

2023 Sustainability Report

Building California's Sustainable Future



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The San Joaquin River Viaduct is one of the Central Valley's signature architectural structures.

Cover: Vegetation thrives near the signature San Joaquin River Viaduct.

The California High-Speed Rail Authority (Authority) is responsible for planning, designing, building and operating the first high-speed rail in the nation. California high-speed rail will connect the megaregions of the state, contribute to economic development and a cleaner environment, create jobs and preserve agricultural and protected lands. When it is completed, it will run from San Francisco to the Los Angeles basin in under three hours at speeds capable of exceeding 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations. In addition, the Authority is working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs.

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Message from the CEO

We are building California's sustainable future. This past year has been marked by significant momentum toward our goal of an operating rail system by the end of the decade, a system that is the backbone of a zero-emissions California.

This annual sustainability report is an opportunity for the High-Speed Rail Authority (Authority) to reflect on what we have accomplished and to also understand in detail areas where we want to improve. That pledge to continuous improvement and transparency is the foundation of not just our sustainability program, but our Authority's mission. Our commitment is to deliver a new option for transportation for all Californians, while setting a new standard in environmental, social, and governance issues as we do so.

2022 was a year of critical achievements that benefit the local and national economy, communities, and the environment. We appreciate that, as the largest infrastructure project in the United States, the nation is watching. We respect the need to set a high sustainability standard for infrastructure projects.

Economic Development: As a multibillion-dollar project, we are leveraging the size of this project to lift disadvantaged communities and small, minority-owned businesses. Progress has been significant. Cumulatively, as of publication, we have created more than 11,000 local jobs in the Central Valley; almost 5,500 of those were filled by targeted workers (residents of disadvantaged communities where annual household income ranges from \$32,000 to \$40,000). As of December 2022, there were 761 certified small businesses working with the Authority statewide.

Safety: In 2022, we initiated a rigorous quality review of our structures to ensure the projects we're building are the best in the nation. As a result of the review, we've implemented a series of steps to our oversight process to make adjustments where needed. The safety of our workers, our structures, and eventually the public traveling on our system will always be our top priority.

Energy and Emissions: In 2022, we maintained our net-positive greenhouse gas (GHG) balance, offsetting more GHG emissions than have been created so far from the project. In 2022, our construction vehicles emitted 68 percent less black carbon than a typical fleet, which means 1.27 tons of that short-lived climate pollutant were effectively avoided. In addition, we have been collaborating with the Governor's Office of Business and Economic Development (GO-Biz) to understand lessons learned on advancing the adoption of zero-emission vehicles (ZEV) in the state. This collaboration feeds our ongoing research to enhance and improve procurement requirements.

Natural Resources: To date, we have preserved and restored more than 4,400 acres of habitat and conserved more than 3,190 acres of agricultural land through the acquisition of agricultural conservation easements.

Building California's sustainable future means maintaining our focus on the ultimate statewide system while getting the work done on the first operating segment in the Central Valley.

We continue making progress on our mission to connect the vibrant communities and cultures of this state. We look forward to helping protect and strengthen those communities through the delivery of California High-Speed Rail. We look forward to having passengers on trains at the soonest possible time. We are making progress for California.



Brian P. Kelly

Executive Summary

Our responsibility to local communities, the economy and the environment informs everything we do as we build California’s high-speed rail system.

As part of our commitment to full transparency, we carefully quantify and document the work we do to engage station communities, protect natural habitats, preserve agricultural lands, and meet strict air emissions standards. This annual sustainability report summarizes that work.

OUR SUSTAINABILITY APPROACH

Our sustainability priorities are described in detail in **Chapter 1**. These have been the core of the sustainability program for the past decade:

- **Economic Development and Governance:** We prioritize/value responsible leadership and management, transparent practices, and sound business planning.
- **Energy and Emissions:** We prioritize the conservation and type of energy resources used to construct and operate our rail system, and the tracking and minimization of emissions associated with both construction and operation.
- **Natural Resources:** This priority focuses on protecting the environment and its resources.
- **Sustainable Infrastructure:** This refers to the principles and actions in planning, siting, design, construction, mitigation, operation, maintenance, and management of infrastructure that reflect a balance of social, environmental, and economic concerns.

- **Station Communities and Ridership:** This refers to collaborative planning activities that promote transit-oriented development and sustainable land use decisions to do the following:
 - bring riders into the system.
 - encourage and promote proximity co-location for education, health, and business institutions.
 - provide ancillary consumer-concession services.

ECONOMIC DEVELOPMENT AND GOVERNANCE

As part of our commitment to strengthening the economic climate of California, we are working to maximize economic benefits to disadvantaged communities. Details are in **Chapter 2**.

Our Community Benefits Policy and our Community Benefits Agreement (CBA) ensure that the jobs created by the building and operation of the high-speed rail system benefit communities most in need.

- In FY 2021-22, 62 percent of the investment in the system occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas.
- In 2022, we continued to add jobs and to hire small businesses, including Disadvantaged Business Enterprises (DBE) and Disabled Veteran Business Enterprises (DVBE). Here are some highlights:

- As of December 31, 2022, 8,346 construction jobs have been created along the Central Valley segment. Of those, 5,439 were filled by targeted workers (residents of disadvantaged communities where annual household income ranges from \$32,000 to \$40,000) — 65 percent of the total construction labor jobs and more than double our 30 percent goal.
- As of December 2022, there were 761 certified small businesses working with the Authority statewide. The number of small businesses put to work on the project has increased 166 percent since 2015, and DBE participation has grown by more than 151 percent since 2015.

For more information, see the Small Business Program page on our website at hsr.ca.gov/business-opportunities/small-business-program.

ENERGY AND EMISSIONS

Our current strategy is to operate on 100 percent renewable energy through solar generation and battery storage on land that we own. This reduces operating costs and mitigates risks to the system's power supply. Details are in **Chapter 3**.

We are also committed to net-zero construction greenhouse gas emissions and net-zero criteria air pollution. Cost-efficiency and reliability are critical to successful operation. Here are some 2022 highlights:

- Contractors reported a 35 percent decrease in electricity consumption and a 13 percent decrease in gasoline consumption from 2021 levels, despite a 39 percent increase in construction activity based on construction hours.
- We achieved a net-positive greenhouse gas (GHG) balance, offsetting more GHG emissions than have been created so far from the project.

- We continue to show tangible avoided emissions resulting from progressive fleet procurement requirements. Our emissions for reactive organic gases, particulate matter, black carbon, and nitrogen oxide were 65 to 76 percent lower than a typical fleet.

DESIGNING NET-POSITIVE ENERGY STATIONS

Our stations are future hubs of electrified transportation fueled by renewables. They should be comfortable, shaded, energy-efficient, and water-efficient, and they should help restore the surrounding community. High-speed rail stations and service facilities will be designed to be net-positive energy, meaning they will produce more energy on-site than they consume. We will focus on equitable sharing of energy in districts around the station.

In October 2022, the Authority's Board of Directors awarded a station design contract of approximately \$35 million to Foster + Partners and Arup (F+P Arup) for the first of two separately funded phases.

The first is to advance the design work at the Merced, Fresno, Kings/Tulare and Bakersfield station sites, including identifying right-of-way and utility relocation requirements necessary for construction.

The second is to progress to final design and construction-ready documents, construction support, and commissioning.

REDUCING GHG EMISSIONS DURING CONSTRUCTION

The Authority requires construction contractors to monitor and report the following:

- material use
- energy consumption
- electricity purchased from the grid and renewable sources
- water consumption
- waste generation volumes by type

- waste management streams by volume and type for each type of waste
- types of on- and off-road equipment
- hours or miles of operation

The Authority uses this data to measure performance and for setting data-driven policy and strategies. These provisions are governed by our Sustainability Policy, most recently updated in April 2020, which can be viewed on our website at hsr.ca.gov/wp-content/uploads/2021/04/Sustainability_signed_policy.pdf

The Authority continued to use binding contract provisions to minimize GHG emissions during construction. In 2022, our construction vehicles emitted 68 percent less black carbon than a typical fleet. Furthermore, our construction vehicles emitted 10 percent less black carbon this year than last year.

Our policy lays out specific measures to decrease our indirect emissions associated with construction. These measures include:

- Integrating climate adaptation and resilience principles into the design, construction, and operation of the system;
- Requiring performance thresholds for global warming potential for major materials while maintaining durability and quality requirements;
- Adapting existing structures and facilities for reuse whenever feasible.

ZERO-EMISSION VEHICLES

The Authority requires 100 percent zero-emission vehicles (ZEV) for on-road contractor fleets in all future infrastructure construction contracts. The Authority also encourages innovation in ZEV off-road construction equipment, which has a more difficult set of parameters to get to zero emissions, by mandating, where feasible:

- 10 percent of off-road equipment be ZEV, at the start of a contract, by 2030;
- 100 percent of off-road equipment be ZEV by 2035;

- 100 percent ZEVs for on-road contractor fleets in all future infrastructure construction contracts, as well as 10 percent ZEV for off-road equipment by 2030 with the goal of 100 percent ZEV for such equipment by 2035, where feasible.

The ZEV standards support our commitment to reducing air pollutants. Through our ongoing research and procurement requirements, we have collaborated with GO-Biz to share lessons learned and continue to advance the adoption of ZEVs in the state.

NATURAL RESOURCES

Ensuring that future generations have the natural resources necessary to lead meaningful and productive lives means preserving and enhancing California’s water systems, ecosystems, and agricultural land. Restoring, caring for, and maintaining natural resources is critical to climate resilience. See **Chapter 4**.

In early 2022, the Authority’s Board of Directors certified the Final Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) and unanimously approved the approximately 90-mile San José to Merced segment in Northern California. This approval completes the environmental clearance for 422 miles of the high-speed rail project’s 500-mile Phase 1 system from San Francisco to Los Angeles/ Anaheim, which includes the stretch from Merced to Palmdale, as well as the section from Burbank to Los Angeles.

To date, we have preserved and restored more than 4,400 acres of habitat and conserved more than 3,190 acres of agricultural land through the acquisition of agricultural conservation easements.

Through participation in the Department of Conservation’s (DOC) California Farmland Conservancy Program (CFCP), not less than one acre of farmland will be conserved for every acre of farmland that is converted to transportation use.

Construction water use decreased by 12 percent compared to 2021, despite a 38 percent increase in construction activity levels.

Several water conservation and efficiency measures support achievement of our net-zero potable water consumption goal. We have established criteria for water use reduction, recycling, capture, and storage, and we prioritize the issue of water consumption when siting future facility locations.

SUSTAINABLE INFRASTRUCTURE

Infrastructure underpins our economy, our communities, and our way of life. The high-speed rail system will transform transportation within the state and make far-flung regions more accessible to one another. It will also set a standard that makes the environment, communities, and the economy the core drivers for how infrastructure projects are delivered. For details, see **Chapter 5**.

In June 2023, the Authority finalized a Sustainable Procurement Policy (POLI-1101) to ensure the alignment of its procurement practices with its environmental, social, and governance priorities. The scope of the policy applies to all procurement activities within the planning, design, construction, operations, maintenance, administration, and management of the system.

Our sustainable infrastructure principles reflect a balance of social, environmental, and economic issues throughout the design, construction, and operations phases of the program. These principles can be found within our Sustainability Policy, which can be accessed here: [hsr.ca.gov/wp-content/uploads/2021/04/Sustainability_signed_policy.pdf](https://www.hsr.ca.gov/wp-content/uploads/2021/04/Sustainability_signed_policy.pdf)

The Authority has integrated requirements for internationally regarded infrastructure sustainability benchmarks, such as Envision, into station design contracts.

Climate stressors have been considered and integrated into design requirements.

Our web-based tool, EMMA 2.0, continues to streamline and enhance data collection, review, and analysis.

We have incorporated aggressive carbon targets into procurement, honoring the implementation steps identified through the Sustainable Purchasing Leadership Council (SPLC) Benchmark.

RECYCLING WASTE RESPONSIBLY

The Authority requires recycling 100 percent of the steel and concrete waste from construction and demolition activities and diverting at least 75 percent of all other construction and demolition waste from landfills. This requirement is superseded by local regulations if they specify a higher diversion rate. Keeping materials such as concrete, asphalt, wood, and organics out of landfills through reuse, recycling, or source reduction avoids the production of methane. It also incentivizes a circular economy, treating the outputs of one set of construction activities as inputs into another, thereby avoiding the extraction of virgin materials.

To measure progress, the Authority tracks the amount of waste produced and diverted from landfills for each construction package and contractor.

GRADE SEPARATIONS

In 2022, seven grade separations were completed, resulting in critical safety benefits for communities. Grade separations also produce environmental and economic benefits, including reduced air pollution from idling vehicles and reduced isolation of disadvantaged communities.

The Authority is also a funding partner for a grade separation at the Rosecrans/Marquardt intersection in Santa Fe Springs in Los Angeles County, which was ranked the most dangerous grade crossing in the state in 2016. LA Metro broke ground on the grade separation in 2022.

CALIFORNIA EXTREME HEAT ACTION PLAN

In April 2022, California released its Extreme Heat Action Plan, which outlines the state government approach to mitigating the health, economic, cultural, ecological, and social impacts of increasing average temperatures and heatwaves. The Authority's climate-resilient station area planning directly supports the state's actions to support communities seeking to invest in heat-resilient transportation infrastructure.

The station area planning effort collaborates with surrounding communities on the use of the station facilities; implements sustainable station designs that minimize heat and maximize shading; and plans for active transportation access to the station to promote walking and biking.

STATION COMMUNITIES AND RIDERSHIP

Customers access these rail systems through stations. Well-planned stations help strengthen the identity and sense of place in communities, and they can bring dramatic new levels of activity and economic development into a city's core. For details, see **Chapter 6**.

Statewide, through 359 community engagement and public outreach events, we worked with local community organizations and elected officials to educate and inform the public about the high-speed rail program, directly connecting with 13,309 people in 2022.

The Authority continued to partner with station communities to ensure that community impacts of station design are aligned with community needs and goals. We are also working with stakeholders in Fresno and Bakersfield on early site activation. This activity looks at parcels the Authority owns and considers how to use them in advance of high-speed rail service to provide early benefits to station communities.

The Authority continues to foster a vital public agency partnership with the City of San José, the Santa Clara Valley Transportation Authority (VTA), the Peninsula Corridor Joint Powers Board, and the Metropolitan Transportation Commission to plan for an expanded Diridon Station in San José. Planning work in 2022 included a business case that focused on technical work and analysis for the next stages of development.

In October 2022, the Authority hired a team to design the Merced, Fresno, Kings/Tulare, and Bakersfield stations. In addition, we continue to partner with LA Metro on the Link Union Station (Link US) project, which will transform LA Union Station (LAUS) into a modern transit and mobility hub.

The Authority also advanced the design of both the 33-mile extension north from Madera to Merced and the 19-mile extension south from Poplar Avenue to Bakersfield. These procurements were initiated in February 2022, and contracts were awarded in June and July 2022, respectively. This work will lay the groundwork for delivering an electrified initial operating segment between Merced and Bakersfield.

The high-speed rail program is delivering benefits now through early investments in bookend and connectivity projects tied to California's existing urban and state passenger rail systems. These early investments will allow the high-speed rail system to connect with those systems, creating an integrated rail network that will offer a viable alternative to vehicle and air travel.

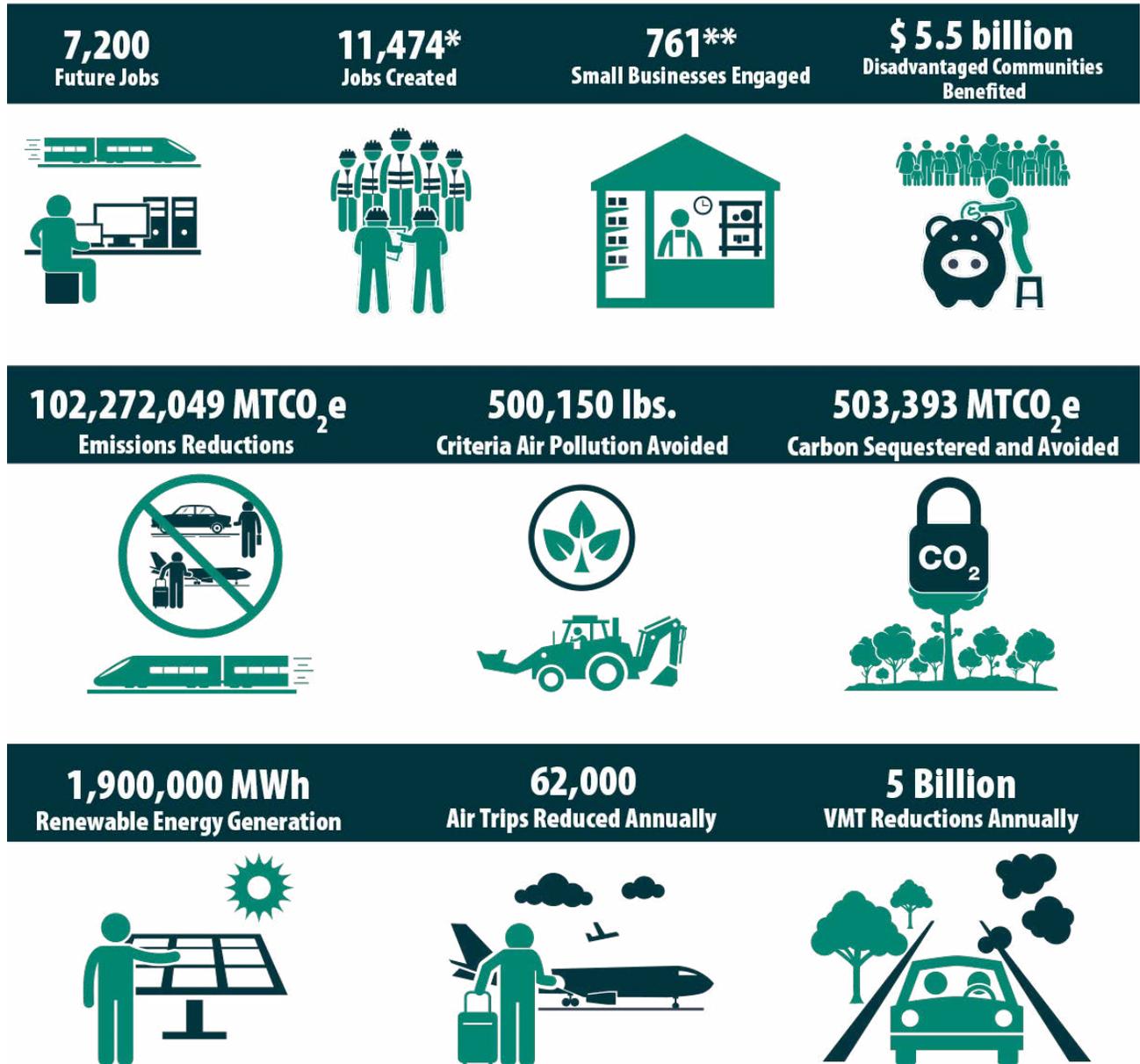
For example, projects such as the Caltrain Electrification Project provide immediate benefits to the adjacent communities by improving the Caltrain system performance and by reducing noise, improving air quality, and lowering GHG emissions. The Caltrain Electrification Project will be completed in 2024.

BENEFITS OF HIGH-SPEED RAIL

Traveling from downtown Los Angeles to San Francisco, a total distance of 380 miles (610 km) in 2 hours and 40 minutes by land was unfathomable before the inception of the California high-speed rail project.

By connecting major cities without traffic jams, the high-speed rail system symbolizes a more efficient, economic, and sustainable way to travel. **Exhibit 0.1** illustrates some of the significant current and future benefits of California’s high-speed rail project.

Exhibit 0.1: High-Speed Rail Is a Valuable Investment



*As of July 31, 2023, **As of Dec 31, 2022.



Coyote Valley in Santa Clara County

Chapter 1: Our Sustainability Approach

Our mission is to bring high-speed rail to California this decade, and sustainability remains at the core of that mission. The Authority, through the high-speed rail program, plays a critical role in helping the state implement its policies to address climate change, develop clean energy, create healthy communities centered around equitable transit, protect the environment, and spur economic prosperity and opportunity.

Our Sustainability Policy, signed in September 2013 and last updated in 2020, summarizes our sustainability objectives, identifies specific commitments, and serves as a framework for strategically identifying directed, cost-effective approaches. The policy applies across all aspects of the design, construction, operations, and governance of the high-speed rail program.

The policy, which honors several industry sustainability and stakeholder commitments, includes the following objectives:

- Minimize impacts to the natural and built environment.
- Maximize safety and reliability.
- Encourage walkable land development around transit stations.
- Increase ridership and revenue.
- Help California reduce resource consumption, traffic and airport congestion, and energy dependency in a cost-effective manner over the entire lifecycle of the high-speed rail system.

To read our Sustainability Policy, see our website at hsr.ca.gov/wp-content/uploads/2021/04/Sustainability_signed_policy.pdf

Authority Policy Statement: The Authority will deliver a sustainable high-speed rail system for California that serves as a model for sustainable rail infrastructure. The Authority has developed and will continue to implement sustainability practices that inform and affect the planning, siting, designing, construction, mitigation, operation, and maintenance of the high-speed rail system.

PRIORITIES AND COMMITMENTS

The Authority's mission is to deliver an electrified high-speed rail system, which will provide critical mobility and serve as a foundation for California's sustainable development. Our commitment is also to employ leading methods during construction to make the country's largest infrastructure program a model for sustainable delivery. A project at the scale of the California high-speed rail system—more than 500 miles and connecting more than 20 million people—provides opportunities to shape industries and set new public policy precedents.

Authority staff and stakeholders have identified five sustainability priorities:

1. **Economic Development and Governance:** This priority focuses on responsible leadership and management, transparent practices, and sound business planning.
2. **Energy and Emissions:** This priority addresses the conservation and type of energy resources used to construct and operate the rail systems and the tracking and minimization of emissions (both greenhouse gas and criteria air pollutant emissions) associated with both construction and operation.

3. **Natural Resources:** This priority focuses on the environment and its resources, addressed in and within ecological systems.
4. **Sustainable Infrastructure:** This refers to the principles and actions in planning, siting, design, construction, mitigation, operation, maintenance, and management of infrastructure that reflect a balance of social, environmental, and economic concerns.
5. **Station Communities and Ridership:** This priority refers to collaborative planning activities that:
 - promote transit-oriented development and sustainable land use decisions that will help bring riders into the system;
 - encourage and promote proximity co-location for education, health, and business institutions; and
 - provide ancillary consumer-concession services.

We recognize how important it is that stakeholders and the general public are well-informed about the system’s sustainability priorities and their alignment with public policy goals, as well as how we intend to achieve them.

In 2022, the Authority re-engaged with stakeholders to update and reaffirm its environmental, social, and governance (ESG) priorities for the California high-speed rail program.

In **Exhibits 1.1** through **1.5**, each priority is broken down into its commitments and the project phase during which the Authority will address those commitments.

Exhibit 1.1: Economic Development and Governance Priority and Commitments by Phase

Commitments	Phase
Improve the economic value of the system to Californians and maximize benefits to disadvantaged communities.	Construction
Implement 30% overall small business participation goal for Authority contracts, including 10% Disadvantaged Business Enterprises (DBE) participation and 3% Disabled Veteran Business Enterprises (DVBE).	Construction
Maximize opportunity for private investment.	Construction
Govern transparently and accountably.	Construction
Continuously improve program delivery and management.	Construction
Maximize opportunity for private investment and private-sector operations.	Operation
Achieve a self-sustaining financial structure.	Operation

Exhibit 1.2: Energy and Emissions Priority and Commitments by Phase

Commitments	Phase
Require 100% zero-emission vehicle (ZEV) fleets in future infrastructure and construction contracts.	Construction
Achieve net-zero greenhouse gas and criteria air pollutant emissions in construction.	Construction
Build net-zero energy and LEED Platinum facilities.	Operation
Operate the system on 100% renewable energy.	Operation
Strengthen public health by improving air quality.	Operation
Reduce vehicle miles traveled.	Operation
Reduce operational energy costs.	Operation

Exhibit 1.3: Natural Resources Priority and Commitments by Phase

Commitments	Phase
Conserve, maintain and restore habitat and wildlife corridors through landscape-scale mitigation.	Construction
Retain, protect and enhance the environmental quality and biodiversity of the high-speed rail project area.	Construction
Conserve agricultural land.	Construction
Reduce the demand for virgin natural resources by using recycled materials.	Construction
Practice on-site water conservation.	Construction
Work toward net-zero water operations.	Operation

Exhibit 1.4: Sustainable Infrastructure Priority and Commitments by Phase

Commitments	Phase
Design and construct the system in conformance with the Authority's Principles for Sustainable Infrastructure.	Construction
Consider climate change risks and vulnerabilities and proactively plan for them by incorporating climate adaptation measures into system design.	Construction
Protect the health and safety of workers and communities.	Construction
Operate the system in conformance with the Authority's Principles for Sustainable Infrastructure.	Operation
Protect the health and safety of workers, customers, and communities.	Operation

Exhibit 1.5: Station Communities and Ridership Priority and Commitments by Phase

Commitments	Phase
Design and construct stations and infrastructure that reinforce sustainable community strategies, as required by state law.	Planning, Construction, and Operation
Implement livable development patterns in station areas and reinforce quality of life through design of the built environment.	Planning, Construction and Operation
Reinforce infill development and affordable housing through station area planning partnerships; identify a mechanism to fund two-to-one replacement of low- and moderate-income housing stock.	Planning, Construction and Operation
Provide convenient station access and appropriate station interfaces to all high-speed rail station areas.	Planning, Construction and Operation
Connect local and regional transit to high-speed rail stations.	Planning, Construction and Operation
Implement active transportation facilities for station access (walking and bicycling).	Planning, Construction and Operation

IMPLEMENTATION PLAN

The Sustainability Implementation Plan guides us to organize how our sustainability priorities are matched with specific implementation actions. The plan translates the broader aspects of the Sustainability Policy into itemized, actionable tasks with measurable performance indicators and metrics.

For details, see our website at [hsr.ca.gov/wp-content/uploads/docs/programs/green_practices/sustainability/Sustainability_implementation_plan_SUMMARY.pdf](https://www.hsr.ca.gov/wp-content/uploads/docs/programs/green_practices/sustainability/Sustainability_implementation_plan_SUMMARY.pdf).

EXTERNAL FRAMEWORKS AND ASSESSMENTS

We consistently look to external sustainability frameworks such as Envision and LEED® to benchmark our performance, gain insights on our project’s relative performance to objective standards and peer infrastructure projects, and identify opportunities for improvement.

We currently align the high-speed rail project with the following frameworks and have added requirements in our station design contracts to reflect this:

- **Envision:** Envision provides a consistent, consensus-based framework for assessing sustainability and resilience in infrastructure. The Envision framework:
 - Sets a standard for what constitutes sustainable infrastructure;
 - Creates incentives for higher performance goals beyond minimum requirements;
 - Gives recognition to projects that make significant contributions to sustainability; and
 - Provides a common language for collaboration and clear communication both internally and externally.
- **LEED:** LEED (Leadership in Energy and Environmental Design) is the most widely used green-building rating system in the world. The LEED framework:
 - Provides healthy, highly efficient, and cost-saving green buildings for virtually all building types;
 - Considers energy use, water use, indoor environmental quality, material selection, and the building’s effects on its site;
 - Aids decision-making for project teams rewarding best practices and innovation and recognizing exemplary building projects with different levels of LEED certification.

MATERIALITY ASSESSMENT

To ensure that we continue to report on what matters most to our stakeholders, the Authority conducts materiality assessments. A materiality assessment is a process of stakeholder engagement and analysis that quantifies the relative significance of various environmental, social, and governance issues as they pertain to the organization or project. This assessment process supports our compliance with the latest Global Reporting Initiative (GRI) reporting standards, which are used to structure this report.

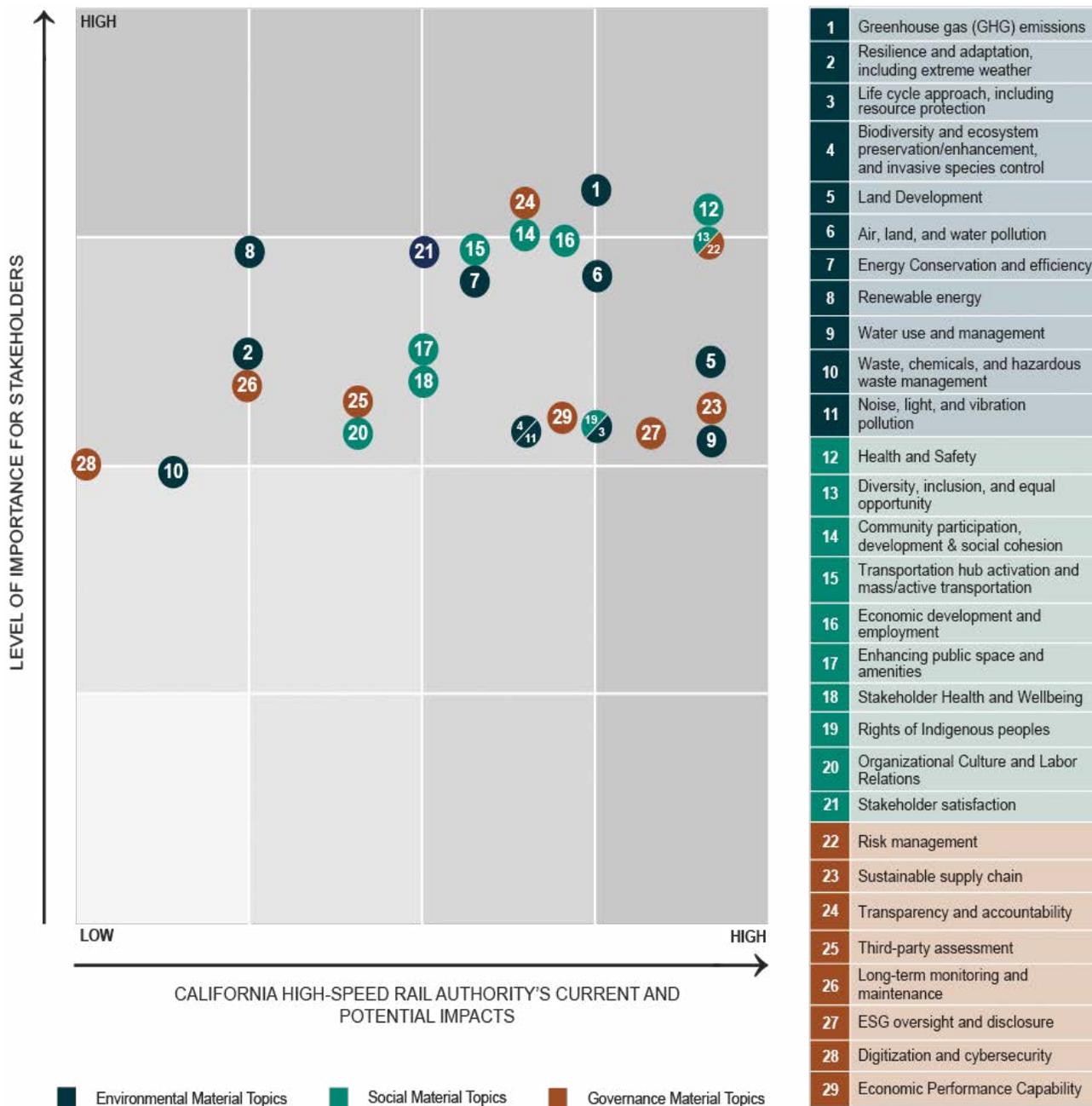
Our most recent assessment was completed in 2022. This exercise revealed the Authority’s focus on GHG emissions management, air, land, and water pollution and socioeconomic equity remains fundamental. Restorative actions relative to economic development and employment continue to rank among the most important issues for stakeholders. Transparency and accountability, and health and safety remain crucial underpinnings of the Authority’s delivery of the high-speed rail project.

The stakeholders engaged through this process included:

- Executive staff and board members
- California High-Speed Rail Authority key external-facing staff
- State agencies
- Non-governmental organizations
- Businesses
- Higher education

Exhibit 1.6 presents the topics of importance to our stakeholders, provides a definition of each, and describes the “boundary” of each topic. In materiality assessments, boundaries identify where the impacts occur and the connection between the reporting agency’s actions and the impacts. Some of these impacts occur internally (e.g., our office energy use), while others (e.g., running the system on renewable energy) are external and have more far-reaching effects.

Exhibit 1.6: California High-Speed Rail Authority Updated Material Topics (2022)



ENVIRONMENTAL MATERIAL TOPICS AND BOUNDARIES

- 1. Greenhouse gas (GHG) emissions:** Greenhouse gases trap energy in the atmosphere and are the primary driver of climate change and global warming. The United Nations Intergovernmental Panel on Climate Change (IPCC) defines seven gases under this category: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs – a family of gases), fluorocarbons (PFCs – another family of gases), nitrogen trifluoride (NF₃), and sulfur hexafluoride (SF₆).

Boundary: Our approach to managing GHG emissions impacts state emissions-reduction commitments.
- 2. Resilience and adaptation:** The ability of an individual, organization or community to adapt to and recover from hazards, shocks, or stresses. This includes climate-change impacts such as extreme weather events (droughts, floods, etc.).

Boundary: Our approach to this topic affects our employees, contractors, consultants, and the public, as well as the resilience of the high-speed rail system.
- 3. Life cycle approach:** Considers upstream and downstream impacts of a product or activity over its lifetime. This includes the environmental or social impacts from extraction, manufacturing, transport, installation, use/operation, decommissioning, and disposal.

Boundary: Taking a lifecycle approach affects the environment and people upstream and downstream of our direct operations.
- 4. Biodiversity and ecosystem preservation/enhancement and invasive species control:** Protecting biological diversity of ecosystems and plant and animal species. Conserving, maintaining, and restoring habitats and wildlife corridors.

Boundary: Our approach to ecosystem preservation and enhancement impacts local biodiversity.
- 5. Land development:** Ensuring sustainable, responsible, and transparent land development practices.

Boundary: Our approach to land management focuses on the land within the Authority's portfolio, working with local jurisdictions on station areas, and regional planning.
- 6. Air, land and water pollution:** Substances associated with potentially harmful impacts on human health and the environment. Criteria air pollutants include particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Land and water pollution may result from leaks or spills of gases, chemicals, oils, fuels, or wastes.

Boundary: Our approach to air, land, and water pollution impacts the environment, as well as state commitments and requirements, such as those made with the California Air Resources Board (CARB).
- 7. Energy conservation and efficiency:** Energy, including electricity and fuels, consumed in offices and project sites, and behaviors and/or technologies that reduce the amount of energy consumed.

Boundary: The efficiency with which we use resources impacts the environment.
- 8. Renewable energy:** Resources such as wind power or solar energy that can be produced indefinitely without being depleted.

Boundary: Our use of renewable energy impacts the global environment.

- 9. Water use and management:** Quantities of water withdrawn, used and discharged; practices to conserve water; consideration of water sources that could be impacted by withdrawal or discharge; and potential water quality concerns.
Boundary: The efficiency with which we use and manage water resources impacts the environment, both through our direct operations as well as via contractors' construction activities.
- 10. Waste, chemicals, and hazardous waste management:** How materials are used and disposed, including wastes diverted from landfill via reuse, recycling, or composting.
Boundary: The efficiency with which we use resources impacts the environment, both through our direct operations as well as via contractors' construction activities.
- 11. Noise, light, and vibration pollution:** The propagation of unwanted or excessive sound and/or physical oscillations with the potential to negatively affect human health and activity or animal life.
Boundary: This topic affects communities located near the high-speed rail system.

SOCIAL MATERIAL TOPICS AND BOUNDARIES

- 12. Health and safety:** Harm prevention and promotion of physical health and mental/emotional well-being of employees, contractors, consultants, and the public. This includes reporting on injury rates, and work-related fatalities.
Boundary: Our approach to health and safety affects our employees, contractors, consultants, and the public.
- 13. Diversity, inclusion, and equal opportunity:** Active promotion of diversity, inclusion, and equity practices at all levels within the organization to ensure that benefits and equal opportunities are delivered to its stakeholders, both internally and externally.
Boundary: Our approach to this topic focuses on our staff, consultants, and contractor workers, as well as entities with which the Authority contracts.
- 14. Community participation, development, and social cohesion:** Providing opportunities, such as public meetings, for community members to receive information and provide feedback on matters affecting them. This includes engaging communities with special concerns, such as disadvantaged communities.
Boundary: Our approach to this topic affects communities located near the high-speed rail system.
- 15. Transportation hub activation and mass/active transportation:** Access to multiple modes of transportation and opportunities to transition between modes, such as from transit to active transportation (e.g., walking, cycling, non-motorized wheelchair use, etc.).
Boundary: Our approach to these topics affects communities located near the high-speed rail system.

- 16. Economic development and employment:** Provision and access to training, development, employment and business opportunities, including programs targeting specific groups such as small businesses, minorities, and veterans.
Boundary: Our approach to skills and training affects our employees, contractors, consultants, and the public.
- 17. Enhancing public space and amenities:** Physical features benefiting neighborhoods and communities, such as public plazas, parks, recreation facilities, public art, and historical/heritage features.
Boundary: Our approach to this topic affects communities located near the high-speed rail system.
- 18. Stakeholder health and well-being:** Measures to prioritize and advocate for customer health, safety, and wellbeing. This includes consideration for the wellness of external stakeholders at all stages of the project lifecycle, as well as any initiatives undertaken for the purpose of improving the welfare of local communities, customers, and other relevant groups.
Boundary: Our approach to this topic includes stakeholders engaged in public outreach events, such as Authority meetings, working groups, and one-on-one discussions, as well as communities adjacent to the project.
- 19. Rights of Native Americans:** Avoidance of the infringement on the rights of Native Americans, and the respect of the rights of Native Americans to free, prior, and informed consent in certain matters affecting them.
Boundary: Our approach to this topic involves early engagement and ongoing, iterative, and meaningful consultation throughout the life of the project.
- 20. Organizational culture and employee relations:** Consultation and engagement with employees to understand their opinions on critical issues, and to increase employee satisfaction, and influence retention rates and overall productivity.
Boundary: Our approach to this topic includes state staff, consultant, and construction contracts.
- 21. Stakeholder satisfaction:** Considers stakeholder's perception of the high-speed rail project in achieving its goals and objectives.
Boundary: These views may correspond to all stakeholders such as regulators, local communities, vendors, and end users.

GOVERNANCE MATERIAL TOPICS AND BOUNDARIES

22. Risk management: Proactively assessing, planning for, and managing actions to be taken before, during, and after a material risk occurs.

Boundary: Risk management is at both the enterprise and project level.

23. Sustainable supply chain: Selecting materials, goods, utilities, and services with enhanced environmental or social benefits, such as goods produced from recycled materials or provided by disadvantaged businesses. Local procurement refers to selecting materials that have been sourced from within the same region or nation, enhancing local economic development, and reducing transportation impacts.

Boundary: Selecting sustainable and local goods affects community partners as well as the environment.

24. Transparency and accountability: Reporting comprehensive, accurate, and balanced information that stakeholders have a right to know. This includes information that supports stakeholders in holding an organization accountable regarding its commitments and legal responsibilities.

Boundary: Our approach to this topic affects the reputation of the Authority and the high-speed rail system.

25. Third-party assessment: Aligning with third-party frameworks for sustainable infrastructure.

Boundary: This topic covers the Authority and the high-speed rail system.

26. Long-term monitoring and maintenance: Ensuring that sufficient plans, processes, and personnel are in place to support long-term protection, mitigation, and enhancement measures.

Boundary: Our approach to this topic includes the high-speed rail system and concept of operations.

27. ESG oversight and disclosure: Reporting of ESG information and performance to demonstrate transparency in explaining how ESG policies and management practices are implemented, how these practices impact the business, and how the practices inform the organization's communication to external stakeholders.

Boundary: Our approach to this topic includes annual reporting to the CEO, public, and staff as required.

28. Digitization and cybersecurity: Examining the organization's modern digital mobility, logistics and services, as well as any risks associated with digitalization. Implementation of data protection and IT security. Cyber risk management through cybersecurity and practices.

Boundary: Security of information is overarching. It applies to every phase and aspect of the Authority, the rail system, its information, and its people.

29. Economic performance capability: Creation and distribution of economic value as an indication of how the organization has created wealth for stakeholders.

Boundary: This topic includes the influence of the project's delivery at the local, regional, state, and federal level as well as forecast economic benefit and is inclusive of a focus on the direct economic benefit to disadvantaged communities.



McCombs Road grade separation



The 3,700-foot Cedar Viaduct in Fresno

Chapter 2: Economic Development and Governance

As we build California’s high-speed rail system, we continue to focus on job creation, economic benefits, continuous improvement, transparency, accountability, and maximizing opportunities for private investment and benefit to disadvantaged communities.

HIGHLIGHTS

- As of December 31, 2022, 8,346 construction jobs have been created along the Central Valley segment; 5,439 are targeted workers.¹
- As of the end of December 2022, the number of small businesses put to work on the project has increased 166 percent since 2015. Disadvantaged Business Enterprises (DBE) participation has grown by more than 151 percent since 2015.
- As of December 31, 2022, participation by certified DBEs increased to 259 and Disabled Veteran Business Enterprises (DVBE) participation increased to 92 certified DVBEs working on the program.
- As construction advanced over 119 miles in the Central Valley, so too have our investments into the system statewide. From July 2006 to June 2022, our investments generated approximately \$15 billion to \$16 billion in total economic activity in the state.
- The Authority’s Diversity, Equity, and Inclusion Taskforce is examining all aspects of the organization, developing action items, and working to create policy initiatives.

EFFECTIVE GOVERNANCE

2022 PROGRESS: The Project Delivery Advisory Committee (PDAC) evolved to provide advice on delivery methods for projects to meet the Authority’s systems goals while minimizing future contract delivery cost and schedule risks. PDAC is focused on, but not limited to, projects that have completed environmental clearance and achieved Record of Decision/Notice of Determination. A white paper and draft documents were prepared in 2022, and the Authority began assembling the PDAC in 2023.

The Authority enforces requirements on contractors, subcontractors, and suppliers to ensure effective governance and transparency. In 2022, we did not identify any significant noncompliance with environmental laws or regulations, nor have we received any fines related to these laws and regulations.

Our oversight philosophy emphasizes stewardship, transparency, and accountability. Our internal governance is comprehensive and structured; it is designed to enhance interdepartmental interaction through a streamlined process to identify issues, resolve problems, and make decisions. Under our governance system, we fully vet all implications and trade-offs of a potential action to ensure fully informed decisions.

The Authority maintains its ISO 9001:2015 Quality Management System (QMS) certification by consistently providing a high level of services that meet customer needs and regulatory requirements. The Authority is only the second state agency to become ISO-certified.

We also require achievement of ISO 55001:2014 standards in our track and systems procurement documents to ensure that both assets and organization practices are effectively managed throughout the contract duration.

OUR GOVERNANCE COMMITTEE STRUCTURE

Executive Committee

- Advises the CEO, who chairs the committee, on the Authority's governance and organizational structure as well as on key agency decisions and recommendations to the Board
- Oversees corrective action implementation from internal and external audits
- Oversees the Business Oversight Committee (BOC), Program Delivery Committee (PDC), and Enterprise Risk Committee (ERC)

Change Control Committee

- Reviews and recommends approval or disapproval of construction contract change orders equal to or greater than \$1 million
- Develops process forms and reference materials and oversees training for change order documentation

Program Delivery Committee (PDC)

- Provides governance and oversight of the Authority's programmatic execution and performance
- Surveils the program baseline threats and opportunities and assesses trends and risk impacts on the program

Business Oversight Committee (BOC)

- Provides programmatic acquisition strategy, procurement governance, and commercial oversight
- Assesses all changes to scope, schedule, and budget

Enterprise Risk Committee:

- Evaluates and prioritizes emerging risks, reviews management risk responses, and provides transparent reporting
- Reports to the Finance and Audit Committee, which is a subcommittee of the Board of Directors

Development Review Committee

- Applies commercial revenue development principles to the development of land owned by the Authority
- Reviews both Authority-led and unsolicited development proposals to determine their viability and their consistency with the Authority's goals
- Reviews advertisements, concessions, and other non-development, revenue-generating opportunities

GOVERNING DIRECTIVES

As a public-sector entity, we are governed by statutes, regulations, and other directives that ensure the development of a system that is safe, sustainable, and compliant with applicable laws and requirements, as shown in **Exhibit 2.0**.

Exhibit 2.0: Statutes Governing High-Speed Rail Development

Statutes
The Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century (Proposition 1A, 2008)
AB 32 (Núñez, 2006) Global Warming Solutions Act
SB 32 (Pavley, 2016) Global Warming Solutions Act, 2006: Emissions Limit
SB 375 (Steinberg, 2008) Sustainable Communities and Climate Protection Act
AB 75 (Strom-Martin, 1999) Waste Management for State Agencies
SB 1029 Budget Act of 2012
SB 852 Budget Act of 2014
SB 862 (2013-2014) Greenhouse Gases: Emissions Reduction
SB 535 (De León, 2012) Global Warming Solutions Act, 2006: Greenhouse Gas Reduction Fund
AB 1352 (Perez, 2012) Global Warming Solutions Act, 2006: Greenhouse Gas Reduction Fund
AB 262 (Bonta, 2017) Buy Clean California Act
SB 350 (De León, 2015) Clean Energy and Pollution Reduction Act
SB 100 (De León, 2018) California Renewables Portfolio Standard Program: emissions of greenhouse gases
SB 379 (Jackson, 2015) Land Use: General Plan: Safety Element: Climate Adaptation
AB 1550 (Gomez, 2016) Greenhouse Gases: Investment Plan: Disadvantaged Communities
AB 398 (Garcia, 2017) Update to Global Warming Solutions Act of 2006: market-based compliance mechanisms
Executive Orders
Executive Order 12898
Executive Order B-18-12
Executive Order B-30-15
Executive Order N-79-20
Executive Order N-82-20
Regulations
2008 California Long-term Energy Efficiency Strategic Plan
2008 Air Resources Board Scoping Plan; 2013 Update
2016 California Green Building Standards Code (CalGreen Code Title 24 Part 11)

ENTERPRISE RISK MANAGEMENT

The independent Risk Management Office was formed to increase risk awareness and improve decision making. This office reports directly to the board and is overseen by the director of risk management and project controls. In the past year ending December 2022, the Risk Management Office has:

- Completed a two-part maturity assessment focusing on cost, schedule, and budget risk management;
- Conducted workshops across the Authority to identify and assess risks related to each office;
- Administered an annual enterprise risk assessment to identify any new risks for the Enterprise Risk Committee to discuss for inclusion in the Enterprise Risk Register;
- Facilitated monthly forums for committee members to analyze emerging risks. For instance, the risk of increased inflation was included on the Enterprise Risk Register in 2022.

We continue to advance construction with a building block approach, focusing first on the Central Valley between Merced and Bakersfield. This phased approach allows us to build in sections, based on available funding.

We have now delivered 96 percent of the 2,286 parcels identified for the 119 miles of construction in the Central Valley, putting this segment on track for completion soon and allowing us to better refine our estimates of future risks and costs.

FINANCIAL RESPONSIBILITY

2022 PROGRESS: Cumulative through June 30, 2022, the Authority had expended \$9.4 billion of capital outlay funding. We continue regular financial reporting to the Federal Railroad Administration (FRA), as well as annual reporting to the California Air Resources Board (CARB) in compliance with requirements for California Climate Investments.

For the most up-to-date information about our spending and funding, read the **2023 Project Update Report**, visit the **Finance and Audit Committee’s webpage**, and keep an eye out for the forthcoming 2024 Business Plan.

Our financial responsibility activities and statutes are shown in **Exhibit 2.1**.

Exhibit 2.1: Financial Responsibility Activities and Statutes

Financial Decision-Making Mandates
Assembly Bill 115 (Com. on Budget, Chapter 38, Statutes of 2011): Budget Act of 2011
Senate Bill 1029 (Com. on Budget, Chapter 152, Statutes of 2012): Budget Act 2012
Senate Bill 852 (Leno, Chapter 25, Statues of 2014): Budget Act of 2014
Financial Responsibility Activities
Managing our Administrative Budget in conformance with State of California requirements
100% compliance with all existing financial obligations and tracking mechanisms
Preparing biannual Business Plans for submittal to the Legislature (even years)
Preparing biannual Project Update Reports for submittal to the Legislature (odd years)
Board of Director and Finance and Audit Committee public meetings and monthly reports
Annual reporting to CARB in compliance with requirements for California Climate Investments

As of December 31, 2022, the Authority has received funding commitments of nearly \$3.5 billion from the federal government, \$9 billion from Proposition 1A bonds (\$8.5 billion for capital outlay and expenditures), and 25 percent of annual Cap-and-Trade proceeds on a continuous basis through 2030, plus one-time appropriations facilitated by CARB programs.

Of this funding, \$17.6 billion in federal and state funding will be allocated to the construction of the Central Valley Segment Funding Plan scope, including \$3 billion from the federal government, \$6.7 billion from Proposition 1A bond proceeds, and \$7.9 billion in current and future Cap-and-Trade proceeds.

In addition, in November 2021, the United States Department of Transportation awarded the Authority a \$24 million RAISE (Rebuilding American Infrastructure with Sustainability and Equity) grant. The Authority is using the funds for construction and safety projects in and around Wasco.

The Authority was awarded a second RAISE grant, for \$25 million, in August 2022 to advance the high-speed rail project into downtown Merced. This funding will provide more than half of the expected \$41 million cost for the Madera-to-Merced design contract.

In June 2023, the Authority was awarded a third RAISE grant of \$20 million for the Fresno High-Speed Rail Station Historic Depot Renovation and Plaza Activation Project. This funding will directly lead to the integration of critical zero-emissions vehicle infrastructure into historically disadvantaged communities, in addition to creating a functioning park and plazas for early site activation efforts.

Through June 2022, approximately 93 percent of overall expenditures went to California-based firms and workers. Through a provision in our grant agreement with the FRA, we were primarily expending federal funds from the American Recovery and Reinvestment Act (ARRA) grant to advance the program.

As of December 2022, more than \$7.9 billion in Cap-and-Trade proceeds have been allocated to the Authority. This funding has allowed us to execute the contracts necessary to continue Central Valley construction. It has also allowed us to complete environmental planning and other early work for the entire Phase I System (San Francisco to Los Angeles), consistent with our federal grant agreements.

LINKS

Full details of program funding and financing are available in the 2022 Business Plan: hsr.ca.gov/about/high-speed-rail-business-plans/2022-business-plan/

Monthly Finance and Audit Committee updates to the Board can be found here: hsr.ca.gov/about/board-of-directors/finance-audit-committee/

Details of funding agreements can be viewed online here: hsr.ca.gov/about/capital-costs-funding/funding-agreements/

SUPPLIERS AND PROCUREMENT

The Authority convenes a working group focused on sustainable procurement. We monitor the environmental impacts of the purchases we make and engage 100 percent of significant new suppliers through procedures, guideline specifications, and contract documents to ensure that high-speed rail procurements meet our sustainability criteria.

Our philosophy of supporting small businesses also applies to our supply chain. Initiatives within the supply chain extend the benefits of the program to local businesses and suppliers, and procurement policies and practices are designed to benefit local, small, and disadvantaged businesses.

In June 2023, the Authority finalized a Sustainable Procurement Policy (POLI-1101) to ensure the alignment of its procurement practices with its environmental, social, and governance priorities. The scope of the policy applies to all procurement activities within the planning, design, construction, operations, maintenance, administration, and management of the system.

JOB CREATION

2022 PROGRESS: Jobs supported by high-speed rail investment have increased significantly as construction has ramped up in the Central Valley over the past several years. Our investment in California’s economy in Fiscal Year 2021 to 2022 yielded more than 9,600 direct, indirect, and induced job-years.²

One of the high-speed rail project’s signature benefits is the ongoing creation of jobs in the designing, planning, and constructing of the system. Our governance process includes a strong focus on creating jobs in disadvantaged communities, which has bolstered local economic development.

Between July 2006 and June 2022, the Authority invested more than \$9.4 billion in planning and building high-speed rail infrastructure, generating significant economic impacts for California’s economy:

- Job-years of employment: 74,000 to 80,000
- Labor income: \$5.6 billion to \$6.0 billion
- Economic output: \$15 billion to \$16 billion

This investment creates jobs and generates economic activity in multiple ways. High-speed rail contractors hire workers throughout the state and pay other businesses for goods and services. Workers spend their earnings throughout the economy. These actions pump money back into local and regional economies.

Exhibits 2.2 and **2.3** show the number of construction jobs dispatched in the Central Valley across the three existing design-build construction packages (CP 1, CP 2-3, and CP 4) and construction hours worked.

Exhibit 2.2: Construction Jobs Created as of July 31, 2023



Exhibit 2.3: Total Construction Hours as of Dec. 31, 2022



In Southern and Northern California, connectivity and bookend projects are providing jobs as well, as shown in **Exhibit 2.4**. These projects, part of the California State Transportation Agency’s (CalSTA) statewide rail modernization program, are designed to strengthen and improve existing rail networks and connect them to the high-speed rail system. In time, permanent jobs will be created in these regions for train operators, maintenance yard workers, station managers, and others to operate and maintain the system. For more information on the economic effects of the program, visit hsr.ca.gov/programs/economic-investment/

Exhibit 2.4: Economic Benefits by Region (July 2006 to June 2021)

Economic Impacts	Northern California (Sacramento and the Bay Area)	Central Valley	Southern California
Job-Years of Employment	21,650	34,530	10,680
Labor income	\$1.76B	\$2.03B	\$800M
Economic output	\$4.13B	\$6.41B	\$2.13B

In the future, more jobs will be created through continued design and buildout of the full system. For example, high-speed rail operations will require five different facility types: Maintenance of Way (MOW) facilities, an operations control center, a heavy maintenance facility for trains, an operations management headquarters location, and light maintenance facilities (LMF).

Exhibits 2.5 and 2.6 show the estimated economic impacts of, and job-years created by, staffing maintenance facilities over a 10-year period, starting at the end of the decade with facilities for initial testing of trains and continuing through operations.

Exhibit 2.5: High-Speed Rail Facilities and Their Economic Impacts Over a 10-Year Period

Facility Type	Labor Income	Output
Maintenance of Way Facilities	\$180 M	\$510 M
Operations Control Center	\$70 M	\$210 M
Heavy Maintenance Facility	\$110 M	\$340 M
Operations Headquarters	\$160 M	\$380 M
Light Maintenance Facilities	\$60 M	\$180 M
Total	\$580 M	\$1,600 M

Exhibit 2.6: High-Speed Rail Facilities and Job Years* Over a 10-Year Period

Facility Type	Job Years
Maintenance of Way Facilities	2,300
Operations Control Center	900
Heavy Maintenance Facility	1,500
Operations Headquarters	1,700
Light Maintenance Facilities	800
Total	7,200

SMALL BUSINESS PROGRAM

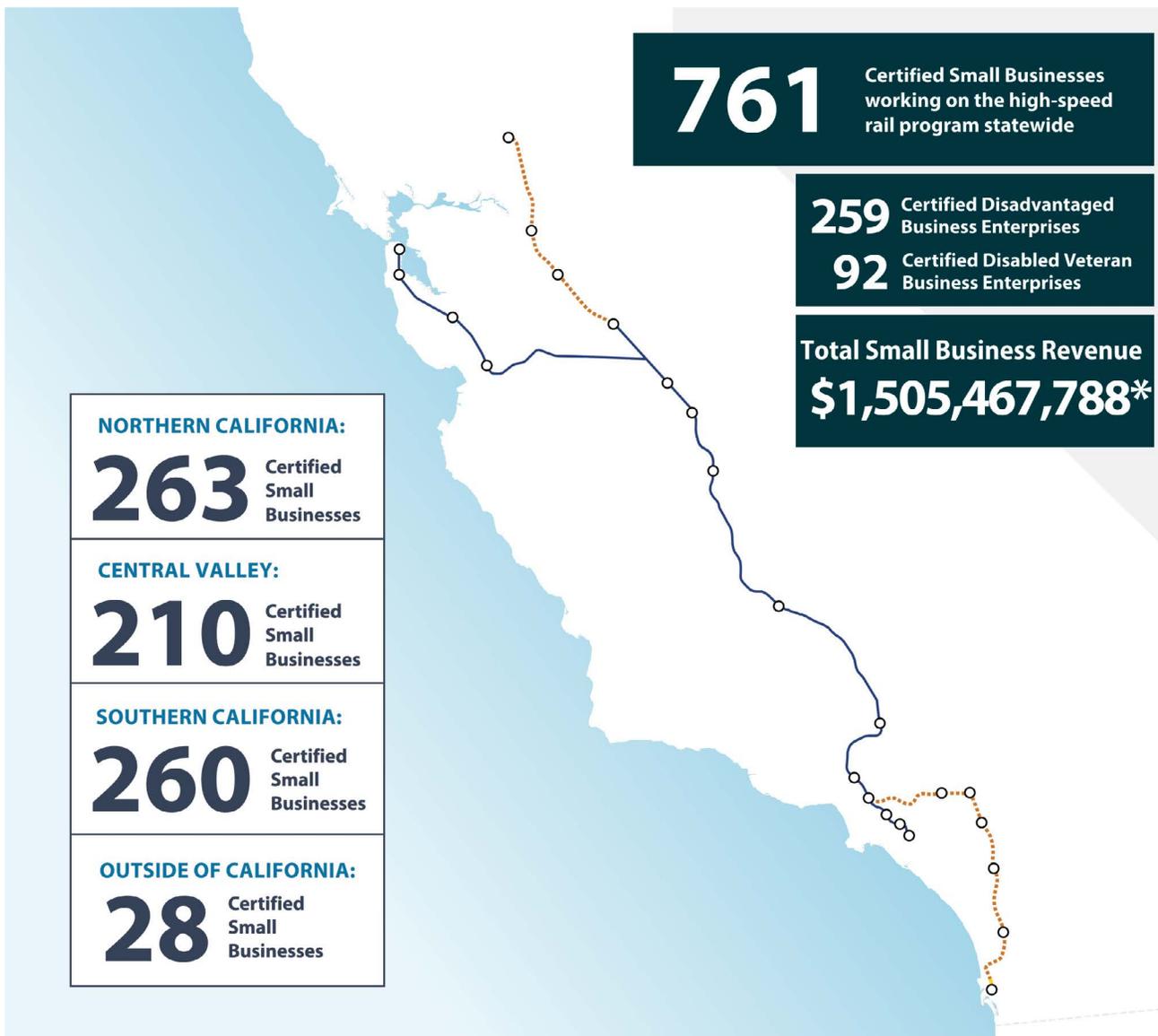
2022 PROGRESS: The small business program continued to grow in 2022, with additional small businesses joining and benefiting from the program. As of December 2022, there were 761 certified small businesses working with the Authority statewide.

We are committed to ensuring that small businesses play an active role in building the high-speed rail program, as shown in **Exhibit 2.7**. Our Small Business Advocate oversees our Small Business Program and guides our efforts to meet

our aggressive 30 percent goal for small business participation, including Disadvantaged Business Enterprises (DBE), Disabled Veteran Business Enterprises (DVBE), and Micro-Businesses (MB). When applicable, this goal includes 10 percent participation for DBEs and 3 percent for DVBEs.

For more information, see the Small Business Program page on our website at hsr.ca.gov/business-opportunities/small-business-program.

Exhibit 2.7: Small Business Participation Map as of December 31, 2022*



OPPORTUNITIES FOR DISADVANTAGED WORKERS

2022 PROGRESS: Through the end of 2022, the construction packages included 5,439 targeted workers—65 percent of the total construction labor jobs and more than double the 30 percent goal.

Our commitment to strengthening the economic climate of California goes beyond creating jobs. We are also working to maximize economic benefits to disadvantaged communities.

In FY 2021-2022, 62 percent of the investment in the system occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas. Additionally, more than half (56 percent) of the total program investment from July 2006 to June 2022 occurred in designated disadvantaged communities.

Our Community Benefits Policy and our Community Benefits Agreement (CBA) ensure that the jobs created by the building and operation of the high-speed rail system benefit communities most in need.

The CBA's Targeted Worker Program ensures that 30 percent of all project work hours are performed by National Targeted Workers (i.e., residents of disadvantaged communities where annual household income ranges from \$32,000 to \$40,000). In addition, the program requires that at least 10 percent of those work hours are performed by disadvantaged workers, as defined in our Community Benefits Plan.

As of December 2022, 8,346 construction labor jobs have been dispatched to the three high-speed rail construction packages in the Central Valley, including 5,439 targeted workers. This 65 percent rate is more than double the 30 percent goal.

For more information on targeted workers and disadvantaged workers, see our Community Benefits Agreement Fact Sheet at [hsr.ca.gov/wp-content/uploads/docs/communication/info_center/factsheets/CBA_Factsheet.pdf](https://www.hsr.ca.gov/wp-content/uploads/docs/communication/info_center/factsheets/CBA_Factsheet.pdf)

In 2022, the **Authority received a \$25 million grant** through the RAISE program to help fund the California High-Speed Rail Merced extension for the first phase of design to extend construction from Madera to Merced. This project furthers the Authority's commitment to sustainability and environmental justice: Construction of the Merced extension will provide additional capacity needed to address population growth, relieve congestion, and improve transit connectivity, creating a mode shift toward lower-carbon travel.

FOSTERING DIVERSITY AND EQUAL OPPORTUNITY

2022 PROGRESS: As of December 2022, 259 certified DBEs and 92 certified DVBEs were working on the project. The Authority has surpassed its milestone of 500 certified small businesses with 761 at work on the program as of December 2022. Additionally, 481 disadvantaged workers have been dispatched to worksites since the project began. The Authority reached out to disadvantaged communities at more than 59 events as of December 31, 2022.

We believe strongly in equal opportunity for all and strength in diversity, as shown in **Exhibit 2.8**. We are committed to ensuring that no person is excluded from participating in any program or activity associated with the design, construction, or operation of the high-speed rail system based on that person’s race, color, national origin, sex, age, or disability, as afforded by Title VI of the Civil Rights Act of 1964 and related statutes. We are committed to ensuring that no person is denied the benefits of participating in the high-speed rail program or is discriminated against under any program or activity of the high-speed rail system.

In addition, it is our policy and practice to provide free language assistance when individuals with Limited English Proficiency (LEP) request assistance.

Of the 761 certified small businesses working on the high-speed rail program statewide as of December 2022:

- 77 are woman-owned firms
- 76 are Hispanic-owned firms
- 42 are African American-owned firms
- 39 are owned by members of the Asian Pacific community
- 19 are owned by members of the Asian Subcontinent community
- 6 are Native American-owned firms

More about our Title VI program can be found on our website at hsr.ca.gov/programs/title-vi/.

Exhibit 2.8: Creating Opportunities for Disadvantaged Workers and Fostering Diversity



¹As of July 31, 2023, ²As of December 31, 2022

ENVIRONMENTAL JUSTICE

Minority and low-income communities have historically borne a disproportionate burden from the effects of pollution. The Authority is committed to upholding the principals of environmental justice (EJ): the fair treatment of people of all races, cultures, and income levels, including minority and low-income populations, with respect to the development, adoption, implementation, and enforcement of environmental laws and policies.

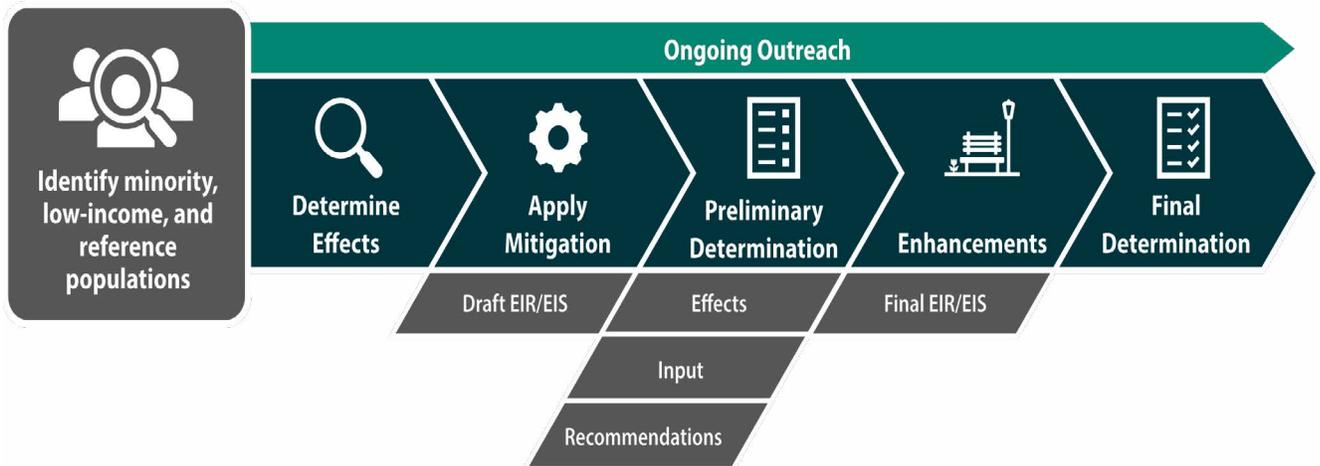
In March 2022, the Authority revised its EJ Policy (POLI-1089) to reaffirm its commitment to identifying and addressing potentially adverse effects of its activities on minority and low-income populations.

Authority staff across program delivery also meet periodically to review progress against EJ commitments and confirm action items.

EJ is considered throughout the project life cycle but is analyzed in depth as part of the environmental clearance process in each project section, as shown in **Exhibit 2.9**.

The final environmental documents delineate the steps the Authority will take to offset disproportionately high and adverse effects on low-income and minority populations.

Exhibit 2.9: Mitigation and Enhancements Process



STRONG LOCAL PARTNERSHIP OPPORTUNITIES

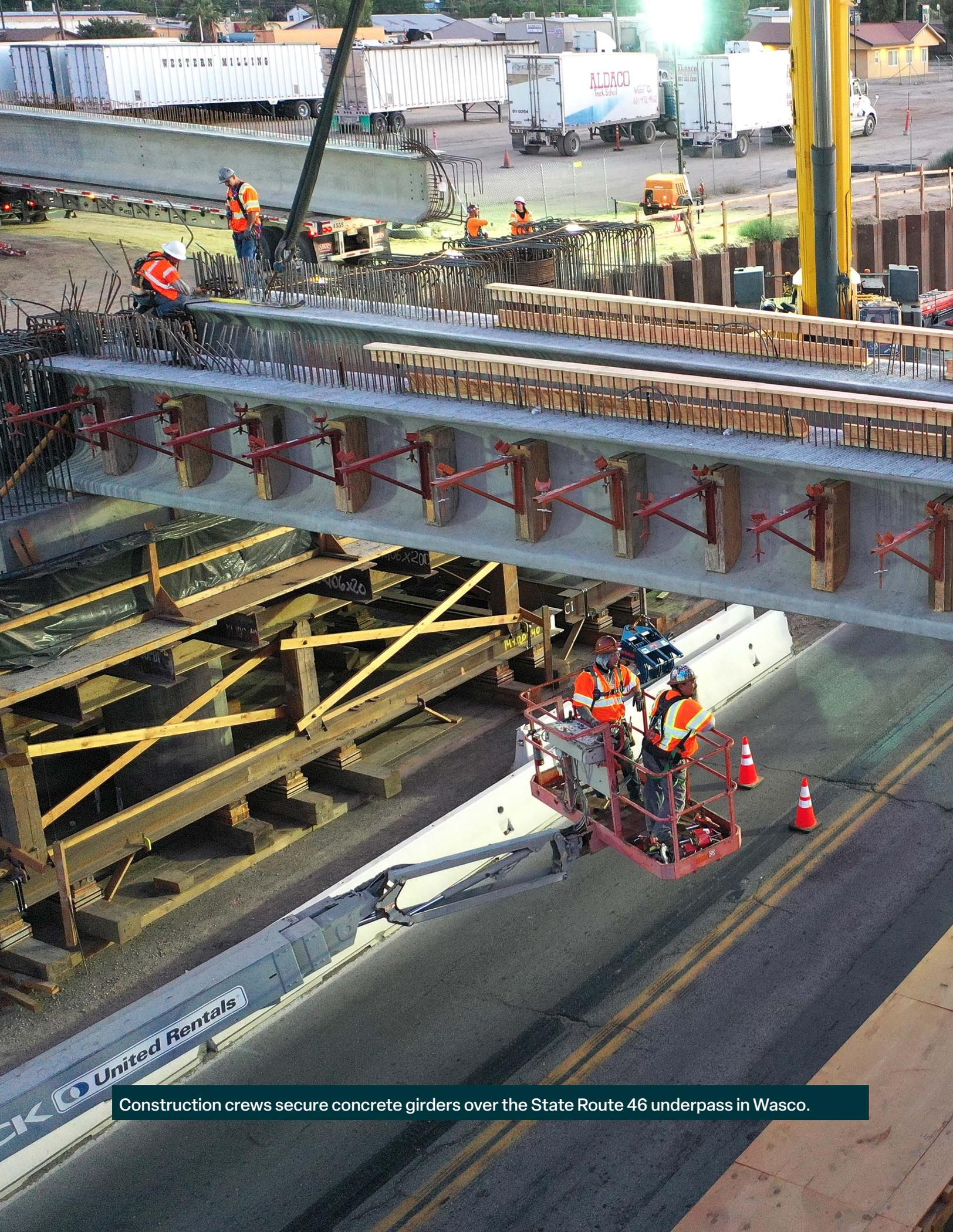
The Authority remains committed to collaboratively working with communities touched by current and future construction of California’s high-speed rail project. In Spring 2021, the Authority finalized agreements with Merced County and the cities of Chowchilla and Fairmead related to the future construction and operation on the Central Valley Wye portion of the project. This work was part of a multiyear effort to identify and implement a series of improvements to the communities of Chowchilla and Fairmead, located in the region of the state that has been historically underserved.

The Authority has committed to a series of mitigation projects, including adding sidewalks and other walking infrastructure, creating a multi-use trail, providing funding assistance for wastewater treatment connections, and constructing a community center and library. The Authority has also committed to assist with relocation for residents as needed to ensure they can stay in the community — including providing them with suitable replacement property options — and mitigation measures during construction including assisting with bus route impacts for the local school district.

These projects are located across three census tracts, with two of the three deemed disadvantaged as defined in the Biden Administration’s **Justice40** screening tool. Fairmead is the most disadvantaged, and the Justice40 tool indicates the area as ranked: 98th for transportation barriers; 97th for asthma rates; 82nd for low income; and 90th for linguistic isolation.

The Central Valley Wye, located near Fairmead and Chowchilla, will serve as the junction for the high-speed rail system connecting the Central Valley, the Bay Area, and Southern California. In September 2020, the Authority’s Board of Directors unanimously approved the environmental documents for this section, which included environmental justice and community cohesion considerations and mitigation measures.

In late September, the Authority applied for a **U.S. Department of Transportation grant** from the Reconnecting Communities and Neighborhoods program, for a grant to help fund these efforts.



Construction crews secure concrete girders over the State Route 46 underpass in Wasco.



San Joaquin River arches

Chapter 3: Energy and Emissions

Transportation generates the largest share of California’s greenhouse gas emissions. Our focus is on reducing those emissions with a system that is itself zero-emission and attracts passengers from other modes. We are also focused on an electricity supply chain with the greenest possible electricity and on reducing emissions in construction. Our trains will be the highest-capacity and fastest zero-emission vehicles in the state. The speed of the transportation system will result in significant reductions in vehicle miles traveled and airplane flights. It is a critical part of the pathway to California’s net-zero near future.

We are committed to running the high-speed rail system’s trains and facilities entirely on 100 percent renewable energy. We are also committed to net zero direct greenhouse gas emissions and net zero criteria air pollution in construction. These are signature commitments that we provide an update on in this chapter.

HIGHLIGHTS

- While fuel consumption of construction equipment increased by 7 percent from 2022 compared to 2021, this is explained by an increase in the number of hours of construction equipment use by 17 percent. This is attributed to our continued progress toward our zero-emission goals for construction vehicles.
- In 2022, we achieved a net-positive greenhouse gas (GHG) balance, offsetting more GHG emissions than have been created so far from the project.
- We continue to show tangible avoided emissions resulting from progressive fleet procurement requirements. Our emissions for reactive organic gases, particulate matter, black carbon, and nitrogen oxide were 65 to 76 percent lower than a typical fleet.

COMMITTING TO RENEWABLE ENERGY

2022 PROGRESS: We continued to iterate and validate electricity cost savings for the Authority through financial modeling based on the 2021 solar and battery sizing calculations. The Authority evaluated how savings would be impacted by the evolving regulatory landscape.

Cost-efficiency and reliability are critical to successful operation. Our current strategy is to operate on 100 percent renewable energy through solar generation and battery storage on land that we own. This reduces operating costs and mitigates risks to the system’s power supply.

All this work will be done in coordination with the track and systems procurement and contract timeline so the renewable energy resources are ready to be commissioned and tested with the traction power delivery system.

As the Authority refines energy specifications and requirements for its future procurement documents for a solar and battery storage solution, close coordination with future contractors.

Part of the renewable energy strategy involves continuing to engage with key stakeholders including the California Public Utilities Commission (CPUC), Pacific Gas & Electric (PG&E), and the California Independent System Operator. This engagement ensures the Authority is well prepared to navigate any regulatory changes that could impact the system, such as Rule 21 revisions.

Concurrently, the Authority initiated a large load interconnection application process with PG&E.

This approach to power supply reflects the importance of system resilience. The system, and its power supply, must operate under any number of future conditions.

DESIGNING NET-POSITIVE ENERGY STATIONS

2022 PROGRESS: In October 2022, the Authority's Board of Directors awarded a station design contract of approximately \$35 million to Foster + Partners and Arup (F+P Arup) for the first of two separately funded phases: the first to advance the design work at the Merced, Fresno, Kings/Tulare, and Bakersfield station sites, including identifying right-of-way and utility relocation requirements necessary for construction; and the second to progress to final design and construction-ready documents, construction support, and commissioning. The duration for the first phase of work is estimated to be 30 months.

Our stations are future hubs of electrified transportation fueled by renewables. They should be comfortable, shaded, energy-efficient, and water-efficient, and they should help restore the surrounding community. High-speed rail stations and service facilities will be designed to be net-positive energy, meaning they will produce more energy on-site than they consume. We will focus on equitable sharing of energy in districts around the station.

ENERGY USE

The Authority continues to make significant progress on the first 119 miles of construction. Compared to 2021, there was a 26 percent increase in construction activity, as measured by the number of construction hours worked. As of the end of 2022, more than 87 percent of construction was complete on Construction Package (CP) 4. CPs 1 and 2-3 were about 63 percent and 64 percent complete, respectively.

Compared to 2021, energy consumption of vehicle fuels increased by more than 7 percent in 2022. Concurrently, the hours of use of construction equipment increased 17 percent and the number of off-road pieces of equipment decreased 6 percent.

Future construction packages have provisions that require contractors to use zero-emission vehicles (ZEV) for travel that occurs on construction sites. These are anticipated to lead to reductions in fuel use during construction over time.

In 2022, electricity consumption was 12,633 gigajoules (GJ), a nearly 29 percent decrease from 2021, due to the decreased electricity consumption from construction, Authority, and Rail Delivery Partner (RDP) offices. During 2022, approximately 32 percent of the total electricity that each contractor reported consuming was sourced from renewable energy, compared to 31 percent in 2021.

In 2022, we estimate that the electricity consumption for powering computers, lights, and heating and cooling systems decreased by approximately 24 percent compared to 2021, which is proportionate to the decrease in Authority and RDP staff during that same period.

The Authority occupies office space in Sacramento in a building that is LEED EB (LEED for Existing Buildings) Gold Certified and uses metered lighting and automatic shut-off of computer monitors to minimize energy use. The building features extensive glass throughout, which creates abundant natural lighting. **Exhibit 3.0** shows the energy that is consumed in high-speed rail construction, in the Authority's offices, and by RDP staff.

Exhibit 3.0: Energy Consumption in 2022

Consumption Type	Units	Quantity
Off-Road Diesel Consumption	Gallons	671,504
On-Road Diesel Consumption	Gallons	458,780
On-Road Gasoline Consumption	Gallons	172,577
Construction Office Natural Gas Use	Therms	1,233
Energy Content of Diesel, Gasoline, and Natural Gas Consumed	GJ	187,457
Construction Electricity Consumption	MWh	1,686
Authority and RDP Office Electricity Consumption	MWh	1,823*
Construction Renewable Electricity	%	32
Energy Content of Electricity Consumed	GJ	12,633

*Authority Office electricity consumption is estimated based on the number of Authority and Rail Delivery Partner (RDP) staff working on the project in 2022. An estimate is used because RDP staff are dispersed across many firms nationally and internationally; therefore, an actual measurement of the office electricity consumed by RDPs is not possible to obtain.

REGULATORY COMPLIANCE (ENERGY)

The California high-speed rail program complied with all applicable energy-related policies, laws, standards, and regulatory guidelines in 2022.

All California high-speed rail systems and facilities are or will be subject to the following energy-related policies, laws, standards, and regulatory guidelines:

- California High-Speed Rail Authority Policy Directive Poli-Plan-03 on Sustainability
- California Building Energy Efficiency Standards
- California Green Building Standards Code (CalGreen Code) Title 24, Part 11
- 2008 California Long-Term Energy Efficiency Strategic Plan (with January 2011 Update)
- Memorandum of Understanding between the Authority and the California Energy Commission
- SB 350 (De León) Clean Energy and Pollution Reduction Act

REDUCING GHG EMISSIONS

2022 PROGRESS: We continued to enforce embodied carbon emissions requirements for future construction contracts, including aligning with the Buy Clean California Act limits for steel, mineral wool, and flat glass in the construction of the high-speed rail system. Additionally, we began updating project's embodied carbon assessment with additional environmentally cleared project segments. This process supports our understanding of the relative GHG emissions impact of major project materials and focuses our efforts to lower the embodied carbon emissions of the high-speed rail system.

California continues to lead the way nationally in establishing targets for reducing GHG emissions and transitioning to a sustainable, low-carbon future by focusing on achieving carbon neutrality across all sectors by 2045. The high-speed rail system is crucial to shift travel away from automobiles and short-haul air travel and to play a key role in California's ambitious plan to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030 (Executive Order B-30-15 and California Global Warming Solutions Act of 2006 (SB 32)).

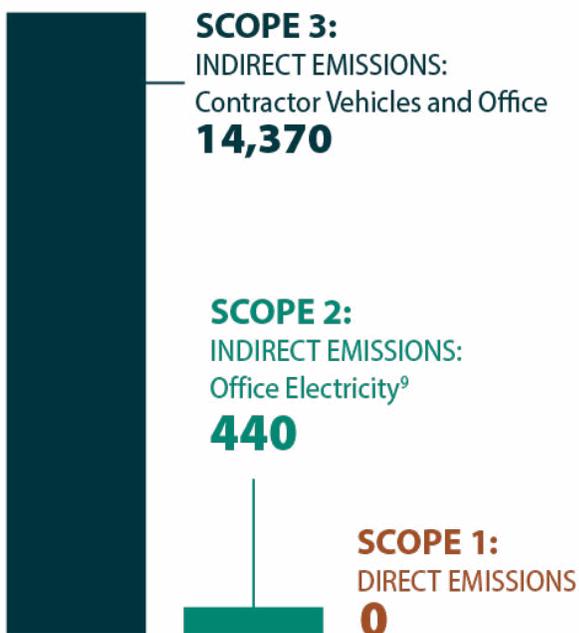
REPORTING ACTUAL AND AVOIDED ANNUAL EMISSIONS

Building and operating the high-speed rail system generates GHG emissions from several sources, including the production of materials used to construct and operate the system, burning of fuel in construction vehicles and equipment, consumption of electricity in offices, treatment of waste, and recycling of materials.

Using an operational control approach, the Authority tracks GHG emissions across emissions scopes, as shown in **Exhibit 3.1**, per the Greenhouse Gas Protocol and with reference to ISO 14064-2:

- Scope 1 emissions are direct emissions from sources owned by the Authority.
- Scope 2 are indirect emissions associated with electricity purchased for Authority activities.
- Scope 3 are indirect emissions associated with contractor vehicles and construction office natural gas use.

Exhibit 3.1: 2021 Annual GHG Emissions (in MTCO₂e)



We continuously look for opportunities to reduce emissions, including conserving fuel and energy; recycling and reusing steel, concrete and other materials during construction; specifying use of materials with lower global warming potentials; and using renewable energy.

We also monitor, record, and report avoided emissions from construction recycling. In 2022, avoided emissions from recycling totaled 6,711 metric tons of carbon dioxide equivalent (MTCO₂e).

The Authority recognizes the importance of telling the whole story of the energy it will take to deliver and operate the system. Given the critical attention to the issue of GHG emissions and protecting air quality, we disclose the energy it takes to construct and operate the system both in energy terms and in units of carbon dioxide equivalents. Emissions are broken down into Scopes 1, 2, and 3. The calculation of GHG emissions always relies on the best available information at the time of reporting and is regularly refined to reflect new information.

Exhibit 3.2 shows information to date on emissions by scope across the project over the initial six decades. It is a periodically updated combination of modeled and actual emissions and is based on the best available information.

The Authority is currently meeting its commitment to zero-net construction emissions. By planting more than 7,100 urban trees, and with the completion of more than 1,804 acres of forest replanting, more than 143,000 MTCO₂e will be sequestered over the trees' life cycles. This offsets the 74,622 MTCO₂e generated during construction since 2016. In addition, more than 272,000 MTCO₂e have been sequestered or avoided through habitat and agricultural land conservation. Finally, more than 123,000 MTCO₂e have been avoided through recycling since 2015.

Exhibit 3.2: GHG Emissions by Scope: 2015 to 2079

	Indirect - Upstream		Direct - System	Indirect - Downstream and Avoided Emissions	
Construction	<p>SCOPE 3</p> <p>Supply Chain Sustainable procurement requirements and baseline setting</p>	<p>SCOPE 3</p> <p>CONTRACTOR FLEET</p> <p>Mobile equipment emissions during rail construction: 75,482 MTCO₂e</p>	<p>SCOPE 1</p> <p>AUTHORITY RAIL DEVELOPMENT</p> <p>Net-zero direct emissions from rail construction</p>	<p>SCOPE 3</p> <p>DISPOSAL/ RECYCLING</p> <p>123,159 MTCO₂e avoided emissions through recycling and reuse to date</p>	<p>OFFSET/AVOIDED EMISSIONS</p> <p>TREE PLANTING</p> <p>143,000 MTCO₂e program balancing fuel-based emissions from construction: 1.43 MMTCO₂e target</p>
Operations	<p>SCOPE 3</p> <p>SUPPLY CHAIN</p> <p>Sustainable procurement of rolling stock and operations supply</p>	<p>SCOPE 2</p> <p>RENEWABLE POWER</p> <p>100% renewable power for train operations</p>	<p>SCOPE 1</p> <p>AUTHORITY RAIL OPERATIONS</p> <p>Zero emissions generated from electric powered operations</p>	<p>OFFSET/AVOIDED EMISSIONS</p> <p>VMT + AIR TRIPS SAVED</p> <p>84 to 102 MMTCO₂e avoided from vehicle and short-haul air trips</p>	<p>OFFSET/AVOIDED EMISSIONS</p> <p>ADDITIONAL SAVINGS</p> <p>Savings from compact land use</p>

REDUCING GHG EMISSIONS DURING CONSTRUCTION

2022 PROGRESS: The Authority continued to use binding contract provisions to minimize GHG emissions during construction. In 2022, our construction vehicles emitted 68 percent less black carbon than a typical fleet. Furthermore, our construction vehicles emitted 10 percent less black carbon this year than last year.

The Authority requires contractors to monitor and report their material use, energy consumption, electricity purchased from the grid and renewable sources, water consumption, waste generation volumes by type, waste management streams by volume and type for each type of waste, types of on- and off-road equipment, and hours or miles of operation. The Authority uses this data to measure performance and for setting data-driven policy and strategies. These provisions are governed by our Sustainability Policy, most recently updated in April 2020, which can be viewed on our website at hsr.ca.gov/wp-content/uploads/2021/04/Sustainability_signed_policy.pdf.

Our policy lays out specific measures to decrease our indirect emissions associated with construction. These measures include:

- Minimizing GHG emissions through design requirements
- Requiring 100 percent ZEVs for on-road contractor fleets in all future infrastructure construction contracts, as well as 10 percent ZEV for off-road equipment by 2030 with the goal of 100 percent ZEV for such equipment by 2035, where feasible
- Achieving net-zero tailpipe GHG emissions in construction through carbon sequestration projects
- Requiring EPDs for construction materials, including steel products and concrete mix designs, to improve disclosure of materials information and allow for the selection of more sustainable products

- Requiring performance thresholds for global warming potential for major materials while maintaining durability and quality requirements
- Adapting existing structures and facilities for reuse whenever feasible
- Integrating climate adaptation and resilience principles into the design, construction, and operation of the system

ZERO-EMISSION VEHICLES

The Authority requires contractors to use only ZEVs for on-road project fleets for all future construction contracts.

The Authority also encourages innovation in ZEV off-road construction equipment, which has a more difficult set of parameters to get to zero emissions, by mandating, where feasible:

- 10 percent of off-road equipment be ZEV, at the start of a contract, by 2030
- 100 percent of off-road equipment be ZEV by 2035

These policies further refine the Authority's existing requirements that all off-road construction equipment meet the highest emission standard set by the U.S. Environmental Protection Agency: Tier 4.

The ZEV standards support our commitment to reducing air pollutant emissions. Through our ongoing research and procurement requirements, we have collaborated with California Governor's Office of Business and Economic Development (GO-Biz) to share lessons learned and continue to advance the adoption of ZEVs in the state.

EMISSIONS REDUCTION CALCULATION

High-speed rail will contribute to reducing GHG emissions in the state as soon as it starts operating. In the absence of high-speed passenger rail service, vehicle miles traveled for long-distance trips in California are projected to increase by approximately 11.7 billion miles per year—to a total of 70 billion miles annually—between 2021 and 2040. Every mile traveled on high-speed rail is a mile of avoided travel by car or airplane. On average, annual GHG emissions reductions are projected to be 2 million MTCO_{2e}. This reduction is equivalent to the annual carbon emissions associated with the energy use of over 250,000 homes.¹

The cumulative reductions in direct emissions (tailpipe) over the first 50 years of operation are projected to be between 84 and 102 MMTCO_{2e} avoided.

The GHG emissions reduction scenarios reflect the ridership range expressed in the 2020 and 2022 Business Plans. Ridership is expressed as both a medium case and as a 75th percentile, which provides the medium and high emission-reductions scenarios. This projection informs the baseline case in California’s AB 32 Climate Change Scoping Plan, which can be viewed at ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan.

Our methodology to calculate projected GHG emissions has remained consistent, relying on a quantification method developed with the California Air Resources Board (CARB). We use the forecast of mode shift to high-speed rail service in combination with emissions factors that reflect the full lifecycle impacts for gasoline, diesel, and jet fuel, limited to the tailpipe emissions. Using this analytic technique enables all fuel types to be evaluated on equal terms. We will be updating the quantification in consultation with CARB in 2024.

In **Exhibits 3.3** and **Exhibits 3.4**, the “well-to-wheels” emissions factors were obtained from the Argonne GREET (Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation) model and applied to the fossil fuel auto and air fleet. A life cycle emissions factor was also applied to the electricity required for system operation. As shown in **Exhibit 3.3**, the results illustrate the full set of lifecycle emissions that can be avoided through mode shift to high-speed rail over the first 50 years—between 83.85 and 102.14 MMTCO_{2e}.

Exhibit 3.3: Projected Cumulative GHG Well-to-Wheels Emissions Avoided

Year	Medium (MMTCO _{2e})	High (MMTCO _{2e})
2030	.16	.16
2040	11	13
2050	27	33
2079	84	102

Exhibit 3.4 illustrates the full set of lifecycle emissions that can be avoided annually at system maturity through mode shift to high-speed rail for the Phase 1 system—between 2.20 and 2.68 MMTCO_{2e}. Projected avoided emissions reflect ramped-up models for riders shifting from automobile and air travel to 100 percent renewable-energy-powered high-speed rail.

Exhibit 3.4: Projected Annual GHG Well-to-Wheels Emissions Avoided for Phase 1

Year	Medium (MMTCO _{2e})	High (MMTCO _{2e})
2030	.08	.08
2040	1.54	1.88
2050	1.69	2.06
2079	2.20	2.68

REGULATORY COMPLIANCE (EMISSIONS)

Our role in reducing GHG emissions is detailed in and governed by the policies and statutes listed in **Exhibit 3.5**.

Exhibit 3.5: Statutes and Policies Governing the Authority’s role in GHG Emissions Reduction

Statutes
Assembly Bill 32 (Núñez, 2006), the California Global Warming Solutions Act of 2006
Senate Bill 32 (Pavley, 2016), requires the CARB, in adopting rules and regulations, to ensure that statewide GHG emissions are reduced to 40% below the 1990 levels by 2030.
Senate Bill 862 (Committee on Budget and Fiscal Review, 2013 to 2014), Greenhouse gases: emissions reduction
Assembly Bill 1550 (Gomez, 2016), prescribes GHG reduction fund investment in disadvantaged communities.
Assembly Bill 617 (Garcia, 2017), requires the CARB to establish a Community Air Protection Program to focus on reducing exposure in communities most affected by air pollution.
Assembly Bill 1279 (Muratsuchi, 2022) requires California to reach carbon neutrality and cut emissions to at least 85 percent below 1990 levels no later than 2045.
Senate Bill 1020 (Laird, 2022) establishes interim clean electricity targets, including a goal to reach 90 percent by 2035.
Senate Bill 1202 (Becker, 2022) requires state agencies to aim to achieve net-zero emissions of greenhouse gases resulting from their operations no later than January 1, 2035.
Policies
CARB 2008 Scoping Plan, 2013 Scoping Plan Update and 2017 Scoping Plan Update, which identifies the high-speed rail system as a measure for GHG reduction.
Greenhouse Gas Emissions Reduction Fund (Cap-and-Trade Auction Proceeds) Fourth Investment Plan: Fiscal Years 2022- 23 through 2024-25, in which the system plays a key role.

PROTECTING AIR QUALITY DURING CONSTRUCTION

2022 PROGRESS: We currently use construction equipment meeting the Tier 4 standard, the highest emission standard for equipment set by the U.S. Environmental Protection Agency, to avoid significant quantities of criteria air pollutant emissions. Our ZEV standards further this commitment by requiring contractors to incorporate ZEVs into their vehicle fleets and off-road equipment.

California suffers from some the worst air pollution in the country. According to the American Lung Association’s State of the Air 2022 Report, four California counties hold the top spots in the nation for worst year-round particle pollution: Mono County is first, Kern County is second, and Kings and Tulare counties are tied at third.

Of the top 10 worst cities for year-round particle pollution in the nation, eight are in California. This underscores the importance of striving to deliver truly clean transportation. In addition to reducing greenhouse gas emissions, we are also concerned with minimizing criteria air pollutant emissions, including NOx, ROG, PM, and black carbon, from the fleets used by our contractors, as shown in **Exhibit 3.6**.

All contractors are required to use fleets that comply with California vehicle standards. Contractors are also subject to contract terms that require equipment to meet the U.S. Environmental Protection Agency standards for the cleanest off-road diesel engines, known as Tier 4 equipment, as available. This requirement is unique among infrastructure projects and continues to push the adoption and use of cleaner off-road diesel engine technology in California in advance of regulatory requirements.

Between 2015 and 2022, on- and off-road vehicles emitted 141 tons of criteria pollutants, including NOx, ROG, PM, and black carbon. From 2015 to 2022, the use of Tier 4 equipment avoided nearly 227 tons of those criteria pollutants. The value for reduced/avoided tons reflects the difference between emissions produced by using Tier 4 equipment and what would have been produced by a typical fleet.

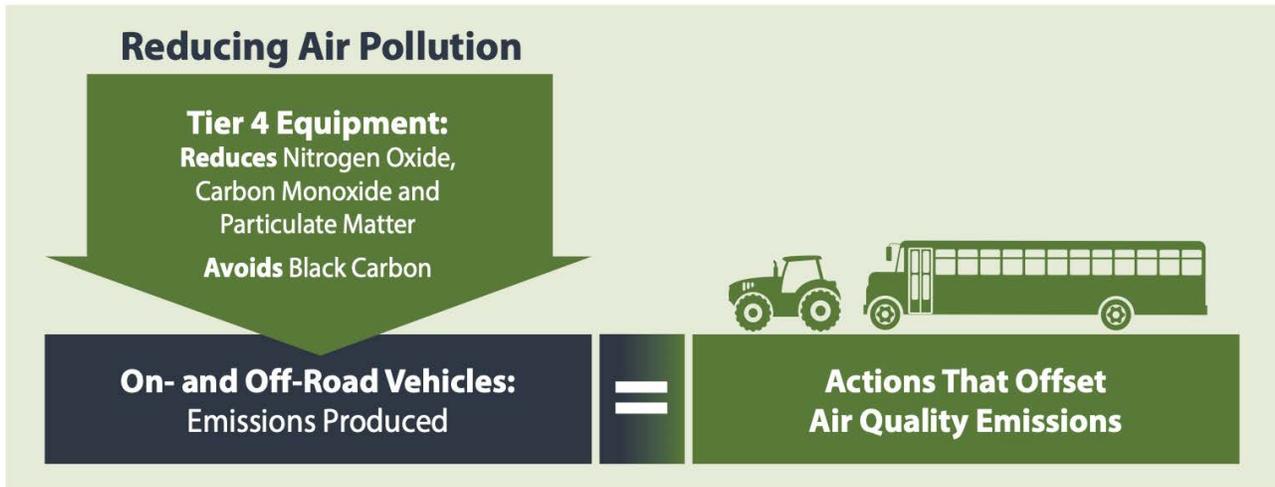
Exhibit 3.6: 2022 Criteria Air Pollutants Emitted and Avoided (Typical California Fleet Comparison)

Criteria Air Pollutant	High-Speed Rail Fleet	Typical California Fleet	Percent Difference
Nitrogen Oxide (NOx)	34,671 lbs.	100,352 lbs.	-65.45%
Reactive Organic Gas (ROG)	2,276 lbs.	9,382 lbs.	-75.74%
Particulate Matter (PM)	1,724 lbs.	5,201 lbs.	-66.85%
Black Carbon	1,283 lbs.	4,087 lbs.	-68.61%

Between 2015 and 2022, we also carried out projects that will deliver 1,358 tons of offsets. To develop these projects, we liaise with local constituencies and their representatives to promote and achieve clean air in their jurisdictions.

Through our Voluntary Emissions Reduction Agreements (VERA) program, we pledge to offset each ton of air pollutants emitted during construction within the local air quality district by supporting the purchase of cleaner equipment, as shown in **Exhibit 3.7**

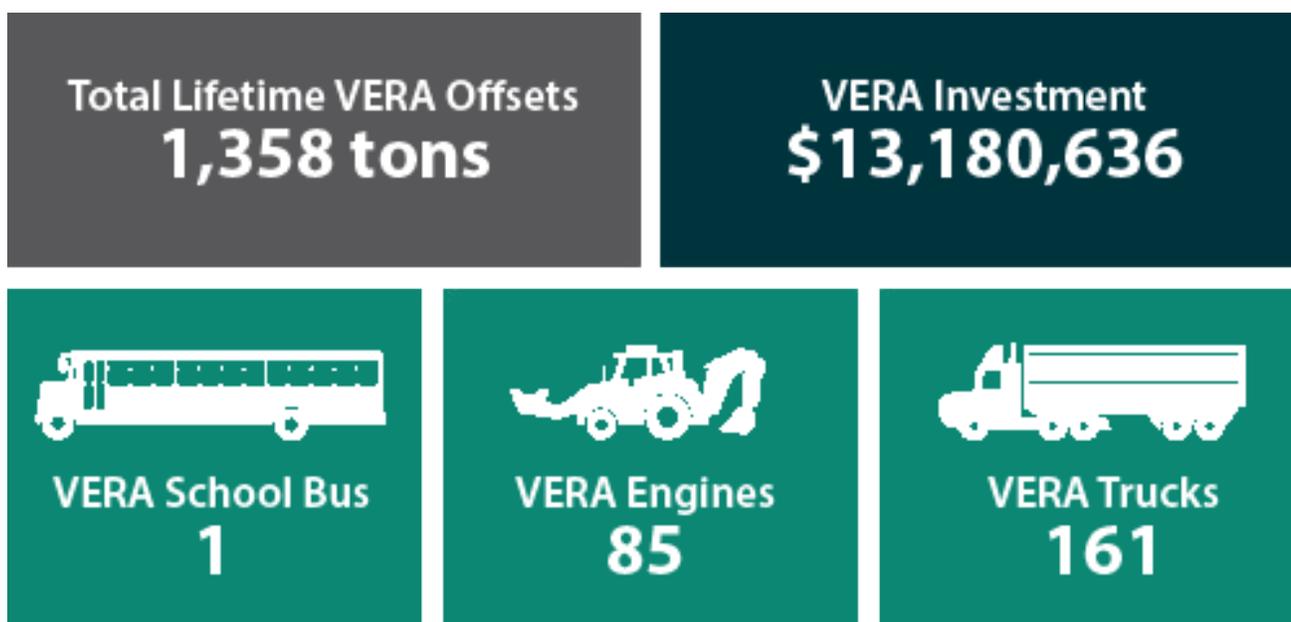
Exhibit 3.7: Minimizing Construction Air Pollutant Emissions



The VERA program provides funding to replace conventional polluting equipment with more efficient equipment. For our VERA offsets, we invested \$13 million in the purchase of cleaner

tractors, trucks, and a school bus for use in areas with poor air quality. These vehicles will reduce air pollutant emissions by 1,358 tons over their lifetime, as shown in **Exhibit 3.8**.

Exhibit 3.8: Voluntary Emissions Reduction Agreements / Minimizing Air Pollutant Emissions





Trees planted by West Fresno Middle School students



The Tule River provides wildlife habitat in the Central Valley and will host the Tule River Viaduct near the Tulare/Kings County line.

Chapter 4: Natural Resources

Ensuring that future generations have the natural resources necessary to lead meaningful and productive lives means preserving and enhancing California's water systems, ecosystems, and agricultural land. Restoring, caring for, and maintaining natural resources is critical to climate resilience. For more information about how natural resources contribute to climate adaptation goals of the Authority and the state, see Chapter 5.

HIGHLIGHTS

- In early 2022, the Authority's Board of Directors certified the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) and unanimously approved the approximately 90-mile San José to Merced segment in Northern California. This approval completes the environmental clearance for 422 miles of the high-speed rail project's 500-mile Phase 1 system from San Francisco to Los Angeles/Anaheim, which includes the stretch from Merced to Palmdale, as well as the section from Burbank to Los Angeles.
- To date, we have preserved and restored more than 4,400 acres of habitat and conserved more than 3,190 acres of agricultural land through the acquisition of agricultural conservation easements.

MANAGING WATER USE

2022 PROGRESS: Compared to 2021, construction water use decreased by 12 percent, despite a 38 percent increase in construction activity levels.

The Authority currently uses water in two ways: in its offices and on construction sites. As with energy, we account for water use by our staff in addition to, and separately from, water used in project construction.

Tracking water use and applying water conservation guidance remains important because California faces inconsistent rainfall and snowfall and ever-increasing demands on water resources.

Federal, state, and local requirements govern water consumption by the high-speed rail program, as shown in **Exhibit 4.0**. As construction extends into other parts of the state beyond the Central Valley, local regulations in Southern and Northern California will also govern water consumption, though the Authority's water conservation policy and water conservation guidance will still apply.

Compliance monitoring showed that construction water use decreased by just over 12 percent compared to 2021, as shown in **Exhibit 4.1**, despite an increase of more than 38 percent in construction activity levels. Non-potable water use decreased by more than 9 percent compared to 2021 levels, while potable water use decreased by more than 33 percent. Altogether, non-potable water accounted for 91 percent of the total water consumed for construction in 2021.

Exhibit 4.0: Requirements Governing Water Consumption by the High-Speed Rail Program

Federal
Clean Water Act of the United States
Section 10: Rivers and Harbors Appropriation Act
Floodplain Management and Protection and Flood Disaster Protection Act
State
California Green Building Standards Code (CalGreen Code)
Porter-Cologne Water Quality Control Act
California Stormwater Permits
California Department of Fish and Wildlife Lake and Streambed Alteration Agreement
Regional and Local
Fresno County General Plan and Ordinances
Kern County General Plan and Ordinances
Metropolitan Bakersfield General Plan/Update and Environmental Impact Report

Exhibit 4.1: Water Consumption (in Gallons)

Water Consumption	Quantity (gallons)
Construction Water Use: Non-Potable	192,434,990
Construction Water Use: Potable	19,440,150
Construction Water Withdrawn from High Water-Stress Areas	211,875,140
Office Water Use	1,866,240

In 2022, 100 percent of the water withdrawals came from high water stress areas. Water stress is defined by the UN’s CEO Water Mandate, Corporate Water Disclosure Guidelines as the “ability, or lack thereof, to meet the human and ecological demand for fresh water.”

Avoiding high water-stress areas is currently impossible as the construction sites are all located in such areas.

To identify and assess water-related impacts, the Authority prepares comprehensive Environmental Impact Reports (EIR) and Environmental Impact Statements (EIS) for each project segment to comply with the National Environmental Policy Act (NEPA) and California’s Environmental Quality Act (CEQA).

Each environmental analysis includes an assessment of water consumption and detailed projections of water required for construction. The Authority tracks water consumption by contractors every month and compares that consumption every quarter against the estimates developed as part of the environmental planning process. This helps us to understand overall trends in water consumption.

More information and context on the Authority’s interaction with and management of water resources is available in the Environmental Planning documents available at the following URL: hsr.ca.gov/programs/environmental-planning/.

To manage water discharge-related impacts, the Authority complies with the National Pollutant Discharge Elimination System (NPDES) water quality order no. 2013-0001-dwq and the National Pollutant Discharge Elimination System (NPDES) general permit no. Cas000004 and follows the State Water Resources Control Board (SWRCB) construction general permit (order 2009-00009-dwq).

More information on stormwater management is available on our website: hsr.ca.gov/programs/environmental-planning/stormwater-management/.

Several water conservation and efficiency measures support achievement of our net-zero potable water consumption goal. We have established criteria for water use reduction, recycling, capture, and storage, and we prioritize the issue of water consumption when siting future facility locations. In addition, our facilities will be designed and built using both the mandatory and voluntary sections of the CalGreen Code for planning, procurement, design, construction, operations, and maintenance.

In operation, the system will not require significant volumes of water or threaten water security for the region. The design requirements for Authority facilities, including maintenance facilities, require water-efficient fixtures as well as water reuse and use of gray water where available. Currently, at our offices, water use is minimized due to low-flow, automatic shut-off sink fixtures and low-flow toilets.

Furthermore, the EIR/EIS completed for each project segment includes an assessment of water consumption and detailed projections of water required during operations.

MANAGING LAND USE

2022 PROGRESS: As of the end of 2022, we have preserved and restored more than 4,400 acres of habitat and conserved more than 3,190 acres of agricultural land through the acquisition of agricultural conservation easements.

It is vital that we manage our land prudently. We consistently revisit the non-operational parcels in our portfolio, using standard criteria, to identify those that can provide long-term value to us. We have also advanced and updated several key land use management policies, including a portfolio-wide Land Management Policy and the Station Site and Adjacent Development Policy.

Our Land Management Policy sets forth our objectives for existing and future development and land uses on Authority lands.

Those objectives are tied to the requirements that the high-speed rail system be a successful commercial enterprise that encourages land-use and transportation planning compatible with the state's greenhouse gas emission reduction, housing, and economic development goals.

The Land Management Policy is intended to complement other policies, including our Station Site Development Policy, which states our objectives for existing and future development, land use, and multimodal access and connectivity at and around high-speed rail stations.

The Station Site Development Policy encourages land use and transportation planning compatible with the state's greenhouse gas (GHG) emission reduction, housing, and economic development goals. We will take actions to enable visionary, compact, walkable, and mixed-use land development, with the goal of increasing density and bringing a variety of developments and destinations closer together, encouraging ridership and passenger revenue while also maximizing revenue from ancillary uses and development.

In 2022, we completed review and development of a High-Speed Rail Oriented Development and Land Development Procedure (HSR Development Procedure), which details how parcels that we own, including land within station area boundaries, are developed in a manner that prioritizes revenue generating opportunities for the Authority, furthers the equity and sustainability goals of the Authority and the State of California, and implements the goals set forth in the Station Site Development Policy and the Land Use Management Policy.

PRESERVING HABITAT

With the scale of the project comes the opportunity to implement regionally significant conservation efforts by preserving high-quality habitat.

These sites vary in their protection needs but generally consist of a conservation easement placed on the properties of willing landowners who maintain property rights, or on property purchased outright with a conservation easement attached to the deed. Typically, there are long-term management activities such as fence maintenance, vegetation control, and annual survey, that are funded through an endowment.

These areas are significant for several reasons:

- Some of the sites are adjacent to other conserved areas;
- The acreage lies in wildlife movement corridors;
- The land contains distinctive, high-quality habitats for a diverse assemblage of plants and animals, including a variety of threatened and endangered species;
- The acreage gives the Authority the opportunity to restore additional habitats.

Biological resources on these protected sites cover include vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, blunt-nosed leopard lizard, Swainson’s hawk, San Joaquin antelope squirrel, Tipton kangaroo rat, San Joaquin kit fox, Buena Vista Lake ornate shrew, Hairy Orcutt grass, and waters including wetlands and riparian habitat.

The Authority actively monitors restoration works with regulatory agencies to verify success criteria of the restoration work is being met. When we assign a property for mitigation, we commit to ensuring that the property ultimately offers a habitat of equal or improved quality for special-status species than the original property that was designated for development.

To date, the Authority has preserved and restored habitat that includes 4,400 acres.

3, 472 acres¹

3,190 acres²



CONSERVING AGRICULTURAL LAND

The Authority collaborates with the Department of Conservation (DOC) to conserve agricultural land through the Agricultural Land Mitigation Program (ALMP).

The ALMP is designed to help mitigate impacts to farmland in California caused by infrastructure-related projects. The DOC contracts with the Authority to provide mitigation services for the loss of important farmland associated with developing the high-speed rail alignment. This service involves working with local non-profit land trusts and other entities to identify and permanently protect important farmland through conservation easements funded by the Authority, occasionally supplemented with other funding sources.

Through the ALMP, the DOC funds the purchase of agricultural conservation easements from willing participants and secures the easements on the Authority's behalf. The aim of the ALMP is to conserve farmland in an amount commensurate with the quantity and quality of converted farmlands at a replacement ratio of no less than 1:1. In other words, for every acre of farmland that is converted from farmland to transportation use, the ALMP will conserve at least one acre of farmland of equal quality within the same agricultural region as the converted land.

To date, the Authority has protected through conservation easements a total of 3,190 acres of farmland.

The DOC routinely reports on the GHG benefits of agricultural conservation projects. Specifically, the DOC quantifies the avoided future GHG emissions. The DOC estimates avoided GHG emissions based on vehicle miles traveled (VMT) avoided by protecting agricultural land under pressure of being converted to non-agricultural uses and limiting opportunities for expansive, vehicle-dependent forms of development.

Of the 1,704 acres protected by the ALMP on behalf of the Authority in 2022, the DOC estimates that 1,654 acres would have been subject to development risk. The DOC estimates that 236 development rights were extinguished as a result of this conservation effort, resulting in an estimated 197,031,883 VMT being avoided and 76,711 MTCO₂e in GHG emissions being avoided.

1 CEO Water Mandate, Corporate Water Disclosure Guidelines from 2014 <https://ceowatermandate.org/files/Disclosure2014.pdf>

3, 472 acres¹

3,190 acres²





The San Joaquin River Viaduct structure crosses the San Joaquin River and represents the northern gateway into the city of Fresno.

Chapter 5: Sustainable Infrastructure

Infrastructure underpins our economy, our communities, and our way of life. The high-speed rail system will transform transportation within the state and make far-flung regions more accessible to one another. It will also set a standard that makes the environment, communities, and the economy the core drivers for how infrastructure projects are delivered.

In practical terms, this means sustainability is integrated into project development and operations as a strategy to manage risks, including climate risk, and to identify opportunities to benefit California's communities and economy.

Our sustainable infrastructure principles reflect a balance of social, environmental, and economic issues throughout the design, construction, and operations phases of the program. These principles can be found within our Sustainability Policy, which can be accessed here: [hsr.ca.gov/docs/programs/green_practices/sustainability/Sustainability_signed_policy.pdf](https://www.hsr.ca.gov/docs/programs/green_practices/sustainability/Sustainability_signed_policy.pdf).

HIGHLIGHTS

- Requirements for internationally regarded infrastructure sustainability benchmarks, such as Envision, have been integrated into station design contracts.
- Climate stressors have been considered and integrated into design requirements.
- Progress continues toward targets and within objective requirements for sustainable construction.
- The Authority diverted about 95 percent of total waste from landfills in 2022, including 3,476 tons that were recycled, 80 tons composted, and 25,010 tons stockpiled.
- We have incorporated aggressive carbon targets into our procurement procedure, honoring the implementation steps identified through the Sustainable Purchasing Leadership Council (SPLC) Benchmark.

PRINCIPLES FOR SUSTAINABLE INFRASTRUCTURE

Looking across the entire lifecycle of a strategy, or taking a lifecycle approach, is foundational to the Authority's approach to sustainability. We consider direct, annual impacts as we develop strategies to improve sustainability performance. This includes impacts that are upstream or downstream from the system and those that have occurred in the past or may occur in the future.

BUY CLEAN CALIFORNIA

The Buy Clean California Act (BCCA) specifies the use of environmental product declarations (EPD) to determine compliance with the global warming potential limits set by the Department of General Services for construction materials used in public works projects. An EPD is a document that transparently communicates the environmental impact of any product or material over its lifetime.

The Authority is aligning with this act through our Design Criteria Manual (DCM) and requirements in future contracts. The DCM presents design standards and guidelines specifically for the design, construction, and operation of high-speed railways based on international best practices. Our first completed southern-most project section, CP-4, used EPDs on construction materials.

In 2023, we finalized a Sustainability Procurement Policy (POLI-1101) to ensure the alignment of our procurement practices with our environmental, social, and governance (ESG) priorities. The scope of this policy is not limited to the materials procured for construction; it is applicable to all procurement activities within the planning, design, construction, operations, maintenance, administration, and management of the high-speed rail system.

We will continue to analyze our material supply chains to clarify their influence on the project's lifecycle footprint. The leading infrastructure lifecycle assessment standard, outlined in a specific Envision V3 credit (CR1.1 Net Embodied Carbon), will be followed for the entire program, and will be supported by detailed best practices outlined by the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) benchmarking system for the lifecycle assessment of facilities.

By measuring and managing the impacts embodied in the materials we use to build the system, we can then demonstrate the benefits of lower lifecycle impacts achieved through construction decisions.

The intention of this work is to express the impacts and benefits as metrics normalized at a range of scales: per mile, per alignment methodology, per construction segment, and per operational segment.

REPORTING AND TRANSPARENCY

To achieve the Authority's transparency goal while reporting on billions of dollars of construction activity across multiple contracts, we developed a robust database called the Environmental Mitigation and Management Application (EMMA), which streamlines sustainability reporting and facilitates data quality assurance. Reported EMMA data is evaluated against supporting documentation provided by the contractor to ensure the sources align. Any reported estimates are grounded in sound methodologies and external databases, or systems are used to ensure other key data can be properly verified. For instance, the Authority uses the California Air Resources Board's (CARB) Diesel Off-Road Online Reporting System (DOORS) database to confirm the accuracy of off-road equipment specifications, which helps ensure that the contractors are using the cleanest construction fleets possible.

Contractor-supplied construction activity summaries help put data into context and can help clarify changes in data based upon season or schedule. The Authority also audits contractors and project and construction managers to verify their adherence to requirements and identify any potential data issues.



The Hanford Viaduct, which will host the Kings/Tulare station, will span almost 6,330 feet.

RECYCLING WASTE RESPONSIBLY

The Authority requires recycling 100 percent of the steel and concrete waste from construction and demolition activities and diverting at least 75 percent of all other construction and demolition waste from landfills. This requirement is superseded by local regulations if they specify a higher diversion rate.

Keeping materials such as concrete, asphalt, wood, and organics out of landfills through reuse, recycling, or source reduction avoids the production of methane. It also incentivizes a circular economy, treating the outputs of one set of construction activities as inputs into another, thereby avoiding the extraction of virgin materials.

To measure progress, the Authority tracks the amount of waste produced and diverted from landfills for each construction package and contractor. At time of reporting, the received records indicated that the Authority diverted about 95 percent of total waste from landfills in 2022, including 3,476 tons that were recycled, 80 tons composted, and 25,010 tons stockpiled, as shown in Exhibit 5.0. The recycling avoided the emission of 6,711 MTCO₂e in 2022 and more than 123,000 MTCO₂e to date. These records are still to be resolved, specifically as to whether the waste not diverted was contaminated and could not be recycled. As of this report’s publication, these records are still in review. Any adjustments to totals will be provided in both regular monthly reporting on our [Finance and Audit Committee webpage](#) and in the next Sustainability Report. Over the entire construction time frame, we have diverted about 95 percent (302,961 tons) of all waste, as shown in Exhibit 5.1, and have sent about 5 percent (15,333 tons) to landfills.

The total amount of waste handled this year by the Authority was significantly lower than in previous years (29,914 tons in 2022 vs 74,600 tons in 2016) as we transition from site preparation to construction.

The Authority produced 1,234 tons of unremediated hazardous waste in 2022.

Exhibit 5.0: 2022 Non-Hazardous Materials Management (in Tons)

Total Waste Generated	29,914
Total Waste Diverted	28,566 including: 3,476 tons recycled 80 tons composted 25,010 tons stockpiled
Total Waste Landfilled	1,348

Exhibit 5.1: 2015 Through 2022 Non-Hazardous Materials Composition (in Tons)

Total Waste Generated	318,294
Total Waste Diverted	302,961 including: 118,381 tons recycled 87,332 tons reused 11,740 tons composted 85,508 tons stockpiled
Total Waste Landfilled	15,333

GLOBAL RECOGNITION FOR EXCELLENCE IN SUSTAINABLE INFRASTRUCTURE

Our work in sustainable infrastructure yielded an Envision Platinum award for the Phase 1 system in December 2020. We significantly surpassed the minimum Platinum threshold, putting us among the highest scoring projects to date.

To maintain our Envision Platinum status, the Authority continues to systematically collect documentation and compliance from design and construction. The Authority uses tools such as EMMA to track compliance with construction-related credits and goals, and we include Envision requirements in our design contracts. Currently, the California high-speed rail program is the largest transportation infrastructure project, both in terms of capital investment and geographic area, to earn an Envision award for sustainable infrastructure. This achievement demonstrates that sustainability is achievable across large-scale and complex transportation systems.

SAFETY AND SECURITY

2022 PROGRESS: Our new station design contracts include Crime Prevention Through Environmental Design (CPTED) requirements. These require the contractor to analyze, document, and provide proposed risk mitigation measures, including, at a minimum:

- Natural surveillance, which limits crimes of opportunity by creating open spaces with maximum visibility and social interaction.
- Natural access control, which creates a clearly sign-posted path through a space delineating public and private areas.
- Territorial reinforcement such as fencing and signage.
- Activity support, such as well-lit areas and maintained spaces.

In addition, station designs will plan for terrorism threat mitigation.

Safety and security are our highest priorities. Our Safety and Security Policy Statement captures our approach and continuous commitment to the safety and security of passengers, employees, consultants, contractors, emergency responders, and the public.

The operationalization of this policy is detailed in the Safety and Security Management Plan (SSMP), which is a comprehensive, systemwide framework for identifying risks of incidents and implementing corresponding mitigation measures.

Our commitment to safety and security includes planning for emergencies and disasters:

- We convened a Seismic Advisory Board that includes nationally and internationally recognized experts in seismic hazards evaluation and seismic design. This panel provides expert advice regarding seismic design of tunnels and reviews our seismic design criteria. It also reviews and provides advice on special conditions that must be addressed in developing California's high-speed rail system, including high seismicity, near-source seismic response, and active fault crossings.
- Prior to the start of operations, we will develop an Emergency Management Plan (EMP) and a Passenger Train Emergency Preparedness Plan (PTEPP) to govern safety and security during system testing and operations.
- Fire and Life Safety and Security Committees (FLSSC) were formed during the preliminary engineering phase of the project to provide outreach to local and regional emergency response agencies. As the project moves into the testing and start-up phase, the FLSSCs will review operating plans and procedures, results of after-action reviews following major emergency response incidents or exercises, and training programs for content appropriateness and effectiveness.

GRADE SEPARATIONS

Grade separations are one of the most significant investments the Authority is making to improve rail safety. In the Central Valley, the high-speed rail system will be fully grade-separated, which is essential to safety because the trains will travel at speeds over 200 miles per hour in this region. In 2023, we won a **grant under the Consolidated Rail Infrastructure and Safety Improvements (CRISI) program** for grade separations in Shafter.

Grade separations not only create important safety benefits for communities. They also produce practical, environmental, and economic benefits, including:

- Improved safety for pedestrians and bicyclists.
- Reduced noise due to the decreased need for audible signals such as train horns.
- Reduced greenhouse gas emissions and air pollutants from idling vehicles.
- Improved train operation reliability.
- Improved access to employment centers and jobs.
- Reduced isolation of disadvantaged communities.

Construction work on grade separations continued through 2022 and into 2023, with several projects reaching completion as of this publication. The South Avenue Grade Separation in Fresno County was opened to traffic in early 2022. Located between Cedar and Maple avenues, the new overpass allows traffic to travel over the existing BNSF Railway and future high-speed rail lines. This is the first completed structure in Construction Package 2-3 in Fresno, Kings, and Tulare counties.

The Avenue 15½ grade separation in Madera County, and the Jackson Avenue and Kent Avenue grade separations in Kings County, also were all completed in 2022.

In Southern California, the Authority has been coordinating with local agencies to advance grade-separation projects south of Bakersfield. We have contributed \$76.7 million to Los Angeles Metro toward the Rosecrans/Marquardt Grade Separation project, which will eliminate one of the most hazardous rail crossings in the state. Los Angeles Metro authorized the contractor to begin construction on June 13, 2023.

TRAIN OPERATIONS

Traveling from downtown Los Angeles to San Francisco, a total distance of 380 miles (610 km) in 2 hours and 40 minutes by land was unfathomable before the inception of the California high-speed rail project. By connecting major cities without traffic jams, the high-speed rail system symbolizes a more efficient, economic, and sustainable way to travel.

We are incorporating the best of current rail technology to build a safe, secure, and reliable system. Some of our project innovations include:

- Tier III-compliant trainsets that are in conformance with 100 percent Buy America requirements.
- Testing of the system, including trainsets, at speeds up to 242 mph—the fastest trains in the United States.
- Automatic train and traffic control coupled with an autonomous early earthquake detection system as well as a hazard warning system (intrusion, high wind, high temperature, high water).
- Regenerative braking.

These new technologies, as well as the use of existing technology in new ways, ensure the design and delivery of a safe and reliable system. In addition, we take a holistic, risk-based approach for securing the rail system, including:

- Automatic Train control level 2 (including Positive Train Control, which is a state-of-the-art system that monitors speeds and regulates the distances between trains and can automatically slow down or even stop trains to prevent collisions.
- An early earthquake warning system that detects earthquakes before they happen to stop the trains so safety measures can be taken.
- Quad gates at grade crossings.
- Global intrusion detection and protection barriers at certain locations on the system.

Similar to safeguarding train operations, we will take a comprehensive approach to securing rail system facilities, including:

- Early engagement with federal, state, and local intelligence and policing agencies during design and construction.
- Ongoing engagement with the same agencies to review current and evolving criminal and terrorist threats, and applying mitigations to minimize vulnerabilities.
- Applying technology, fencing, intrusion protection, surveillance capabilities, and other system-hardening techniques.
- Development of security plans, procedures, protocols, and a professional security force to monitor, patrol, and respond to incidents.

HEALTH, SAFETY, AND SECURITY FOR WORKERS

2022 PROGRESS: The Authority continues to prioritize the creation of a safe and equitable workplace for its employees, contractors, first responders, ridership, and the public. In addition to meeting relevant federal laws establishing labor protections, such as the Fair Labor Standards Act (FLSA), the Authority continues to outperform California benchmarks for injury rate and lost days.

As well as designing a safe and secure high-speed rail system, we are also prioritizing creating a safe, equitable, and enjoyable place to work within the Authority. The Safety and Security Management Plan (SSMP) is essential to achieving this goal. The SSMP was developed through consultation with Authority staff, local communities, law enforcement, and first responders to manage the safety and security of all stakeholders. At the heart of the plan is hazard and vulnerability identification, evaluation, and an avoidance framework that is applied during all phases of the project for resolving safety hazards and security vulnerabilities. The SSMP encompasses all equipment, infrastructure, operation, and maintenance plans and procedures associated with the system and covers all Authority employees, contractors, first responders, transit riders, and the public.

CONSTRUCTION SAFETY

Safety for our construction workers is an important indicator that we track and monitor.

Exhibit 5.2 shows injury rates and lost days in 2022. These are significantly lower than similar metrics for the construction industry statewide. The main types of injury include finger lacerations, strained backs, and sprained ankles.

Exhibit 5.2: Worker Health and Safety

Injury Rate	2022	State Benchmark
CP 1	0.28	
CP 2-3	2.66	
CP 4	0.71	
Weighted Overall Average	1.53	2.1
Lost Days Rate		
CP 1	0.28	
CP 2-3	0.33	
CP 4	0.36	
Weighted Overall Average	0.32	0.9
Fatalities		
Overall	0	

EQUITY COMPLIANCE OFFICE

The Authority’s Equity Compliance Office and Equal Employment Opportunity Officer ensure that no discrimination occurs based on race, age, culture, gender, ability, or any other socio-demographic factors. The officer reports directly to the CEO and, along with investigating complaints of discrimination, oversees reasonable accommodation processes. The officer also provides monthly ethics and anti-discrimination training to employees.

EMPLOYEE PROGRAMS

State of California employees and their eligible dependents have access to an Employee Assistance Program (EAP) that provides support for healthy lifestyles and facilitates positive health outcomes. This program is provided by the state as part of its commitment to promote employee health and well-being. More information is available here: calhr.ca.gov/employees/pages/eap.aspx.

CLIMATE ADAPTATION PLANNING

2022 PROGRESS: The Authority is creating our rail system with climate change and future weather extremes in mind. The expected future climate conditions are calculated and analyzed by comparing using the 10 downscaled **Global Climate Models** (GCM) recommended for use in California in the **Perspectives and Guidance for Climate Change Analysis** report developed by the California Department of Water Resources and the Climate Change Technical Advisory Group. Risks we are keeping in mind while designing and building include changes in sea level and surge elevations, extreme storms, floods, extreme temperatures, and wildfires.

High-speed rail is a critical element of the state’s climate change adaptation strategy. California policy requires that state agencies consider climate change in all major state investments, and this is especially important for large infrastructure projects, such as the high-speed rail project. Our internal and interdisciplinary Climate Adaptation Implementation Committee (CAIC) is dedicated solely to climate change adaptation.

In 2021, the CAIC released the first Climate Adaptation Plan (CAP), which summarizes our climate adaptation practices to date and identifies critical next steps, including:

- Re-evaluating climate change impacts to the system as new information becomes available;
- Collecting weather- and climate-related impacts to the system and integrating climate data into maintenance, rehabilitation, and replacement schedules;
- Continuing to develop design, operations and maintenance, and programmatic responses to future climate conditions and extreme weather events; and
- Reconvening following the completion of major climate change-related milestones and/or at regular intervals to continue to build a sophistication with climate data within the Authority

CALIFORNIA EXTREME HEAT ACTION PLAN

In April 2022, California released its Extreme Heat Action Plan, which outlines the state government approach to mitigating the health, economic, cultural, ecological, and social impacts of increasing average temperatures and heatwaves. The Authority's climate-resilient station area planning directly supports the state's actions to support communities seeking to invest in heat-resilient transportation infrastructure.³ The station area planning effort:

- Collaborates with surrounding communities on the use of the station facilities.
- Implements sustainable station designs that minimize heat and maximize shading.
- Plans for active transportation access to the station.
- Additionally, the Authority supports nature-based cooling strategies, which are also included in the California Extreme Heat Action plan.⁴ The Authority provides \$2 million in funding toward urban tree planting in disadvantaged communities adjacent to the high-speed rail tracks.

California Climate Plan

In September 2021, Governor Gavin Newsom signed the largest climate package in state history, dedicating \$3.7 billion toward building resilience against California's multifaceted climate risks, including extreme heat and sea level rise. The Authority has taken significant steps toward climate resilience, as detailed in its Climate Adaptation Plan, including:

- A thorough exposure analysis of climate stressors to the high-speed rail system and its surrounding communities, including widened temperature ranges, wildfires, precipitation-based flooding, and sea-level rise.
- The first draft of an Authority-wide framework for climate change adaptation to ensure that all current Authority processes are equipped to deal with climate-related hazards.



Wildlife crossing in Kern County



Trees planted by West Fresno Middle School students with a grant to Tree Fresno from the Authority are thriving five years later.

Chapter 6: Station Communities and Ridership

Fixed-rail systems present a unique opportunity to focus urban growth within existing communities without the need for more roads, thus dramatically reducing transportation greenhouse gas (GHG) emissions. Locating development adjacent to high-speed rail stations is a crucial strategy to help protect agricultural land, as well as the forests, streams, watersheds, and other natural lands that clean our air and water and provide beauty and recreation.

Customers access these rail systems through stations. Well-planned stations help strengthen the identity and sense of place in communities, and they can bring dramatic new levels of activity and economic development into a city's core.

HIGHLIGHTS

- The Authority continues to foster a vital public agency partnership with the City of San José, the Santa Clara Valley Transportation Authority (VTA), the Peninsula Corridor Joint Powers Board, and the Metropolitan Transportation Commission to plan for an expanded Diridon Station in San José. Planning work in 2022 included a business case that focused on technical work and analysis for the next stages of development.
- In October 2022, the Authority hired a team to provide final design for the Merced, Fresno, Kings/Tulare, and Bakersfield stations.
- The Authority continues to partner with Metro on the Link Union Station (Link US) project, which will transform Los Angeles Union Station (LAUS) into a modern transit and mobility hub. The Authority, in partnership with the Los Angeles County Metropolitan Transportation Authority (Metro) and the Los Angeles–San Diego–San Luis Obispo Rail Corridor Agency (LOSSAN), continued progress on a brownfield study around LAUS. The Phase II Assessment was completed in 2022.
- In 2022, the Authority advanced the design of both the 33-mile extension north from Madera to Merced and the 19-mile extension south from Poplar Avenue to Bakersfield. These procurements were initiated in February 2022, and contracts were awarded in June and July 2022 respectively. This work will lay the groundwork for delivering an electrified initial operating segment between Merced and Bakersfield.

STATION PLANNING AND DESIGN

2022 PROGRESS: The five-member Diridon Integrated Station Concept (DISC) partnership procured a team led by Mott MacDonald to advance a business case for the DISC program. Five agencies are partnering on a planning effort to re-envision the Diridon Station in the City of San Jose: the Authority, the Peninsula Corridor Joint Powers Board (Caltrain), the City of San Jose, the Metropolitan Transportation Commission (MTC), and the Santa Clara Valley Transportation Authority (VTA).

The planning involves incorporating integrated land use, transit-oriented development and station design, and access. The business case will further define the project, costs, and benefits, align the organizational/governance approach for project advancement, and prepare the project to enter the environmental phase.

Our station planning process focuses on transforming the communities in which we operate. Through thoughtful and inclusive planning, we work with regional and local partners to contribute to sustainable development, job creation, downtown revitalization, and protection of important agricultural land and other open spaces.

Rail investment must be accompanied by policy changes and interventions that specifically benefit station cities. We have dedicated funding to support station cities in completing area plans for their respective stations. These plans must be consistent with and supportive of local and regional planning efforts required by Senate Bill (SB) 375 and our station area development policies. In addition, we have executed planning agreements with the cities of Gilroy, Merced, Fresno, San José, Bakersfield, Millbrae, Palmdale, and Burbank, as well as the Tulare County Association of Governments and the VTA.

These agreements allow us to work closely with station jurisdictions and other service providers to:

- Create economic engines for local communities.
- Foster sustainable development and operation.
- Reduce greenhouse gas (GHG) emissions.
- Help maximize system performance
- Make great places.

In 2022, we continued to focus on project delivery for the stations in the Central Valley service section. At each station site, project delivery work will result in a preliminary configured station footprint that includes identified space for access, transit-oriented development (TOD), station facilities, and early site activation.

MERCED INTEGRATED STATION

The Authority, the San Joaquin Joint Powers Authority (SJJPA), and the City of Merced are working to achieve an integrated rail station in Merced that will allow passengers to easily transfer between Altamont Corridor Express (ACE), intercity San Joaquins services, and high-speed rail service. An environmental report was completed in March 2023 that studied the relocation of the Merced station from its originally planned location between G Street and Martin Luther King Jr. Way to a new downtown location between O and R streets. The Merced Intermodal Track Connection (MITC) project will enable the San Joaquins to connect with interim HSR operations at Merced, which is critical for integrating the San Joaquins with the Merced to Bakersfield high-speed rail service.

The MITC will be part of a broader new development around the new site location, as shown in **Exhibit 6.0**. The City of Merced has consistently championed collocated facilities and focused its planning and economic development efforts to achieve this outcome. The city will undertake an update to its general plan, specifically the sections related to housing. New development around the station facility will encourage increased density and improved quality of life for adjacent communities.

Exhibit 6.0: Merced Station Rendering

INTERMODAL HUBS AND REGIONAL TRANSIT INTEGRATION

High-speed rail stations will serve as anchor points for intermodal networks. The stations are being designed to function as transportation hubs for a seamless, interregional travel experience. Starting with local and regional bus transit, bus stops with frequent service and access to other rail services will be located within a five-minute walk of the high-speed rail platform, where possible. In 2022, the Authority continued to work closely with local transit providers to start planning for enhanced transit service at stations on opening day and to accommodate their operational needs to provide seamless connections for passengers.

The high-speed rail program is delivering benefits now through early investments in bookend and connectivity projects tied to California's existing urban and state passenger rail systems. These early investments will allow the high-speed rail system to connect with those systems, creating an integrated rail network that will offer a viable alternative to vehicle and air travel.

For example, projects such as the Caltrain Electrification Project provide immediate benefits to the adjacent communities by improving the Caltrain system performance and curtailing environmental impacts by reducing noise, improving air quality, and lowering GHG emissions. The Caltrain Electrification Project will be completed in 2024.

In 2022, we also continued participating in regional rail coordination meetings organized by the California State Transportation Agency (CalSTA) and Caltrans. We coordinate extensively with CalSTA and other regional partners on planning and implementing the overall Statewide Rail Modernization Program. The goal is to incorporate high-speed rail into a single, integrated state rail improvement strategy. We also continue to closely track the California Integrated Travel Project (Cal-ITP), given its role to underpin seamless travel.

The vision is to develop stations that act as hubs with coordinated, pulse-timed schedules, with the aim of improving service in less-dense areas and increasing ridership on all systems, including the local and regional transit networks that connect to the high-speed rail system.

High-speed rail stations will prioritize public space and amenities to support access for people arriving on low-carbon modes, such as transit, as well as via foot or bike, and other individual modes, and will also include locations for passenger pick-up and drop-off.

We are engaging with local and regional transit providers, as well as the station cities, to provide bike facilities at station sites, including making bike parking available in the stations.

Stations are being designed to facilitate pedestrian access by having direct connections to sidewalks. In 2022, we continued this work by meeting with local active transportation organizations to develop supportive policies and optimize the use of state funding available for active transportation facilities.

In 2022, the Authority advanced more detailed access planning for the stations on the initial operating segment to support the delivery of service.

Access improvements and parking are focal points for early discussion and investment. We are mindful that thoughtfully designed and coordinated parking infrastructure can support development in some markets. We also recognize how vital it is to prioritize walking, biking, and transit over single-occupancy-vehicle use to reflect demographic and market trends.

COORDINATION EFFORTS WITH STATION CITIES

The Authority continued to partner with station communities to ensure that community impacts of station design are aligned with community needs and goals.

SAN JOSÉ DIRIDON STATION (DISC)

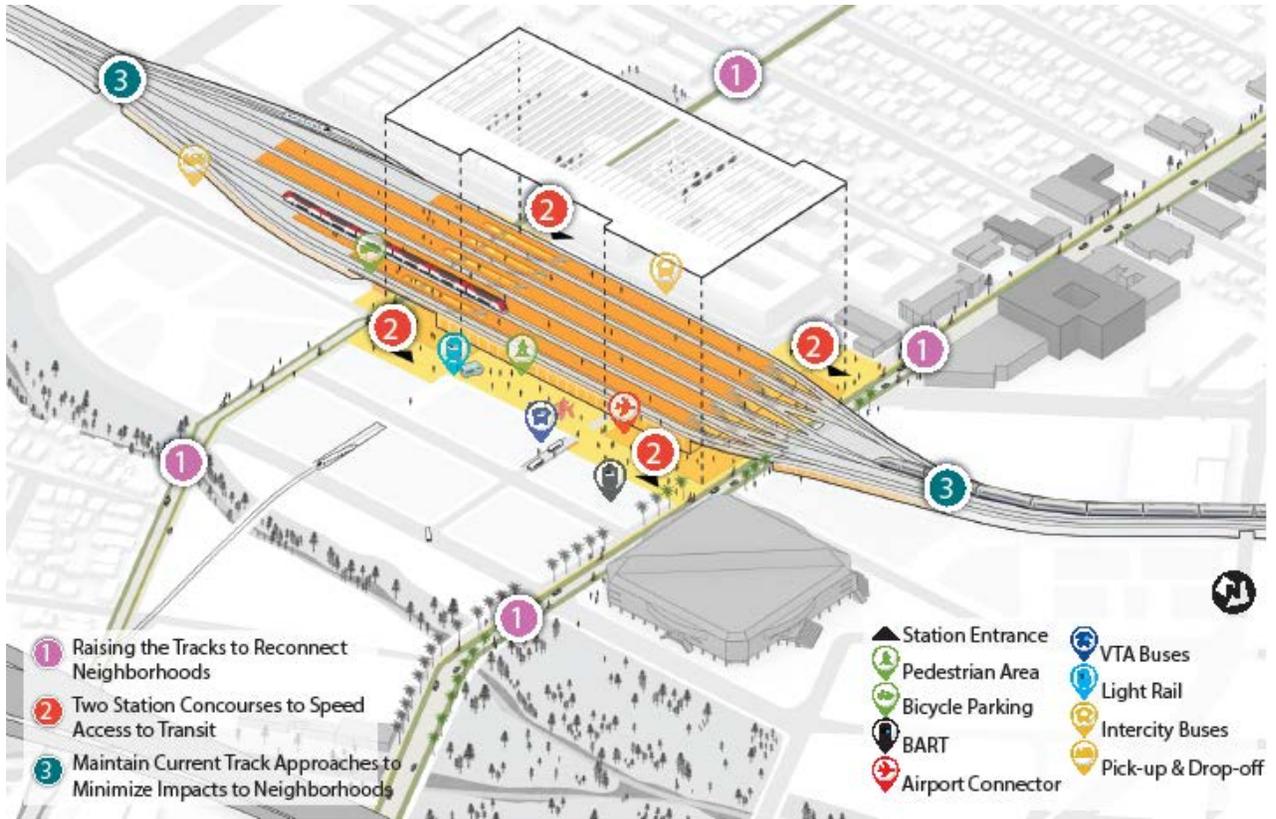
Diridon Station has been identified as a major hub for the high-speed rail system due to its connectivity to Silicon Valley, downtown San José, and the rest of the Bay Area. Planning efforts include the development of a concept layout that has been accepted by DISC partners, as shown in **Exhibit 6.1**.

The partners continue their collaboration and are now developing a business case for the station concept.

Currently, the station is the primary transit hub in the San José area, serving approximately 17,000 passengers daily; that number is expected to grow to more than 100,000 passengers per day by 2040. The station today provides access to Caltrain, Amtrak Capitol Corridor, the Altamont Corridor Express (ACE), as well as VTA light rail and bus service, and other regional bus transportation providers.

With the future addition of high-speed rail and BART, and enhanced service by the current providers, Diridon Station will provide more connections than any other station in Northern California.

Exhibit 6.1: Diridon Station Rendering



LOS ANGELES UNION STATION

In 2022, the Authority’s Board of Directors approved a \$423 million project management and funding agreement between Los Angeles Metro and the Authority to modernize the historic LAUS through the extensive track and station upgrades that are part of the Link US project. LAUS is centrally located in downtown Los Angeles and is one of the busiest transportation hubs in the nation, with almost 160,000 trips per day.

The Link US project will transform how the regional rail system operates in Southern California by allowing trains to enter and exit the station from both the existing northern tracks and new run-through tracks to the south over US 101 freeway, as shown in **Exhibit 6.2**. The project is anticipated to significantly increase capacity for rail service while reducing train idling times. Improvements will accommodate future high-speed rail service with new run-through tracks dedicated to high-speed trains heading south toward Anaheim.

The Link US Project will greatly expand the station’s pedestrian capacity with a new expanded concourse and passageway under the tracks as well as new platforms, escalators, and elevators. The project includes opportunities for future transit-oriented development, improved connectivity to enhance the passenger experience, and design and safety improvements to US 101 freeway. The project is expected to generate more than 200 permanent jobs and approximately 4,500 short-term jobs per year during the anticipated five-year construction period.

Exhibit 6.2: Link US Project Rendering



LOS ANGELES UNION STATION BROWNFIELD DEVELOPMENT

The Authority, in partnership with Metro and LOSSAN, received a U.S. EPA grant to study brownfield properties within approximately a mile of LAUS. The group is gathering information on contamination of the properties to identify suitable locations for potential redevelopment opportunities. These purposes fulfill the objectives of local, regional, state, and federal policies and move the LAUS target area from planning toward implementation. The grant work was completed in December 2022.

The Authority, Metro, LOSSAN, and other stakeholder agencies share a vested interest in revitalizing land around LAUS to support system ridership and TOD. **Exhibit 6.3** summarizes the key milestones for this grant and notes key partners involved in providing the necessary input.

Exhibit 6.3: Brownfields Milestones and Estimated Completion

Milestone	Description	Estimated Completion	Partners
Site Selection	Identify up to 24 brownfield sites for environmental assessment based on community input and economic, social, environmental, and viability criteria	Completed Fall 2019	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles
Phase I Assessment	Produce site-specific reports on historical contamination through high-level environmental assessments	Completed June 2019	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles
Phase II Assessment	Determine the specific nature and extent of pollutants through sampling and analysis for up to eight Phase I sites	Completed 2022	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles
Cleanup Plans	Produce cleanup plans and schematic site plans for the Phase II sites	Completed December 2022	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles

FRESNO, KINGS/TULARE, AND BAKERSFIELD

In 2022, the Authority continued working with stakeholders in Fresno and Bakersfield on early site activation. This activity looks at the parcels the Authority owns and considers how to use them in advance of high-speed rail service to provide early benefits to station communities.

Much of this work has focused on the Fresno Station. The Authority received a Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant in June 2023 for work on this station. The grant will support the reuse of the historic Fresno Depot and the old Greyhound site.

A diverse stakeholder group provided crucial feedback, which will be incorporated into site activities in the next few years:

- Emphasize the distinct character of each station-adjacent neighborhood;
- Connect neighborhoods across high-speed rail tracks through physical bridges as well as consistent quality and character of public realm improvements;
- Activate station sites as soon as possible; and
- Maintain regular communication and inclusion in the process to build confidence in outcomes.

The Fresno Station will connect to Fresno Area Express, Amtrak, Greyhound, and Yosemite Area Regional Transit Services, providing broad regional access, including to the Fresno Yosemite International Airport. A conceptual site plan for the Fresno Station is shown in **Exhibit 6.4**.

Exhibit 6.4: Fresno Station Conceptual Site Plan



COMMUNITY PARTNERSHIPS TO REDUCE VEHICLE MILES TRAVELED

California has been clear about the need to reduce vehicle miles traveled (VMT). The Authority has worked in partnership with station communities and mobility service providers to promote urban regeneration and district-scale sustainable development at and around the stations.

Creating 15-minute neighborhoods—areas of focused development accessible within 15 minutes by foot—means more compact, bike- and pedestrian-friendly development within the station area. This reinforces the potential for the system to reduce not just VMT at the regional scale, but also to provide first-mile/last-mile access to and from the station and within the station district.

Updating local plans is a key first step in using the high-speed rail stations to focus growth. Funding for station-area planning provides several benefits. Station area funding helps stimulate local planning for smart development and for updates to local land use plans and zoning codes. It additionally promotes transit-oriented development around high-speed rail stations.

Development around high-speed rail stations, in response to high-speed rail service, has the potential to lower the average daily VMT for existing and future residents and workers near the rail stations. These infill efforts align with critical policy objectives of AB 32 and have the potential to reduce millions of tons of GHG emissions.

Locating high-speed rail stations in existing downtown cores, as envisioned by Proposition 1A, will assist with infill development, stimulate the local economy, reinforce SB 375 regional plans, and reduce the pressure on agricultural land. The Authority has started advancing its own policies to bring clarity to our community partners about its affordable housing, equity, and mixed-use goals for land controlled by the Authority.

ENGAGING COMMUNITIES

2022 PROGRESS: In Southern California, as part of our community engagement efforts, the Urban Field Studio has been working with the city of Palmdale and hosting community planning workshops for the future Palmdale station and surrounding area. Goals include developing a common vision, lasting partnerships, and an effective station area governance structure; and ultimately creating and implementing a successful Master Plan. The group is working to schedule more community workshops, seek funding for the Palmdale Station Master plan, and publish the Palmdale-to-Burbank final EIR/EIS.

We value community meetings and open houses as opportunities to gather comments and feedback from communities that may be directly affected by the high-speed rail project. Engaging with communities and stakeholders enables us to incorporate unique community values and priorities into our project plans and helps to improve community benefits while considering the collective rights of local communities.

Statewide, through 359 community engagement and public outreach events, we worked with local community organizations and elected officials to educate and inform the public about the high-speed rail program, directly connecting with 13,309 people.



Chuck Riojas of the Fresno, Madera, Tulare, Kings Building Trades Council leads a tour of the Cedar Viaduct for students of the Central Valley Training Center in Selma.

The Authority engaged with the City of Palmdale in a series of virtual and in-person workshops to advance the understanding of a station master plan and opportunities to use the design and layout of the station to positively influence local economic development.

Generally, we promote public participation through various outreach methods, including, but not limited to:

- Engaging people within their own communities and at regularly scheduled community meetings.
- Establishing community and/or stakeholder working groups to help inform stakeholders on the latest developments in those regions.
- Participating in public involvement activities (meetings, hearings, advisory groups, workshops, and task forces) to help the community understand the project as well as to identify community interests and needs and define project goals.
- Encouraging collaboration among diverse groups of community leaders.
- Hosting tables or booths at community-based events.
- Partnering with community-based organizations that serve underrepresented populations and minority- and women-owned business organizations.

- Encouraging public comments at monthly Board of Directors meetings and quarterly Business Advisory Council meetings.
- Streaming live webcasts of the monthly Board of Directors meetings.
- Maintaining a toll-free hotline that includes multiple language options.

CONNECTING STUDENTS TO THE CALIFORNIA HIGH-SPEED RAIL PROJECT

The I Will Ride student outreach initiative, originally founded by college students in the Central Valley, engages and inspires students about high-speed rail. Local campus chapters keep students involved as the previous members graduate.

In 2022, the Authority took part in a total of 64 student outreach events, reaching close to 3,000 students statewide, virtually or in-person. Some presentations were primarily focused on sustainable infrastructure, with the California high-speed rail project as an example of sustainable construction. They covered recycling, clean equipment, offsetting emissions, cleaner materials, and the Envision Platinum Certification. Given the youth efforts in reducing the impacts of climate change, we emphasize our commitment to sustainable infrastructure at student outreach events.

The Authority makes it a priority to reach transportation education programs statewide. In 2022, we had our first group of both Bay Area and Southern California students tour construction



Meg Cederroth, Director of Sustainability and Station Planning for the Authority, gives a presentation at Sacramento State.



Authority spokesperson Augie Blancas, right, speaks to students at a UC Merced career fair.

in the Central Valley: Summer Transportation Institute, hosted at San Jose State by the Mineta Transportation Institute; and an education consortium of schools with the San Gabriel Valley. Each group went on a construction tour and attended panel discussions with HSR engineers.

In one of the Authority's first in-person events since the beginning of the pandemic, I Will Ride partnered with Fresno City College's engineering department in October 2021 to host a luncheon and networking session for high-speed rail professionals and engineering students. More than 30 students attended and heard firsthand from engineers about their experience working on the system.

Several virtual student events were held as well. On February 14, 2022, Professor Maria Calahorra-Jimenez at Fresno State invited our Director of Planning and Sustainability to speak about our Envision Platinum Certification and sustainable practices in construction. Calahorra-Jimenez teaches heavy civil construction in the Construction Management program at Fresno State. On May 6, 2022, lecturer Mrudang Shah invited our Director of Planning and Sustainability to present to his California State University Sacramento civil engineering class of 30 students. This virtual presentation similarly focused on the Envision certification and sustainable practices during construction.

The Authority is also reaching young students through its recently opened high-speed rail exhibit at the Kid's Discovery Station in Merced. The exhibit currently boasts an interactive high-speed rail train. In the future, the Authority will collaborate with the museum to complete the exhibit with painted tracks and a creative wall featuring the high-speed rail system and key facts. Given its financial contribution at the inception of the museum, the Authority is noted as a sponsor for the high-speed rail exhibit and is also recognized as a lifetime founding partner of the museum.

STAKEHOLDER ENGAGEMENT

Along with engaging communities and the public, partnering with stakeholders and oversight agencies is critical to the success of the high-speed rail program. Our Office of Strategic Communications focuses on stakeholder involvement, working collaboratively with the Authority's Regional Directors in the Central Valley and in Northern and Southern California to provide a centralized focus for addressing stakeholder interests and concerns related to potential project effects.

The Chief of Strategic Communications and staff throughout the Office of Strategic Communications and regional offices support the Authority's outreach-related activities to ensure consistent and accurate dissemination of information and to address questions or concerns.

Key topics and issues often raised through stakeholder engagement include cost, schedule, alignment choices, and legislative concerns. These issues are addressed through outreach and via our official social media accounts—Facebook, X (formerly Twitter), LinkedIn, Instagram, YouTube—as well as the publication and regular updates of project information via eblast and on the Authority's website, including:

Eight newsletters every year, including a **quarterly small business newsletter** and **Northern and Southern California newsletters** and **construction updates**

- Presentations
- Information sharing at open-house sessions
- Responses to information requests
- Technical reports and background data related to Business Plans
- Specialized reports, including the small business and jobs reports



Workers tie rebar at the Avenue 12 grade separation in Madera.

DAYTON
SUPERIOR

Chapter 7: About This Report

This report has been prepared in accordance with the Global Reporting Initiative (GRI) Standards: Core option: the world's leading and most widely adopted sustainability reporting framework that addresses environmental, social, and governance issues.

It covers the California High-Speed Rail Authority (Authority) and its activities from January 1, 2022, to December 31, 2022, except where indicated. The Authority is the only entity included in its consolidated financial documents. This report is updated on an annual basis; our previous report was published in 2022 and covered the 2021 calendar year.

There have been no significant changes in the reporting scope or boundaries. The scope and boundaries of all material topics are summarized in the Materiality Assessment section of this report. Any restatements of information published in previous reports have been noted in the affected section.

The intended audience for this report includes members of the California State Legislature, station cities, and other stakeholders. The contents of this report have not been externally assured, unless otherwise noted.

This report looks backward when highlighting the progress we made in 2022 toward advancing our sustainability policies and commitments. This report looks forward when discussing how our policies and practices will affect California into the future.

ACKNOWLEDGMENTS

Thanks to all our federal, state, regional, and local partners, as well as to our environmental and community nonprofit and advocacy partners who contributed to this report and with whom we are delivering California's high-speed rail system.

WHO WE ARE

The Authority is responsible for planning, designing, building, and operating the first high-speed rail system in the nation.

California high-speed rail will connect the megaregions of the state, and contribute to economic development and a cleaner environment, by connecting regions, creating jobs, and preserving agricultural and protected lands. When Phase 1 is complete, trains will run from San Francisco to the Los Angeles basin in less than three hours at speeds exceeding 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totaling 800 miles and up to 24 stations. In addition, under the direction of the California State Transportation Agency, the Authority is working with other state and regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs.

The Authority is headquartered in Sacramento, California, and operates in the United States of America. The Authority is a California state department established pursuant to the California High-Speed Rail Act (SB 1420, Chapter 796 of the California Statutes of 1996) to develop and implement high-speed intercity passenger rail service. It is located under the California State Transportation Agency under the direction of Transportation Secretary Toks Omishakin. No significant changes occurred in the Authority's structure or ownership during the reporting period.

OUR GOVERNANCE STRUCTURE

The Authority's Board of Directors was established in 2003 by California Public Utilities Code 185020 to oversee the planning, construction, and operation of the high-speed rail system. The Board of Directors consists of nine members: five appointed by the governor, two appointed by the Senate Committee on Rules, and two appointed by the speaker of the Assembly.

Each board member represents the entire state and serves a four-year term. There is a Board Chair (Tom Richards) and a Vice-Chair (Nancy Miller). During 2022, and as of September 2023, the Board included five men and four women. In 2016, Governor Jerry Brown signed AB 1813, which added two nonvoting, ex officio members (one member of the California Senate and one member of the California Assembly) to the board. Both positions were filled in 2017 and are currently filled.

The Board of Directors is responsible for setting policy directives and for developing and approving the Authority's key policy documents. These policy documents include business plans, financial plans, and strategic plans, such as those related to sustainability, and environmental, social, and governance issues. The Authority's Chief Executive Officer (CEO) and Authority staff designated by the CEO report directly to the Board of Directors on ongoing program issues.

The Board of Directors also maintains several subcommittees dedicated to overseeing specific aspects of the high-speed rail program. These include the

- Executive/Administrative Committee
- Finance and Audit Committee
- Operations Committee
- Transit and Land Use Committee

The California State Legislature provides oversight and monitoring of the program through the annual budget cycle and through committees specifically tasked with reviewing and monitoring the Authority and progress on the project.

The Authority produces two statutorily mandated reports to the Legislature: a Business Plan (submitted in even years) and a Project Update Report (submitted in odd years).

The legislative oversight committees include:

- Senate Committee on Transportation
- Assembly Committee on Transportation
- Senate Committee on Budget and Fiscal Review
- Assembly Committee on Budget

In addition, state law established an independent Peer Review Group (PRG), which is responsible for reviewing the planning, engineering, financing, and other elements of the Authority's plans. The PRG analyzes the appropriateness and accuracy of the Authority's assumptions, as well as the viability of the Authority's financing plan, including the funding plan for each corridor required by California law. The PRG reports its findings and conclusions to the Legislature.

State law also established a High-Speed Rail Authority Office of the Inspector General. The duties of the Inspector General include:

- Conducting independent fiscal estimates and reviews of the Authority's plans and estimates for project advancement and make findings of the reasonableness of those plans and estimates.
- Monitoring progress toward meeting the milestones toward the implementation of the successful completion of the Merced to Bakersfield segment of the high-speed rail project.
- Conducting audits and investigations relating to delivery of the high-speed rail project.
- Identifying best practices in the delivery of capital projects and recommending policies to enable the Authority to adopt these practices when practicable.
- Recommending policies promoting efficiency in the administration of programs and operations as part of any audit findings.

- Reviewing the Authority’s process for considering proposed and executed change orders and making any recommendations to ensure the process is appropriate for determining the merit and reasonableness of change orders.
- Reviewing the Authority’s contracts and contracting practices to determine whether they are executed consistent with state and federal laws and policies and are conducted in a fair and reasonable manner.

OUR VALUES

We are committed to delivering high-speed rail and achieving our mission in a way that reflects our highest values:

- **Sustainability:** Deliver a system that maximizes benefits to priority communities, protects resources, and serves in the transition to a low-carbon economy.
- **Transparency and Engagement:** Engage and consider input from the public and our stakeholders in an authentic dialogue to provide information about program achievements, milestones, and challenges.
- **Diversity:** Develop and support a diverse workforce fully capable of delivering this transformative project.
- **Safety:** Prioritize the safety and security of our workers, employees, and customers.
- **Stewardship:** Protect and conserve public and environmental resources dedicated to this project.
- **Performance:** Use specific performance measures to track progress, and support the development of a robust culture of program delivery and accountability.

OUR TEAM

As of December 31, 2022, the Authority had 379 state employees on staff in several regions of the state, including full-time employees, retired annuitants, part-time employees, student assistants, and employees on loan from other state agencies, as shown in **Exhibits 7.0, 7.1, and 7.2**. During the reporting period, the only significant variation in staff numbers was due to turnover and the addition of new staff.

In 2022, the Authority hired 95 new employees, for a new hire rate of 25 percent. There was a turnover rate of 15 percent for 2022. The Authority also includes a significant number of private-sector consultants integrated with state employees.

We provide state employees with training opportunities designed to increase job proficiency and career advancement with the goal of promoting a capable, efficient, and service-oriented workforce. This is done by developing employees’ skills and abilities through training programs that meet Government Code Section 19995 and the Authority’s Policy Directive POLI-HR-21, titled Employee Training Policy, and signed in June 2014.

Our policies are consistent with the California Department of Human Resources policies and laws.

Exhibit 7.0: 2022 Authority Employee Breakdown by Gender and Employee Category

Employee Category	Male	Female
Rank and File	91	83
Managerial	42	35
Supervisory	17	31
Exempt	39	32
Confidential	0	0
Total	189	181
Employees – Total (Including 9 Board Members)	379	

Exhibit 7.1: 2022 Authority Employee Breakdown by Location*

Region	Employees
Sacramento	303
Central Valley	51
Southern California	9
Northern California	7

Exhibit 7.2: 2022 Authority Employee Breakdown by Age*

Age	Employees
24 or younger	9
25 to 34	62
35 to 44	107
45 to 54	102
55 to 64	77
65+	13

*Employee diversity is not reported by minority group and does not include board members.

We undertook a strategic review of our organizational structure to properly align both state and consultant resources for functions and roles (Form-to-Function). We received approval for budget change proposals in consecutive years under the Form-to-Function initiative, and the latest approved proposal provides for 85 additional state positions to reduce reliance on contracted resources, resulting in approximately 137 new state positions to date and an estimated \$23.4 million in cost savings.

Form-to-Function increased state oversight in key areas, created consultant efficiency opportunities, and shifted funding to other critical areas of the high-speed rail program such as civil works and rail infrastructure, operations, and safety support.

OUR SUPPLY CHAIN

We are responsible for procuring services, contractors, and materials, as well as for coordinating the delivery of the high-speed rail program. Our supply chain includes suppliers providing materials, as well as consultants and contractors providing design and construction services to build the high-speed rail system, with many of these businesses being locally based in California.

Details of supply chain expenditures are available online via the **Finance and Audit Committee materials** webpage. The outputs of this work include the physical infrastructure (e.g., rail, trains, and stations), as well as outcomes of cleaner air, transit-oriented development, and a highly connected California.

CONTACT

We value all feedback. Please send comments and questions to info@hsr.ca.gov.



Sunflower near Avenue 15

GRI Content Index

This index allows GRI report users to quickly find the disclosure information they are seeking. The GRI indicators listed correspond to the information that the Authority’s stakeholders noted was important to disclose. Consistent with the majority of GRI reports, the information presented here was not subject to third-party

verification or external assurance, except for the methodology used to estimate future greenhouse gas (GHG) emissions reductions and air pollutant emissions co-benefits, which has been reviewed by the California Air Resources Board. The Authority may consider verification or external assurance of future reports as the high-speed rail program advances.

Organizational Profile Disclosures	Section	Page(s) of Associated Section
102-1 Name of the organization	Who We Are	67
102-2 Activities, brands, products, and services	Who We Are	67
102-3 Location of headquarters	Who We Are	67
102-4 Location of operations	Who We Are	67
102-5 Ownership and legal form	Who We Are	67
102-6 Markets served	Who We Are	67
102-7 Scale of the organization	Our Team	69
102-8 Information on employees and other workers	Our Team	70
102-9 Supply chain	Our Supply Chain	70
102-10 Significant changes to the organization and its supply chain	Our Team	69
102-11 Precautionary Principle or approach	Climate Adaption Planning	51
102-12 External initiatives	External Frameworks and Assessments	4

Ethics And Integrity	Section	Page(s) of Associated Section
102-16 Values, principles, standards, and norms of behavior	Our Values; Priorities and Commitments	19; 1

GENERAL DISCLOSURES

Strategy	Section	Page(s) of Associated Section
102-14 Statement from senior decision-maker	Message from the CEO	V
Governance	Section	Page(s) of Associated Section
102-18 Governance structure	Effective Governance	13
Stakeholder Engagement	Section	Page(s) of Associated Section
102-40 List of stakeholder groups	Engaging Communities	63
102-41 Collective bargaining agreements	Health, Safety, and Security for Workers	50
102-42 Identifying and selecting stakeholders	Engaging Communities	63
102-43 Approach to stakeholder engagement	Engaging Communities	63
102-44 Key topics and concerns raised	Engaging Communities	65
Reporting Practices	Section	Page(s) of Associated Section
102-45 Entities included in the consolidated financial statements	About this Report	67
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SPECIFIC STANDARD DISCLOSURES

GRI Standard	Disclosure	Section	Page(s)	Omission
Economic Performance (2016)	201-4 Financial assistance received from government	Financial Responsibility; Performance (Economic Development and Governance)	16; 81	NO
Indirect Economic Impacts (2016)	203-1 Infrastructure investments and services supported	Economic Development and Governance; Performance (Economic Development and Governance)	19; 81	NO
	203-2 Significant indirect economic impacts	Economic Development and Governance; Performance (Economic Development and Governance)	19; 81	NO
Procurement Practices (2016)	204-1 Proportion of spending on local suppliers	Fostering Diversity and Equal Opportunity; Performance (Economic Development and Governance)	22; 82	NO
Energy (2016)	302-1 Energy consumption within the organization	Highlights; Energy Use in Construction; Energy Use in Authority Offices; Quantification Methodologies; Performance (Energy and Emissions)	27, 28, 80, 83	NO
Water and Effluents (2018)	303-3 Water withdrawal	Conserving Water Resources; Performance (Natural Resources)	40; 86	NO
Biodiversity (2016)	304-3 Habitats protected or restored	Managing Land Use; Performance (Natural Resources)	41; 86	NO

Emissions (2016)	305-1 Direct (Scope 1) GHG emissions	Highlights (Energy and Emissions); Reducing GHG Emissions; Reporting Actual and Avoided Emissions; Reducing GHG Emissions during Construction; Quantification Methodologies; Performance (Energy And Emissions); Endnotes	27, 29, 30, 34, 80, 83, 90	NO
	305-2 Energy indirect (Scope 2) GHG emissions	Highlights (Energy and Emissions); Reducing GHG Emissions; Reporting Actual and Avoided Emissions; Reducing GHG Emissions During Construction; Quantification Methodologies;	27, 29, 30, 34, 80, 83, 90	NO
	305-3 Other indirect (Scope 3) GHG emissions	Highlights (Energy and Emissions); Reducing GHG Emissions; Reporting Actual and Avoided Emissions; Reducing GHG Emissions During Construction; Quantification Methodologies; Performance (Energy and Emissions); Endnotes	27, 29, 30, 34, 80, 83, 90	NO
	305-5 Reduction of GHG emissions	Reducing GHG Emissions	29	NO
	305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	Protecting Air Quality During Construction	35	NO
	Waste (2020)	306-3 Waste generated	Recycling Waste Responsibly	47
306-4 Waste diverted from disposal		Recycling Waste Responsibly	47	NO
306-5 Waste directed to disposal		Recycling Waste Responsibly	47	NO
Environmental Compliance (2016)	307-1 Non-compliance with environmental laws and regulations	Effective Governance	13	NO
Supplier Environmental Assessment (2016)	308-1 New suppliers that were screened using environmental criteria	Suppliers and Procurement	17	NO
Employment (2016)	401-1 New employee hires and employee turnover	Our Team	69	YES
Occupational Health and Safety (2018)	403-9 Work-related injuries	Health, Safety and Security for Workers; Performance (Sustainable Infrastructure); Endnotes	49; 87; 90	NO

Occupational Health and Safety (2018)	403-10 Work-related ill health	Health, Safety and Security for Workers; Performance (Sustainable Infrastructure)	49; 87	NO
Training and Education (2016)	404-1 Average hours of training per year per employee	Our Team	69	YES
Diversity and Equal Opportunity (2016)	405-1 Diversity of governance bodies and employees	Our Team	69	YES
Local Communities (2016)	413-1 Operations with local community engagement, impact assessments, and development programs	Station Communities and Ridership	55	NO

ADDITIONAL DISCLOSURES

During the 2018 materiality assessment, the Authority identified a number of material topics that are not covered by available GRI Standards and disclosures. The location of this information in the report is summarized below.

Material Topic	Section	Page(s)
Emergency and disaster recovery planning	Materiality Assessment; Climate Adaptation Planning	5; 51
Enhancing public space and amenities	Materiality Assessment; Intermodal Hubs and Regional Transit Integration	5; 57
Land and water pollution*	Materiality Assessment	5
Life cycle approach	Materiality Assessment; Principles for Sustainable Infrastructure	5; 45
Noise and vibration	Materiality Assessment	5
Resilience and adaptation, incl. extreme weather	Materiality Assessment; Climate Adaptation Planning	5; 51
Third-party assessment	External Frameworks and Assessments; Materiality Assessment	4; 5
Transportation hub activation and mass/ active transportation	Materiality Assessment; Intermodal Hub and Regional Transit Integration	5; 57

*Note: Material topic defined as “Air, land and water pollution”; air pollution is covered by GRI indicator 305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions.

GLOSSARY

Biodiesel: A diesel replacement fuel made from new and used vegetable oils or animal fats that have been chemically reacted with an alcohol

Black Carbon: A component of fine particulate matter. It is produced from the incomplete combustion of fossil fuels and biomass burning, particularly from older diesel engines and forest fires. Black carbon warms the atmosphere by absorbing solar radiation, influences cloud formation and darkens the surface of snow and ice, which accelerates heat absorption and melting. Diesel particulate matter emissions are a major source of black carbon and are also toxic air contaminants.

CALGreenCode: The California Green Building Standards Code is Part 11 of the California Building Standards Code and defines and encourages sustainable construction practices for residential and non-residential buildings.

Carbon Offsets: Emissions reductions that have been made by an entity and retained or sold to a different entity that seeks to reduce its impact.

Carbon Sequestration: the process of capturing and storing atmospheric carbon.

Central Valley Segment: Current area of construction spanning 119 miles across Madera, Fresno, Kings, Tulare and Kern counties. The Authority plans to extend this 119-mile segment into Merced and Bakersfield.

Construction Package 1 (CP 1): 32-mile section of the Central Valley Segment that stretches between Avenue 19 in Madera County and East American Avenue in Fresno County.

Construction Package 2-3 (CP 2-3): 65-mile section of the Central Valley Segment that is a corridor between East American Avenue in Fresno County and one mile north of the Tulare-Kern County line.

Construction Package 4 (CP 4): 22-mile section of the Central Valley Segment that stretches between one mile north of the Tulare-Kern County line and Poplar Avenue in Kern County.

Criteria Air Pollutants: Six common air pollutants regulated by the US Environmental Protection Agency due to their potentially harmful human health and environmental impacts. These pollutants include particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides and lead.

Direct GHG Emissions: Emissions from sources that are owned or controlled by the reporting entity.

Disabled Veteran Business Enterprise: A small business owned and controlled by a veteran of the U.S. military, naval, or air service, who must have a service-connected disability of at least 10-percent or more and must reside in California.

Disadvantaged Business Enterprise: A small business owned and controlled by socially and economically disadvantaged individuals must receive DBE certification from the relevant state. To be regarded as economically disadvantaged, an individual must have a personal net worth that does not exceed \$1.32 million. To be seen as a small business, a firm must meet SBA size criteria and have average annual gross receipts not to exceed \$23.98 million.

Disadvantaged Community: Distinguished by higher risk of environmental hazards and/or lower socioeconomic status. Disadvantaged communities are the target of some high-speed rail programs. Criteria the California Environmental Protection Agency uses to identify disadvantaged communities include but are not limited to:

- Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure or environmental degradation.
- Areas with concentrations of people that are of low income, high unemployment, low levels of home ownership, high rent burden, sensitive populations, or low levels of educational attainment.

A Disadvantaged Worker: An individual (household income less than \$32,000 a year) who meets the income requirements of a Targeted Worker and faces at least one of the following barriers to employment prior to commencing work on the high-speed rail program:

- Being a veteran
- Being a custodial single parent
- Receiving public assistance
- Lacking a GED or high school diploma
- Having a criminal record or other involvement with the criminal justice system
- Suffering from chronic unemployment
- Emancipated from the foster care system
- Being homeless
- Being an apprentice with less than 15 percent of the required graduating apprenticeship hours in a program

Environmental Product Declaration (EPD):

A standardized statement summarizing environmental impacts throughout the product life cycle. EPDs may include information about global warming potential, ozone depletion, acidification, eutrophication, smog or other environmental impact areas.

Greenhouse Gas (GHG): Greenhouse gases trap energy in the atmosphere and are the primary driver of climate change and global warming. The United Nations Intergovernmental Panel on Climate Change (IPCC2) defines six gases under this category: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs – a family of gases), fluorocarbons (PFCs – another family of gases) and sulfur hexafluoride (SF₆). Carbon emissions are measured in the unit “carbon dioxide equivalent” (CO₂e) and expressed in metric tonnes (MTCO₂e).

Indirect GHG Emissions: Emissions that are a consequence of the activities of the reporting entity but occur at sources owned or controlled by another entity.

Job-Years: The equivalent number of one-year-long, full-time jobs supported by the project. For example, if one full-time job is supported for two years, it therefore represents two job-years.

Leadership in Energy and Environmental Design (LEED®): LEED® certification provides independent, third-party verification that a building, home or community was designed and built using strategies aimed at achieving high performance in the following key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Net-Zero Energy: Refers to a facility or system that produces as much energy as it uses over the course of a year (or other defined period).

Particulate Matter (PM): An air pollutant made up of extremely small particles and liquid droplets. Small particles 10 micrometers (PM₁₀) in diameter or less can be inhaled into the lungs, causing serious respiratory and circulatory health effects. Smaller particles of 2.5 micrometers (PM_{2.5}) in diameter or less are also a significant contributor to haze. A component of particulate matter called black carbon can disrupt climate patterns.

Phase 1 System: The California High-Speed Rail will be implemented in phases. The Phase 1 system will connect San Francisco to the Los Angeles basin via the Central Valley in under three hours on trains capable of exceeding 200 miles per hour. The Phase 2 system encompasses future program extensions that will extend to Sacramento and San Diego.

Photovoltaic (PV): Technology using semiconductor material to convert sunlight into electricity. Power is produced when sunlight strikes the semiconductor material and creates an electric current.

Post-consumer Recycled Content: A material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item.

Pre-consumer Recycled Content: Material diverted from the waste stream following an industrial process that is capable of being reclaimed within the same process.

Rail Delivery Partner (RDP): Consultants who provide professional services to the Authority for support and technical expertise related to the delivery of the high-speed rail program.

Reactive Organic Gases: Carbon-based gases (excluding carbon monoxide and carbon dioxide) that can react with other chemicals and light to produce smog and ozone.

Recycling: Material recovery from the solid waste stream for use in the manufacture of new products.

Renewable Energy: Energy resources such as wind power or solar energy that can be produced indefinitely without being depleted.

Senate Bill 375 (Steinberg, 2008): SB375 sets regional targets for greenhouse gas emissions reductions and requires cities and counties to address GHG reductions through a Sustainable Communities Strategy in the regional transportation plan.

Sustainability: The capacity to endure. Sustainable thinking recognizes how current decisions affect the capacity of current and future generations to lead healthy and rewarding lives.

Sustainable Transportation: Modes of transportation that does not rely on the use of fossil fuels.

Tailpipe Emissions: The amount of pollutants in exhaust gases discharged from an internal combustion engine.

Targeted Worker: An individual whose primary place of residence is within an Economically Disadvantaged Area or an Extremely Economically Disadvantaged Area. For more information, visit the California Rail Builders' National Targeted Hiring Initiative website: californiarailbuilders.com/requirements/national-targeted-hiring-initiative/

Vehicle Miles Traveled (VMT): The total number of miles traveled by vehicles in a given geographic boundary over a specific time.

Well to Wheel Emissions: These include all emissions related to fuel production, processing, distribution, and use.

QUANTIFICATION METHODOLOGIES

Values reported in this Sustainability Report are quantified according to the following methodologies:

Energy

Office energy consumption is estimated from the number of Authority employees and consultants, along with the average energy intensity and occupant density of LEED®-certified buildings. Electricity consumption is converted from kilo-BTU (kBTU) to kilowatt hours (kWh) using a conversion factor from EPA Climate Leaders GHG Inventory Protocol, Appendix 2: Unit Conversions.

Fuel consumption is tracked for construction activities and is converted from gallons to gigajoules (GJ) using conversion factors from EPA Climate Leaders GHG Inventory Protocol, Appendix 2: Unit Conversions.

GHG Emissions

We take the operational control approach to quantifying GHG emissions, and we have adopted 2015 as the baseline year for reporting on emissions changes over time. GHG emissions are quantified using methodologies consistent with the GHG Protocol Corporate Standard, ISO 14064, California Air Resources Board methodologies and U.S. Environmental Protection Agency (EPA) models.

Scope 1 emissions are direct emissions from sources owned or controlled by the Authority. Emissions associated with Authority fleet vehicles are not presently included.

Scope 2 GHG emissions are calculated from annual electricity consumption consumed by the Authority office headquarters in Sacramento, and emissions factors sourced from the U.S. EPA (2016) and eGRID for California (CAMX).

Scope 3 emissions from contractor vehicles are calculated using Emission Factors for Greenhouse Gas Inventories provided by the EPA. Scope 3 emissions also include construction electricity emissions, and emissions generated from the use of natural gas in a construction office.

Fugitive emissions associated with the refrigerant equipment within the Authority's office are not presently included.

Scope 3 emissions avoided through materials recycling are calculated using the amount of construction materials recycled and the EPA Waste Reduction Model (WARM).

Anticipated GHG emissions reductions during systems operations are calculated according to the methodology available online at: arb.ca.gov/cci-resources. All greenhouse gases relevant to the activities are included (CO₂, CH₄, N₂O). Projected avoided emissions are reported relative to a scenario without high-speed rail, rather than relative to a baseline year. Avoided emissions occur as a result of the service provided by high-speed rail, which will displace the emissions that would have released by higher polluting transportation modes, so are classified as Scope 3 emissions reductions.

Air Pollutant Emissions

Air pollutant emissions from construction vehicles are calculated using the methodology and EMFAC2021 emissions rates from the California Air Resources Board.

Criteria pollutants are the most significant air pollutants related to human health and environmental impacts. Other categories of air emissions, such as persistent organic pollutants, volatile organic compounds and hazardous air pollutants, are not quantified.

Water

Office water consumption is estimated from the number of Authority employees and consultants, along with the average water intensity and occupant density of LEED®-certified buildings. Construction water consumption is tracked and reported.

Waste

Waste and recycling information is collected from contractors and tracked using an online data tool. Waste generation and disposal weights are recorded from records received from recycling and waste treatment facilities. Diversion rates are calculated by dividing the weight of materials diverted (through recycling, reuse and stockpiling) by the total materials weight.

Job Creation

Hours worked data come from certified payroll submissions while the number of workers is based on monthly submittals from prime contractors in compliance with the National Targeted Hiring Initiative (NTHI).

PERFORMANCE

Economic Development And Governance

FUNDING AND INVESTMENT (\$ IN BILLIONS)

Funding and investments	FY15-16	FY16-17	FY17-18	FY18-19	FY19-20	FY20-21	FY21-22
Total Invested	\$2.306 B	\$3.586 B	\$4.766 B	\$5.719 B	\$7.237 B	\$8.227 B	\$9.782 B
Investment in California Firms/ Workers	94%	97%	97%	98%	98%	99%	93%
Percent of Authorized Federal Funds Expended	48%	73%	73%	73%	73%	73%	73%

DISPATCHED WORKERS BY CONSTRUCTION PACKAGE

Dispatched Workers	2015	2016	2017	2018	2019	2020	2021	2022*
CP 1	214	1,089	1,239	1,716	1,872	2,238	2,466	2,834
CP 2-3	-	257	318	750	1,060	1,951	2,311	3,493
CP 4	-	106	142	293	648	1,205	1,595	2,019

*As of December 2022

CONSTRUCTION HOURS BY CONSTRUCTION PACKAGE AS OF DECEMBER 2022

Construction hours	2015	2016	2017	2018	2019	2020	2021	2022
CP 1	83,154	666,033	539,547	1,538,063	1,884,039	2,484,311	2,774,330	3,259,589
CP 2-3	-	59,638	60,032	297,334	487,560	1,213,608	1,937,847	3,288,148
CP 4	-	8,219	8,627	47,037	158,151	496,902	973,801	1,330,331

CREATING OPPORTUNITIES FOR DISADVANTAGED WORKERS AND FOSTERING DIVERSITY: WORKER SUMMARY

Workers	2015	2016	2017	2018	2019	2020	2021*	2022*
Construction Workers Dispatched	214	1,525	1,699	2,759	3,580	6,243	6,372	8,346
Disadvantaged Workers Dispatched	-	174	149	402	426	440**	440	481

*As of December of stated year. ** Previously reported as 449. Has been corrected for 2020.

SMALL AND DISADVANTAGED BUSINESS SUMMARY (ANNUAL)

Small and Disadvantaged Businesses	2015	2016	2017	2018	2019	2020	2021	2022
Small Business Participants – Total	318	417	427	474	530	626	655	761
Disadvantaged Business Enterprises (DBE)	100	130	139	157	172	201	214	259
Disabled Veteran Business Enterprises (DVBE)	36	49	51	52	56	70	75	92
Small Business Located in Disadvantaged Communities	-	96	115	129	156	129	159	215
Local Procurement (U.S.-based businesses)	Nearly 100%							
Expenditures in Disadvantaged Communities	-	52%	Nearly 60%	54%	50%	55%	57%	62%

ENERGY AND EMISSIONS

ENERGY CONSUMPTION (ANNUAL)

Type	2015	2016	2017	2018	2019	2020	2021	2022
Office Electricity Consumption* (Megawatt hours)	1,036	1,287	1,431	1,908	1,908	1,954	2,387	1,823
Off-Road Diesel Consumption (Gallons)	26,816	172,684	276,556	292,662	443,935	694,029	720,582	671,504
On-Road Diesel Consumption (Gallons)	5,859	26,665	54,524	115,495	241,737	342,392	291,945	458,780
On-Road Gasoline Consumption (Gallons)	116,947	203,304	383,994	333,317	598,208	556,952	198,321	172,577
Energy Content of Fuel Consumed (Gigajoules)**	37,000	55,800	98,846	103,385	178,725	224,352	173,979	187,457

*Office electricity consumption is estimated for the total number of Authority staff and RDP staff using 2015 average EUI and occupancy rates for LEED office buildings in California.

PROJECTED AVERAGE ANNUAL GHG EMISSIONS AVOIDED FOR PHASE 1: WELL-TO-WHEELS (MMTCO₂E)*

Year	Medium	High
2030	.08	.08
2040	1.54	1.88
2050	1.69	2.06
2079	2.20	2.68

* The greenhouse gas emissions reduction scenarios reflect the ridership range expressed in the 2020 Business Plan. Ridership is expressed as both a medium case and a 75% percentile, which provides the medium and high emissions scenarios. The Authority calculates emissions reductions for the initial 50-year span of operation for well-to-wheels for Phase 1 (2029-2079, per the 2020 Business Plan). These reductions are reported at intervals corresponding to state reduction milestones (2030, 2050), program milestones (2040), and at year 50 (2079).

PROJECTED CUMULATIVE GHG EMISSIONS AVOIDED: TAILPIPE (MMTCO2E)*

Year	Low	High
2030	.12	.12
2040	8.63	10.51
2050	21.39	25.97
2079	65.93	79.98

* The greenhouse gas emissions reduction scenarios reflect the ridership range expressed in the 2020 Business Plan. Ridership is expressed as both a medium case and a 75% percentile, which provides the medium and high emissions scenarios. The Authority calculates emissions reductions for the initial 50-year span of operation (2029-2079, per the 2020 Business Plan). These reductions are reported at intervals corresponding to state reduction milestones (2030, 2050), program milestones (2040), and at year 50 (2079).

PROJECTED CUMULATIVE GHG EMISSIONS AVOIDED: WELL-TO-WHEELS*

Year	Medium	High
2030	.16	.16
2040	10.96	13.39
2050	27.18	33.14
2079	83.85	102.14

*For this sustainability report, we also analyzed the avoided emissions by assigning an emissions factor that illustrates the full life cycle impacts of the fuels used for transportation; electricity, gas, diesel and jet fuel. Using this analytic technique enables all fuel types to be evaluated on equal terms. For this chart, “well-to-wheels” emissions factors were obtained from GREET and applied to the fossil fuel auto and air fleet. A life cycle emissions factor was also applied to the electricity required for system operation.

GREENHOUSE GAS EMISSIONS IN METRIC TONS OF CARBON DIOXIDE EQUIVALENT (MTCO2E)

Emissions Source	2015	2016	2017	2018	2019	2020	2021	2022
Scope 2	307	381	344	459	432	404	556	440
Scope 3	1,400	4,282	6,795	8,063	9,197	17,458	13,690	14,371

Emissions Avoided Source	2015	2016	2017	2018	2019	2020	2021	2022
Recycling *	23,165	21,125	36,009	17,579	13,028	2,450	3,292	6,711
Bookend and Connectivity**	142,519	142,519	142,519	142,519	142,519	142,519	142,519	142,519
Agricultural Easements	-	-	-	-	36,600	115,030	120,366	76,711

* Materials data have been provided by the contractors to the Authority working on four construction packages. At time of report publication, some records are still being validated for accuracy. Updated figures have been provided based on the latest available information at the time of this report.

**Calculated for Caltrain Electrification, Central Subway, Regional Rail Connector and grade separations in Southern California. Additionally, between 2026 and 2078, Link Union Station’s estimated contribution to GHG reductions is estimated to be 13.5 million MT of CO2e. https://media.metro.net/projects_studies/rr/LINKUS_DEIR/3.5_AirQualityandGlobalClimateChange.

CRITERIA AIR POLLUTANT EMISSIONS (CONSTRUCTION FLEET) – EMITTED AND AVOIDED (IN POUNDS)

Reporting Year	NOx		ROG		ROG		BC	
	Emissions	Emissions Avoided						
2015	4,006	49%	549	41%	341	41%	262	42%
2016	23,024	51%	1,715	58%	1,082	60%	833	60%
2017	20,944	70%	2,441	59%	1,467	61%	1,130	61%
2018	27,190	54%	2,318	58%	1,964	43%	1,513	43%
2019	42,507	49%	2,802	65%	2,374	50%	1,869	51%
2020	50,043	67%	3,982	71%	3,775	55%	2,638	58%
2021	39,801	64%	2,669	74%	1,886	65%	1,428	66%
2022	34,671	65%	2,276	76%	1,724	67%	1,283	69%

VOLUNTARY EMISSIONS REDUCTION AGREEMENTS (VERA)

VERA details	2015	2016	2017	2018	2019	2020	2021	2022
VERA Offsets: Total Lifetime Emissions (in tons)	26	1,006	1,369	1,358	1,358	1,358	1,358	1,358
VERA Investment - \$ million		9	13	13	13	13	13	13
VERA Equipment – Tractors	20	46	82	84	84	84	85	85
VERA Equipment – Trucks		104	161	162	162	162	161	161
VERA Equipment – School Bus			1	1	1	1	1	1

NATURAL RESOURCES

WATER CONSUMPTION (ANNUAL, IN GALLONS)

Water Usage	Office*	Construction**
2015	1,060,560	2,517,153
2016	1,317,600	14,500,000
2017	1,464,480	31,207,986
2018	1,952,640	13,150,724 (potable) - 58,927,468 (nonpotable)
2019	1,952,640	10,003,936 (potable) - 105,632,701 (nonpotable)
2020	2,000,160	88,075,850 (potable) - 211,509,340 (nonpotable)
2021	2,442,960	29,526,266 (potable) - 218,137,740 (non-potable)
2022	1,866,240	19,440,150 (potable) - 192,434,990 (non-potable)

* Office water consumption is estimated for the total number of Authority staff and RDP staff using 2015 average WUI and occupancy rates for LEED office buildings in California. No changes between 2018 and 2019 are recorded as total number of employees and RDP staff is unchanged between the years.

** 2021 Construction water consumption includes both approved and in-review water consumption data as reported by the contractors.

HABITAT AND AGRICULTURAL LAND PRESERVATION (CUMULATIVE, IN ACRES)

Land	Type of Preservation	2015	2016	2017	2018	2019	2020	2021	2022
Habitat *	Preserved and Restored	400	2,000	2,510	2,680	2,349	2,320	2,972	4,492
Agricultural **	Approved for Conservation	-	1,200	1,200	1,200	1,200	3,096	3,190	3,472

* Land for species and water that is preserved and/or restored for biological mitigation. Land for species and water that is preserved and/or restored for biological mitigation.

** Important farmland that has been approved by the DOC for conservation via the ALMP and CFCP.

SUSTAINABLE INFRASTRUCTURE

RECYCLING AND REUSE (ANNUAL, IN TONS)*

Material	2015	2016	2017	2018	2019	2020	2021	2022
Recycled/Reused Concrete	37,506	68,183	25,088	11,001	805	1,506	2,280	3,881
Recycled/Reused Asphalt*	-	-	47	1,041	93	15	934	70
Recycled Mixed Metals	2,701	1,294	2,500	839	1,750	55	275	133
Recycled Wood	-	39	242	615	34	9	278	1191
Recycled Organics	-	-	5,845	9,549	5,922	2,086	572	80
Mixed Recycling	3,661	4,649	7,714	4,459	1,314	1,270	468	3,476
Materials Landfilled	360	444	1,300	3,449	1,417	2,698	5,797	1,348

Recycling Details	2015	2016	2017	2018	2019	2020*	2021	2022
Recycled Concrete and Metal	100%	99.9%	100%	100%	100%	100%	99.7%	100%
Recycled Other Materials	94.6%	93.1%	92.6%	87.2%	92.6%	78.8%	34.4%	100%
Overall Recycling Rate	-	99.2%	99.4%	97.0%	84.1%	64.7%	45.3%	95%

* Materials data have been provided by the contractors to the Authority working on four construction packages. At time of report publication, some records are still being validated for accuracy. Updated figures have been provided based on the latest available information at the time of this report.

WORKER HEALTH AND SAFETY, INJURY RATE*

Injury Rate	2015	2016	2017	2018	2019	2020	2021	2022	State Benchmark
Construction Package 1	3.56	1.12	1.76	1.59	1.78	1.60	1.00	0.28	
Construction Package 2-3	0	0	0	0.29	1.00	2.18	1.66	2.66	
Construction Package 4	N/A	N/A	0	0	1.47	1.09	0.71	0.71	
Overall Weighted Average	2.09	0.54	1.1	0.97	1.38	1.77	1.30	1.53	1.8
Lost Days Rate									
Construction Package 1	0	0.37	0.7	0.4	0.3	0.80	0.50	0.28	
Construction Package 2-3	0	0	0	0	0	0.00	0.00	0.33	
Construction Package 4	N/A	N/A	0	0	0	0.00	0.00	0.36	
Overall Weighted Average	0	0.18	0.44	0.22	0.11	0.24	0.14	0.32	1.4
Fatalities									
Total Fatalities	0	0	0	0	0	0	0	0	

* U.S. Bureau of Labor Statistics, California, 2020 Heavy and civil engineering construction

STATION COMMUNITIES

COMMUNITY OUTREACH

Event Information	2015	2016*	2017**	2018***	2019****	2020*****	2021*****	2022
Open Houses and Community Meetings	85	85	40	377	200	340	426	68
Attendees	6,000	6,000	953	15,000+	55,800+	18,800	7,100+	10,100+
Events with EJ Outreach	130	130	15	238	87	12	32	59

* 2016 saw an increase in meetings related to construction as several sites came online. Work continued on those sites in 2017, but no new meetings were required.

** Although outreach in 2017 was ongoing, we held fewer large-scale community meetings and open houses, due to our focus on other areas of the program.

*** All reported statewide outreach (events, meetings, webinars).

**** This includes one Southern California event with an attendance of 40,000 attendees.

***** Many events took place virtually in 2020 and 2021 due to COVID-19.w

Endnotes

1 A “targeted worker” is an individual whose primary place of residence is within an Economically Disadvantaged Area or an Extremely Economically Disadvantaged Area. For more information, visit the California Rail Builders’ National Targeted Hiring Initiative website: <https://www.californiarailbuilders.com/requirements/national-targeted-hiring-initiative/>

2 Job-years represent a combination of total jobs and the length of time of those jobs. For example, one job supported for two years equals two job-years; five jobs supported for one year equals five job-years.

3 California Extreme Heat Action Plan, Track C – Goal 1, E3: Support communities seeking to invest in heat-resilient transportation infrastructure.

4 California Extreme Heat Action Plan, Track D – Goal 1, E3: Utilize nature-based-solutions as part of cooling strategies in public and private spaces, including through planting trees, expanding greenspace, restoring urban streams, and increasing public awareness of best practices to green urban residential areas.