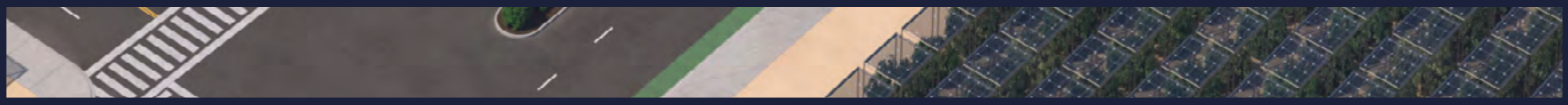
CALIFORNIA High-Speed Rail Authority

2022 SUSTAINABILITY REPORT



BOARD OF DIRECTORS

Tom Richards
Chair

Nancy Miller
Vice Chair

Ernesto M. Camacho

Martha M. Escutia

James C. Ghielmetti

Margaret Peña

Henry Perea

Lynn Schenk

Anthony Williams

Ex Officio Board Members

Honorable
Dr. Joaquin Arambula

Honorable
Lena Gonzalez

Brian P. Kelly
Chief Executive Officer

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.

On the cover: The rendering of the Kings/Tulare station highlights how the station's design accommodates passengers arriving via low-carbon modes of transit, such as bus, rideshare and shuttle service, as well as via individual modes, such as bicycles or walking. Beneath the station, crops are covered by photovolatic cells that generate solar power.

TABLE OF CONTENTS

PHOTO: Cedar Viaduct construction of the arches

MESSAGE FROM THE CEO

We are building momentum. High-speed rail in California is advancing statewide, transforming how Californians will get around and delivering real action on climate-positive strategy.

California's Legislature made a significant commitment to electrified high-speed rail this year by passing Senate Bill 198. This key piece of legislation sets the groundwork for two-track, electrified high-speed rail service between Merced and Bakersfield. This is an important step, and it positions the state to achieve the highest reduction in vehicle miles traveled in the cleanest way – by diverting intrastate travel from highways to high-speed rail.

Since we started building the high-speed rail system, our actions have been guided by the knowledge that high-speed rail is critical to our state's success in achieving its far-reaching goals to address climate change.

We are delivering a system that:

1. Interconnects with local and regional transit to create benefits for disadvantaged communities.
2. Helps California's transition to a low-carbon economy.
3. Protects endangered species and natural resources.
4. Curbs air pollution and greenhouse gas emissions, and reduce vehicle travel.

This new service will give Californians an unbeatable alternative to vehicle travel in the Central Valley – a region that has been plagued with unhealthy air quality for far too long and has had too few choices for long-distance travel. Passengers will travel from Bakersfield to Merced in 56 minutes via high-speed rail, as opposed to 2.5 hours by car. They can use the new multimodal station in Merced to connect to the San Joaquins and Altamont Corridor Express services, making it possible for them to travel from Bakersfield to Oakland, Sacramento or San José without having to sit behind a steering wheel for hours on end.

This is the value of high-speed rail travel; travel-time savings "shrink" the state, and destinations that were once viewed as "too far away" are, instead, viewed as easily reachable. We are building a system that will give people a viable alternative to driving. And no one enjoys being stuck in traffic, even if it is zero-emissions-vehicle traffic.

We appreciate our duty to minimize our project impact by preserving natural resources now. Since 2016, we have put a high priority on preserving valuable habitat. Over the past six years, we have focused on our goal that any land identified for mitigation purposes offers a habitat of equal, or preferably greater, value for special-status species to land that is being replaced. To date, the Authority has preserved and restored 2,972 acres of habitat.

We have also worked with the Department of Conservation (DOC) since 2012 to preserve agricultural land, and of the 3,190 acres approved for protection by the DOC programs, over 2,400 acres of important farmland has been protected in perpetuity.

As another way we use construction of this megaproject as a tool for greater change: we take active steps to minimize greenhouse gas (GHG) emissions during construction. We've participated in a tree-planting program in urban and rural areas of California that provides an offset for what GHGs have been produced:

- Through our Urban Forestry program, we have planted more than 7,100 urban trees since 2018 in partnership with Tree Fresno and the California Urban Forests Council. We focus on communities that are near the rail system, with special attention paid to providing benefits to disadvantaged communities.

- The rural component of the project restored more than 1,800 acres damaged by fire and pests to forests, preventing soil erosion and restoring habitats and natural ecosystems by planting native tree species.

Transparency is a critical part of our sustainability efforts. We understand how important it is that stakeholders and the public be clearly aware of the sustainability priorities for the system, how these priorities help implement wider public policy goals and how we will achieve these priorities.

We are committed to responsible leadership and management, transparency practices and sound business planning. To that end, we engage with our stakeholders to learn their thoughts on the significant environmental, social and governance (ESG) issues related to the high-speed rail project. Why is this so crucial? Because it is important that we uphold our duty to build a system that will achieve the most good for the public in the future while doing the least harm now. We are humbled by the results of a recent poll from the U.C. Berkeley Institute of Governmental Studies, results that show growing support for the high-speed rail project. California voters support continuing to build high-speed rail by a five-to-three margin, 56% to 35%. Future riders overwhelmingly support high-speed rail (65% of voters aged 18-40), and people see how high-speed rail can create more equitable mobility for all Californians (63% of those making less than $20,000 support the high-speed rail project).

We are building this system for them, and for the future.

PHOTO: FRESNO COMMUNITY TREE PLANTING.

EXHIBIT 0.0: Map of Environmental Status and Progress

Distances based on preferred alternatives identified and subject to final environmental documentation

EXECUTIVE SUMMARY

Nearly 20 years ago, California started its march to a sustainable, low-carbon future when AB 32, the California Global Warming Solutions Act, was signed into law.

California's leaders have long focused on formulating policies and funding programs to advance clean transportation, spur job growth and improve air quality. This focus is what made California's high-speed rail project possible. It's the largest, greenest infrastructure project in the country, and it's what will propel California into the future.

California is not just talking about the vision of the future. We are building that system now, and we are making tremendous progress. We have environmentally cleared more than 420 miles of the full high-speed rail system, as shown in **Exhibit 0.0**, and we are leading the nation toward a faster, cleaner and more sustainable transportation future. But before we get to the future, the system must be built, and it must be built responsibly. Sustainability is at the heart of those efforts. We are pursuing a vision of all-electric construction sites – a vision that builds on our existing requirements that all off-road construction equipment must meet the highest emission standard set by the U.S. Environmental Protection Agency.

To start, for all future construction contracts, we will require contractors to use only zero-emission vehicles (ZEV) for on-road project fleets. We are extending this to off-road fleets by mandating that:

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

We are designing our stations to meet our "net-positive energy" goal, meaning they will produce more energy on-site than they consume. Alongside this commitment, we are not forgetting who will use our stations – our passengers. We are designing stations with a focus on ease of navigation and accessibility. Our stations will feature abundant natural light and ventilation to enhance our passengers' well-being. The stations will be built to the highest LEED® standards and will make extensive use of healthy building materials.

We procured a station designer in 2022 for all four stations in the Central Valley – Madera, Fresno, Kings/Tulare and Bakersfield. As we evaluated station design bidders, we specifically reviewed bids for pass-fail elements, among which is a pass-fail requirement related to a company's environmental, social and governance (ESG) efforts, which may include any environmental sustainability efforts, socio-economic equity policies, and governance policies, or a report that conforms to certain sustainability frameworks.

For our purposes, "socio-economic equity" means making opportunities and benefits available to all applicants, employees, and affected community members regardless of socioeconomic status, and decision-making that balances the effects of decisions on vulnerable and underserved communities and individuals regardless of income, race, ethnicity, age, gender or other factors.

As we look outward from the stations, we will use an equity lens so that stations connect the communities in which they are located. Through conscious and deliberate design choices, we aim to:

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

Stations have the power to transform urban cores by reversing urban blight, revitalizing downtown areas, injecting artistic energy into station neighborhoods and creating a sense of place that all community residents feel connected to.

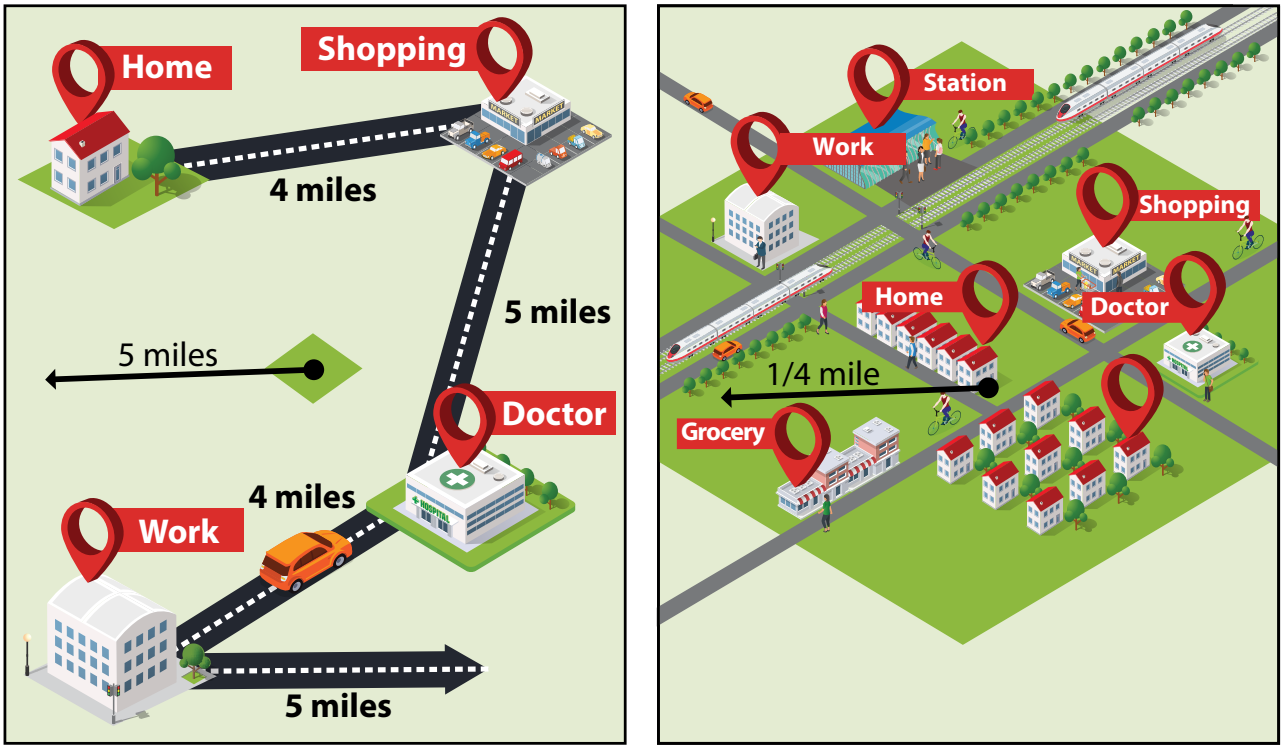
Creating "15-Minute" Communities

Our station area development plans focus offices, housing, education, health care facilities and shopping around high-speed rail stations, creating "15-minute" communities where daily needs are within walking or cycling distance, as shown in **Exhibit 0.1**. These 15-minute communities hold the greatest potential for significantly reducing daily vehicle miles traveled (VMT) within neighborhoods and will offer dramatically improved quality of life. Given the potential of smart development, high-speed rail could deliver four times more than its current projected greenhouse gas (GHG) emissions reductions.

California's high-speed rail system will offer more than just long-distance travel between cities. The Authority is working with cities so that the last mile traveled from the station is safe, quick, convenient and enjoyable. Some of these strategies include:

- Micromobility, including bike share and scooter share
- Bike parking on the station sites
- Enhanced existing infrastructure with ADA-compliant, well-shaded sidewalks
- Seamlessly coordinated and timed transfers for public transit
- Coordinated taxi, Transportation Network Companies (TNC) and ridesharing applications
- Convenient pick-up and drop-off locations near the stations
- Safe, shaded parking within an easy walk of the station entrance

EXHIBIT 0.1: REDUCING VMT EMISSIONS THROUGH INFILL DEVELOPMENT AROUND STATIONS
Left: Today, destinations in our communities are spread out, requiring the need to drive many miles every day.
Right: High-speed rail attracts businesses and others to locate near the stations, reducing the need to drive to every destination.



High-Speed Rail Provides Increased Capacity at Lower Costs

Most of California's highways, airports and rail networks are already operating at or over capacity, and California estimates that the state's population will grow to a total of 50 million people by 2050.

High-speed rail's alternatives, such as expanding airports or adding more lanes to the existing interstate and highway system, are not just costlier but would also create significant negative impacts to the environment and communities from their construction and operations.

Our 2019 Capacity Analysis Update compared the capital cost of building the high-speed rail system to the capital cost of adding highway lanes and airport runways that could supply equivalent people-moving capacity to that of high-speed rail. It would cost between $122 billion and $199 billion to provide the equivalent people-moving capacity through highway and airport expansion, according to the report, which is twice as much as the estimated range of $77 billion to $113 billion for the high-speed rail network. These highway and airport capital expenditures would also require substantially more land, necessitate extensive environmental analysis and clearances, and result in significant negative impacts on communities.

California Climate Change Assessment

Every five years, the State of California updates its statewide Climate Change Assessment. In summer of 2022 the state kicked off the creation of its Fifth Climate Change Assessment (Fifth Assessment), which is led by the California Governor's Office of Planning and Research (OPR) in partnership with the California Natural Resources Agency, the California Energy Commission and the California Strategic Growth Council.

The Fifth Assessment involves downscaling global climate projections produced by the international climate change council, the Interagency Panel on Climate Change. This involves using different statistical techniques to make Global Climate Model projections more applicable to a regional scale. The Fifth Assessment will produce a series of technical reports on research topics related to climate change. It will also include a Tribal Research Program, through which the Fifth Assessment leadership will coordinate with California native Tribes on their research needs and collect Traditional Ecological Knowledge, which is unique to each Tribe and represents their historical understanding of a place and their environmental management practices.

The California High-Speed Rail Authority was interviewed by OPR to identify research and data needs for its climate change adaptation planning. The Authority shared how it has used the findings of the last statewide climate change assessment through the state's online climate data portal, Cal-Adapt. The Authority also shared some ideas for climate change research topics and information needs related to statewide transportation. The Authority will continue to engage with the Fifth Assessment team throughout the process.

With the resolution of the funding, the future is much clearer: complete the first operating segment of true high-speed rail.

High-Speed Rail: The Backbone of California's Climate Goals

The California high-speed rail project is focused on reducing greenhouse gas (GHG) emissions and mitigating climate change for the future, while also preparing for how climate change can impact our project in the near term.

Accessible stations, serving as hubs for and bridges within station neighborhoods, will support a range of modes such as walking and biking. We are using several robust resilience frameworks and conversations with station communities to prepare for the future and make our project as resilient as possible. We are developing a climate policy that details our commitment to climate change mitigation and adaptation.

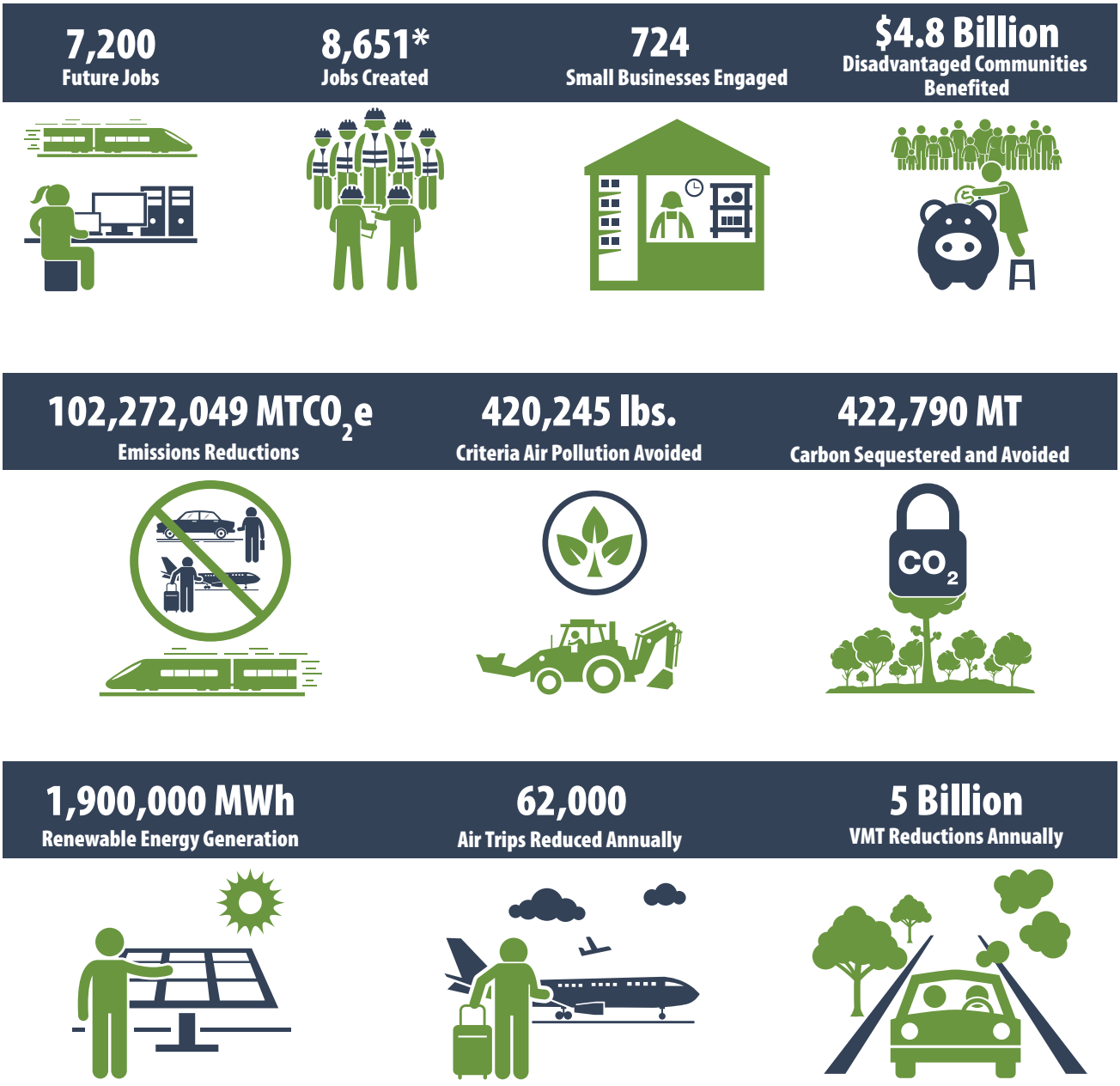
Governor Gavin Newsom's Zero-Emissions Executive Order (N-79-20) set a target of zero emissions by 2035, while Governor Edmund G. Brown Jr.'s Executive Order B-55-18 set California on the path to carbon neutrality by establishing an ambitious statewide target of becoming carbon neutral by 2045. Achieving deep emission reductions quickly requires an investment in projects that deliver short- and long-term greenhouse gas (GHG) emissions reductions.

California has invested strategically toward achieving its audacious goals and will continue to do so. The state invests proceeds from its signature Cap-and-Trade program into projects and programs that deliver on statutory requirements. Recent federal budgets have also pointed to significantly greater investment in zero-emissions transportation infrastructure, including both rail and automobile infrastructure.

High-speed rail is a valuable investment not just for the vehicle miles traveled (VMT) and GHG reductions it will deliver, but also the extensive co-benefits, as shown in **Exhibit 0.2**, that return to Californians, including those in the state who are most vulnerable. No mode of transportation delivers the speed and quality of trip at the same energy efficiency as high-speed rail. California high-speed rail is currently projected to capture 30%, minimum, of the intrastate air market and, given international experience, it is likely the system could entirely replace intrastate air markets in some corridors.

The high-speed rail system is integral to achieving carbon neutral objectives because the system will directly deliver crucial GHG emissions reductions in the transportation sector. The potential for exponential GHG emissions reductions through reduced VMT is discussed in more detail in **Chapter 6**, Station Communities and Ridership. The project's positive impact on employing targeted and disadvantaged workers, a core priority of projects funded by the Greenhouse Gas Reduction Fund, is also highlighted in **Chapter 2**, Economic Development and Governance.

EXHIBIT 0.2: HIGH-SPEED RAIL IS A VALUABLE INVESTMENT



* As of August 30, 2022
** As of June 30, 2022

Delivering the Operating Segment

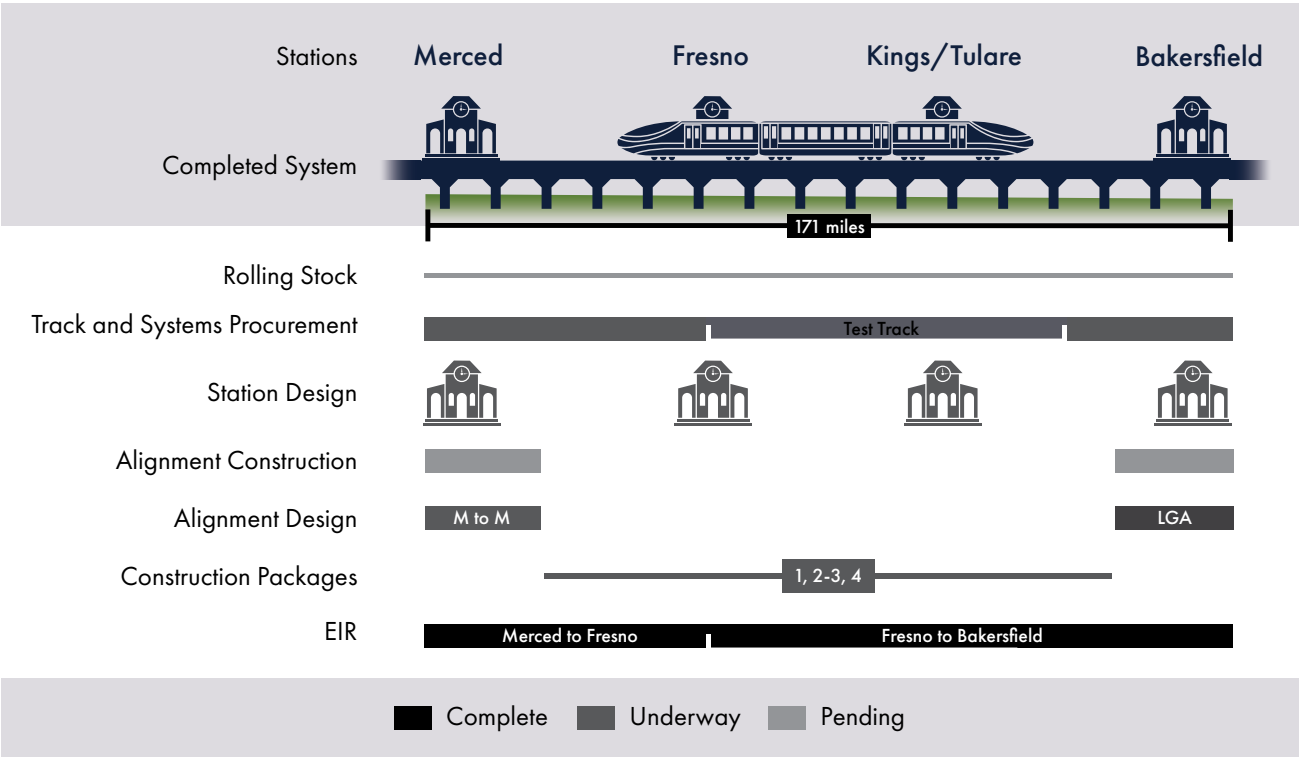
The Authority understands its mandate from stakeholders to deliver an operating segment between Merced and Bakersfield as the first element of the statewide system. The Authority has been actively issuing design and management contracts to accelerate the delivery of that first operating segment, all under the purview of its governance systems. These multiple contracts are all governed by our financial and operational requirements, are all reviewed by the Business Oversight Committee, our Executive Committee, and all conform to Board-approved budgets.

There is a tremendous amount of work underway. The environmental documents between Merced and Bakersfield have long been complete. The construction along the first 119 miles is well underway, and progress against the completion dates is detailed in our annual construction update.

In August 2022, the Authority Board approved two design contracts to complete the design work on the 171 miles of the early operating segment, into Merced and into Bakersfield. The Authority is currently finalizing procurement of a designer for the first four Central Valley Stations, with an anticipated award date of October 2022. A study is underway to organize all three rail operators, the San Joaquins, the Altamont Corridor Express and the California High-Speed Rail Authority, in Merced in one location. Procurement of a contractor to design, build, operate and maintain the Track and Systems has been underway. And looking ahead, the Authority will start procurement of the trains for the system (rolling stock) in the immediate near term.

These contracts come together into an operating system by 2030, as shown in **Exhibit 0.3**.

EXHIBIT 0.3: PROGRESS GRAPHIC



Schematic illustration of the sequence of environmental clearance, ongoing construction projects, new design contracts, and future contracts that comprise the early operating system between Merced and Bakersfield.

Creating Current and Future Benefits

Governor Newsom has provided clear, ambitious direction: Get the state to carbon neutrality as soon as possible. High-speed rail is both a part of that future – zero-carbon, interregional travel, via stations that are restorative, zero-carbon mobility hubs – and is benefiting from the ambitious policies, plans and regulations that agencies throughout the state have already put in place to transform delivery practices for infrastructure.

The numbered paragraphs below explain how the high-speed rail system aligns itself with the plans created by the state to reduce climate impacts to the California. **Exhibit 0.4** on the next two pages provides a visual representation of the ambitious programs, plans and targets the state is putting into practice. The numbers on the exhibit correspond to the paragraphs below and illustrate how the Authority is using that foundation to implement critical benefits and set up future success.

1. The goal of California's 30x30 initiative is to conserve 30% of the state's land and coastal waters by 2030. The high-speed rail program has already secured more than 2,900 acres of habitat land and will benefit from the momentum of the 30x30 initiative.
2. The Buy Clean California Act requires the Department of General Services to establish and publish the maximum acceptable Global Warming Potential (GWP) limit for four eligible materials: structural steel, concrete reinforcing steel, flat glass, and mineral wood board insulation. The High-Speed Rail Authority requires GWP limits for its major materials.
3. California's Sustainable Agricultural Lands Conservation program is providing critical support to jurisdictions and agricultural land owners to help conserve critical working lands. The High-Speed Rail Program has preserved 3,190 acres of agricultural land.
4. This year's landmark budget included an $845 million investment into training and hiring the clean energy workforce. The high-speed rail project has created more than 8,000 jobs and focused on targeting jobs for disadvantaged workers, resulting in millions of dollars of benefit to these communities.
5. Senate Bill (SB) 100, a landmark policy that sets a goal of powering 100% of retail electricity sold in California and state agency electricity needs with renewable and zero-carbon resources by 2045, has helped lead the High-Speed Rail Authority to planning solar arrays on its land that can serve our traction power load, over 45 MW for the first operating segment.
6. The State Rail Plan establishes a 2040 Vision that the rail system will carry more than 1.3 million daily trips by 2040. The high-speed rail system is the electrified backbone of that plan, delivering 106,000 daily trips.
7. The Draft 2022 Scoping Plan lays out a plan for how the fifth largest economy in the world can get to carbon neutrality by 2045 or earlier. The high-speed rail system, as a zero-carbon interregional transportation tool that catalyzes infill, plays a further role in reducing 11 billion vehicle miles travelled every year and delivering more than 100 million metric tons of greenhouse gas reductions.

EXHIBIT 0.4: NOW AND THE FUTURE


7
5
6
1

Photo: Avenue 11 overpass in Madera County.

CHAPTER 1: OUR SUSTAINABILITY APPROACH

The California high-speed rail system and its delivery are rooted in sustainability. Sustainability is at the core of our mission. It is one of the six overarching goals that guide us as we deliver high-speed rail to California. We constantly assess our efforts while building the high-speed rail system to make sure that our actions will enable current and future generations to lead healthy and rewarding lives.

We take actions in system delivery that play a critical role in helping the state achieve its forward-looking policies to address climate change, develop clean energy, create healthy communities centered around equitable transit, protect the environment and spur economic prosperity and opportunity while transitioning to a low-carbon economy.

Our Sustainability Policy

The Authority's Board of Directors, legislators, stakeholders and regulatory bodies have stressed that the high-speed rail project should exemplify sustainability in its planning, siting, design, construction, mitigation, operation, maintenance and management.

The Authority's Sustainability Policy, signed in September 2013 and updated in 2020, honors several industry sustainability and stakeholder commitments. We continuously implement a range of sustainability actions based on our policy. In 2022, we will review our materiality assessment, re-engaging with stakeholders to update and reaffirm environmental, social and governance (ESG) priorities for the California high-speed rail program. Results of this assessment will inform future updates to the Sustainability Policy, including refinements to priorities, objectives and commitments, and a clear delineation by program phase.

Our Sustainability Policy summarizes our sustainability objectives, identifies specific sustainability commitments and serves as a framework for strategically identifying directed, cost-effective approaches. It applies across all aspects of the design, construction, operations and governance of the high-speed rail program.

The policy's objectives are to minimize impacts to the natural and built environment, maximize safety and reliability, encourage walkable land development around transit stations, increase ridership and revenue, and 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.

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.

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

Our Sustainability 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 connecting more than 20 million people,

provides opportunities to shape industries and set new public-policy precedents.

We understand how important it is that stakeholders for the system, as well as the general public, be clearly aware of the sustainability priorities for the system, how these priorities help implement wider public policy goals, and how these priorities will be achieved by the Authority and its delivery teams. Authority staff and stakeholders first identified five sustainability priorities in 2012. The Authority periodically confirms the relevance of these five priorities and makes refinements to them. In 2022, the Authority is re-engaging with stakeholders to update and reaffirm ESG priorities for the California high-speed rail program.

Economic Development and Governance

Refers to responsible leadership and management, transparency practices and sound business planning.

Energy and Emissions

Refers to the conservation and type of energy resources used to construct and operate the rail systems and to the tracking and minimization of emissions (both greenhouse gas and criteria air pollutant emissions) associated with both construction and operation.

Natural Resources

Refers to the environment and its resources, addressed in and within ecological systems.

Sustainable Infrastructure

Refers to the set of 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

Refers to collaborative planning activities that (1) promote transit-oriented development and sustainable land use decisions that will help bring riders into the system and (2) encourage and promote proximity co-location for education, health and business institutions; and (3) provide ancillary consumer-concession services.

As shown in **Exhibits 1.1** through **1.5**, each priority is broken down into its commitments, which correspond to specific actions the Authority will undertake itself or through work with partners. Together, these priorities and commitments are designed to act as a unified whole to advance the overall Sustainability Policy.

EXHIBIT 1.1: ECONOMIC DEVELOPMENT AND GOVERNANCE PRIORITY AND COMMITMENTS BY PHASE

Commitments	Phase
Improve the economic value to Californians from the system and maximize benefits to disadvantaged communities.	Construction
Implement 30% overall small business participation goal for Authority contracts, including 10% Disadvantage 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 ***https://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 frameworks to benchmark our performance. Third-party sustainable rating systems, such as Envision and LEED®, help us understand our project's performance relative to objective standards and peer infrastructure projects and, more importantly, show us areas where we can improve. We currently align the high-speed rail project with the following frameworks.

GRESB Infrastructure Assessment

The GRESB Infrastructure Assessment is a globally consistent, voluntary framework that benchmarks the environmental, social and governance performance of infrastructure assets and funds. It ranks us in relation to our peers and provides useful insight into the integrity of our sustainability policies, practices and performance. It provides third-party validation of our program and leadership at an international scale.

The Authority began participating in 2015 (the inaugural year of this assessment), demonstrating our broader commitment to setting a new standard in sustainable high-speed rail infrastructure. We participated for the sixth time in 2021, maintaining our standing among leading infrastructure projects in North America.

Our participation in the GRESB Infrastructure Assessment supports our focus on attracting private investment. The GRESB assessment helps us align our reporting efforts with information that major investors find important.

Consistent High Marks

In 2021, GRESB awarded the California high-speed rail program four stars and ranked it as one of the top infrastructure projects in North America. The program improved its rating for the second year in a row, from 79 to 83.

This achievement provides third-party validation of our leading position in terms of environmental, social and governance measures at North American and international scales.

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.

The Envision framework provides a flexible system of criteria and performance objectives to aid decision-makers and help project teams identify sustainable approaches during planning, design and construction that will continue throughout the project's operations and maintenance and end-of-life phases.

The Envision framework provides a flexible system of criteria and performance objectives to aid decision-makers and help project teams identify sustainable approaches during planning, design and construction that will continue throughout the project's operations and maintenance and end-of-life phases.

In December 2020, the California high-speed rail project earned the Envision Platinum rating, making it the largest transportation infrastructure project both in terms of capital investment and geographic area to earn an Envision award for sustainable infrastructure to date.

LEED

LEED© (Leadership in Energy and Environmental Design) is the most widely used green-building rating system in the world. Available for virtually all building types, LEED provides a framework for healthy, highly efficient and cost-saving green buildings.

Green building is the planning, design, construction and operations of buildings with several central, foremost considerations: energy use, water use, indoor environmental quality, material selection and the building's effects on its site. LEED acts as a framework for decision-making for project teams in all of these areas, rewarding best practices and innovation and recognizing exemplary building projects with different levels of LEED certification.

Through its procurement practices, the Authority will require all occupied facilities to achieve LEED Platinum Certification.

Working With Industry Partners

We continue to work with established industry partners to demonstrate our commitment to sustainability. These partners include the:

- American Public Transportation Association (APTA): This international organization represents the transit industry. By becoming a signatory of APTA's Sustainability Commitment, we committed to a core set of actions that enhance sustainability.
- International Union of Railways (UIC): This worldwide professional association represents the railway sector and promotes rail transport. We signed the UIC's Railway Climate Responsibility Pledge in 2015, committing to taking action to prevent climate change, reduce our carbon footprint and support a more sustainable balance of transport modes.
- Transportation Decarbonization Alliance (TDA): This organization launched in 2018 to accelerate the worldwide transformation of the transportation sector toward a net-zero emission mobility system before 2050. California became the 19th member of the TDA and the first in North America, joining countries, cities and companies to encourage decarbonization in the transportation sector.
- California Climate Safe Infrastructure Working Group: Participation in this group enabled us to directly detail how infrastructure projects include climate change impacts in infrastructure planning, design and implementation processes.
- Governor's Office of Business and Economic Development (GO-Biz): This state agency developed a Zero Emissions Vehicle (ZEV) action plan, and with input from different agencies including the Authority, communicates ZEV priorities and objectives each agency is seeking to implement, advance and improve.
- The Sustainable Purchasing Leadership Council (SPLC): This nonprofit organization supports and recognizes purchasing leadership that accelerates the transition to a prosperous and sustainable future. The Authority participated in a State of California benchmarking exercise with the SPLC.

In addition, we look across global best practices and align our work on the high-speed rail project with those practices. One example is the United Nations' Sustainable Development Goals (SDGs), a collection of 17 global goals that the United Nations General Assembly set in 2015 for the year 2030.

The UN describes the SDGs as the "blueprint to achieve a better and more sustainable future for all". The SDGs address global challenges, including climate, environmental degradation, poverty, inequality, prosperity and peace and justice. Worldwide, 193 governments, including the United States, ratified the SDGs in 2015, and worldwide implementation started in 2016.

Materiality Assessment

Listening to stakeholders is vital. A materiality assessment is a process of stakeholder engagement and analysis undertaken to quantify the relative significance of different environmental, social and governance issues to the organization or project in question. To ensure that we continue to report on what matters most to our stakeholders, we repeated the materiality assessment process in 2022—a process that was last completed in 2018.

The Authority and the high-speed rail program have passed various project millstones since 2018, making it prudent to validate and refresh material topics covered in our sustainability program and reporting. In addition, repeating the materiality assessment supports our compliance with the latest Global Reporting Initiative (GRI) reporting standards, which are used to structure this report.

This exercise revealed that 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, and its commitments and objectives. The 2022 materiality assessment that we conducted was completed in three main steps.

Step 1: Identify Topics

We researched and identified possible topics by reviewing existing reports and priorities, peer reports, industry frameworks and regulatory changes. We then validated the initial list of possible topics internally. We then reviewed these topics with external and internal stakeholders via questionnaires and individual conversations to validate our internal perspectives.

Step 2: Prioritize Topics

We identified stakeholders based on the extent to which the groups are interested in, affected by or potentially affected by our activities. We examined the groups' ability to influence the program's outcomes and the extent to which the groups are invested in the high-speed rail program's success or failure. Below is the list of stakeholder groups that were engaged through this process, including:

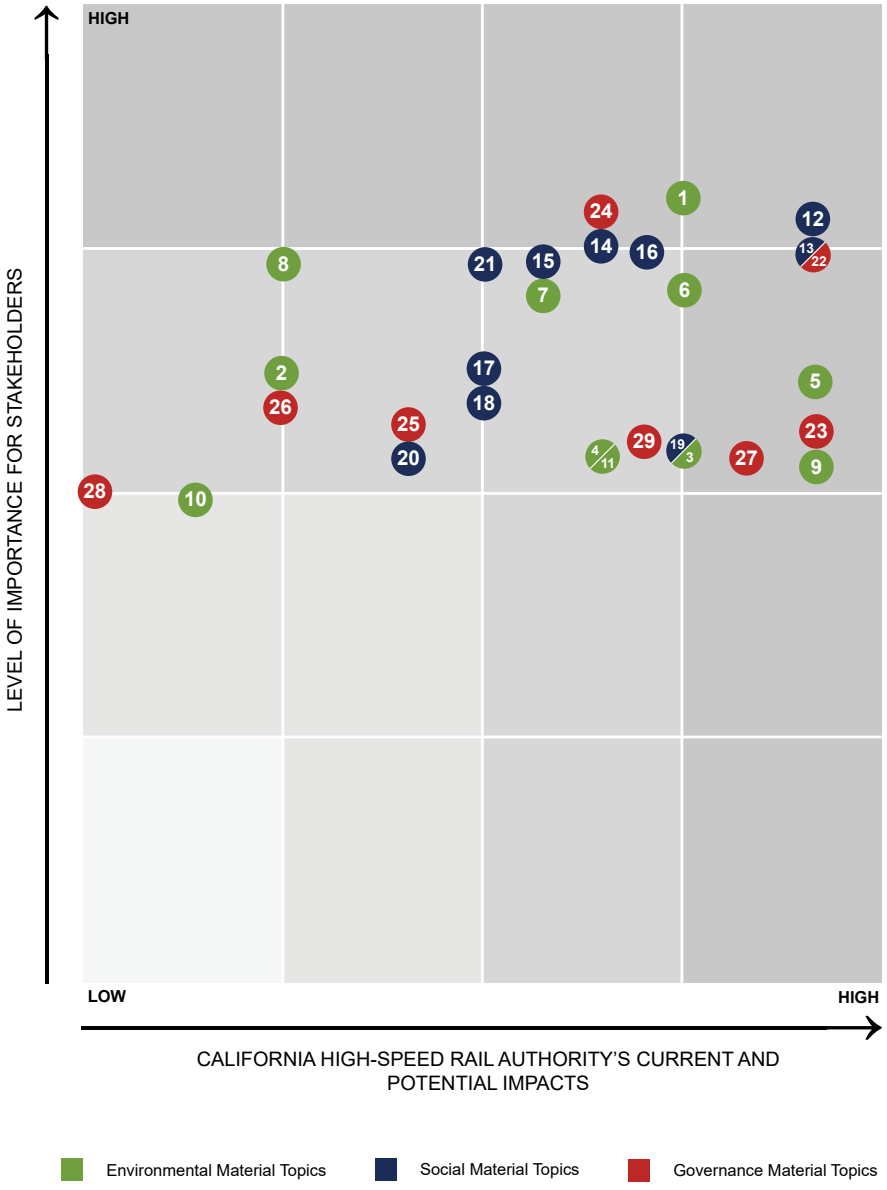
- Executive and Board members;
- California High-Speed Rail Authority key external-facing staff;
- State agencies;
- Non-governmental organizations;
- Businesses; and
- Higher education.

Step 3: Validate Topics

We analyzed all stakeholder feedback to determine which topics should be reported. We then validated the report content to ensure that it included the outcomes of stakeholder-engagement processes and covered significant organizational impacts in a balanced and transparent manner. The materiality assessment provided clarity on how to respond to increasing requests for information related to our sustainability activities, in addition to our traditional reporting. This extensive review revealed the sustainability impacts (shown in **Exhibit 1.6**) that matter most to our stakeholders.

The section below presents the topics of material 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), but many (e.g., running the system on renewable energy) have far-reaching effects external to our own operations.

EXHIBIT 1.6: CALIFORNIA HIGH-SPEED RAIL AUTHORITY UPDATED MATERIAL TOPICS (2023)



1	Greenhouse gas (GHG) emissions
2	Resilience and adaptation, including extreme weather
3	Life cycle approach, including resource protection
4	Biodiversity and ecosystem preservation/enhancement, and invasive species control
5	Land Development
6	Air, land, and water pollution
7	Energy Conservation and efficiency
8	Renewable energy
9	Water use and management
10	Waste, chemicals, and hazardous waste management
11	Noise, light, and vibration pollution
12	Health and Safety
13	Diversity, inclusion, and equal opportunity
14	Community participation, development & social cohesion
15	Transportation hub activation and mass/active transportation
16	Economic development and employment
17	Enhancing public space and amenities
18	Stakeholder Health and Wellbeing
19	Rights of Indigenous peoples
20	Organizational Culture and Labor Relations
21	Stakeholder satisfaction
22	Risk management
23	Sustainable supply chain
24	Transparency and accountability
25	Third-party assessment
26	Long-term monitoring and maintenance
27	ESG oversight and disclosure
28	Digitization and cybersecurity
29	Economic Performance Capability

Environmental Material Topics and Boundaries

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.

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 environment.

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).

Biodiversity and Ecosystem Preservation Enhancement

Protecting biological diversity of ecosystems, plant and animal species. Conserving, maintaining and restoring habitats and wildlife corridors.

Boundary: Our approach to ecosystem preservation and enhancement impacts local biodiversity.

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 (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs – a family of gases), fluorocarbons (PFCs – another family of gases), nitrogen trifluoride (NF_3) and sulfur hexafluoride (SF_6).

Boundary: Our approach to managing GHG emissions impacts state emissions-reduction commitments.

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.

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.

Lifecycle 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.

Resilience and Adaptation, Including Extreme Weather

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.

Noise and Vibration

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

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.

Socioeconomic Equity

Benefits delivered to all community members regardless of socioeconomic status, such as benefits created by station configurations, development practices, accessibility and environmental justice considerations.

Boundary: Our approach to this topic affects communities located near the high-speed rail system.

Economic Development Skills and Employment

Provision and access to training, development, employment and business opportunities, including programs targeting specific groups, such as small businesses, disadvantaged communities and veterans.

Boundary: Our approach to skills and training affects our employees, contractors, consultants and the public.

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.

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.

Community Consultation, Engagement and Participation

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.

Governance Material Topics and Boundaries

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.

Emergency and Disaster Recovery Planning

Actively planning for actions to be taken before, during and after a disaster. This includes natural, environmental or human-caused disasters.

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.

Sustainable and Local Procurement

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. (*All Authority procurements will comply with state and federal law.)

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

Third-Party Assessment

Aligning with third-party frameworks for sustainable infrastructure (e.g., the GRESB Infrastructure Assessment for benchmarking infrastructure asset sustainability policy and performance and the Envision rating system for sustainable infrastructure projects).

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

Board of Directors











Photo: Central Valley Training Center leaders at the Cedar Avenue Viaduct discuss how skills from the apprentice program transfer to real-world construction activities.

Photo: Detail work continues on high-speed rail structures.

CHAPTER 2: ECONOMIC DEVELOPMENT AND GOVERNANCE

Introduction

The Authority is delivering a high-speed rail system that will link California's economic and population centers with reduced travel times. We continue to focus on making sure that all Californians have equal access to travel time savings and economic development opportunities associated with the high-speed rail system.

We continue to focus on job creation, economic benefits, continuous improvement, transparency, accountability and maximizing opportunities for private investment while we work to deliver the system.

Our Sustainability Policy identifies our commitments related to economic development and governance, and directs our current and future actions to tailor the program to deliver economic value to all Californians.

We continue to make progress toward fulfilling our mission. Our 2022 Business Plan, which was adopted by the board on April 27, 2022, and submitted to the state legislature on May 6, 2022, explained our progress in building an organization focused on performance and delivery. We continue to improve our governance processes, and we are committed to a continuous process to improve organizational capacity and maturity.

Highlights

- As of the end of August 2022, over 8,600 construction jobs have been dispatched at construction sites along the Central Valley segment – more than 4,100 are targeted workers[1].
- As of the end of December 2021, the number of small businesses put to work on the project has increased by nearly 130% since 2015. The number of those businesses located in disadvantaged communities has grown by over 210% since 2016.
- As of May 31, 2022, Participation by certified Disadvantaged Business Enterprises (DBE) increased to 229, and Disabled Veteran Business Enterprises (DVBE) participation increased to 82 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 2006 to mid-2021, our investments generated approximately $12.7 billion to $13.7 billion in total economic activity in the state.
- With the direction of the executive team, the Authority developed a Diversity, Equity and Inclusion Taskforce in 2021 that is examining all aspects of the organization, developing action items and working to create policy initiatives to address gaps.

Effective Governance

2021 PROGRESS: In September 2021, the Board of Directors approved the creation of the Change Control Committee. The purpose of the new committee is to clarify roles and responsibilities, to bring more rigor to decision-making and more consistency to documenting the change order process.

The Authority enforces requirements on contractors, subcontractors and suppliers to ensure effective governance and transparency in everything we do. In 2021, we did not identify any significant noncompliance with environmental laws or regulations, nor have we received any fines related to these laws and regulations.

After achieving our goal of obtaining ISO 9001:2015 Quality Management System (QMS) certification in December 2020, we have continued to maintain our QMS system by exploring opportunities to enhance customer satisfaction 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.

In addition to ISO 9001:2015, we have also established a mandatory achievement of ISO-55001:2014 in our Track and Systems procurement documents to ensure that both the assets and the organization practices are managed and assured throughout the contract duration.

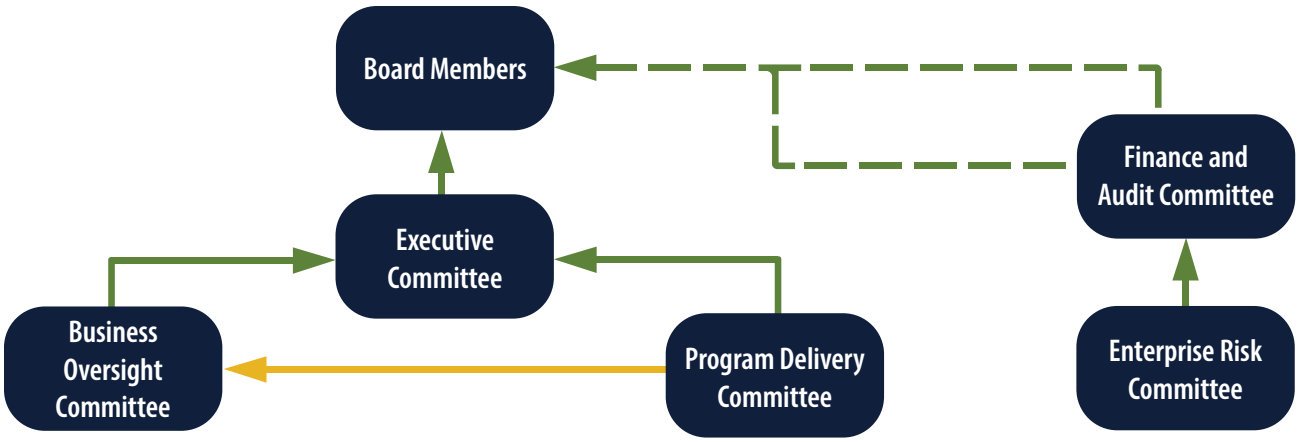
Governance Committees Structure

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

The new Change Control Committee joins the existing committees shown in **Exhibit 2.0**—the four governance committees (the Executive Committee, the Program Delivery Committee (PDC), the Business Oversight Committee (BOC) and the Enterprise Risk Committee), as well as the Administrative Committee, a non-governance committee—to deliver more rigor to internal decision-making, and accountability and transparency for major decisions for program delivery and organization. Proposed changes to the overarching program or to individual projects within the program go through the PDC and BOC for a comprehensive review of the full effects of a proposed change.

Each of the four governance committees has its own purpose, roles, organization and operation, but they regularly interact with each other to address programmatic issues.

EXHIBIT 2.0: OUR GOVERNANCE COMMITTEE STRUCTURE



The PDC, BOC and administrative committees report directly to the Executive Committee. The Enterprise Risk Committee, which was created in 2020, is an oversight body comprised of members including the CEO, the Director of Risk Management and Project Controls, and other Authority executives. The Enterprise Risk Committee evaluates and prioritizes emerging risks, reviews management risk responses and provides transparent reporting. The Enterprise Risk Committee reports to the Finance and Audit Committee, which is a subcommittee of the Board of Directors.

New Development Review Committee

The Development Review Committee (DRC) was established at the request of the CEO to apply commercial revenue development principles to the development of land owned by the Authority.

This committee consists of five core members, supported by advisors and administrators, who will review both Authority-led and unsolicited development proposals to determine their viability and their consistency with the Authority's goals. The committee will carry out the goals set forth in the Station Site Development Policy and Land Management Policy, prioritizing revenue-generating opportunities on Authority-owned land.

The committee will also review advertisements, concessions and other non-development, revenue-generating opportunities. The committee is slated to meet at least quarterly.

Reformed Right-of-Way Division

In 2021, the Authority established new leadership and a more realistic approach to acquiring right of way for the Central Valley. Following this, the number of parcels acquired each month increased and stabilized, resulting in high-priority parcels being delivered on a reliable schedule. We have now delivered 90.4% of the 2,286 parcels identified for the 119 miles of construction in the Central Valley, putting this segment on track for completion soon.

Governing Statutes and Regulations

As a public-sector entity, we are governed by regulations that ensure the development of a system that is safe, sustainable and compliant with applicable laws and requirements, as shown in **Exhibit 2.1**.

EXHIBIT 2.1: 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 Authority created an independent Risk Management Office to manage enterprise risks. This office reports directly to the Board and is overseen by the Director of Risk Management and Project Controls. Since the Risk Management Office was established, the Authority has made progress on several fronts, including:

- Completing a two-part maturity assessment focusing on cost, schedule and budget risk management;
- Conducting workshops across the Authority to identify and assess risks related to each office;
- Evaluating available risk registers for completeness and process alignment, and making recommendations to improve risk management; and
- Advancing the Enterprise Risk Management Plan and vision for the program.

Managing Risk in the Central Valley

We are continuing with our plan to advance construction through a "building block" approach, focusing first on the Central Valley between Merced and Bakersfield. This phased approach allows us to advance construction and begin operation in sections, based on available funding.

As construction advances in the Central Valley and environmental reviews are completed, we can better refine our estimates of future risks and costs. In 2021, we substantially completed all major design elements for the 119-mile Central Valley Segment and established a third-party task force to advance first-order utility work. We are now beginning to advance design procurements for the Central Valley, which will also allow us to further refine cost and schedule estimates, while also gaining a greater understanding of engineering and construction issues and risks.

Financial Responsibility

2021 PROGRESS: As of June 30, 2021, the Authority had expended $8.227 billion of capital outlay funding. We also continued regular financial reporting to the Federal Railroad Administration (FRA), as well as annual reporting to the California Air Resources Board in compliance with requirements for California Climate Investments.

It is vital that the Authority is transparent about how the construction of the rail system is funded and how this funding is being used to deliver a high-speed rail system that will help the state achieve its forward-looking policies to address climate change, create healthy communities, and spur economic prosperity, as shown in **Exhibit 2.2**.

The State of California and the federal government committed significant amounts of funding to build an electrified high-speed rail system. As of June 30, 2021:

- 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% of annual Cap-and-Trade proceeds on a continuous basis through 2030 plus one-time appropriations, facilitated by California Air Resources Board programs.
- Of this funding committed to the Authority, $13.9 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 $4.2 billion in current and future Cap-and-Trade proceeds.

In addition, the United States Department of Transportation awarded the Authority a $24 million RAISE (Rebuilding American Infrastructure with Sustainability and Equity) grant in November 2021. The Authority will use the $24 million for crucial safety, efficiency and construction projects in and around Wasco. The Authority was also awarded another $25 million RAISE grant in August 2022 to advance the project beyond the 119 miles under

construction and into downtown Merced. This funding will provide more than half of the expected $41 million cost for the Madera to Merced design contract.

Through June 2021, approximately 99% of 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 2021, more than $4.2 billion in Cap-and-Trade proceeds have been allocated to the Authority for the high-speed rail. This funding has allowed us to execute the contracts necessary to continue the 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.

EXHIBIT 2.2: FINANCIAL RESPONSIBILITY ACTIVITIES AND STATUTES

Financial Decision-Making Statutes
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 the California Air Resources Board in compliance with requirements for California Climate Investments

LINKS

- Full details of program funding and financing are available in the 2022 Business Plan: ***https://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: ***https://hsr.ca.gov/about/ board-of-directors/finance-audit-committee/***
- Details of funding agreements can be viewed online here: ***https://hsr.ca.gov/about/capital-costs-funding/funding-agreements/***

Engaging Suppliers

2021 PROGRESS: The Authority continued coordination with other agencies focused on supply chain issues and established performance thresholds for embodied carbon for concrete and steel.

Our sustainable procurement approach is intended to scale to all sizes of suppliers to the high-speed rail program. The 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. The Authority also continued to convene a working group focused on sustainable procurement. In 2021, the Authority began drafting a Sustainable Procurement Policy to ensure the alignment of its procurement practices with its environmental, social and governance priorities. The Authority will continue to develop this policy and its corresponding procedural documents in 2022.

As we work to finalize the Sustainable Procurement Policy and establish environmental, social and governance targets and requirements for the supply chain, we will also identify how the targets and requirements can be scaled so that small businesses can participate. We currently monitor the environmental impacts of the purchases we make and engage 100% of significant new suppliers through procedures, guideline specifications and contract documents to ensure that high-speed rail procurements meet our sustainability criteria.

Job Creation

2021 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 2020-21 yielded 10,100 direct, indirect, and induced job-years.

One of the high-speed rail project's signature benefits is the ongoing creation of jobs in designing, planning and constructing 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 2021, the Authority invested more than $8.227 billion in planning and building high-speed rail infrastructure, generating significant economic impacts for California's economy:

- Job-years of employment: 64,000 to 70,500
- Labor income: $4.8 billion to $5.2 billion
- Economic output: $12.7 billion to $13.7 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 direct and indirect impacts induce statewide economic activity by pumping money back into local and regional economies.

Jobs in the Central Valley

During this time of economic uncertainty spurred by the ongoing COVID-19 pandemic, it's evident that investment in good-paying transportation infrastructure jobs is key to combatting unemployment. Although uncertainty related to the pandemic and supply chain has continued, California's unemployment rate saw an overall decline from 8.8% in January 2021 to 5.8% in January 2022[2].

High-speed rail construction in the Central Valley continues to support employment across the state by creating jobs. **Exhibits 2.3** and **2.4** 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 2.3: JOBS DISPATCHED BY CONSTRUCTION PACKAGE SINCE INCEPTION (AS OF JUNE 30, 2022)

EXHIBIT 2.4: CONSTRUCTION HOURS BY CONSTRUCTION PACKAGE SINCE INCEPTION (AS OF JUNE 30, 2022)

Jobs In Other Regions

Additionally, connectivity and bookend projects provide jobs in Southern and Northern California, as shown in **Exhibit 2.5**. 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 to 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 ***https://hsr.ca.gov/programs/economic-investment/***.

EXHIBIT 2.5: ECONOMIC BENEFITS BY REGION (JULY 2006 - JUNE 2021)[3]

Economic Impacts	Northern California (Sacramento and the Bay Area)	Central Valley	Southern California
Job-Years of Employment	19,100	29,600	9,200
Labor income	$1.52 B	$1.7 B	$680 M
Economic output	$3.5 B	$5.4 B	$1.8 B

Future Jobs in Operations and Maintenance Facilities

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. As the system expands further and MOW and LMF sites are added, staffing will grow and be located strategically along the line for effective and efficient maintenance, operations and oversight.

Exhibit 2.6 shows the estimated economic impacts of staffing the five 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 2.6: 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 2.7 shows the estimated job-years created by staffing the five maintenance facilities over a 10-year span of operation.

EXHIBIT 2.7: 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

* 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.

Small Business Program

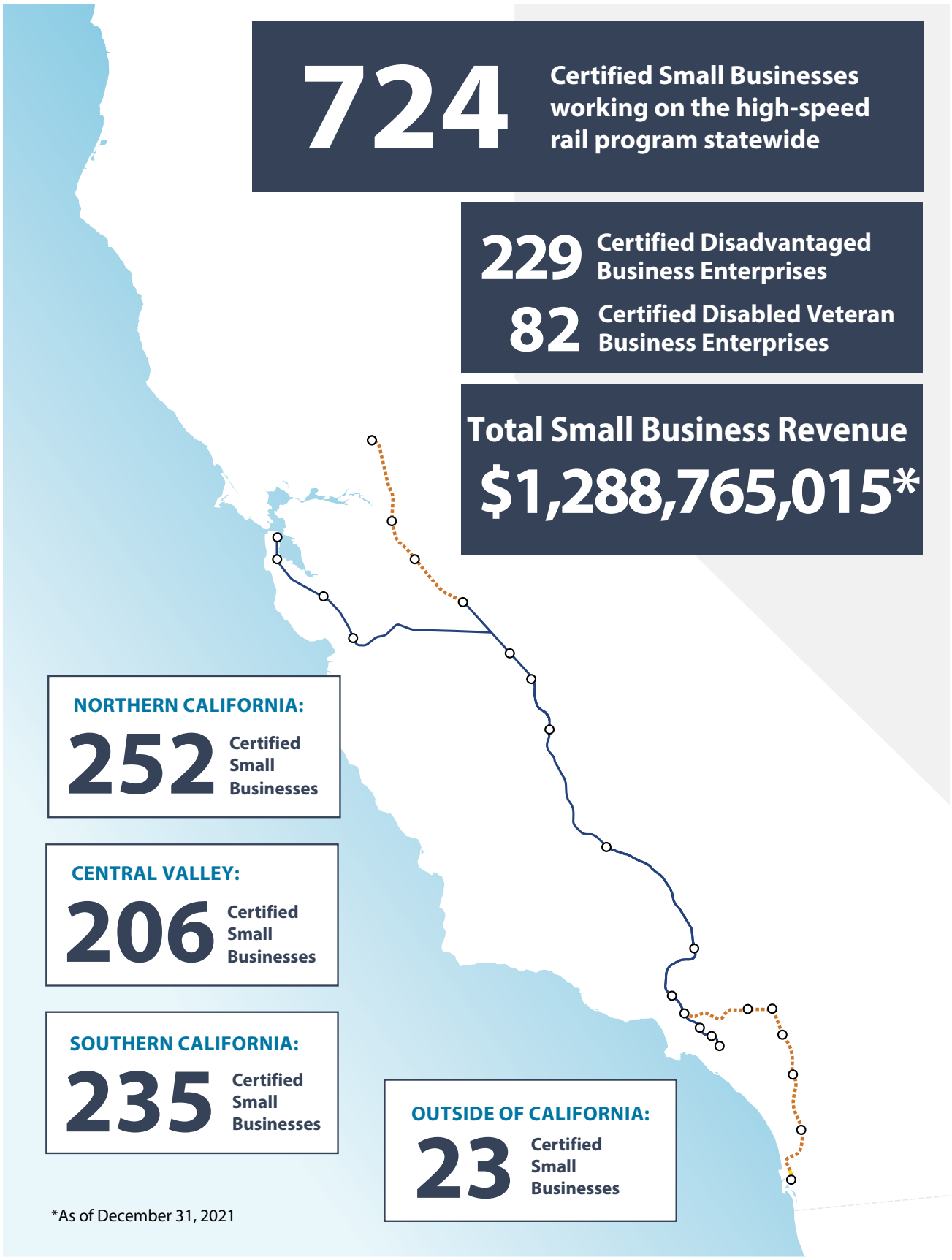
2021 PROGRESS: The small business program continued to grow in 2021, with additional small businesses joining and benefiting from the program. As of June 30, 2022, there were 724 certified small businesses working with the Authority on the high-speed rail program statewide.

We are committed to ensuring that small businesses play an active role in building the high-speed rail program, as shown in **Exhibit 2.8**. Our Small Business Advocate oversees our Small Business Program and guides our efforts to meet our aggressive 30% 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% participation for DBEs and 3% for DVBEs.

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

PHOTO: Small businesses play an important role in the high-speed rail project (photo taken pre-COVID restrictions).

EXHIBIT 2.8: SMALL BUSINESS PARTICIPATION MAP AS OF JUNE 30, 2022



Opportunities For Disadvantaged Workers

2021 PROGRESS: Through the end of 2021, the construction packages included 4,192 targeted workers, 66% of the total construction labor jobs and more than double the 30% 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 2020-2021, 57% of the investment in the system occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas. Additionally, more than half (57%) of the total program investment from July 2006 to June 2021 occurred in designated disadvantaged communities.

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

The CBA's Targeted Worker Program ensures that 30% 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). The program also requires that at least 10% of those work hours are performed by Disadvantaged Workers.

As of December 2021, 6,372 construction labor jobs have been dispatched to the three high-speed rail construction packages in the Central Valley, including 4,192 Targeted Workers. This 66% rate is more than double the 30% goal.

For more information on Targeted Workers and Disadvantaged Workers, see our Community Benefits Fact Sheet at ***https://hsr.ca.gov/wp-content/uploads/docs/communication/info_center/factsheets/CBA_Factsheet.pdf***.

Central Valley Training Center Update

The California High Speed Rail Authority partnered with the City of Selma to create the Central Valley Training Center, a workforce development center that provides pre-apprenticeship classes and hands-on construction training for residents up and down the Central Valley who are looking for work on the nation's first high-speed rail project. The Central Valley Training Center and its programs are open to all Californians and have served many veterans, at-risk young adults, minority and low-income populations within Fresno, Kings, Tulare, Kern, Madera and Merced counties with a comprehensive and innovative look into careers in more than 10 different construction trades.

With small classes of 30 students and a succinct 12-week term, students receive pre-apprenticeship and hands-on construction training from professional carpenters, cement masons, electricians and other construction specialists. In addition to technical skills, students also learn soft skills such as active listening, teamwork, ethics and more.

To date, the Central Valley Training Center has received 1,050 applicants. Since welcoming its first group of 30 students in October 2020, 95 people have graduated from the program. Upon completion of the program, graduates receive job-placement assistance from the high-speed rail program and its contractors. New cohorts are scheduled to begin approximately every two months at least through November 2022.

Fostering Diversity And Equal Opportunity

2021 PROGRESS: As of May 31, 2022, 229 certified Disadvantaged Business Enterprises (DBE) and 82 certified Disabled Veteran Business Enterprises (DVBE) were working on the project. The Authority has surpassed its milestone of 500 certified small businesses with 724 at work on the program as of May 31, 2022. Additionally, 482 disadvantaged workers have been dispatched to worksites since the project began. Despite most events taking place virtually in 2021, the Authority continued to carry out environmental justice outreach in over 30 events to reach disadvantaged communities.

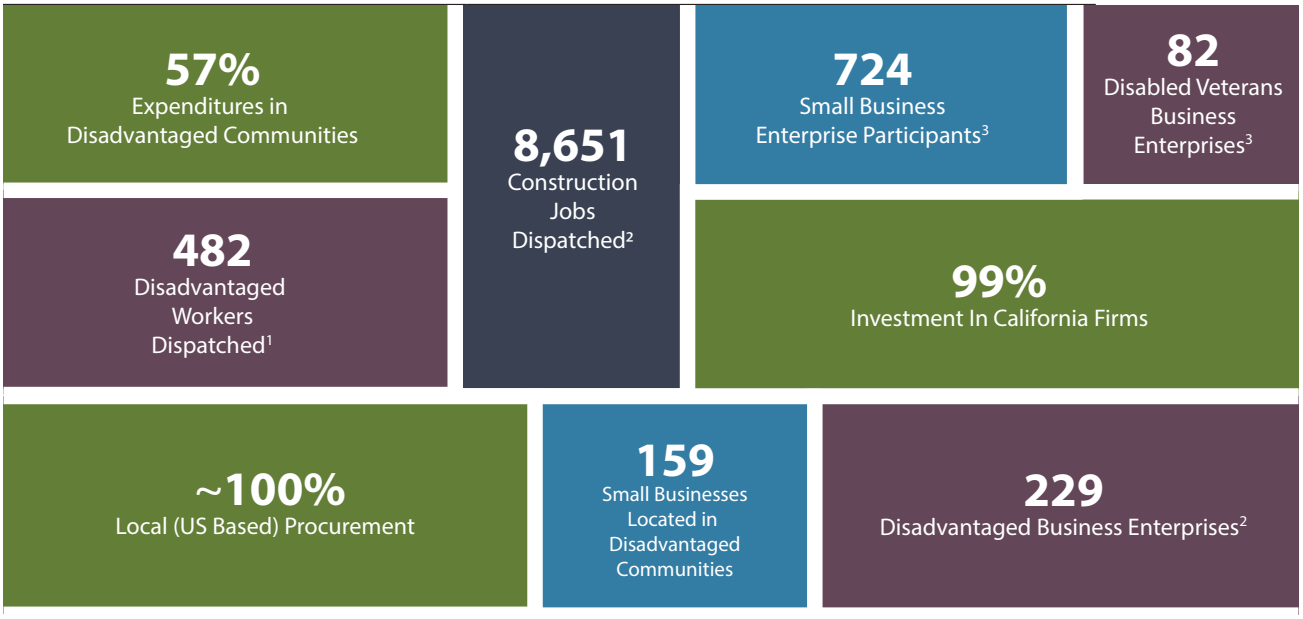
We believe strongly in equal opportunity for all and strength in diversity, as shown in **Exhibit 2.9**. We are committed to ensuring that no person is excluded from participating in any program or activity associated with the design, construction and operation of the high-speed rail system based on 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.

Of the 724 certified small businesses working on the high-speed rail program statewide as of May 2022[4]:

- 109 are woman-owned firms
- 66 are Hispanic-owned firms
- 36 are African American-owned firms
- 35 are owned by members of the Asian Pacific community
- 18 are owned by members of the Asian Subcontinent community
- 5 are Native American-owned firms

It is our policy and practice to provide free language assistance whenever individuals with Limited English Proficiency (LEP) request assistance. An individual with LEP is a person who does not speak English as their primary language and who has limited ability to read, write, speak or understand English. More about our Title VI program can be found on our website at ***https://hsr.ca.gov/programs/title-vi/***.

EXHIBIT 2.9: CREATING OPPORTUNITIES FOR DISADVANTAGED WORKERS AND FOSTERING DIVERSITY



[1]As of June 30, 2022; [2]As of August 30, 2022; [3]As of May 31, 2022; All others as of December 31, 2021

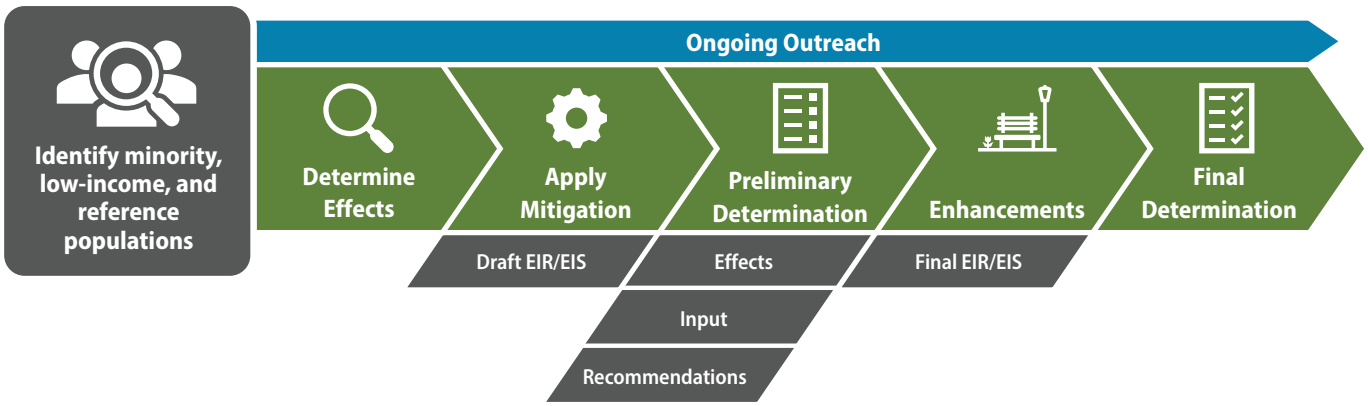
Environmental Justice

Progress toward a clean, safe and healthy environment for all Americans has resulted in uneven and unequal distribution of environmental benefits. Members of minority and low-income communities disproportionately bear the burdens of a polluted environment. Environmental Justice (EJ) addresses the unequal environmental burden often borne by minority and low-income populations.

The Authority is committed to upholding EJ principles—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. We created an EJ program to ensure that our program, policies and activities incorporate EJ principles to mitigate disproportionate adverse impacts, particularly on minority LEP and low-income populations.

In March 2022, the Authority revised its Environmental Justice Policy (POLI-1089) to reaffirm the Authority's commitment to identifying and addressing potentially adverse effects of its activities on minority and low-income populations. Environmental Justice 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 2.10**. The final environmental documents will lay out the steps that the Authority will take to offset disproportionately high and adverse effects on low-income and minority populations.

EXHIBIT 2.10: MITIGATION AND ENHANCEMENTS PROCESS



For example, the Authority and the FRA engaged extensively with stakeholders in the San José to Merced project section, beginning with scoping in 2009 and continuing through the release of the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) in February 2022. Public engagement activities were held prior to the release of a Draft EIR/EIS to solicit community input and concerns regarding the potential effects of the project on minority populations and low-income populations. After the Draft EIR/EIS was released, the community was again engaged to consider comments on the Draft EIR/EIS and any additional mitigation efforts to incorporate, and to conduct a more thorough analysis of the effects of project benefits.

As a result of these engagement efforts, stakeholders in the San José to Merced project section identified adverse impacts, including noise and vibration concerns, traffic congestion, aesthetics and visual quality, air quality, and displacement. To mitigate these concerns, the Final EIR/EIS document released in early 2022, with a Record of Decision in Spring 2022, proposes an array of offsetting measures including noise treatments, streetscape improvements, funding to local communities such as libraries and recreational areas, pedestrian safety improvements and investments in affordable housing. These mitigation efforts are now a part of the San José to Merced project section and the Authority's commitment, once funding for the project section becomes available.

For more information about the environmental planning process and additional details about each project section, visit ***https://hsr.ca.gov/programs/environmental-planning/***.

Environmental Justice Policy

The primary purpose for the Authority's Environmental Justice Policy is to identify and address the potential for disproportionately high and adverse effects of our programs, policies and activities on minority and low-income populations. The policy also requires fair and equal treatment of all races, cultures, and minority and low-income populations during the development and adoption of environmental laws and policies in keeping with state and federal environmental justice guidelines.

The Environmental Justice Policy further supports the following goals of the Authority:

- Protect environmental quality and human health in all communities;
- Apply environmental and civil rights laws to achieve fair environmental protection;
- Promote and protect community members' rights to participate meaningfully in environmental decision-making that may affect them; and
- Promote full and fair opportunity for access to environmental benefits and minimize activities that result in a disproportionate distribution of environmental burdens.

Photo: Attendees and elected officials, including Congresswoman Jackie Speier and state Senator Scott Wiener, attending Caltrain's celebration of completing the installation of the overhead catenary system poles for the Caltrain Electrification Project.

CHAPTER 3: ENERGY AND EMISSIONS

Introduction

California is decarbonizing the transportation sector for one crucial reason: it continues to represent the largest share of the greenhouse gas emissions problem. California has been aggressive in transit and rail investment as well as creating incentives and requirements for zero emissions vehicles. We focus on delivering the highest capacity, fastest and zero-emissions system for the state of California and in delivering a power system the greenest possible electricity.

The speed of travel on the system has an essential benefit—billions of vehicle miles not traveled on California roads and tens of thousands of flights reduced. Electric high-speed rail is a crucial part of the pathway to California's net-zero near future.

Given our central purpose, transforming long-distance travel in California, and the nature of our operations, energy and emissions are a primary focus for the program. In 2008, our board recognized the power of setting a clear goal, and we committed to running the high-speed rail system's trains and facilities entirely on 100% renewable energy. They also committed the system to net zero construction greenhouse gas emissions and criteria air pollution. These are signature commitments that we provide an update on in this chapter.

Highlights

- On Earth Day in April 2021, we announced that we will require contractors to solely use zero-emission vehicles (ZEV) for their on-road project fleets in all future construction contracts. By 2030, 10% of off-road equipment must be ZEV at the start of a contract, with the goal of 100% ZEV for off-road construction equipment by 2035, where feasible.
- We advanced other aspects of our net-zero energy and renewable energy goals.
- Contractors reported an 8% increase in electricity consumption and a 50% decrease in gasoline consumption from 2020 levels, despite an over 55% increase in construction activity based on construction hours.
- In 2021, we achieved a net-positive balance, offsetting more greenhouse gas 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 64% to 74% lower than a typical fleet.

Committing to Renewable Energy

2021 PROGRESS: We continued confirming the details of a preferred approach through extensive financial modelling, review of regulatory structures, and initiated the configuration of the proposal into the Authority program. Modeling and analysis continued with a focus on optimizing the size of batteries to enable a range of operating scenarios.

The Authority will carry out detailed coordination with the California Independent Systems Operator and California Public Utilities Commission to determine and resolve any regulatory issues as we approach important milestones, including initiating interconnection agreements.

Building Sustainable Power

Battery storage continues its rapid increase in efficiency. Cost-efficiency and reliability are critical to successful operation. Our current strategy to operate on 100% renewable energy reduces operating costs and mitigates risks to the system's power supply. We have identified an effective strategy for 100% renewable energy: solar generation with battery storage on land that we own.

Staff are further refining the steps for power generation and renewable power purchases where necessary. The most promising strategy is to use land owned by the Authority for solar generation and battery storage resources. We will finalize the procurement strategy, continue socialization and coordination with regulatory bodies, and possibly seek additional grant funding in 2022. All this work will be done in coordination with the track and systems procurement and contract timeline.

As the Authority refines energy specifications and requirements for its future procurement documents for a solar and battery storage solution, close coordination with the future Track and Systems contractor will include examining power-connection points. The future train manufacturer is another critical player in the electricity demand of the system. The intention is to complete construction of the system in time for testing.

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

2021 PROGRESS: The Authority used contract performance requirements to implement net energy-positive infrastructure maintenance facilities. Furthermore, the Authority continued investigation of district opportunities at station areas in the Central Valley and incorporated requirements to complete district utility studies into procurement requirements for the Central Valley stations. The goal is to take advantage of synergies and restorative opportunities between the station facilities and surrounding communities.

Our stations are future hubs of electrified transportation fueled by renewables. They should be comfortable, shaded, energy and water-efficient destinations for customers and help restore the surrounding community. We will design all high-speed rail stations to function as high-performance buildings that provide low-cost operations by maximizing efficiency. 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 could be supplied by building-integrated elements, such as solar thermal or photovoltaics. We will adopt passive building design approaches to take advantage of the on-site natural and renewable energy sources in efforts to minimize energy demand and reliance on active heating and cooling systems.

Energy Use

2021 PROGRESS: The Authority continues to make significant progress on the first 119 miles of construction. As of the end of 2021, more than 70% of construction is complete on Construction Package 4, and about 50% on Construction Packages 1 and 2-3. Despite making strong progress in construction activities, the Authority was able to decrease fuel consumption in 2021.

Energy Use in Construction

Contractors engaged by the Authority use energy sources, such as fuel and electricity, to power construction and related equipment, as well as site/field offices. The Authority continued to monitor fuel and electricity consumption throughout construction in 2021.

Fuel Consumption

On- and off-road diesel fuel consumption decreased by over 2%, while gasoline fuel consumption decreased by over 50% from 2020. In total, energy consumption of vehicle fuels decreased 16% compared to 2020. This decrease in fuel consumption does not mean that construction slowed down in 2021. In fact, there was a 55% increase in construction activity in 2021 compared to 2020, as measured by the number of construction hours worked.

The decrease in fuel consumption is largely due to the transition into later phases of construction where the need for large, off-road pieces of equipment (such as excavators and hauling trucks) decreased because much of the demolition has been completed. Compared to 2020, there was a 12% decrease in the number of off-road pieces of equipment in 2021, and a nearly 20% decrease in the number of hours those pieces of off-road equipment were in use.

Future construction packages, including the track and systems contract, have provisions that require contractors to use zero-emissions vehicles for travel that occurs on construction sites. These are anticipated to lead to reductions in fuel use during construction over time.

Electricity Consumption

In 2021, electricity consumption was 17,911 gigajoules (GJ), a nearly 15% increase over 2020, due to the increased electricity consumption from construction, Authority and RDP offices. During 2021, approximately 31% of the total kWh that each contractor reported consuming was sourced from renewable energy, compared to 28% in 2020.

Energy Use in Offices

2021 PROGRESS: In 2021, we estimate that the electricity consumption for powering computers, lights, and heating and cooling systems increased by approximately 22% compared to 2020, which is proportionate to the increase in Authority and Rail Delivery Partner (RDP) staff during that same period.

As the number of personnel dedicated to the program increased in 2021, so too did energy consumption in offices. In addition, 2021 saw the beginning of a transition back to offices after the COVID disruptions in 2020.

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 2021

Consumption Type	Units	Quantity
Off-Road Diesel Consumption	Gallons	720,582
On-Road Diesel Consumption	Gallons	291,945
On-Road Gasoline Consumption	Gallons	198,321
Construction Office Natural Gas Use	Therms	3823
Energy Content of Diesel, Gasoline, and Natural Gas Consumed	GJ	173,979
Construction Electricity Consumption	MWh	2,588*
Authority and RDP Office Electricity Consumption	MWh	2,387**
Construction Renewable electricity	%	31
Energy Content of Electricity Consumed	GJ	17,911***

* Last year's report incorrectly reported this figure as MWh, when it was showing the amount of electricity consumed in kWh.
** Authority Office electricity consumption is estimated based on number of Authority and Rail Delivery Partner (RDP) staff working on the project in 2021. 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.
*** Previous years' calculations used kWh to complete this calculation when MWh should have been used. This report has corrected this error and reports the figure in GJ to align with the energy content of fuel consumed.

Regulatory Compliance (Energy)

2021 PROGRESS: The California high-speed rail program complied with all applicable energy-related policies, laws, standards and regulatory guidelines in 2021.

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 2013 Building Energy Efficiency Standards;
- 2019 California Green Building Standards Code (CalGreen Code) Title 24, Part 11;
- 2008 California Long-term Energy Efficiency Strategic Plan;
- Memorandum of Understanding between the Authority and the California Energy Commission; and
- SB 350 (De León) Clean Energy and Pollution Reduction Act.

Reducing GHG Emissions

2021 PROGRESS: Our early investments in upgrading regional rail systems, referred to as "bookend" and "connectivity" projects, will reduce GHG emissions now and into the future. For example, the Caltrain Electrification Project in Northern California is one of the main early investments that will provide immediate benefits by improving system performance, reducing noise, improving air quality and lowering GHG emissions. This project is well underway, and electrified Caltrain service is anticipated to start in 2024. We continue to apply innovative construction practices, such as the durable concrete mix designs in Construction Package 1 (CP 1) that use 25% fly ash for cement and 100% recycled steel with global warming potential scores below industry average.

This underscores the importance of striving to deliver truly clean transportation. 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% 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 in constructing and operating the system, fuel burned in construction vehicles and equipment, electricity consumed in offices, and waste treatment and recycling.

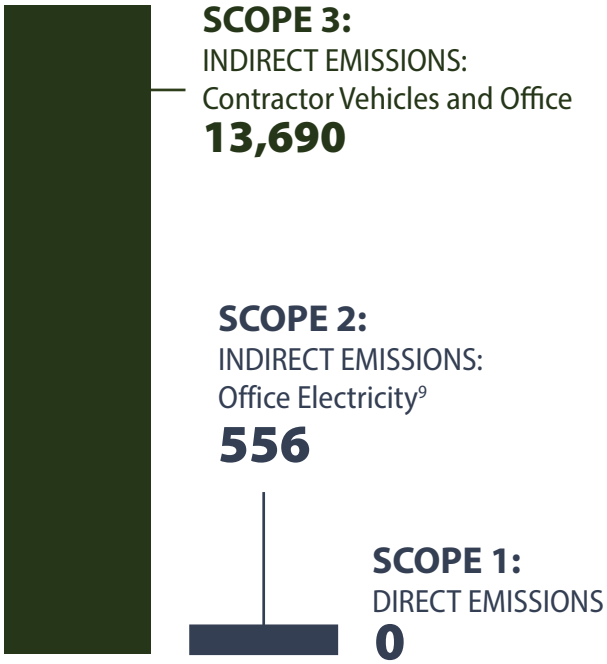
Using an operational control approach, the Authority tracks GHG emissions across emissions scopes, as shown in **Exhibit 3.1**, per the Greenhouse Gas Protocol and with reference to ISO 14064-2:

- 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.

We continuously look for opportunities to reduce emissions, including fuel and energy conservation; 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 2021, avoided emissions from recycling totaled 3,291.5 $MTCO_2e$.

EXHIBIT 3.1: 2021 ANNUAL GHG EMISSIONS (IN MTCO2E)



EMMA

The Environmental Mitigation and Management Application, or EMMA, is a robust database to streamline sustainability reporting and facilitate data quality assurance. EMMA is used to track environmental and approval requirements for each contract. The contractor is required to submit all mandatory sustainability related indicators in EMMA. The Authority uses EMMA to verify the accuracy of reported data for key data fields. It also has a built-in workflow to ensure multi-level review of data quality and contains built-in dashboards to track contractor performance against requirements.

Field staff working on certain segments of CHSR have been using EMMA and found that it complements field oversight of construction activity, and vice versa. Field staff review EMMA data submittals critically to evaluate the conformance of reported information with field observations. EMMA's data collection capabilities can reveal trends or patterns that highlight issues that field staff may have missed. Field staff can therefore utilize EMMA data to better inform oversight of construction activity.

EMMA is also a centralized location where large quantities of construction submittals documenting sustainability will be submitted and reviewed. In 2021, the platform went through several rounds of user acceptance testing and development. In 2021 the Authority's development team continued to customize this web-based tool to streamline and enhance data collection, review, and analysis.

Emissions by Scope

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, the Authority discloses the energy it takes to construct and operate the system both in energy terms (see the Energy Use in Construction section) and in units of carbon dioxide equivalents. The calculation of those 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 combination of modeled and actual emissions and is based on the best available information. It is periodically updated.

The Authority is currently meeting its commitment to zero-net construction emissions. Through planting more than 7,100 urban trees and completing more than 1,804 acres of forestland projects (forest replanting), more than 143,000 $MTCO_2e$ will be sequestered over the trees' life cycle. This offsets the 60,257 $MTCO_2e$ that have been generated during construction since 2016. In addition, more than 272,000 $MTCO_2e$ have been sequestered or avoided through habitat and agricultural land conservation. Finally, more than 116,400 $MTCO_2e$ have been avoided through recycling since 2015.

EXHIBIT 3.2: GHG EMISSIONS BY SCOPE: 2015-2079

	Indirect - Upstream		Direct - System	Indirect - Downstream and Avoided Emissions	
Construction	**SCOPE 3** SUPPLY CHAIN Sustainable procurement requirements and baseline setting	**SCOPE 3** CONTRACTOR FLEET Actual mobile equipment emissions during rail construction: 60,987 $MTCO_2e$[9]	**SCOPE 1** AUTHORITY RAIL DEVELOPMENT Net-zero direct emissions from rail construction	**SCOPE 3** DISPOSAL/ RECYCLING 116,448 $MTCO_2e$[10] avoided emissions through recycling and reuse to date	**OFFSET/AVOIDED EMISSIONS** TREE PLANTING 143,000 $MTCO_2e$ program balancing fuel-based emissions from construction
Operations	**SCOPE 3** SUPPLY CHAIN Sustainable procurement of rolling stock and operations supply	**SCOPE 2** RENEWABLE POWER 100% renewable power for train operations	**SCOPE 1** AUTHORITY RAIL OPERATIONS Zero emissions generated from electric powered operations	**OFFSET/AVOIDED EMISSIONS** VMT + AIRTRIPS SAVED 84-102 Million $MTCO_2e$ avoided from vehicle and short-haul air trips	**OFFSET/AVOIDED EMISSIONS** ADDITIONAL SAVINGS Savings from compact land use

Reducing GHG Emissions During Construction

2021 PROGRESS: The Authority continued to use binding contract provisions to minimize GHG emissions during construction. In 2021, our construction vehicles emitted over 65% less black carbon than a typical fleet. Furthermore, our construction vehicles emitted 46% 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 ***https://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% zero-emission vehicles (ZEVs) for on-road contractor fleets in all future infrastructure construction contracts, as well as 10% ZEV for off-road equipment by 2030 with the goal of 100% ZEV for such equipment by 2035, where feasible;
- Achieving net-zero tailpipe GHG emissions in construction through carbon sequestration projects;
- Requiring Environmental Product Declarations (EPD) 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; and
- Integrating climate adaptation and resilience principles into the design, construction and operation of the system.

Zero Emission Vehicles

In honor of Earth Day 2021, we announced that we will require contractors to use only zero-emission vehicles (ZEV) for on-road project fleets for all future construction contracts. With ZEV technology improving and more options becoming available, the requirement for 100% ZEVs for project fleets is a significant step toward reducing GHG emissions.

The policy also leverages its large size to encourage 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% of off-road equipment be ZEV, at the start of a contract, by 2030; and
- 100% ZEV for off-road equipment by 2035.

This policy further refines 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 also support our commitment to reducing air pollutant emissions. Through our ongoing research and procurement requirements, we have collaborated with GO-Biz and their ZEV initiatives to share lessons learned and continue to advance the adoption of ZEVs in the state.

Sequestering and Reducing GHG Emissions Now

The Authority has partnered, for the past several years, with the California Department of Forestry and Fire Protection (CAL FIRE) on a tree-planting program in urban and rural areas of California, with the goal of delivering carbon sequestration to balance, or offset, the remaining direct (tailpipe) GHG emissions associated with constructing the Central Valley Segment.

Although the current tree planting project has closed out, we anticipate planting hundreds of thousands of trees across California over time to improve air quality and quality of life in priority communities, and to reduce energy use and stormwater runoff.

The Urban Forestry program focused on communities that are near the rail system, with special emphasis on providing benefits to disadvantaged communities. Since 2018, more than 7,100 urban trees have been planted in partnership with Tree Fresno and the California Urban Forests Council. For more information about the Urban Forestry program, see the Authority's Sustainability web page at ***https://hsr.ca.gov/programs/green-practices-sustainability/sustainability/***.

The rural component of the project restored more than 1,800 acres damaged by fire and pests to forests, preventing soil erosion and restoring habitats and natural ecosystems by planting native tree species.

Reducing GHG Emissions in Operations

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. Without high-speed rail, there is no alternative for intrastate air travel.

High-speed rail contributes to reducing GHG emissions in the state as soon as it starts operating. Every mile traveled on high-speed rail is a mile of avoided travel by automobile or airplane. The emissions associated with these less energy-efficient forms of travel will be significantly avoided by traveling on the high-speed rail. On average, annual GHG emissions reductions are projected to be 2 million metric tons of carbon dioxide equivalent ($MMTCO_2e$).[5]

Emissions Reduction Calculation

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 Scoping Plan.

Our methodology to calculate projected GHG emissions has remained consistent, relying on a quantification method developed with the California Air Resources Board. 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.[6] Using this analytic technique enables all fuel types to be evaluated on equal terms.

In **Exhibits 3.3** and **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 lifecycle 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 EMISSIONS AVOIDED WELL-TO-WHEELS

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% renewable-energy-powered high-speed rail.

EXHIBIT 3.4: PROJECTED ANNUAL GHG EMISSIONS AVOIDED FOR PHASE 1 WELL-TO-WHEELS

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 following policies and statutes:

Statutes
Assembly Bill 32 (Núñez, 2006), the California Global Warming Solutions Act of 2006
Senate Bill 32 (Pavley, 2016), requiring the California Air Resources Board, 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, 2013-2014), Greenhouse gases: emissions reduction
Assembly Bill 1550 (Gomez, 2016), prescribing GHG reduction fund investment in disadvantaged communities
Assembly Bill 617 (Garcia, 2017), required the California Air Resources Board to establish a Community Air Protection Program to focus on reducing exposure in communities most affected by air pollution
Policies
California Air Resources Board 2008 Scoping Plan and 2013 Scoping Plan Update, which identify the high-speed rail system as a measure for GHG reduction
Greenhouse Gas Emissions Reduction Fund (Cap-and-Trade Auction Proceeds) Third Investment Plan: Fiscal Years 2019- 20 through 2021-22, in which the system plays a key role

Protecting Air Quality During Construction

2021 PROGRESS: We currently use Tier 4 equipment in construction—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 announcement furthers this commitment by requiring contractors to incorporate zero emission vehicles into their vehicle fleets and off-road equipment.

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 3.5**.

EXHIBIT 3.5: 2021 CRITERIA AIR POLLUTANTS EMITTED AND AVOIDED (TYPICAL CALIFORNIA FLEET COMPARISON)

Criteria Air Pollutant	High-Speed Rail Fleet	Typical Fleet	Percent Difference
Nitrogen Oxide (NOx)	39,801 lbs.	111,323 lbs.	-64.25%
Reactive Organic Gas (ROG)	2,669 lbs.	10,281 lbs.	-74.04%
Particulate Matter (PM)	1,886 lbs.	5,354 lbs.	-64.78%
Black Carbon	1,428 lbs.	4,172 lbs.	-65.78%

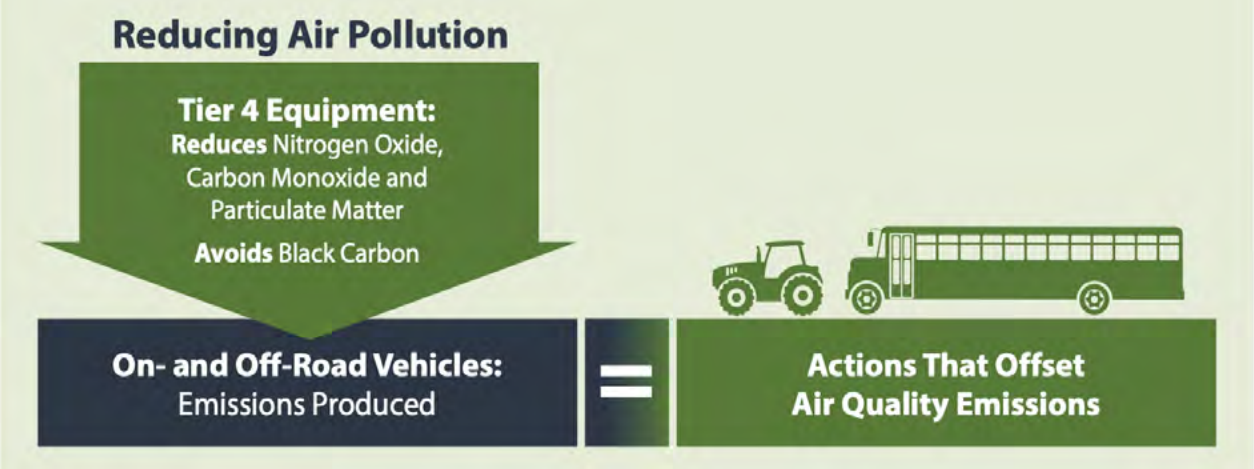
California suffers from some the worst air pollution in the country. According to the American Lung Association's State of the Air 2022 Report, four California counties hold the top spots in the nation for worst year-round particle pollution: Mono county is first, followed by Kern, and Kings and Tulare are tied at third. Of the top 10 worst cities for year-round particle pollution in the nation, eight of the cities are located in California counties[7] . This underscores the importance of striving to deliver truly clean transportation.

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 (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 2021, on- and off-road vehicles emitted 123 tons of criteria pollutants, including NOx, ROG, PM and black carbon. From 2015 to 2021, the use of Tier 4 equipment reduced/avoided nearly 191 tons of those criteria pollutants. The value for avoided/reduced tons reflects the difference between emissions produced by using Tier 4 equipment and what would have been produced by a typical fleet.

Between 2015 and 2021, 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 and sign agreements with local agencies to promote and achieve clean air in the 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 3.6**.

EXHIBIT 3.6: 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 in the local air quality districts with poor air quality. These vehicles will reduce air pollutant emissions by 1,358 tons over their lifetime, as shown in **Exhibit 3.7**.

EXHIBIT 3.7: VOLUNTARY EMISSIONS REDUCTION AGREEMENTS

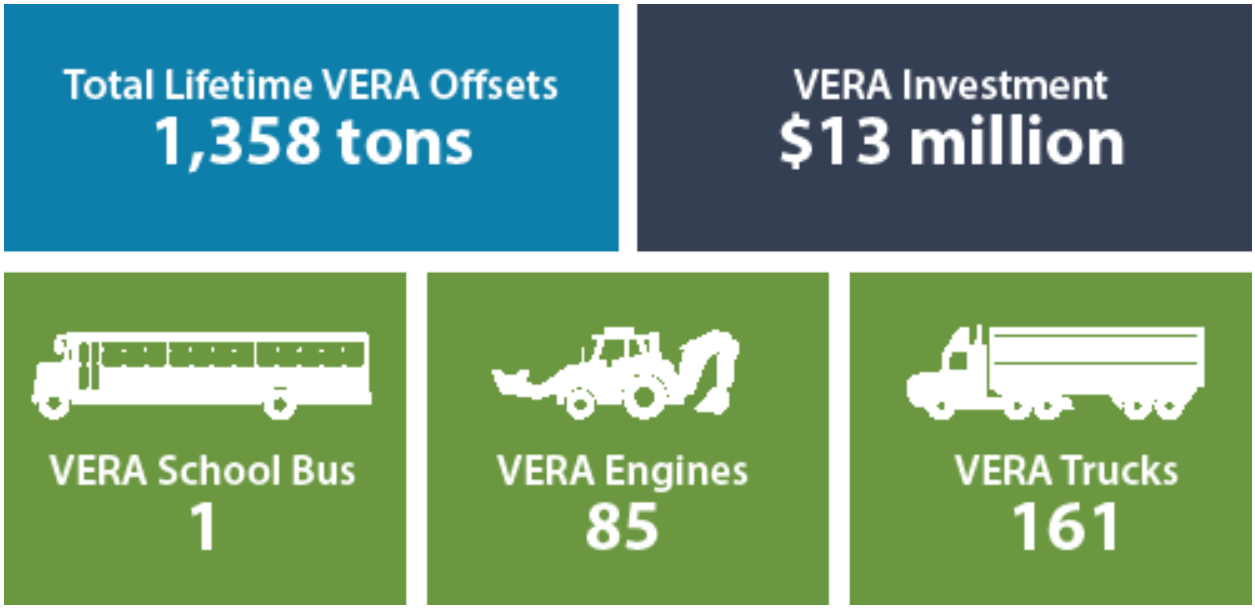


Photo: Future Kings/Tulare station trackway viaduct structure.

Photo: Coyote Valley in Santa Clara County

CHAPTER 4: NATURAL RESOURCES

Introduction

The natural systems of our state and our planet are the foundation for life. The environment is one of the three core elements of sustainability; 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 a crucial climate resilience activity. For more information about how natural resources contribute to climate adaptation goals of both the Authority and the state, refer to **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 nearly 400 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 2,900 acres of habitat and approved more than 3,190 acres of agricultural land for protection, including over 2,400 acres now protected under agricultural conservation easements.
- Through participation in the Department of Conservation's (DOC) California Farmland Conservancy Program (CFCP), one acre of farmland will be preserved for every acre of farmland that is converted to transportation use.
- Construction potable water decreased by 67% compared to 2020, despite an over 55% increase in construction activity levels.

Conserving Water Resources

2021 Progress: The 2021 Water Year in California was California's second driest year as measured in terms of statewide runoff. The construction packages continued to comply with water-conservation measures initiated in compliance with state policy.

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 from residential and commercial users.

How Water Consumption is Governed

Federal, state and local regulations govern water consumption by the high-speed rail program. As construction extends into other parts of the state beyond the Central Valley, local regulations in Southern and Northern California will govern water consumption, though the Authority's water conservation policy and water conservation guidance will still apply. We must comply with several applicable federal and state statutes and regulations, as well as with regional and local requirements.

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
2016 California Green Building Standards Code (CalGreen Code)
Porter-Cologne Water Quality Act
Statewide Stormwater Permits
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

Water Consumption

The 2021 Water Year in California (October 1, 2020, to September 30, 2021) was California's second driest year as measured in terms of statewide runoff. Statewide runoff is the water in excess of the demands of infiltration into soils, evaporation from land surfaces, and transpiration that make it to the rivers and streams. State emergency proclamations for drought were issued in April, May and July, which resulted in a total of 50 counties being covered under emergency proclamations[8].

The Authority continued to require contractors to comply with water conservation practices, respecting the continual scarcity of water in California. Compliance monitoring showed that non-potable water use increased by less 0.5% above 2020 levels, while potable water use decreased by 67%, as shown in **Exhibit 4.0**. Altogether, non-potable water accounted for 88% of the total water consumed for construction in 2021.

EXHIBIT 4.0: WATER CONSUMPTION (IN GALLONS)[9]

Water Consumption	Quantity (gallons)
Construction Water Use: Non-Potable	218,137,740
Construction Water Use: Potable	29,526,266
Construction Water Withdrawn from High Water-Stress Areas	247,664,006
Office Water Use	2,442,960[10]

The Authority used drought as an indicator for water stress in 2021. The data from the U.S. Drought Monitor (USDM) was cross-referenced against the location of our construction sites to examine drought conditions in areas where water was withdrawn. The USDM uses a five-category system, from Abnormally Dry (D0) conditions to Exceptional Drought (D4). The USDM relies on drought experts to synthesize the best available data and work with local observers to interpret the information.

Starting from approximately May 2021 through December 2021, 100% of the state of California was categorized as in a Moderate Drought (D1) or above. During the hot summer months of August and September, as much as 40% of the state was categorized as in an Exceptional Drought (D4).

Due to this widespread drought throughout 2021, 100% of the water withdrawals came from 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".[11]

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: ***https://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: ***https://hsr.ca.gov/programs/environmental-planning/stormwater-management/***.

Water and Future Operation

In operation, there is a wide array of water conservation and efficiency measures that support getting to a net-zero potable water consumption target. We established criteria for our facilities to work toward net-zero potable water consumption through water-use reduction, recycling, capture and storage. To support these efforts, the issue of water consumption is a priority when siting future facility locations. In addition, our facilities will be designed and built using the CalGreen Code for planning, procurement, design, construction, operations and maintenance, including the Code's mandatory and voluntary sections.

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

2021 Progress: As of the end of 2021, we have preserved and/or restored more than 2,900 acres of habitat and protected over 2,400 acres of agricultural farmland through conservation easements.

It is vital that we manage our land prudently, and we have been consistently revisiting the non-operational parcels in our portfolio using standard criteria to identify those parcels 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 also encourages land-use and transportation planning compatible with the state's greenhouse gas emission reduction, housing, and economic development goals to maximize system ridership and revenue.

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 commensurate with the magnitude of this transformative project and 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 diverse array of development types and destinations closer together, encouraging ridership and passenger revenue while maximizing revenue generation from ancillary uses/development.

In 2022, we will complete review and development of a High-Speed Rail Oriented Development and Land Development Procedure (HSR Development Procedure), which will detail 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

Preserving valuable habitat has been an activity of the Authority since 2016. Over the past 6 years, we have focused on our goal that any land identified for mitigation purposes offers a habitat of equal, or preferably greater, value for special-status species than that which it replaces.

With the scale of the project comes the opportunity to implement regionally significant conservation efforts by preserving high-quality habitat. To date, the Authority has preserved and restored habitat that includes 2,972 acres. The acreage is considered regionally significant for several important reasons:

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

In 2016, the Authority secured a conservation easement on 446 acres of the Lazy K Ranch, a working horse and cattle ranch in Chowchilla. The parcel borders a larger landscape of habitats, and the connection between the parcel and the adjacent land helps sustain the integrity of the preserved vernal pool landscape. Since the establishment of the conservation easement, there has been restoration of an almost 60-acre wetland area and just over 4 acres of riparian habitat along the Lower Chowchilla River, in addition to the preservation of 380 acres of vernal pool habitat.

The restoration of the wetland (vernal pool) area involved re-contouring of the topography, which had been leveled prior to 1950, to restore mound and basin (pool) features and interconnecting swales. The riparian restoration component involved the planting of almost 300 native woody tree and shrub species. There was also supplemental planting that occurred in 2018 and 2019. Restoration activities began in the summer/fall of 2016 and the site is currently in year 5 of monitoring the restoration work. The Authority, along with the contractor charged with establishing the site, is currently working with regulatory agencies to verify success criteria of the restoration work is being met.

The Authority secured another 866 acres of valuable habitat at Cottonwood Creek, Cross Creek East and CD Hill.

In 2017, the Authority, working through its contractor, Westervelt Ecological Services, secured the rights to establish a conservation easement of 829 acres along Cross Creek in Kings and Tulare counties. This conservation easement preserves some of the last larger, intact grasslands and wetlands in this important wildlife movement corridor used by California tiger salamanders, San Joaquin kit foxes and vernal-pool invertebrates. The Authority also secured an additional 527 acres at Kings River, Alkali Flats and Poso Plains.

The Kings River Mitigation Site is another combination of restoration/preservation site that will reestablish, rehabilitate, enhance, and preserve seasonal riverine, seasonal wetland, emergent marsh, riparian, upland and open water habitats. The restoration activities were conducted from 2018 to 2019, and the conservation easement was subsequently recorded on July 26, 2019.

This stie also requires a 5-year monitoring period to ensure success of the restoration activities and is currently in process of year 4. So far, the results of annual monitoring have been above average and, in some cases, far exceed the minimum requirements to meet final success criteria set by the regulatory agencies.

In 2019, the Authority purchased 978 acres of additional mitigation land at multiple sites: Hog Flats (144 acres); Hog Hills (401 acres); CD Hillman Expansion (77 acres); and Lost Hills (356 acres). The Hog Flats, Hog Hills and CD Hillman Expansion are still working through regulatory agency approval. However, Lost Hills was approved in 2021 and a conservation easement was recorded on June 25, 2021, which preserves 333 acres of habitat for San Joaquin kit fox, Tipton's kangaroo rat, and blunt-nosed leopard lizard.

In 2020, the Authority purchased one additional mitigation site, Antelope Plains (705 acres). The Antelope Plains Conservation Site was approved by regulatory agencies in 2022 and a conservation easement was recorded April 21, 2022. No additional biological mitigation sites were purchased in 2021.

Environmental Mitigation

In 2022, the Authority Board of Directors completed environmental clearance for high-speed rail in Northern California by approving the San Francisco to San José and San José to Merced project sections and certifying the Final Environmental Impact Report/ Environmental Impact Statement (EIR/ EIS) documents for both project sections.

With these actions, more than 420 miles of the high-speed rail project's 500-mile Phase 1 alignment have received environmental clearance. Phase 1 spans from San Francisco to Los Angeles/Anaheim – including a stretch between Merced and Palmdale.

Prior to finalization, each draft EIR/EIS was circulated for public review, and the Authority considered all comments received. The final EIR/EIS documents incorporate responses related to mitigation measures proposed to reduce environmental impacts and effects and analysis of alternatives among other topics.

Together, the Board's approvals mark a critical milestone in advancing the entire statewide program by linking the San Francisco Bay Area and the Peninsula to San José, the Central Valley, and Los Angeles County in Southern California.

Connecting these major economic regions with high-speed rail will change how people travel throughout the state and foster more equitable employment and housing opportunities.

The Final EIR/EIS documents can be found on the Authority's website, ***https://hsr.ca.gov/programs/environmental-planning/***.

Preserving Agricultural Land

2021 Progress: There are three stages involved with preserving land in perpetuity. First the land is purchased; second, it is then approved for protection by state agencies. The third and final stage is to sign a conservation easement which guarantees the protection of the land. Of the 3,190 acres approved for protection by the Department of Conservation's programs, over 2,400 acres of important farmland has been protected in perpetuity through conservation easements.

Agricultural land preservation is another area where the Authority relies on the organizational prowess and established programs of other state agencies to effectively carry out mitigation. The Authority has worked with the Department of Conservation (DOC) since 2012 to preserve agricultural land. We participate in two DOC programs: the Agricultural Land Mitigation Program (ALMP) and the California Farmland Conservancy Program (CFCP). As shown in **Exhibit 4.1**, a total of 3,190 acres of important farmland have been protected through these two programs to date.

The ALMP is designed to 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 CFCP, 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 CFCP is to preserve 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 CFCP will preserve an acre of farmland of equal quality and within the same agricultural region as the converted land.

As shown in **Exhibit 4.1**, a total of 2,465 acres of important farmland are protected through conservation easements to date.

EXHIBIT 4.1: AGRICULTURAL LAND PRESERVATION IN CALIFORNIA (CUMULATIVE)

3,190 acres[1] **2,465 acres**[2]

1. Important farmland that has been approved by the DOC for protection via the ALMP and CFCP.
2. Important farmland that has been protected from development through conservation easements. Obtaining a conservation easement is the final step in protecting the land in perpetuity.

Emissions Reductions from Conservation Projects

The DOC routinely reports on the benefits of conservation projects that protect land from development; specifically, the DOC quantifies the GHG emissions reductions that are created by these conservation projects. Typically, the DOC estimates three factors:

- Vehicle miles traveled (VMT) that are avoided by limiting development in a given area;
- Avoided energy use from building; and
- Avoided soil disturbance caused by housing construction.

The Authority asked the DOC to perform a similar assessment of the GHG emissions reduced through the conservation of farmlands made possible by the Authority's mitigation funds.

Out of the 234 acres protected by the ALMP on behalf of the Authority in 2021, the DOC estimates that 223 acres would have been subject to development risk. The DOC estimates that 311 development rights were extinguished as a result of this conservation effort, resulting in an estimated 259,647,948 VMT being avoided and 120,366 $MTCO_2e$ in GHG emissions being avoided.

Photo: Drone Photo of the San Joaquin River Viaduct.

CHAPTER 5: SUSTAINABLE INFRASTRUCTURE

Introduction

Infrastructure underpins our economy and our communities. It shapes how we live our lives. The high-speed rail system is among those significant, ambitious projects that make California the 5th largest economy in the world. It is set to transform transportation in the state while knitting regions of the state together and, in its delivery, set a standard for infrastructure delivery that keeps the environment, communities, and the economy all as core drivers for success.

In practical terms, this means that we integrate sustainability actions into project development and operations as a strategy for managing risks, including climate risk, and for identifying opportunities to benefit California's communities and economy.

As of the end of 2021, more than 70% of construction was complete on Construction Package 4 (CP 4), and about 50% of construction was complete on Construction Packages 1 (CP 1) and 2-3 (CP 2-3). Furthermore, 100% of the structures in CP 4 are complete or in-progress, with CP 1 and CP 2-3 not far behind at 79% and 59.2%, respectively. As construction progresses, we continue to focus on implementing sustainability into program delivery.

Highlights

- Continued the use of internationally regarded infrastructure sustainability benchmarks, such as the GRESB Infrastructure Assessment and Envision.
- Incorporated considerations of climate stressors into design requirements.
- Maintained progress against targets and objective requirements for sustainable construction.
- Continued to customize our web-based tool, EMMA 2.0, to streamline and enhance data collection, review and analysis.
- Incorporated aggressive carbon targets into procurement, honoring the implementation steps identified through the Sustainable Purchasing Leadership Council (SPLC) Benchmark.
- Began the development of a Sustainable Procurement Policy and corresponding procedure that will ensure the Authority's procurement of all goods and services is in alignment with its environmental, social and governance priorities.

Principles For Sustainable Infrastructure

2021 PROGRESS: The Authority continued to report to external frameworks to measure and benchmark performance. In 2021, the Authority participated in the GRESB Infrastructure Assessment for the sixth year in a row. We once again improved our rating, increasing from a score of 79 to 83, and placed ninth among similar projects.

Our sustainable infrastructure principles reflect a balance of social, environmental and economic issues relevant throughout the design, construction and operations phases of the program. These principles were developed in consultation with leaders across functional areas of the Authority to represent and reflect California's priorities. They can be found within our Sustainability Policy, which can be accessed here: ***http://www.hsr.ca.gov/docs/programs/green_practices/sustainability/Sustainability_signed_policy.pdf***.

Lifecycle Approach

Looking across the entire lifecycle of a strategy, or taking a lifecycle approach, is a foundation for the Authority's approach to sustainability. In developing implementation strategies to improve sustainability performance, we consider direct, annual impacts; impacts that are upstream or downstream from the system; and those that have occurred in the past or may occur in the future. Our Sustainability Policy and the construction package-specific design criteria continue to include Sustainable Infrastructure Principles related to the lifecycle approach, encompassing our commitment to sustainable infrastructure through specific contract requirements, specifications and design criteria.

We continuously revise specifications and contract provisions to require improved lifecycle scores for materials:

- In 2019, we set global warming potential performance thresholds for major system materials (concrete and steel); and
- In 2020 and 2021, we required these thresholds in major procurements.

In 2021, we began the development of a Sustainability Procurement Policy, which will ensure the alignment of our procurement practices with our environmental, social and governance (ESG) priorities. The scope of this policy is not limited to just 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. Once finalized, the Sustainable Procurement Policy will inform a more detailed Sustainability Procurement Plan, which will provide increased detail around the specific sustainability requirements for all aspects of the Authority's activities.

We will continue a range of analyses of supply chain impacts of major materials to clarify their relative 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)[12] 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

The high-speed rail system is a program of mega projects. Reporting—which is a priority for the Authority—on billions of dollars of construction activity across multiple contracts can quickly spiral into volumes of unmanageable data. The Authority's goal of transparency led us toward developing a robust database called the Environmental Mitigation and Management Application (EMMA) to streamline sustainability reporting and facilitate data quality assurance. EMMA provides sophisticated controls on key data fields that the Authority uses to verify accuracy of reported data, a built-in workflow to ensure multi-level review of data quality and built-in dashboards to track contractor performance against requirements.

EMMA complements field oversight of construction activity and vice versa. Field staff review EMMA data submittals critically to evaluate whether the reported information comports with field observations. EMMA data can reveal trends or patterns that highlight issues that field staff may have missed. As a result, field staff use EMMA data to better inform oversight of construction activity.

Reported data is evaluated against supporting documentation provided by the contractor to ensure that what is stated in the supporting documentation aligns with what is reported in EMMA. 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's) Diesel Off-Road Online Reporting System (DOORS) database to confirm the accuracy of off-road equipment specifications, helping ensure that the contractors are using the cleanest construction fleets possible.

Summaries of construction activities provided by the contractors help put data into context and can help to clarify changes in data based upon season or schedule. The Authority also audits the contractors and Project and Construction Managers to verify their adherence to requirements or to identify any potential issues that appear in the data.

Recycling Waste Responsibly

The Authority requires recycling 100% of the steel and concrete from construction and demolition and diverting at least 75% of all other construction and demolition waste from landfills unless local regulations specify a higher diversion rate. To measure progress, the Authority tracks the amount of waste produced and diverted from landfills for each construction package. The Authority manages toward a critical metric every month: the percent of waste diverted from landfills by each contractor.

At time of reporting, the records received indicated that the Authority diverted just over 45% of total waste from landfills in 2021, including 3,469 tons that were recycled, 63 tons composted and 1,276 tons stockpiled, as shown in **Exhibit 5.0**. These records are still to be resolved, specifically as to whether the waste was contaminated and could not be recycled. As of this report's publication, these records are still in review and any adjustments to totals will be provided in both regular monthly reporting and in the next Sustainability Report.

Over 99% of concrete and metal were recycled or stockpiled (8 tons of concrete were landfilled by CP 4). The recycling avoided the emission of 3,292 $MTCO_2e$ in 2021 and more than 116,440 $MTCO_2e$[13] to date. Keeping materials such as concrete, asphalt, wood and organics out of landfills, either through reuse, recycling or source reduction, avoids the production of methane. It also incentivizes a circular economy, treating the outputs of construction activities as inputs and avoids the extraction of virgin materials.

It is worth noting that the total amount of waste handled this year by the Authority was significantly lower than in previous years (10,605 tons in 2021 vs 74,600 tons in 2016) as we transition from demolition to construction. Over the entire construction time frame, we have recycled nearly 93% (196,838 tons) of all waste, as shown in **Exhibit 5.1**, and have sent 7% (15,368 tons) to landfills.

The Authority produced no un-remediated hazardous waste in 2021.

EXHIBIT 5.0: 2021 NON-HAZARDOUS MATERIALS MANAGEMENT (IN TONS)[14]

Total Waste Generated	10,605
Total Waste Diverted	4,808, including: • 3,469 tons recycled • 63 tons composted • 1,276 tons stockpiled
Total Waste Landfilled	5,797

EXHIBIT 5.1: RECYCLING CONSTRUCTION WASTE (THROUGH 2021)

Global Recognition for Excellence in Sustainable Infrastructure

Our work in sustainable infrastructure yielded an Envision Platinum for the Phase 1 system in December 2020. Not only is this the highest award level possible in the newest and most stringent version of the Envision framework (version 3), but we also significantly surpassed the minimum Platinum threshold by 15%, putting us among the highest scoring Envision-awarded projects to date.

To maintain our Envision Platinum award, the Authority continued to systematically collect documentation and compliance from design and construction throughout 2021. The Authority utilizes tools such as its EMMA software to track compliance for construction-related credits and goals and to maintain our certification. 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.

Designing for Safety and Security

2021 PROGRESS: In November 2021, the United States Department of Transportation awarded a $24 million RAISE (Rebuilding American Infrastructure with Sustainability and Equity) grant to the Authority. The funds will be used for crucial safety, efficiency and construction projects in and around the city of Wasco, including better and safer multimodal connectivity across the freight corridor with a new sidewalk, an enhanced State Route 46 and an efficient roundabout.

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), a comprehensive, systemwide framework for identifying risks and implementing mitigation measures to decrease the risk of incidents.

The risk-assessment effort includes collaboration with the system disciplines (engineering, core systems, high-speed rail trains and operations) to develop safety and security design requirements that mitigate the risk to an acceptable level. The SSMP describes process requirements that demonstrate the achievement of Safety and Security Certification and communication processes administered by the Safety and Security Team, including internal and external committee meetings and stakeholder outreach.

Our comprehensive safety and security program also addresses operations and facilities and ensures that these measures enhance our passengers' experience. 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 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.

Emergency and Disaster Recovery Planning

One way we seek to manage risk focuses on planning for emergencies and disasters. Our SSMP establishes our commitment and philosophy to achieve the highest safety standards and to establish a framework for emergency preparedness. 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. The PTEPP will identify training program requirements for operations and maintenance personnel, as well as local emergency response departments including fire, police and medical responders. The goal of the PTEPP is to verify and validate:

- Adequacy of emergency plans and procedures;
- Readiness of railroad operating and maintenance personnel to perform under emergency conditions;
- Effective coordination between railroad operations and emergency response agencies, such as police, fire and emergency medical services; and
- Familiarization of fire, police and emergency medical services personnel with the physical and operating characteristics of high-speed rail operations and hazards inherent to the high-speed rail system.

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

The new grade separations that the Authority is planning and building represent one of the most significant investments that we are making to increase 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 in excess of 200 miles per hour in this region.

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

- 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 operations reliability;
- Improved access to employment centers and jobs; and
- Disadvantaged communities are no longer isolated.

Construction work on grade separations has continued throughout 2021 and into 2022, with some projects reaching completion. One such project is the South Avenue Grade Separation located in Fresno County, which was opened to traffic early in 2022. Located between Cedar and Maple Avenues, the newly constructed overpass allows traffic to travel over the existing BNSF Railway and future high-speed rail lines.

Additionally, the Road 27 overcrossing in Madera County was completed in late summer of 2021. Located between Avenue 17 and Club Drive north of the city of Madera, the Road 27 overcrossing is one of nine grade separations in Madera County built to take traffic over the existing BNSF rail and future high-speed rail lines.

We are also planning to eliminate or improve grade crossings along the system through Northern and Southern California, improving safety and reliability

for train operations, reducing noise (due to less need for trains to sound warnings at crossings) and reducing vehicle emissions. Additionally, we have also identified additional grade separations to be constructed in these corridors.

In Northern California, the Authority and its partners in San Mateo County completed the 25th Avenue Grade Separation Project in September 2021, making it the first bookend project open to the public. This project is improving lives now by separating the rail corridor from the roadways at 25th, 28th and 31st avenues and improving safety for pedestrians, cyclists and motorists.

In Southern California, we have been coordinating with local agencies to advance grade-separation projects at specific locations south of Bakersfield. We have also been coordinating with LA Metro on the High Desert Corridor (HDC) project, which would bring a rail connection from Victorville to Palmdale and interface with high-speed rail at the Palmdale Station. At Victorville, the HDC project would connect with the Brightline West project to Las Vegas. Environmental clearance on the HDC was completed in late 2021.

These projects provide important immediate improvements to safety and traffic flow, while also preparing for future high-speed rail construction.

Train Operations

The rail system we are designing and delivering has incorporated the best of current rail technology and practice. Bringing best-in-class technology is important to delivering a safe, reliable, certifiable system. Some of the innovations incorporated in the project include:

- Tier III-compliant[15] trainsets that are in conformance with 100% 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); and
- Regenerative breaking.

These practices use existing technology in new ways as well as new technology. As discussed elsewhere in this chapter, climate change resiliency and adaptive practices have already been incorporated into the design and operations and asset management systems.

In addition, we take a holistic, layered and risk-based approach for securing the rail system, 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;
- Using an early earthquake warning system that detects earthquakes before they happen to stop the trains so that safety measures can be taken;
- Installing quad gates[16] at grade crossings; and
- Building intrusion protection barriers at certain locations on the system.

Facilities

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; and
- Development of security plans, procedures, protocols and a professional security force to monitor, patrol and respond to incidents.

Health, Safety and Security for Workers

2021 PROGRESS: The Fair Labor Standards Act (FLSA) is a federal law that establishes minimum wage, overtime pay, recordkeeping and youth employment standards affecting employees in both the private sector as well as in federal, state and local governments. All Authority staff and consultants are covered by FLSA and/or union bargaining agreements that define labor conditions and wages. All construction workers follow a bargaining unit agreement or are protected by the FLSA.

In addition to designing a safe and secure high-speed rail system, ensuring the Authority is a safe, equitable and enjoyable place to work is also a top priority for us. The Safety and Security Management Plan (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 2021. 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[17]	2021	State Benchmark[18]
CP 1	1.00	
CP 2-3	1.66	
CP 4	0.71	
Weighted Overall Average	1.30	1.8
Lost Days Rate[19]		
CP 1	0.50	
CP 2-3	0.00	
CP 4	0.00	
Weighted Overall Average	0.14	1.4
Fatalities		
Overall	0	

Safety During the Pandemic

We worked closely with our contractors to continue construction in 2021 during the ongoing coronavirus pandemic. Our goal is to ensure that California's workforce remains employed and contributing to the local economy, while also respecting local and state requirements related to COVID-19 and social distancing measures.

The construction teams continue to follow the Centers for Disease Control and Prevention (CDC) and Occupational Safety and Health Administration's (OSHA) increased safety protocols and guidelines.

Equity Compliance Office

To maintain a high-quality working atmosphere for its employees, the Authority appointed an Equal Employment Opportunity Officer and established an Equity Compliance Office.

The Equal Employment Opportunity Officer reports directly to the CEO and ensures that no discrimination occurs based on race, age, culture, gender, ability or any other socio-demographic factors. Along with investigating complaints of discrimination, the Equal Employment Opportunity Officer oversees reasonable accommodation processes to ensure that the work offered is accessible to all, as well as provides monthly training to employees related to ethics and anti-discrimination.

Working together, the Equal Employment Opportunity Office and the Equity Compliance Office ensure that Authority employees are protected against discrimination and feel empowered to voice their concerns should they believe there has been a violation in policy.

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 of California as part of the state's commitment to promote employees' health and well-being.

Each department also has an EAP coordinator and there is a Statewide EAP Benefits Manager available. More information is available here: ***http://www.calhr.ca.gov/employees/pages/eap.aspx***.

Management, Resilience and Adaptation in the Face of Climate Change

In recent years, California residents have experienced natural disasters such as heat waves, drought, wildfires, floods and mudslides, events which have likely been worsened or even triggered as a result of climate change. As these events are likely to continue and intensify into the future, it becomes increasingly important for the Authority to develop a plan for managing these climate-related risks as well as adapt to a changing climate.

In 2021 we achieved a significant milestone by releasing our Climate Adaptation Plan (CAP). This was a significant undertaking which summarizes and memorializes climate adaptation practice across the Authority and lays a path for future climate risk mitigation work at project and programmatic levels.

Our approach to risk management is systemic, collaborative and cross-disciplinary, and it is viewed as essential for successful project management, building upon and extending other project management processes.

Our risk management approach also incorporates the precautionary principle, particularly in the application to climate adaptation planning, which identifies actions to be taken even in the absence of complete certainty concerning climate risk scenarios. The actions to be identified in the climate adaptation plan will rely on reasonable evidence of considerable potential risk.

Climate Adaptation Planning

2021 PROGRESS: The Climate Adaptation Implementation Committee (CAIC), a working group that was formed in alignment with state guidance, released the Authority's Climate Adaptation Plan (CAP) in 2021. The CAP identifies the path forward for climate change adaptation efforts for the Authority with the ultimate goal of creating a resilient and reliable system for California.

High-speed rail is a critical element of the state's climate change adaptation strategy. Given the importance of the high-speed rail system through the coming century, it is good policy and sound business practice for the Authority to consider the impacts of climate change and extreme weather. The Authority has a unique privilege to design, build and operate the system with climate change in mind. Preparing for the foreseeable impacts of the climate crisis now will allow the Authority to avoid the future costs of these impacts.

Not only does it make sense for the Authority to consider these challenges now, but it is also a requirement for all state agencies to do so. 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. In 2015, a landmark Executive Order by Governor Jerry Brown (EO B-30-15) required state agencies to account for climate change impacts in investment decisions. This legislation was followed by others and a statewide guidance document, "Planning and Investing for a Resilient California", which provides recommendations for how state agencies can begin to evaluate climate change impacts and develop adaptation responses.

Stakeholders also consistently emphasize that resilience and adaptation are of the highest importance. The Authority responded by taking several actions on climate resilience, including:

- Organizing the Climate Adaptation Implementation Committee (CAIC), an internal committee dedicated solely to climate change adaptation, which reviewed the Authority's existing risk assessment framework, the SSMP, and proposed revisions to the plan so that it includes and addresses climate change–related risks;
- Assessing potential climate change impacts to high-speed rail through a systemwide exposure analysis of relevant climate stressors, including temperature rise, precipitation and riverine flooding, wildfire, sea-level rise and storm surge; and
- Setting design, operations and maintenance, and programmatic requirements that address climate change.

In 2021, the CAIC released the first Climate Adaptation Plan for the system, which summarizes and organizes the Authority's climate change adaptation progress to date and identifies the critical next steps, including:

- Re-evaluating climate change impacts to the system as new information becomes available;
- Finalizing an Authority climate change policy;
- Updating the next version of the SSMP to include climate change as another type of risk to the high-speed rail;
- Coordinating with the Authority asset management team to collect weather- and climate-related impacts to the system and integrate climate data into asset 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 the CAIC 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.

Climate Adaptation Planning

In 2021, the California High-Speed Rail Authority released its first Climate Adaptation Plan. The plan summarizes work completed to date by the Authority to assess system exposure to changing climate hazards including temperature rise, wildfire, precipitation-based flooding, and sea level rise and storm surge. The Climate Adaptation Plan compiles ways the Authority is preparing for climate change through design, operations and maintenance, and programmatic strategies, and summarizes key next steps for the agency. A two-page overview of the Climate Adaptation Plan is available here.
The Authority has been making progress on some of the next steps outlined in the plan. Over the last year, the Authority Sustainability Team has been:
- Developing a California High-Speed Rail Authority climate change policy
- Updating the next version of the Authority's Safety and Security Management Plan to include climate change as another type of risk to the Authority
- Coordinating with the Authority's asset management team to identify ways in which ongoing asset management practices can be used to track weather- and climate-related impacts to the system
- Reconvening the Climate Adaptation Implementation Committee (CAIC)

Climate Policy

The Authority has been at work setting a formal policy on mitigating greenhouse gas emissions and adapting to climate change. The draft Climate Policy, which outlines the Authority's commitments to create a system that will significantly reduce overall greenhouse gas emissions from the transportation sector and help the state and help the state meet its greenhouse gas reduction targets to mitigate climate change, is currently under review before final adoption. The policy also states the Authority's commitment to incorporating climate change resilience into project planning, design, and operations to ensure the system is safe and efficient into the future; sets goals for how to approach climate change adaptation so that it is cost-effective and equitable in terms of who it serves and whose input is considered; and incorporates natural solutions where possible.w

Rendering: Preliminary concept for the signature Bakersfield Station.

CHAPTER 6: STATION COMMUNITIES AND RIDERSHIP

Introduction

Customers access the rail system through stations. They are critical factors in the success of the high-speed rail system. Not only will they help strengthen the identity and sense of place in station communities, but they will also bring dramatic new levels of activity and act as magnets for development as high-speed trains bring thousands of people into a station city's core.

Fixed-rail systems are a unique opportunity to focus urban growth within existing communities without the need for more roads, protect natural landscapes and dramatically reduce transportation greenhouse gas (GHG) emissions.

Reducing the miles that are traveled every day in automobiles is one of the state's key climate goals. Locating development adjacent to low-carbon transportation investments, such as high-speed rail, is a crucial strategy to help protect the agricultural lands that the economy relies on, as well as the forests, streams, watersheds and other natural lands that clean our air and water and provide beauty and recreation.

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 includes a business case that will focus on technical work and analysis to the next stages of development.
- Station site planning work is moving forward in Fresno, Bakersfield and Kings/Tulare, including land use and site history, multimodal station access facilities, sustainability infrastructure, transit-oriented development (TOD) and site plan concept drawings/plans.
- 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 Los Angeles Union Station (LAUS). The Phase II Assessment is expected to be completed in 2022.
- The Authority continues to partner with Metro on the Link Union Station (Link US) project, which will transform LAUS into a modern transit and mobility hub.
- In December 2021, additional budgetary funding was authorized by the Board of Directors, which included funds to advance design on 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 we anticipate awarding contracts in mid-2022. The Authority also intends to initiate procurements to design four Central Valley stations this year. This work will lay the groundwork for delivering an electrified initial operating segment between Merced and Bakersfield.

Advancing Station Planning and Design

2021 Progress: The Authority continued to work with local partners to develop station area plans based around the proposed high-speed rail locations. For example, the City of Palmdale has completed its planning around the high-speed rail station to prioritize transit-complementing land use. Next steps for the city of Palmdale include advancing the planning and design of an integrated facility.

Planning and Policy Development

Our station planning process focuses on transforming the communities in which we operate. Through thoughtful and inclusive planning, we want to 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 other policy changes and interventions specifically to benefit station cities for the system to have the type of impact sought. We have dedicated funding to support station cities in completing station area plans that are 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; and
- Make great places.

In 2021, we continued to focus on project delivery for the stations in the Central Valley service section. This work is grounded in the building block approach expressed in the 2020 Business Plan. 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

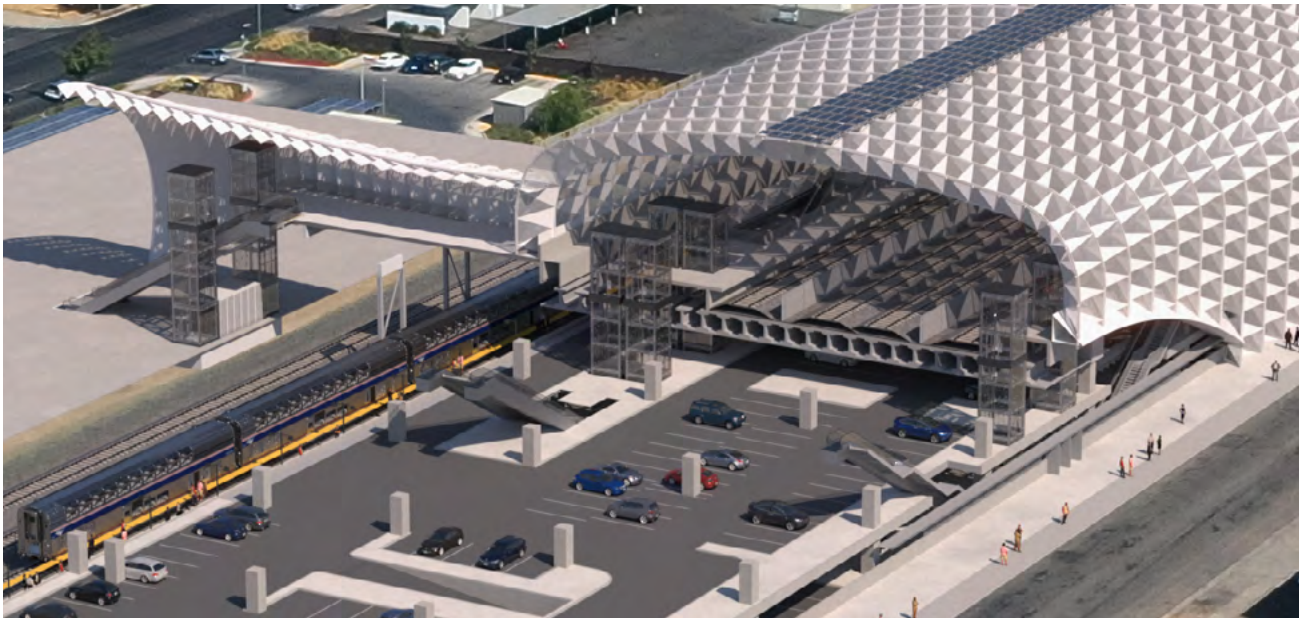
The Authority, the San Joaquin Joint Powers Authority (SJJPA) and the City of Merced are working to achieve one integrated rail station in Merced that allows for seamless transfer of passengers between Altamont Corridor Express (ACE), intercity San Joaquins services, and high-speed rail service.

The Authority has been engaged in a study to find an ideal location for the Merced station facility. During the study, which is targeted for completion in the winter of 2022, a design team will be selected by the Authority to develop designs for all of the elements necessary for initial passenger service. Upon completion of the relocation study and environmental assessments, the Authority will be able to advance work on the viaduct structure, as shown in **Exhbit 6.0,** to access the new station location and select a station design team.

SJPPA and San Joaquin Regional Rail have been focused requesting funding for the detailed design and environmental clearance on the Merced Intermodal Track Connector (MITC) Project. The MITC project will enable the San Joaquins to connect with interim HSR operations at Merced. This project is critical for integrating the San Joaquins with the Merced to Bakersfield high-speed rail service.

Finally, 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 their 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: RENDERING OF CONCEPT FOR PASSENGER ACCESS TO THE MERCED STATION



In Merced we have been working closely with the San Joaquin Joint Powers Authority and the City to integrate the ACE commuter service and the San Joaquins service with the High-Speed Rail System. This cross section, with portions of the station layers and the canopy cut away, illustrates the current thinking about how to achieve cross platform transfers, circulation between ACE and the other rail systems, as well as integration of access facilities including parking into the station facility.

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 5-minute walk of the high-speed rail platform, where possible. In 2021, 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 community by improving the Caltrain system performance and curtailing environmental impacts by reducing noise, improving air quality and lowering GHG emissions.

In 2021, we 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 better saturating less-dense areas with transit service and increasing ridership on all systems, including the local and regional transit networks that connect to the high-speed rail system.

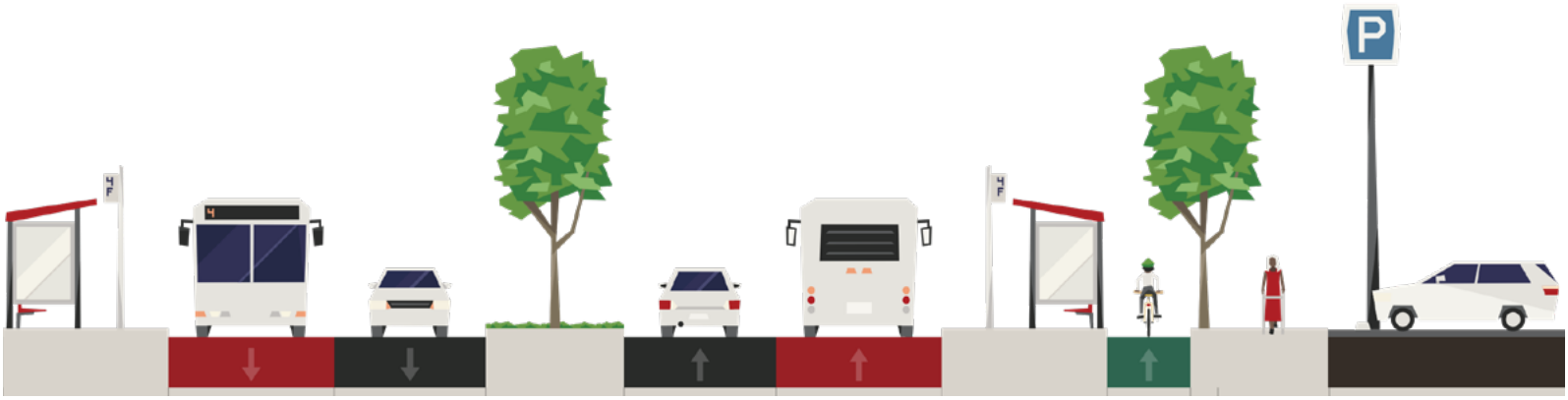
Multimodal Station Access

High-speed rail stations will prioritize public space and amenities. As shown in **Exhibit 6.1**, stations will support access for people arriving on low-carbon modes, such as transit, as well as via foot, bike, scooter and other individual modes, and will also include locations for passenger pick-up/drop-off. The access hierarchy for high-speed rail stations is shown in **Exhibit 6.2**.

Additionally, 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 vehicle miles traveled (VMT) at the regional scale, but also to provide first-mile/last-mile access to and from the station and within the station district.

EXHIBIT 6.1: RENDERING OF FRESNO STATION DESIGN BASED ON ACCESS HIEARCHY

EXHIBIT 6.2: ACCESS HIERARCHY FOR STATIONS



We are engaging with local and regional transit providers, as well as the station cities, to enable provision of bike facilities at station sites, including making bike parking available in the stations, courtesy of the Authority. Stations are being designed to facilitate pedestrian access by having direct connections to sidewalks. In 2021, we continued this work by meeting virtually with local active transportation organizations to develop supportive policies and optimize the use of state funding available for active transportation facilities.

In 2021, 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 Effort with Station Cities throughout the State

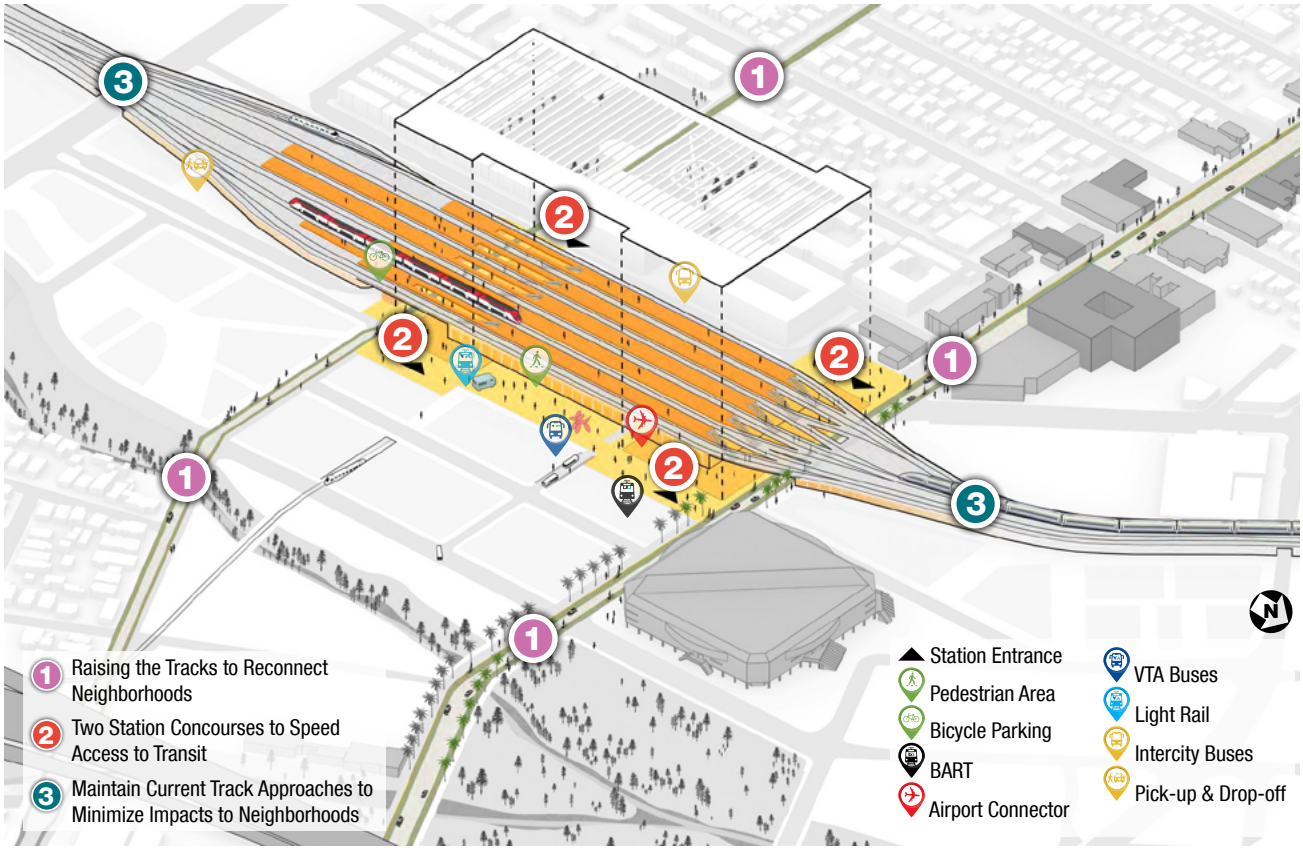
The Authority continued to partner with station communities to ensure that community impacts of station design are aligned with the communities' needs and goals.

SAN JOSÉ DIRIDON STATION (DISC)

Diridon Station was identified as a major hub for the high-speed rail system with its connections to Silicon Valley, robust access to current and future access to transit, and important connectivity to downtown San José and the rest of the Bay Area. A convergence of transportation and land use activity is inspiring planning for a new, re-envisioned Diridon Station. Planning efforts include the development of a concept layout that has been accepted by the DISC partners, as shown in **Exhibit 6.3**. 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 daily passengers and anticipated 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, BART and enhanced service by the current providers, Diridon Station will provide more connections than any other station in Northern California.

EXHIBIT 6.3: DIRIDON STATION RENDERING



LOS ANGELES UNION STATION (LINK US PROJECT)

In 2022, the Authority's Board of Directors approved a $423 million project management and funding agreement between Los Angeles Metropolitan Transit Authority (Metro) and the Authority to modernize the historic Los Angeles Union Station (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, as shown in **Exhibit 6.4**. 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 and new platforms, escalators and elevators. The project also includes opportunities for future transit-oriented development, improved connectivity to enhance the passenger experience, as well as design and safety improvements to US 101. The project is expected to generate more than 200 permanent jobs, and approximately 4,500 short-term jobs per year during the anticipated 5-year construction period.

EXHIBIT 6.4: LINK US PROJECT RENDERING

LOS ANGELES UNION STATION BROWNFIELD DEVELOPMENT

The Authority, Metro, LOSSAN and other stakeholder agencies share a vested interest in revitalizing land around Los Angeles Union Station (LAUS) to support system ridership and TOD. The Authority, in partnership with the above agencies, applied for and received a grant from the U.S. EPA to study candidate Brownfield properties within an approximately one-mile radius around LAUS.

The study gathers and prepares information on environmental contamination of the properties so that ongoing regional planning initiatives can identify suitable locations for potential redevelopment opportunities. The grant supported efforts to help prepare land for potential repurposing. These purposes fulfill the objectives of local, regional, state and federal policies and move the LAUS target area from planning toward implementation.

In spring of 2022, the Phase II environmental assessment for the Lincoln Heights Jail site was submitted to the City of Los Angeles.

Exhibit 6.5 summarizes the key milestones for completing this grant and notes key partners involved in providing the necessary input.

EXHIBIT 6.5: 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 the Lincoln Heights Jail Site	Summer 2022	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles
Human Health Risk Assessment and Reuse Plan	Produce Health Risk Assessment and Schematic Site Plans and Reuse Plans for the Lincoln Heights Jail Site	2022	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles

CENTRAL VALLEY STATIONS (FRESNO, KINGS/TULARE AND BAKERSFIELD)

The Authority continued hosting conversations with stakeholders in Fresno and Bakersfield to identify early site activation, placemaking activities that include physical improvements in advance of high-speed rail service.

While the Authority is partnering with each of the station communities on a variety of planning activities, 2021 saw a continuation of the planning work at the Fresno, Bakersfield and Kings/Tulare stations to understand what actions the Authority can undertake in advance of service to provide early benefits to the station communities. This activity, called early site activation, looks at the parcels the Authority owns and how to use them in advance of high-speed rail service.

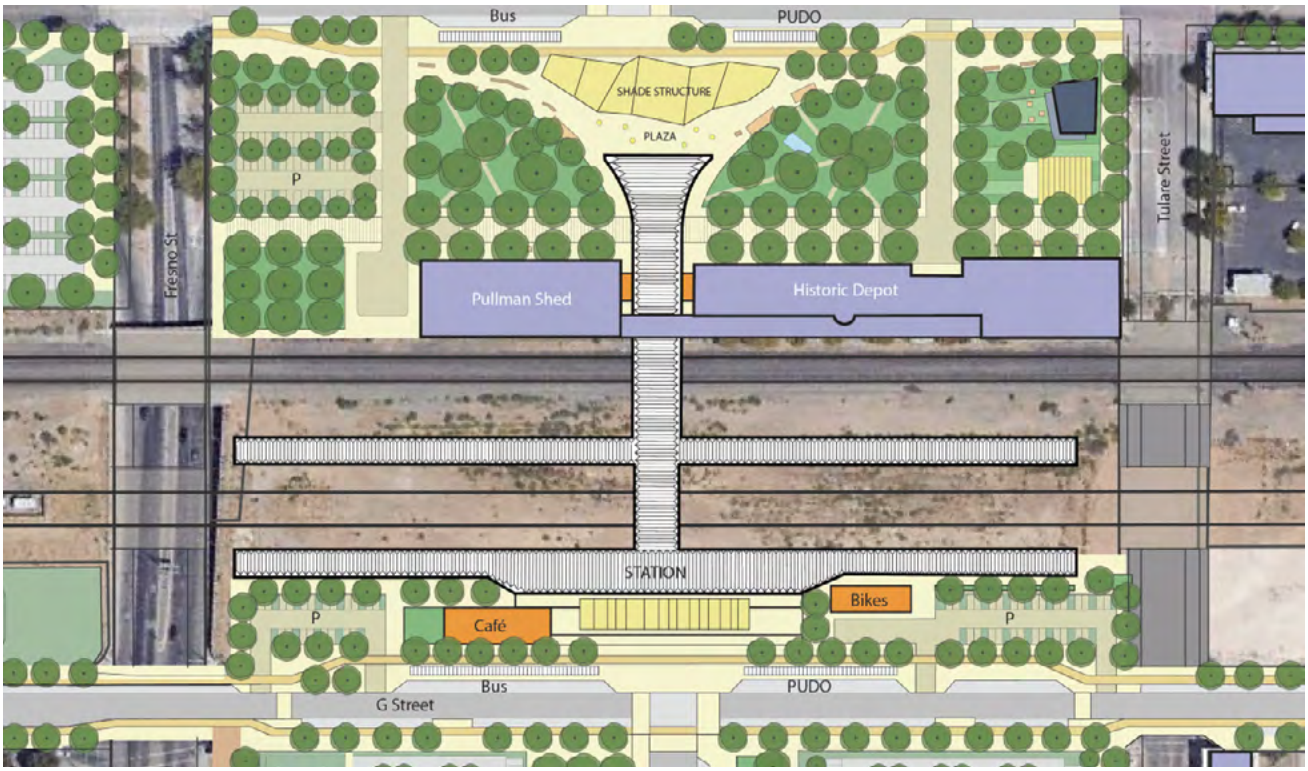
Most of this work in 2021 was focused on the Fresno Station. A focus on early site activation led us to consider using the historic Fresno Depot and the old Greyhound site as shown in **Exhibit 6.6**. A diverse stakeholder group provided crucial feedback and priorities to the Authority, which will be incorporated into site activities in the next few years:

1. Emphasize the distinct character of each station-adjacent neighborhood.
2. Connect neighborhoods across high-speed rail tracks through physical bridges as well as consistent quality and character of public realm improvements.
3. Activate station sites as soon as possible.
4. 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.

The Authority worked closely with local partners in Fresno, including the Strategic Growth Council, to implement public art and food events in 2021.

EXHIBIT 6.6: REVITALIZING THE FRESNO DEPOT



Other Planning Activities

Changing how the state grows and how people get around is necessary to achieve the state's climate goals and to meet the vision of a carbon-neutral future.

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.

Updating local plans is a key first step in using the high-speed rail stations to focus growth. Funding for station-area planning helps stimulate local planning for smart development and updates to local land use plans and zoning codes and 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.[21] The Authority started advancing its own policies to bring clarity to our many community partners about the affordable housing, equity and mixed-use intensity goals it has for development on land controlled by the Authority.

Engaging Communities

2021 Progress: Throughout 2021, communities were involved in the development of the environmental documents in Northern and Southern California project sections. The Authority continued a focused and comprehensive engagement process with all communities along the high-speed rail alignment to best identify and address community issues, such as construction impacts, noise during operation and relocation processes, and to identify ideas for mitigation.

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.

Community Outreach Efforts

Statewide, through community engagement and public outreach events, we worked with more than 200 local community organizations and elected officials to educate and inform the public about the high-speed rail program, as shown in **Exhibit 6.7**.

In 2021, the authority reached out to communities using a hybrid approach of both in-person and virtual events, including open houses, telephone town halls, live webinars, virtual open houses and office hours. Engagement with communities in 2021 continued to bring unique challenges, due to the ongoing COVID-19 pandemic, but was successfully carried out through a range of virtual engagement processes.

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 between 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 webcast of the monthly Board of Directors' meetings; and
- Maintaining a toll-free hotline that includes multiple language options.

EXHIBIT 6.7: 2021 COMMUNITY OUTREACH

REACHING DISADVANTAGED COMMUNITIES DURING COVID-19

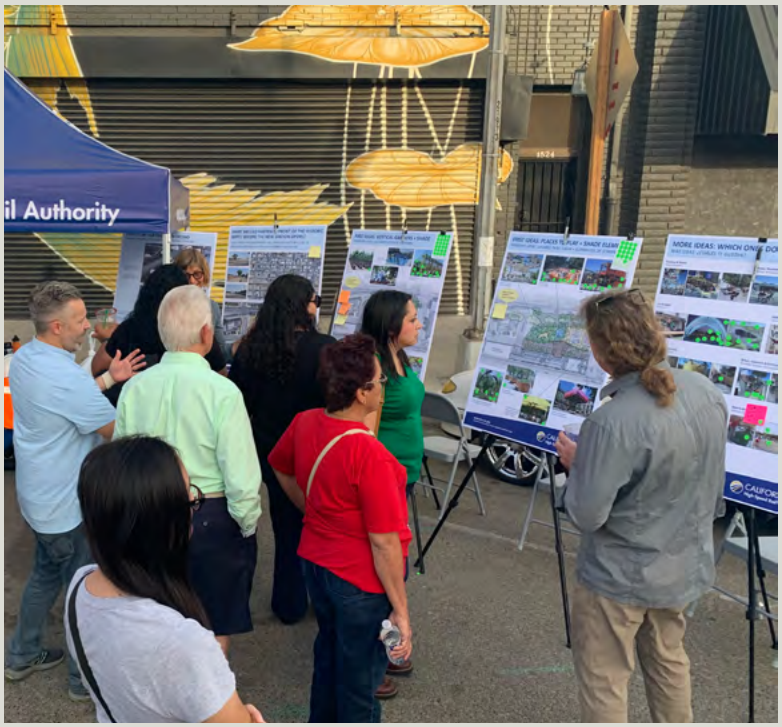
COVID-19 has affected every aspect of the high-speed rail project, not least of which was our ability to connect with surrounding disadvantaged communities.

Despite facing restrictions due to the ever-changing landscape of the pandemic, the Authority continued to host events that employed environmental justice outreach techniques to ensure that communities remained engaged and informed about the high-speed rail project.

In addition to the social media campaigns, emails, website updates and distribution of printed materials, we:

- Held recurring virtual meetings with stakeholder groups and leaders to plan for and encourage community participation;
- Provided webinars and presentations in multiple languages, which enabled non-English-speaking community members to participate;
- Hosted public meetings, working group webinars, informational webcasts and town hall webinars to keep disadvantaged communities informed on key initiatives; and
- Safely participated in outreach events within the disadvantaged communities where possible, such as the 559 Night Market in Fresno's Chinatown, which enabled us to reach over 400 community members in a single outdoor event.

Outreach at 559 Night Market in Fresno's Chinatown



The Authority places a high value on working with local partners to implement public art and food events to help drive business back to Fresno's historic Chinatown. The 559 Night Market is one such event. Spearheaded by local small businesses including Fresno's Central Fish Company, the 559 Night Market brings together foodies, music fans, families, and others from all over Fresno to enjoy an evening of entertainment, music and food from local food trucks and small businesses located in Chinatown. Authority outreach staff have been attending the event regularly from the start to host an informational booth and provide updates on ongoing construction in Fresno and across the Central Valley. The Authority has also provided support with traffic control and additional signage to direct visitors to the businesses in the area.

CONNECTING STUDENTS TO THE CALIFORNIA HIGH-SPEED RAIL PROJECT

I Will Ride, originally founded by college students in the Central Valley, is a student outreach initiative designed to inform, engage, inspire and connect students to the nation's largest and greenest infrastructure project, high-speed rail. I Will Ride alumni established local student chapters in their regions to stay engaged in the development of the high-speed rail project.

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 were in attendance to learn more about the high-speed rail project and hear firsthand from engineers about their experience working on the system.

We also conducted several virtual events for students. On February 14, 2022, Professor Maria Calahorra-Jimenez at Fresno State invited our Director of Planning and Sustainability to provide a lecture on our Envision Certification and general work in sustainable practices in construction. Professor Calahorra-Jimenez teaches heavy civil construction in the Construction Management program at Fresno State. This was offered as a hybrid event with some students in Fresno.

On May 6, 2022, lecturer Mrudang Shah invited our Director of Planning and Sustainability to present to his civil engineering class at California State University, Sacramento. This virtual presentation was for a class size of 30 and similarly focused on the Envision Platinum Award and sustainable practices during construction.

The Authority is also reaching young students through its recently opened high-speed rail exhibit

Kids in Merced help the executive director of the Kids Discovery Station and the Authority's Central Valley Deputy Regional Director cut the ribbon to open the high-speed rail exhibit at the Merced Kids Discovery Station. The Authority continues to partner with the kids museum to incorporate more features to the exhibit in the future, including educational facts on high-speed rail, jobs and public transportation.

at the Kid's Discovery Station in Merced. The Kid's Discovery Station, first opened to the public in September of 2021, creates opportunities for students to learn through the power of play. Since it's opening, the museum has already received over 10,000 visits, sold over 200 family memberships, and hosted 640 elementary school students. The museum is fully accessible and offers a Family Access Inclusion program that provides free annual memberships and low-cost tickets to low-income families and historically disadvantaged communities.

The high-speed rail exhibit at the Museum currently s

Stakeholder Engagement

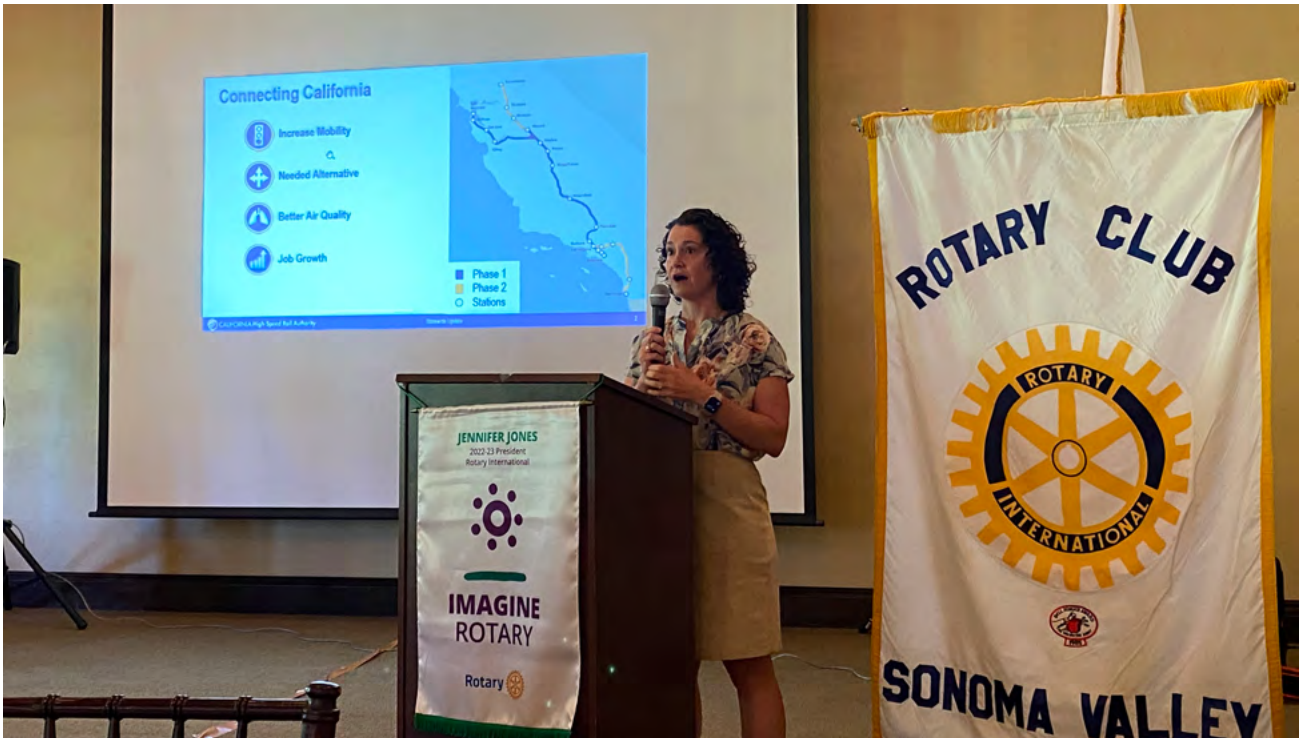
Along with engaging communities and the public, partnering with stakeholders and oversight agencies is critical to the success of the high-speed rail program. Our Office of Strategic Communications focuses on stakeholder involvement, working collaboratively with the Authority's Regional Directors in 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 the Office of Strategic Communications and the Deputy Director of External Affairs support the Authority's statewide and regional stakeholder-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 compliance with enabling legislation. These issues are addressed through outreach via our official social media accounts – Facebook, Twitter, LinkedIn, Instagram, YouTube and Flickr – and the publication and regular updates of project information on the Authority's website, including:

- 8 newsletters every year, which includes quarterly small business newsletters and Northern and Southern California newsletters;
- Presentations;
- Information sharing at open-house sessions;
- Responses to information requests;
- Providing technical reports and background data related to Business Plans; and
- Specialized reports, including the small business and jobs reports.

Open-air, open house at the Fresno Art Hop.



The Northern California Deputy Regional Director presented an overview of California High-Speed Rail to the Sonoma Valley Rotary Club. Attendees asked questions about the status of the project and how the Authority is incorporating environmental and sustainability goals and strategies into its work. The upcoming timeframe for environmental clearance in Northern California was also explained to attendees.

Photo: The Authority completed restoration activities at the Kings River mitigation site.

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, 2021, to December 31, 2021, 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 September 2021 and covered the 2020 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 2021 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, contribute to economic development and a cleaner environment, by connecting regions, creating jobs, and preserving agricultural and protected lands. When complete, trains 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 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 members appointed by the governor, two members appointed by the Senate Committee on Rules and two members 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 (currently, Tom Richards) and a Vice-Chair (currently, Nancy Miller). During 2021, the Board included five men and four women[22]. 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.

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, including the:

- Executive/Administrative Committee;
- Finance and Audit Committee;
- Operations Committee; and the
- 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 are the:

- Senate Committee on Transportation;
- Assembly Committee on Transportation;
- Senate Committee on Budget and Fiscal Review; and the
- 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 recommend 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 to make any recommendations to ensure the process is appropriate for determining the merit and reasonableness of change orders; and
- 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, two-way 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: The safety and security of our workers, employees and customers is first and always our top priority.
- 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, 2021, the Authority had 324 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 the addition of new staff and turnover.

In 2021, the Authority hired 116 new employees, for a new hire rate of 36%[23]. There was a turnover rate of 12% for 2021. 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, entitled Employee Training Policy, and signed in June 2014[24].

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

EXHIBIT 7.0: 2021 STATE EMPLOYEE BREAKDOWN BY GENDER AND EMPLOYEE CATEGORY

EMPLOYEE CATEGORY	MALE	FEMALE
Rank and file	82	68
Managerial	35	31
Supervisory	15	22
Exempt	32	30
Confidential	0	0
Total	164	151
Employees – Total (Including 9 Board Members)	324	

EXHIBIT 7.1: 2021 STATE EMPLOYEE BREAKDOWN BY LOCATION*

REGION	EMPLOYEES
Sacramento	253
Central Valley	48
Southern California	7
Northern California	6

EXHIBIT 7.2: 2021 STATE EMPLOYEE BREAKDOWN BY AGE*

AGE	EMPLOYEES
24 or less	5
25 to 34	50
35 to 44	81
45 to 54	94
55 to 64	69
65+	15

*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 an estimated $18 million in cost savings.

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

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 web page (see ***https://www.hsr.ca.gov/about/board/finance.aspx***). 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***.

Photo: The Central Valley Regional Director providing a tour of the San Joaquin River Viaduct.

Photo: California's diverse array of ecosystems.

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	About This Report	77
102-2 Activities, brands, products, and services	Who We Are	77
102-3 Location of headquarters	Who We Are	77
102-4 Location of operations	Who We Are	77
102-5 Ownership and legal form	Who We Are	77
102-6 Markets served	Who We Are	77
102-7 Scale of the organization	Our Team; Highlights	79, 13
102-8 Information on employees and other workers	Our Team	79
102-9 Supply chain	Our Supply Chain	80
102-10 Significant changes to the organization and its supply chain	Our Team	79
102-11 Precautionary Principle or approach	Management, Resilience and Adaptation in the Face of Climate Change	57
102-12 External initiatives	External Frameworks and Assessments	4
102-13 Membership of associations	Working With Industry Partners	5

ETHICS AND INTEGRITY	Section	Page(s) of Associated Section
102-16 Values, principles, standards, and norms of behavior	Our Values; Our Sustainability Priorities and Commitments	79, 1

GENERAL DISCLOSURES

STRATEGY	Section	Page(s) of Associated Section
102-14 Statement from senior decision-maker	Message from the CEO	vi

GOVERNANCE	Section	Page(s) of Associated Section
102-18 Governance structure	Our Governance Structure	78

STAKEHOLDER ENGAGEMENT	Section	Page(s) of Associated Section
102-40 List of stakeholder groups	Engaging Communities, Materiality Assessment	70,6
102-41 Collective bargaining agreements	Health, Safety and Security for Workers	56
102-42 Identifying and selecting stakeholders	Engaging Communities, Materiality Assessment	70,6
102-43 Approach to stakeholder engagement	Engaging Communities	70
102-44 Key topics and concerns raised	Stakeholder Engagement	74

REPORTING PRACTICES	Section	Page(s) of Associated Section
102-45 Entities included in the consolidated financial statements	About this Report	77
102-46 Defining report content and topic boundaries	About this Report, Materiality Assessment	77,6
102-47 List of material topics	Materiality Assessment	6
102-48 Restatements of information	About this Report	77
102-49 Changes in reporting	About this Report	77
102-50 Reporting period	About this Report	77
102-51 Date of most recent report	About this Report	77
102-52 Reporting cycle	About this Report	77
102-53 Contact point for questions regarding the report	Contact	80
102-54 Claims of reporting in accordance with the GRI Standards	About this Report	77
102-55 GRI content index	GRI Content Index	83
102-56 External assurance	GRI Content Index	83

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, 93	NO
Indirect Economic Impacts (2016)	203-1 Infrastructure investments and services supported	Economic Development and Governance; Performance (Economic Development and Governance)	13, 93	NO
	203-2 Significant indirect economic impacts	Economic Development and Governance; Performance (Economic Development and Governance)	13, 93	NO
Procurement Practices (2016)	204-1 Proportion of spending on local suppliers	Fostering Diversity and Equal Opportunity; Performance (Economic Development and Governance)	23, 93	NO
Energy (2016)	302-1 Energy consumption within the organization	Highlights; Energy Use in Construction; Energy Use in Offices; Quantification Methodologies; Performance (Energy and Emissions)	27, 29, 91, 94	NO
Water and Effluents (2018)	303-3 Water withdrawal	Conserving Water Resources	41	NO
Biodiversity (2016)	304-3 Habitats protected or restored	Managing Land Use	44	NO
Emissions (2016)	305-1 Direct (Scope 1) GHG emissions	Highlights; Reducing GHG Emissions; Reporting Actual and Avoided Emissions; Reducing GHG Emissions During Construction; Quantification Methodologies; Performance (Energy and Emissions); Endnotes	27, 30, 31, 34, 91, 94, 100	NO
	305-2 Energy indirect (Scope 2) GHG emissions	Highlights; Reducing GHG Emissions; Reporting Actual and Avoided Emissions; Reducing GHG Emissions During Construction; Quantification Methodologies; Performance (Energy and Emissions); Endnotes	27, 30, 31, 34, 91, 94, 100	NO
	305-3 Other indirect (Scope 3) GHG emissions	Highlights; Reducing GHG Emissions; Reporting Actual and Avoided Emissions; Reducing GHG Emissions During Construction; Quantification Methodologies; Performance (Energy and Emissions); Endnotes	27, 30, 31, 34, 91, 94, 100	NO
	305-5 Reduction of GHG emissions	Reducing GHG Emissions	30	NO
	305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	Reducing GHG Emissions; Protecting Air Quality During Construction	30, 37	NO

Waste (2020)	306-3 Waste generated	Recycling Waste Responsibly	51	NO
	306-4 Waste diverted from disposal	Recycling Waste Responsibly	51	NO
	306-5 Waste directed to disposal	Recycling Waste Responsibly	51	NO
Environmental Compliance (2016)	307-1 Non-compliance with environmental laws and regulations	Effective Governance	14	NO
Supplier Environmental Assessment (2016)	308-1 New suppliers that were screened using environmental criteria	Engaging Suppliers	17	NO
Employment (2016)	401-1 New employee hires and employee turnover	Our Team	79	YES
Occupational Health and Safety (2018)	403-9 Work-related injuries	Health, Safety and Security for Workers; Performance (Worker Health and Safety, Injury Rate); Endnotes	59, 99, 100	NO
Occupational Health and Safety (2018)	403-10 Work-related ill health	Health, Safety and Security for Workers; Performance (Worker Health and Safety, Injury Rate)	56, 99	NO
Training and Education (2016)	404-1 Average hours of training per year per employee	Our Team	79	YES
Diversity and Equal Opportunity (2016)	405-1 Diversity of governance bodies and employees	Our Team	79	YES
Local Communities (2016)	413-1 Operations with local community engagement, impact assessments, and development programs	Station Communities and Ridership	61	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.

In 2022, the Authority is re-engaging with stakeholders to update and reaffirm ESG priorities for the California High-Speed Rail. This section will be updated in next years' report to reflect any changes that arise from the 2022 materiality assessment.

Material Topic	Section	Page(s)
Emergency and disaster recovery planning	Materiality Assessment; Management, Resilience and Adaptation in the Face of Climate Change, Climate Adaptation Planning	6, 57, 58
Enhancing public space and amenities	Materiality Assessment; Advancing Station Planning and Design	6, 62
Land and water pollution*	Materiality Assessment	6
Life cycle approach	Materiality Assessment; Life Cycle Approach	6, 50
Noise and vibration	Materiality Assessment; Environmental Justice	6, 24
Resilience and adaptation, incl. extreme weather	Materiality Assessment; Management, Resilience and Adaptation in the Face of Climate Change, Climate Adaptation Planning	6, 57, 58
Third-party assessment	External Frameworks and Assessments; Materiality Assessment	4, 6
Transportation hub activation and mass/ active transportation	Materiality Assessment; Intermodal Hubs and Regional Transit Integration	6, 63

*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 (PM2.5) 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: ***https://www.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: 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: ***www.arb.ca.gov/cci-resources***. All greenhouse gases relevant to the activities are included (CO_2, CH_4, N_2O). 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

The data in the 2021 columns is as of December 31, 2021.

Economic Development And Governance

FUNDING AND INVESTMENT ($ IN BILLIONS)

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

DISPATCHED WORKERS BY CONSTRUCTION PACKAGE

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

CONSTRUCTION HOURS BY CONSTRUCTION PACKAGE

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

CREATING OPPORTUNITIES FOR DISADVANTAGED WORKERS AND FOSTERING DIVERSITY:
WORKER SUMMARY

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

* 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
Small Business Participants – Total	318	417	427	474	530	626	655
Disadvantaged Business Enterprises (DBE)	100	130	139	157	172	201	214
Disabled Veteran Business Enterprises (DVBE)	36	49	51	52	56	70	75
Small Business Located in Disadvantaged Communities	-	96	115	129	156	129	159
Local Procurement (U.S.-based businesses)	Nearly 100%	Nearly 100%	Nearly 100%	Nearly 100%	Nearly 100%	Nearly 100%	Nearly 100%
Expenditures in Disadvantaged Communities	-	52%	Nearly 60%	54%	50%	55%	57%

Energy And Emissions

ENERGY CONSUMPTION (ANNUAL)

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

*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 ($MMTCO_2E$)*

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 ($MMTCO_2E$)*

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 ($MTCO_2E$)

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

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

* 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)

Criteria Air Pollutant	2015 Emissions	2015 Emissions Avoided	2016 Emissions	2016 Emissions Avoided	2017 Emissions	2017 Emissions Avoided	2018 Emissions	2018 Emissions Avoided	2019 Emissions	2019 Emissions Avoided	2020 Emissions	2020 Emissions Avoided	2021 Emissions	2021 Emissions Avoided
NOx	4,006	-49%	23,024	-51%	20,944	-70%	27,190	-54%	42,507	-49%	50,043	-67%	39,801	-64.3%
ROG	549	-41%	1,715	-58%	2,441	-59%	2,318	-58%	2,802	-65%	3,982	-71%	2,669	-74%
PM	341	-41%	1,082	-60%	1,467	-61%	1,964	-43%	2,374	-50%	3,775	-55%	1,886	-64.8%
BC	262	-42%	833	-60%	1,130	-61%	1,513	-43%	1,869	-51%	2,638	-58%	1,428	-65.8%

VOLUNTARY EMISSIONS REDUCTION AGREEMENTS (VERA)

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

Natural Resources

WATER CONSUMPTION (ANNUAL, IN GALLONS)

Water Usage	2015	2016	2017	2018	2019	2020	2021
Office*	1,060,560	1,317,600	1,464,480	1,952,640	1,952,640	2,000,160	2,442,960
Construction**	2,517,153	14,500,000	31,207,986	13,150,724 (potable) 58,927,468 (nonpotable)	10,003,936 (potable) 105,632,701 (nonpotable)	88,075,850 (potable) 211,509,340 (nonpotable)	29,526,266 (potable) 218,137,740 (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
Habitat *	Preserved and Restored	400	2,000	2,510	2,680	2,349	2,320	2,972
Agricultural **	Approved for Conservation	-	1,200	1,200	1,200	1,200	3,096	3,190

* 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
Recycled/Reused Concrete	37,506	68,183	25,088	11,001	805	1506	2280
Recycled/Reused Asphalt*	-	-	47	1041	93	15	934
Recycled Mixed Metals	2,701	1,294	2500	839	1750	55	275
Recycled Wood	-	39	242	615	34	9	278
Recycled Organics	-	-	5845	9549	5922	2086	572
Mixed Recycling	3,661	4649	7714	4459	1314	1270	468
Materials Landfilled	360	444	1300	3449	1417	2,698	5797

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

* 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	State Bench-mark
Construction Package 1	3.56	1.12	1.76	1.59	1.78	1.60	1.00	
Construction Package 2-3	0	0	0	0.29	1.00	2.18	1.66	
Construction Package 4	N/A	N/A	0	0	1.47	1.09	0.71	
Overall Weighted Average	2.09	0.54	1.1	0.97	1.38	1.77	1.30	1.8
Lost Days Rate								
Construction Package 1	0	0.37	0.7	0.4	0.3	0.80	0.50	
Construction Package 2-3	0	0	0	0	0	0.00	0.00	
Construction Package 4	N/A	N/A	0	0	0	0.00	0.00	
Overall Weighted Average	0	0.18	0.44	0.22	0.11	0.24	0.14	1.4
Fatalities								
Total Fatalities	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*****
Open Houses and Community Meetings	85	85	40	377	200	340	499
Attendees	6,000	6,000	953	15,000+	55,800+	18,800	7,100 +
Events with EJ Outreach	130	130	15	238	87	12	32

* 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.

END NOTES

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 Read more about California's unemployment rate here: ***https://edd.ca.gov/en/about_edd/news_releases_and_announcements/unemployment-january-2022/***

3 The table shows values for the three regions. Additional economic benefits accrue in other parts of the state.

4 For more information about Our Commitment to Diversity, Equity and Inclusion, see this factsheet: ***https://hsr.ca.gov/wp-content/uploads/2022/01/Diversity-Equity-And-Inclusion-Factsheet.pdf***

5 Details of the projected emissions reduction calculation methodology are available online at: ***https://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/auctionproceeds/chsra_hsr_finalqm.pdf***. All greenhouses relevant to the activities are included (CO2, CH4, N2O). Emissions are converted to metric tons of carbon dioxide equivalent (tCO2e) using the Global Warming Potential (GWP) values published in the United Nations Intergovernmental Panel on Climate Change Second Assessment Report (IPCC SAR). Reductions are reported relative to a scenario without high-speed rail, rather than relative to a baseline year. Emissions reductions occur as a result of the service provided by high-speed rail, so are classified as scope 3 emissions reductions.

6 Details of the projected emissions reduction calculation methodology are available online at: ***https://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/auctionproceeds/chsra_hsr_finalqm.pdf***. All greenhouses relevant to the activities are included (CO2, CH4, N2O). Emissions are converted to metric tons of carbon dioxide equivalent (tCO2e) using the Global Warming Potential (GWP) values published in the United Nations Intergovernmental Panel on Climate Change Second Assessment Report (IPCC SAR). Reductions are reported relative to a scenario without high-speed rail, rather than relative to a baseline year. Emissions reductions occur as a result of the service provided by high-speed rail, so are classified as scope 3 emissions reductions.

7 Read the key findings of the State of the Air 2022 here: ***https://www.lung.org/research/sota/key-findings***

8 For more information about Water Year 2021, refer to the following report: ***https://water.ca.gov/-/media/DWR-Website/Web-Pages/Water-Basics/Drought/Files/Publications-And-Reports/091521-Water-Year-2021-broch_v2.pdf***

9 Water withdrawal and discharge 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. If necessary, updated figures will be published in the next Sustainability Report.

10 Office water use is estimated based on number of Authority and Rail Delivery Partner staff working on the project in 2021.

11 CEO Water Mandate, Corporate Water Disclosure Guidelines from 2014 ***https://ceowatermandate.org/***

files/Disclosure2014.pdf

12 LEED is a certification system that provides independent, third-party verification that a building or community was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health: location and transportation, sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

13 This number has been adjusted from previous years' reporting due to updated records.

14 Material 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. If necessary, final updated figures will be published in the next Sustainability Report.

15 Tier III passenger trains are categorized by the Federal Rail Administration as passenger trains that travel between 160 and 220 mph in areas with exclusive rights-of-way

16 Quad gate (Four-Quadrant Gate) systems are designed to block all lanes of traffic on both sides of the track by having four at-grade crossing gates. These systems are temporary and will be used during construction. Upon completion of the system, the high-speed rail will be fully grade separated.

17 Reported as rate per 200,000 hours of work

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

19 Reported as rate per 200,000 hours of work

20 Material 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. If necessary, final updated figures will be published in the next Sustainability Report.

21 Vision California; "Charting Our Future: Statewide Scenarios Report," May 2010. ***http://libraryarchives.metro.net/dpgtl/harvested/2010-Vision-California-charting-our-future.pdf***

22 Board member diversity is not reported by age or minority group.

23 New hire and turnover rates are not reported by age group, gender or region.

24 Training hours are not reported.

2022 Sustainability Report

CALIFORNIA
High-Speed Rail Authority

California High-Speed Rail Authority
770 L Street, Suite 620,
Sacramento, CA 95814
(916) 324-1541
info@hsr.ca.gov
www.hsr.ca.gov
www.buildhsr.com

Instagram *Facebook* *Twitter* *LinkedIn* *YouTube*