024:** Continue overseeing an active R&D project to demonstrate vehicle-to-grid with electric school buses in Richmond.
 - **Action for 2024:** Continue overseeing active R&D projects to demonstrate the role of distributed energy resources for support medium- and heavy-duty vehicle charging infrastructure and advance technologies, modeling tools, and community engagement to inform development of public access high-power charging infrastructure.
 - **Action for 2024:** Develop additional solicitations in response to the EPIC 4 Transportation Electrification initiatives:
 - Efficient transportation electrification and charging technologies.
 - Technology enablers for using EVs as distributed energy resources.
 - Integrating distributed energy resources for grid-supportive EV charging.
 - Lithium-ion battery reuse and recycling technologies.
 - **Action for 2024:** Develop Strategic Objectives for the EPIC 5 Investment Plan which will include quantified targets for achieving the Strategic Goal of Transportation Electrification.
 - **Action for 2024:** Execute a federal cost share agreement with UC San Diego to leverage \$10 million of federal funds with \$1.2 million of EPIC funds to scale up a novel lithium-ion battery direct recycling technology.
- b. **Gas R&D Program.** Fund research to support the gas sector transition and cost-effective achievement of California's clean energy and climate goals. The Gas R&D Program awards funding through competitive grants to advance technologies and research that support reductions in fossil gas consumption, advance the production and use of renewable gas, and deliver public health,

affordability, environmental, and safety benefits.

- **Progress in 2023:** Awarded \$8.5 million to two projects to develop high flow mobile hydrogen refueler technologies for emerging applications.
- **Action for 2024:** Continue overseeing projects to demonstrate pre-commercial hydrogen fuel cell vehicles and refueling infrastructure technologies for difficult-to-electrify heavy-duty vehicle applications.

4. **Infrastructure Resilience:** Support strategies to improve resiliency including related to energy storage, vehicle-grid integration, hydrogen supply and refueling station reliability, electric grid and EVSE reliability, on-site generation, and related workforce adequacy.

Direct Pillar Connection: Vehicles, Infrastructure

Indirect Pillar Connection: End Users, Workforce

Key Collaborators: CAISO and grid operators, CARB, CPUC, California Labor & Workforce Development Agency, California Workforce Development Board, Employment Training Panel, GO-Biz, utilities, vehicle manufacturers and supply chain stakeholders, electricity and hydrogen providers, energy technology developers, federal and tribal governments, local and regional governments, non-governmental organizations, universities and other research entities, and organized labor.

Key Results & Actions:

- a. **Workforce Development.** Support workforce and equity priorities articulated in the Clean Transportation Program Investment Plan.
- **Progress in 2023:** Hosted the Clean Transportation Program Proposed Workforce Investment and Activities workshop to discuss workforce training and development topics, potential funding concepts, and solicit public feedback on proposed program activities.
 - **Progress in 2023:** Expanded the Electric School Bus Training Project to develop course material on EVSE Equipment and Systems, provide training for more schools, and develop online/hybrid training delivery.
 - **Progress in 2023:** Drafted Clean Transportation Program Workforce Training and Development Strategy document to clarify the CEC's role, identify objectives and actions to build career pathways, establish funding priorities, and develop and actionable implementation plan for in ZEV and EV charging infrastructure (EVCI) workforce development.
 - **Action for 2024:** Collaborate with California Workforce Development Board to provide interagency technical assistance, analysis, and education for workforce development in clean energy, to support high-quality jobs, careers, and workforce education and training, and facilitate greater access to quality employment and workforce

development opportunities in the energy sector for disadvantaged and low-income communities.

- **Action for 2024:** Increase the number and geographic diversity of electricians who can install charging infrastructure through an interagency agreement with the Employment Training Panel to train and certify electricians through the EV Infrastructure Training Program.
- **Action for 2024:** Conduct a workforce assessment of EV charger construction, installation, and maintenance occupations to forecast future labor demand and current labor market conditions.
- **Action for 2024:** Develop an incentive program to provide charger maintenance and repair training for electricians and service technicians.
- **Action for 2024:** Establish the Clean Transportation Program Workforce web portal to provide resources for navigating the workforce for ZEV and EVCI, including current CEC workforce projects and information on EVITP.
- **Action for 2024:** Conduct a Workforce Training and Development Workshop to provide updates on program initiatives and solicit public input regarding ZEV and EVCI maintenance and repair.

b. **Hydrogen Supply and Station Reliability.** Collaborate with stakeholders to ensure the hydrogen supply and distribution system has sufficient backup to continue functioning through supply disruptions and to increase the reliability and availability of existing stations.

- **Progress in 2023:** Continued to work toward increasing hydrogen supply source options by including supply requirements in solicitations and by funding renewable hydrogen production plants. For example, the funding solicitations GFO-19-602 and GFO-22-607 required funded stations to have a second supply agreement as backup to ensure station operators do not rely on a single supply source.
- **Progress in 2023:** The CEC launched the Clean Hydrogen Program to provide financial incentives to projects scaling-up clean hydrogen production, processing, delivery, storage, or end use in-state. The CEC continued developing two competitive grant solicitations under this program for a total of \$55 million to increase the supply of hydrogen in California.
- **Progress in 2023:** One of the renewable hydrogen production plants funded by the Clean Transportation Program started production in June 2023.
- **Progress in 2023:** The CEC held a joint-agency workshop with CARB and GO-Biz in November 2023 to discuss the light-duty FCEV customer experiences at hydrogen refueling stations in California and identify new strategies to overcome key barriers. The CEC also established a contract with UC Davis to conduct a customer survey to investigate barriers further.
- **Progress in 2023:** The CEC released a solicitation to support operations and maintenance of existing stations and provided a manufacturing grant to produce hydrogen refueling equipment in California.

- **Action for 2024:** Continue focusing on increasing hydrogen production for the California mobility market, with a focus on clean hydrogen and low carbon intensities. In addition, more hydrogen production projects, even outside the transportation sector, will help reduce the costs of hydrogen production and delivery in general and will help advance technologies.
 - **Action for 2024:** Continue focusing on improving the reliability and availability of existing hydrogen refueling stations.
 - **Action for 2024:** Release two solicitations through the Clean Hydrogen Program to fund large-scale centralized hydrogen production and the second solicitation funding distributed hydrogen production projects with on-site use. Release proposed awards for both solicitations in 2024.
- c. **EV Charging Station Reliability.** Collaborate with stakeholders to measure and track EV charging station reliability and up-time.
- **Progress in 2023:** Continued developing reliability recordkeeping and reporting requirements for CEC grant funding opportunities to ensure the reliable operation of chargers installed using CEC funds. These requirements have evolved to include standardized data collection, routine maintenance, and data on successful charges in addition to uptime.
 - **Progress in 2023:** Executed contract with UC Davis to develop a field testing program that will test charger reliability. The initial phases of this contract were completed, and UC Davis began beta testing in 2023. The data from this program coupled with data from chargers installed through grant funding agreements will better inform modelling and policy development.
 - **Progress in 2023:** Pursuant to AB 2061, staff developed draft reliability regulations for state-funded chargers installed on or after Jan 1, 2024. The draft regulations were released for public comment in September. At the same time, AB 126 amended the original legislation, which required staff to update the initial proposal. Staff also included updates based on stakeholder feedback. The revised draft regulations began routing for approval in Dec 2023.
 - **Action for 2024:** Continue including reliability recordkeeping and reporting requirements as well as performance standards for CEC grant funding opportunities to ensure the reliable operation of chargers installed using CEC funds.
 - **Action for 2024:** Continue to manage the UC Davis contract to ensure the field testing program maintains schedule for incorporating data into the inaugural biennial reliability assessment, required by AB 2061.
 - **Action for 2024:** Conduct analysis and draft the inaugural AB 2061 reliability report for publication in 2025.
 - **Action for 2024:** Release second draft of the proposed reliability regulations for public comment. Revise proposed regulations as necessary and submit final draft for adoption in CEC Business Meeting.

5. **Special Projects, Lithium Valley:** Work with multiple stakeholders to develop and implement recommendations for lithium extraction in California, per AB 1657 (2020), as well as through other CEC efforts to facilitate a California-based lithium industry.

Direct Pillar Connection: Vehicles, Workforce

Indirect Pillar Connection: Infrastructure, End Users

Key Collaborators: CPUC, California Natural Resources Agency, tribal representatives, local and regional governments, and private market participants. Additional collaboration with GO-Biz, the United States Environmental Protection Agency, and the United States Department of Energy.

Key Results & Actions:

- a. **Lithium Valley Commission.** Convened Lithium Valley Commission (LVC) in March 2021 with appointed members. AB 1657 charged the Lithium Valley Commission with reviewing, investigating, and analyzing certain issues and potential incentives regarding lithium extraction and use in California. The Lithium Valley Commission was to consider a range of issues including the further development of geothermal power and lithium recovery from existing and new geothermal facilities, market opportunities for lithium, and potential economic and environmental impacts to the state resulting from extraction and processing of lithium from geothermal brines and production of lithium-dependent products. (Discontinued after 2023).

- **Progress in 2023:** The Lithium Valley Commission has completed its work and statutory responsibility and was dissolved in 2023.
- **Progress in 2023:** Conduct a workshop in the first quarter of 2023 to discuss future activity of the LVC with a summary of ongoing responsibilities under AB 1657, CEC resources for future activities, and recommendations for next steps.
- **Action for 2024:** Coordinate with US DOE, GO-Biz, and other state partners to share funding opportunities for lithium-ion battery manufacturing and the related ZEV supply chain.
- **Action for 2024:** The CEC's ZEV battery manufacturing block grant, PowerForward, will provide preference to projects using material sourcing within the United States with a higher preference to sourcing within California (including Salton Sea lithium extraction projects).