

2020 Sustainability Report



Building Resilience

Board of Directors

Thomas Richards

Chair

Nancy Miller

Vice Chair

Andre Boutros

Ernesto M. Camacho

Martha M. Escutia

James C. Ghielmetti

Henry Perea

Lynn Schenk

Anthony Williams

Ex Officio Board

Members

**Honorable Dr. Joaquin
Arambula**

Honorable Jim Beall

Brian P. Kelly
Chief Executive Officer

California High-Speed Rail Authority

*770 L Street, Suite 620
Sacramento, CA 95814*

(916) 324-1541

*info@hsr.ca.gov
www.hsr.ca.gov*



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 mega-regions 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, we are 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.

COVER IMAGE: Conceptual rendering of the canopy covering the vertical circulation and platform at the heart of high-speed rail stations.

TABLE OF CONTENTS

MESSAGE FROM THE CEO.....	vi
Where We Are.....	vii
Sustainability Drives Us	ix
Where We Want to Go	ix
About This Report.....	1
Acknowledgements	1
Who We Are.....	1
Our Governance Structure	1
Our Values.....	2
Our Team	3
Our Supply Chain.....	3
Contact.....	3
Chapter 1: Our Sustainability Approach	5
Our Sustainability Policy	5
Our Sustainability Priorities and Commitments.....	6
Implementation Plan.....	8
A Leading Role in Climate Goals.....	8
External Frameworks and Assessments	10
Third-Party Assessments.....	10
Working with Industry Partners	11
Materiality Assessment	12

Chapter 2: Economic Development and Governance..... 19

- Introduction 19
- Highlights..... 19
- Effective Governance 20
- Financial Responsibility 21
- Job Creation 23
- Construction Jobs in the Central Valley 24
- Opportunities for Disadvantaged Workers..... 28
- Fostering Diversity and Equal Opportunity..... 30
- Worker Protections 33
- Engaging Suppliers..... 33
- Small Business Program 34

Chapter 3: Energy and Emissions 37

- Introduction 37
- Highlights..... 37
- Designing Net-Zero Energy Stations..... 38
- Committing to Renewable Energy 38
- Energy Use in Construction..... 39
- Energy Use in Authority Offices..... 40
- Regulatory Compliance (Energy)..... 40
- Reducing GHG Emissions..... 41
- Reporting Actual and Avoided Annual Emissions..... 42
- Reducing and Managing GHG Emissions in Delivery..... 43
- Regulatory Compliance (Emissions) 46
- Protecting Air Quality During Construction 46

Chapter 4: Natural Resources 51

- Introduction 51
- Highlights..... 51
- Conserving Water Resources..... 51
- Managing Land Use..... 55

Chapter 5: Sustainable Infrastructure..... 61

- Introduction 61
- Highlights..... 61
- Principles for Sustainable Infrastructure..... 62
- Ensuring Health, Safety and Security..... 66
- Management, Resilience and Adaptation 69
- Climate Adaptation Planning 70

Chapter 6: Station Communities and Ridership 73

- Introduction73
- Highlights.....73
- Enhancing Public Space and Amenities.....74
- Engaging Communities..... 80
- Connecting Existing Transportation Systems83

Chapter 7: Moving Forward 85

- Building Even Better 86
- Responding to Climate Change..... 86
- Curbing Air Pollution and Reducing Greenhouse Gas Emissions 86
- Resilient Clean Energy..... 86

Global Reporting Initiative Content Index 89

- General Standard Disclosures89
- Specific Standard DisclosuresAdditional Disclosures.....91

Glossary 93

Quantification Methodologies 95

- Energy95
- GHG Emissions.....95
- Air Pollutant Emissions95
- Water.....95
- Waste95
- Job Creation 96
- Exhibit 1.7: High-Speed Rail Is a Valuable Investment..... 96

Performance..... 97

- Economic Development and Governance97
- Energy and Emissions98
- Natural Resources..... 100
- Sustainable Infrastructure101
- Station Communities..... 102

End Notes 103

MESSAGE FROM THE CEO

Building the nation's first truly high-speed rail system is essential for California to maintain its position as a global leader when it comes to economic standing, job creation and efforts to combat the effects of climate change. This future-ready system, with high-speed trains that will be powered by 100-percent renewable energy, will ensure that Californians can move efficiently and effectively even as the state's population grows toward 50 million people.

Sustainability is, and always will be, at the core of our mission to deliver high-speed rail to California. The California High-Speed Rail Authority (Authority) remains dedicated to the goal of creating the greenest infrastructure project in the nation, both in its operations and its construction.



This is a transformative transportation project. Slashing travel times between the state's megaregions, the Bay Area, the Central Valley and the Los Angeles Basin will transform the mental map of California, as shown in Exhibit 0.0. A trip between downtown San Francisco and downtown Los Angeles will take less than three hours. California has not seen this level of transformation in the speed of ground-based transportation since rail was first introduced in the 19th century. These travel times will transform the job and industry opportunities in state.

EXHIBIT 0.0: HIGH-SPEED RAIL TRAVEL TIMES CHANGE THE MAP OF CALIFORNIA



Given that transportation is the highest source of greenhouse gas emissions in California, it is an environmental imperative to inspire travelers to make a massive mode shift away from gas-powered cars and planes to clean, zero-emission high-speed rail trains. We project that the system will save 3,000 tons of air pollution each year in vulnerable communities. The system will save 2 million metric tons of carbon each year, equivalent to taking 432,000 cars off the road annually – roughly all of the cars registered in San Francisco County. Mode shift from traditional forms of travel to clean, green high-speed rail will deliver GHG reductions for California of more than 100 million metric tons in the first 50 years of operation.

Our commitment is to deliver a system as a foundation for a more sustainable California transportation network. By using leading-edge methods during construction, we strive to make the country’s largest infrastructure program a national model for sustainable project delivery.

Where We Are

In 2020, we are making progress even through the COVID-19 pandemic. We have 119 miles of high-speed rail infrastructure under construction. We are on pace to have the entire system environmentally cleared by the end of 2022. We are funding important regional investments in the Bay Area and the Los Angeles regions.

California high-speed rail is already playing a role in helping California achieve its social equity, economic development and environmental objectives. To date, we have created thousands of good-paying jobs statewide and provided work for more than 550 small businesses, resulting in more than \$9 billion in economic output from investments. These jobs are well-paying jobs, capable of supporting families, most of whom live in the most economically disadvantaged part of the state.



In 2019, our progress was marked by several milestones, including:

- Being awarded five stars and being named as one of the top sustainable rail infrastructure projects in North America by the GRESB Infrastructure Assessment, which benchmarks our environmental, social and governance policies, practices and performance;
- Increasing the total area of habitat preserved and restored by more than 35 percent, compared to 2018;
- Continuing partnerships to plant more than 1,200 trees in schools and parks in the Fresno area, and 4,000 more in disadvantaged communities throughout the state;
- Avoiding nearly 48,000 pounds of criteria air pollutants during construction;
- Creating more than 4,000 jobs on construction sites (as of June 2019), with almost 40 percent of the workers coming from disadvantaged communities; and
- Generating economic opportunity for hundreds of businesses, including 180 Disabled Business Enterprises and 58 Disabled Veteran Business Enterprises.

The importance of our investments in the Central Valley cannot be overstated. It's a region that is often overlooked as other areas of the state reap the benefits from economic investment and development. In 2009, during the Great Recession, the federal government provided funds from the American Recovery and Reinvestment Act (ARRA) to begin building high-speed rail in California. At that time, during the Great Recession, the Central Valley was suffering from some of the worst unemployment in the nation. Because of that, the Federal Railroad Administration targeted the ARRA funds to that region in order to create good-paying jobs and aid in the nation's economic recovery.

In its October 2010 selection notification letter, the Federal Railroad Administration (FRA) noted that applications were subject to many evaluation criteria, including a project's ability to meet broad program objectives and strategic transportation goals—including economic recovery benefits (including job creation) and environmental benefits. The Authority and the FRA jointly agreed that construction in the Central Valley met these goals for several reasons:

- The Central Valley suffered from one of the highest unemployment rates in the nation, reaching nearly 17 percent in 2010;
- The Central Valley had long experienced the negative effects of some of the worst air quality in the nation;
- The funding would provide immediate recession relief through design and construction employment in one of the hardest-hit areas of the country; and
- The project would deliver a high-speed rail test track for high-speed rail trains, systems and technology.

Since then, high-speed rail investments have provided consistent stimulus to the Central Valley's economy, with more than 4,000 construction jobs created on job sites in the valley and about \$750 million in economic output in FY 18-19, alone.

As we're building in the Central Valley, we are simultaneously investing in other important regional projects in both Northern and Southern California.

The High-Speed Rail Authority contributed more than \$700 million to the Caltrain Modernization Program, which includes electrifying the Caltrain corridor between San Francisco and San José. This investment is helping Caltrain replace 75 percent of its diesel service with trains that are powered by electricity – providing cleaner and more sustainable service to the tens of thousands of Bay Area residents. This is also critically important to high-speed rail operating in that corridor.

Work in this important corridor is well underway. Crews have installed more than 1,000 poles along the corridor from South San Francisco to San José. Each pole installed will support the wires needed to provide power to the new electric trains. This milestone brings Caltrain one step closer to providing a modernized electric commute.

In Southern California, the High-Speed Rail Authority contributed \$423 million in Proposition 1A bookend funds to the Link Union Station Project, which will expand and upgrade this important multimodal station and transform how regional rail systems and California's high-speed rail operate in this economic megaregion. Los Angeles Union Station is California's largest multimodal transportation hub, serving a region with a combined population that exceeds 20 million people. We also contributed more than \$75 million to the Rosecrans/Marquardt Grade Separation Project, once ranked as one of the deadliest grade crossings in California, improving safety, mobility and air quality in the surrounding community that California has designated as disadvantaged.

Sustainability Drives Us

Sustainability influences all aspects of our organization and every element of the project life cycle, especially as we consider the environmental, social, and financial impacts for both current and future generations.

We updated our Sustainability Policy in April 2019 to reflect stakeholder feedback and to specifically map our sustainability objectives to construction and operations, per a recommendation from the California State Auditor's Office.

Our updated Sustainability Policy continues to reinforce the fundamental commitment to Californians and the goals expressed in the high-speed rail enabling legislation.

Where We Want to Go

On March 11, 2020, the World Health Organization declared the coronavirus outbreak a pandemic and subsequently, on March 19, Governor Gavin Newsom issued a stay-at-home order to protect the health and well-being of all Californians and to slow the spread of COVID-19.

Over that month, everything in our world, our nation and our state changed. We adapted quickly to address the immediate circumstances associated with the pandemic. Within 10 days, more than 90 percent of our administrative organization was teleworking on a full-time, part-time or rotational basis. In March, we shifted our public meetings to a virtual format, and, in April, our Board of Directors held its first virtual meeting.

Although COVID-19 has affected our program, just as it has affected other public agencies and businesses, construction has progressed in the Central Valley and, as of July 23, 2020, we hit an all-time high of 1,000 average weekly workers dispatched to job sites in the Central Valley while following strict health and safety protocols, quadrupling our numbers since February 2019. We also released three draft environmental documents, and a scoping document for public review and have held several virtual public hearings and meetings on all of them.

We have done our best to continue making progress on the high-speed rail project, because our commitment to the vision behind Proposition 1A has not changed. It is our mission to deliver a truly transformative and sustainable mobility option to California.



Brian P. Kelly
Chief Executive Officer

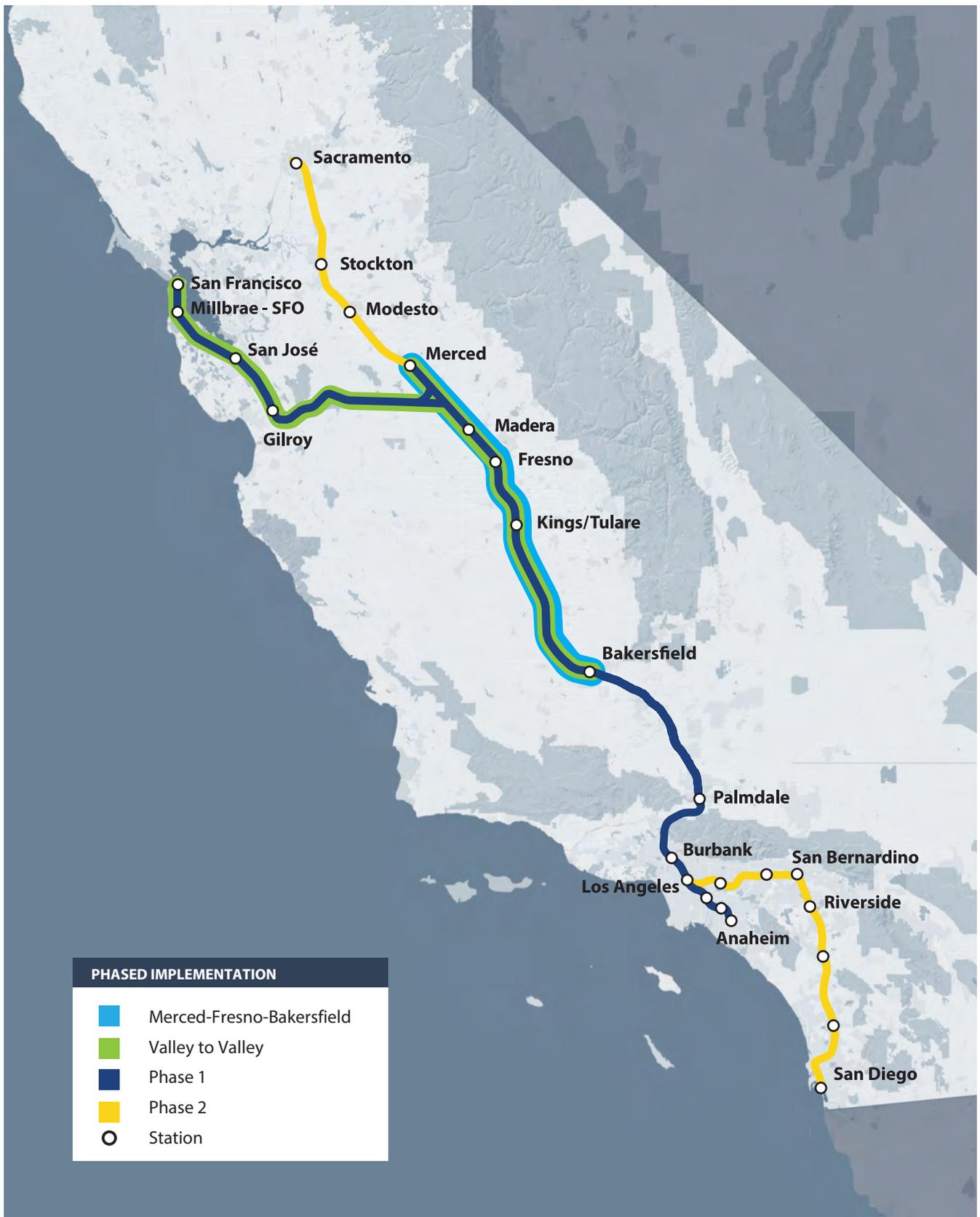


EXHIBIT 0.1: THIS MAP SHOWS THE PHASED IMPLEMENTATION PLAN AS DESCRIBED IN THE DRAFT 2020 BUSINESS PLAN.

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.

It covers the California High-Speed Rail Authority (Authority) and its activities from January 1, 2019, to December 31, 2019, except where indicated. This report is updated on an annual basis; our previous report was published in September 2019 and covered the 2018 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. No restatements of information published in previous reports have been made.

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 2019 toward advancing our sustainability policies and commitments. This report looks forward when discussing how our policies and practices will affect California into the future.

Acknowledgements

Thanks to all our federal, state, regional and local partners and to our environmental and community non-profit 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, 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.

The Authority is headquartered in Sacramento, California, and operates in the United States of America. The Authority is a California state agency 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 (CalSTA) under Transportation Secretary David Kim. In April 2020, the Chair of the Board of Directors resigned, and the spot is currently vacant. In September 2020, the Board will vote on a new Chair. No other 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 vacant) and a Vice-Chair (the Vice-Chair is currently acting as the interim Board Chair). During 2019, the Board included five men and three women.¹ In 2016, Governor Jerry Brown signed AB 1813, which added two non-voting, ex-officio members 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 sub-committees 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 analyses 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.

Our Values

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

- **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.
- **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.
- **Sustainability:** Deliver a system that maximizes benefits to priority communities, protects resources and serves in the transition to a low-carbon economy.

Our Team

As of December 31, 2019, the Authority had 226 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 0.2 and 0.3. During the reporting period, the only significant variation in staff numbers was due to the addition of new staff and turnover.

In 2019, the Authority hired 64 new employees, for a new hire rate of 28 percent.² There was a turnover rate of 21 percent for 2019. 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 employee’s 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 2014.³

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

EXHIBIT 0.2: 2019 STATE EMPLOYEE BREAKDOWN BY GENDER AND EMPLOYEE CATEGORY

EMPLOYEE CATEGORY	MALE	FEMALE
Rank and File	58	47
Managerial	29	21
Supervisory	14	28
Exempt	15	12
Confidential	0	2
Total	116	110
Employees - Total (Incl. Board Members)	226	

EXHIBIT 0.3: 2019 STATE EMPLOYEE BREAKDOWN BY REGION*

REGION	EMPLOYEES
Sacramento/HQ	190
Fresno/Central Valley	31
Los Angeles/Southern California	1
Santa Clara/Northern California	4

*Employee diversity is not reported by age or minority group

Our Supply Chain

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

Details of supply chain expenditures are available online via the Finance and Audit Committee materials webpage (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: Shovels await tree planting in Glendale.



CHAPTER 1: OUR SUSTAINABILITY APPROACH

Sustainability is at the core of our mission. It is one of the six overarching goals that guide our holistic, integrated approach to delivering high-speed rail to California. We work to be the greenest infrastructure project in the nation, both in construction and operations.

We are making investments and rely on public-policy leading practices 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. To that end, 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.

Our Sustainability Policy

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

The Authority's Sustainability Policy, signed in September 2013, honors several industry sustainability and stakeholder commitments. An updated Sustainability Policy was adopted by the Authority's Board of Directors in March 2016. Since then, the Authority has continuously implemented a range of sustainability actions, including an update in 2018 to its materiality assessment. This led to an updated policy adopted by the Board of Directors in April 2019, which included 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 objectives of the policy 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 its entire lifecycle.

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/SustainabilityPolicy>.

Our Sustainability Priorities and Commitments

The mission of the Authority is to deliver an electrified high-speed rail system, which provides critical mobility and serves 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 California high-speed rail provides opportunities to move industries and set new public policy precedents.

It is vital that the public and stakeholders are 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. In 2012, Authority staff and stakeholders identified five sustainability priorities. The Authority periodically confirms the relevance of and refines these five priorities, which was last completed in 2015 and then in 2018.

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 promote transit-oriented development and sustainable land use decisions that will help bring riders into the system, encourage and promote proximity co-location for education, health and business institutions, and ancillary consumer concession services.

As shown in Exhibits 1.1 through 1.5, each priority is broken down to 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-percent overall small business participation goal for Authority contracts, including 10-percent Disadvantage Business Enterprise (DBE) participation and 3-percent Disabled Veteran Business Enterprise (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
Achieve net-zero GHG and criteria air pollutant emissions in construction.	Construction
Net-zero energy/LEED® Platinum facilities.	Operation
Operate the system on 100-percent 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 program 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 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 Policy into itemized, actionable tasks with measurable performance indicators and metrics. For details, see our website at <http://www.hsr.ca.gov/SustainabilityImplementationPlan>.

A Leading Role in Climate Goals

California invests proceeds from its signature Cap-and-Trade program into projects and programs that deliver on the requirements of Assembly Bill 32 (Nunez, 2006; the Global Warming Solutions Act) and Senate Bill 32 (Pavley, 2016; the California Global Warming Solutions Act and an update to the Act to include greenhouse gas

(GHG) reduction targets, respectively). High-speed rail is a valuable investment not just for the GHG reductions it will deliver, as shown in Exhibit 1.7, but also the extensive co-benefits that return to Californians, including those most vulnerable.

As shown in Exhibit 1.6, the high-speed rail system is integral to achieving those objectives because the system will directly deliver crucial GHG emissions reductions in the transportation sector as well as extensive co-benefits. The potential for exponential GHG reductions through reduced vehicle miles traveled (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 1.6: CALIFORNIA CLIMATE INVESTMENTS AND GREENHOUSE GAS EMISSIONS REDUCTIONS

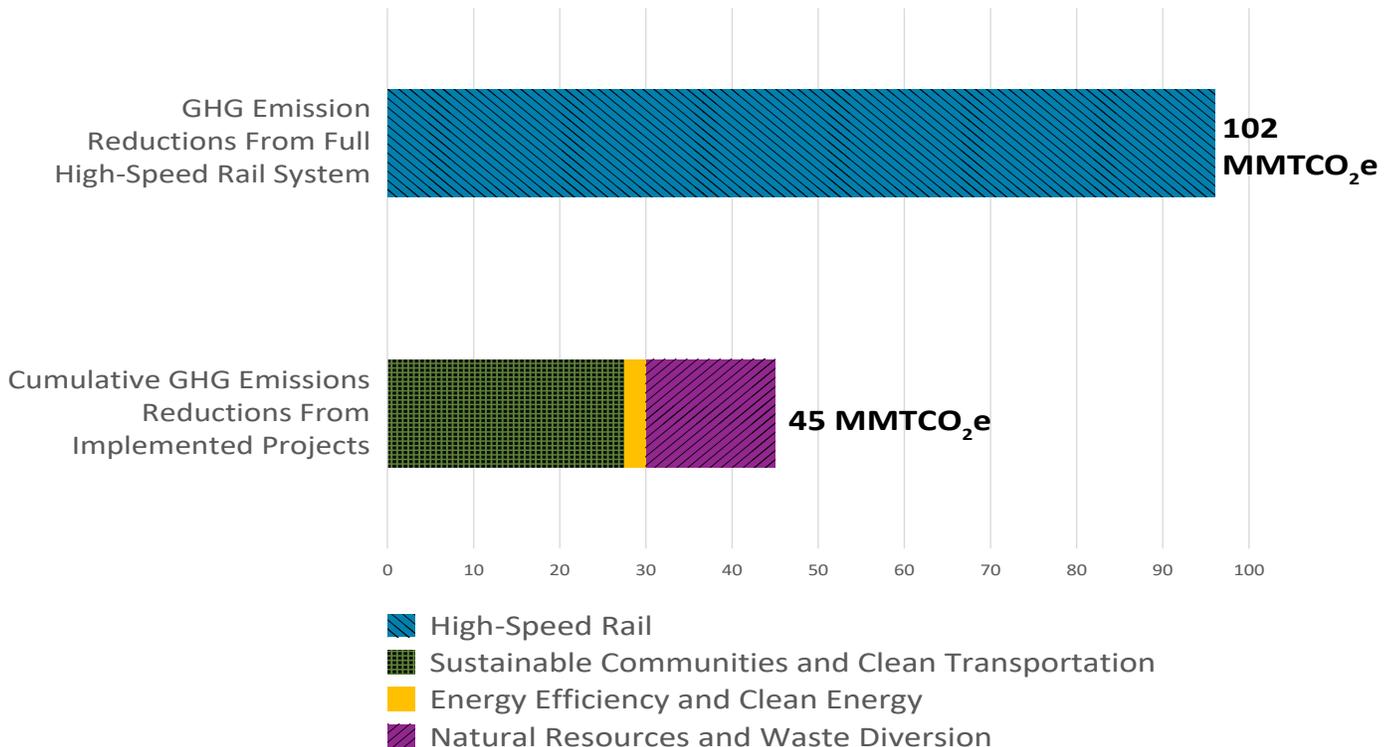


EXHIBIT 1.7: HIGH-SPEED RAIL IS A VALUABLE INVESTMENT



**225,000 MT
Carbon Sequestered
and Avoided**



**102,000,000 MTCO₂e
Emissions Reductions**



**4,439
Jobs Created**



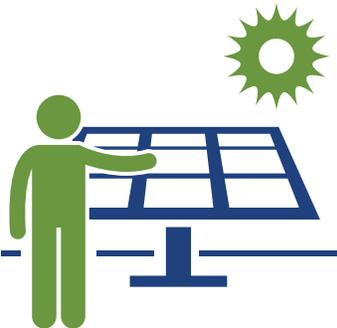
**\$2,400,000,000
Disadvantaged
Communities Benefited**



**140,000 lbs.
Criteria Air Pollution
Avoided**



**560
Small Businesses Engaged**



**1,900,000 MWh
Renewable Energy Generation**



**7,200
Future Jobs**

External Frameworks and Assessments

We consistently look to external frameworks to benchmark our performance. One such framework is the GRESB Infrastructure Assessment, 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.

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 fifth time in 2020, maintaining our standing among leading infrastructure projects in North America.

Our participation in the GRESB Infrastructure Assessment is valuable as we consider ways to attract investment. The assessment enables consistent reporting on sustainability information across a range of infrastructure investments. Anticipating the information that major investors could seek helps us align our reporting efforts with what investors find most important.

Consistent High Marks

The California High-Speed Rail program was awarded five stars and ranked as the one of the top infrastructure projects in North America, placing fourth among similar projects in the 2019 GRESB Infrastructure Assessment.

Peer Comparison



Rail Companies

out of 11

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



Third-Party Assessments

We also look to sustainable rating systems, such as Envision and LEED®. These third-party assessments 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. Our Envision application began in 2019, and the project is expected to have its program wide achievement verified by late 2020.

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.

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 a holistic concept that starts with the understanding that the built environment can have profound effects, both positive and negative, on the natural environment, and on the people who inhabit 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.

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 world-wide 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 to 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.

- 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.

In 2018, as part of our work to refresh our materiality assessment, we discussed the SDGs with each of our stakeholders to determine the importance of referencing these broader global goals and how high-speed rail actions affect positive outcomes in relation to the goals. Our stakeholders expressed favorable reactions to the idea, because it is important to understand how our actions relate to broader global issues.

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.

We conducted the materiality assessment update in 2018 via questionnaires and individual conversations with selected stakeholders. These stakeholders were identified 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. External stakeholders comprised local non-governmental organization representatives, as well as representatives from six state agencies: California State Transportation Agency (CalSTA); California Department of Transportation (Caltrans); California Environmental Protection Agency; California State Energy Commission; and the California Strategic Growth Council.

Our internal stakeholders included nine Board members and executives and six key external-facing staff, as well as the Early Train Operator (ETO), DB Engineering & Consulting USA.

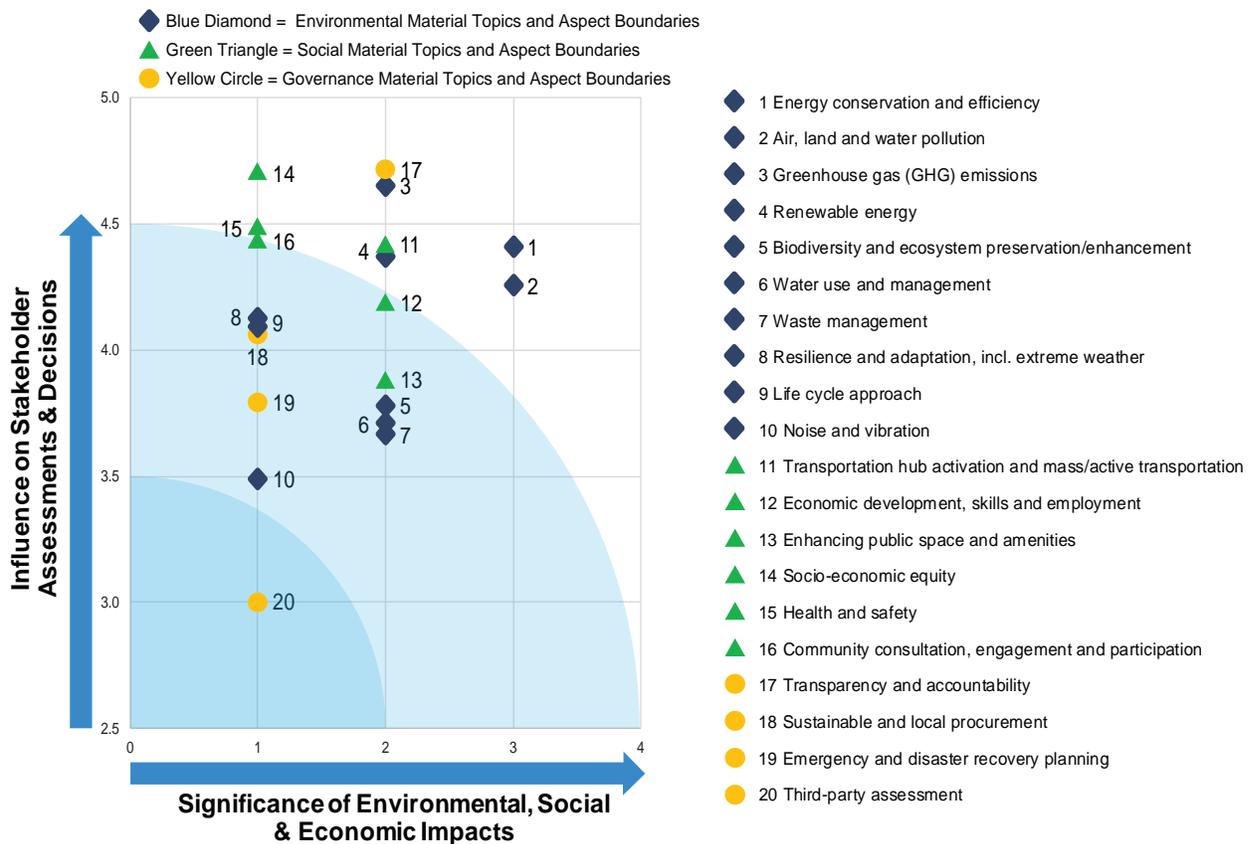
Materiality Assessment Results

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 1.8) that matter most to our stakeholders.

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. Boundaries for each material topic for the Authority and the project are shown in Exhibit 1.8. For more information on the materiality assessment completed in 2018, the methodology used and detailed descriptions of the topics and boundaries covered, see our Sustainability Report from 2019 at https://www.hsr.ca.gov/docs/programs/green_practices/sustainability/Sustainability_Report_2019.pdf.

EXHIBIT 1.8: CALIFORNIA HIGH-SPEED RAIL AUTHORITY MATERIAL TOPICS



Environmental Material Topics and Aspect 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.

Air, land and water pollution

Substances associated with potentially harmful human health and environmental impacts. Criteria air pollutants include particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides and lead, while 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).

Greenhouse gas (GHG) emissions

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

Boundary: The efficiency with which we use resources impacts the environment. Our approach to managing GHG emissions impacts State emissions reduction commitments.

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.

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.

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.

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 impacts our employees, contractors, consultants and the public, as well as the resilience of the high-speed rail system.

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 life cycle approach impacts the environment and people upstream and downstream of our direct operations.

Noise and vibration

The propagation of unwanted or excessive sound and/or physical oscillations with the potential to negatively impact human health and activity, or animal life.

Boundary: This topic impacts communities located near the high-speed rail system.



PHOTO: The Fresno River Viaduct maintains clearance beyond the main river channel to maximize movement along this important wildlife corridor.

Social Material Topics and Aspect Boundaries

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 impacts communities located near the high-speed rail system.

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 impacts our employees, contractors, consultants and the public.

Community consultation, engagement and participation

Providing opportunities, such as public meetings, for community members to receive information and/or provide feedback on matters affecting them. This includes engaging communities with special concerns, such as disadvantaged communities.

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

Economic development skills and employment

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

Boundary: Our approach to health and safety impacts 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 impacts communities located near the high-speed rail system.

Socioeconomic equity

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

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



PHOTO: Rebar at Avenue 7 grade separation.

Governance Material Topics and Aspect 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 impacts the reputation of the Authority and 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.

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

Emergency and disaster recovery planning

Proactively 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 impacts our employees, contractors, consultants and the public, as well as the resilience of the high-speed rail system.

Third-party assessment

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

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



PHOTO: The Board of Directors is responsible for setting policy directives for the Authority, and for the development and approval of the Authority’s key policy documents, including the Authority’s business plans, financial plans and strategic plans.



PHOTO: Workers prepare a road bed at Avenue 7 in Madera County (June 2020)



CHAPTER 2: ECONOMIC DEVELOPMENT AND GOVERNANCE

Introduction

We understand that the environment and the economy are intertwined and that the ability to get to destinations reliably, cleanly and quickly is at the heart of economic vitality. The Authority's mission is to deliver a functional, certified and commercially viable high-speed rail system in California. The system links California's economic and population centers with the travel times to underpin continued economic resilience. We continue to progress that mission despite the challenges facing this project. In our 2019 Project Update Report, we identified areas where our organizational capabilities were still developing. The 2019 Project Update Report discussed our plans to address these areas and how we implemented those plans.

Our Draft 2020 Business Plan built on that discussion by explaining the progress we have made to build an organization focused on performance and delivery. This started from the top down, with important appointments to our Board of Directors and executive staff leadership. We launched a thorough organizational review, with an emphasis on enhancing contract-management staffing and clarifying consultant and State roles. We increased transparency through detailed reporting to the Board of Directors and the Board's Finance and Audit Committee, and through posting change orders on our website. Further, we adopted a cost and schedule Program Baseline and implemented more rigor in critical decision-making through establishing a stringent governance process. We are committed to a continuous process to improve organizational capacity.

We continue to focus on job creation, economic benefits, continuous improvement, transparency, accountability and maximizing opportunities for private investment while delivering the system. These priorities, and a demonstrated focus on becoming a high-performance organization, are encoded into our structure through governing statute and agency policy.

Our Sustainability Policy identifies commitments relative to economic development and governance, pointing to how we and our consultants and contractors have and will continue to tailor the program to deliver economic value to Californians.

Highlights

- 4,439 construction labor workers have been sent to work at various construction sites along the Central Valley alignment.
- The number of small businesses put to work on the project increased by nearly 88 percent since 2015, and the number of those businesses located in disadvantaged communities grew by 67 percent in the same timeframe.
- Participation by Certified Disadvantaged Business Enterprises (DBE) increased to 180, and Disabled Veteran Business Enterprises (DVBE) participation increased to 60 Certified DVBE working on the program.
- As construction advanced over 119 miles in the Central Valley, so, too, have our investments in the system statewide. From 2006 to mid-2019, our investments generated approximately \$8.3 to \$9.2 billion in total economic activity in the state.

Effective Governance

2019 PROGRESS: The Authority's governance committees deliver internal decision-making rigor, accountability and transparency for major decisions. Proposed changes to the program or to projects go through these committees for a comprehensive review of the full effects of a proposed change.

We enforce requirements on contractors, subcontractors and suppliers to ensure effective governance and transparency in everything we do. In 2019, we received no fines related to these regulations. Furthermore, we have identified no significant noncompliance with environmental laws and/or regulations.⁴

Our oversight philosophy emphasizes stewardship, transparency and accountability. We made significant changes to our internal governance to make it more comprehensive and structured. These changes were 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 tradeoffs of a potential action to ensure fully informed decisions.

Governance Committees Structure

We maintain a structure of four governance committees, each with its own purpose, roles, organization and operations. The four governance committees—the Executive Committee, the Program Delivery Committee (PDC), the Business Oversight Committee (BOC) and the Administrative Committee—regularly interact with each other to address programmatic issues. The PDC, BOC and Administrative committees report directly to the Executive Committee.

The Executive Committee is the senior governance committee. Members of the committee advise the Chief Executive Officer, who chairs the committee, on key agency decisions and recommendations to the Board of Directors. The Executive Committee makes executive, enterprise-wide policy decisions, provides overarching Authority strategy and priorities, resolves escalated disputes and ensures preparation of agenda items for upcoming board meetings.

The Program Delivery Committee (PDC) provides governance and oversight of the Authority's programmatic execution and performance. The PDC is accountable for all aspects of Program development and delivery in accordance with the Program Baseline, including scope, schedule and adherence to budget. The PDC advises the Board of Directors, the CEO and the Executive Committee regarding Program execution and performance.

The Business Oversight Committee (BOC) provides programmatic acquisition strategy, procurement governance and commercial oversight. It acts as the Program Baseline configuration-management control board and approves all changes of scope, timeline and budget to any program element within the Program Baseline. This committee ensures Program Baseline compliance with federal and state regulations and statutes.

The Administrative Committee provides governance and oversight of human resources, IT, communications, employee engagement, administrative functions and facilities outside of Program Delivery, and business oversight. The Administrative Committee ensures effective administration and support to the entire Authority.

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, including:

- 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 (Senate Budget and Fiscal Review Committee, 2013-2014) Greenhouse Gases: Emissions Reduction
- SB 535 (De León, 2012) Global Warming Solutions Act, 2006: Greenhouse Gas Reduction Fund
- AB 1352 (Pérez, 2012) Global Warming Solutions Act, 2006: Greenhouse Gas Reduction Fund
- AB 262 (Bonata, 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
- Executive Order B-18-12
- Executive Order B-30-15
- Executive Order N-19-19
- 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
- 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

Financial Responsibility

2019 PROGRESS: As of June 2020, the Authority had expended \$7.0 billion of the \$20.6 billion to \$23.4 billion of capital outlay funding currently identified for the program. Also, we continued regular financial reporting to the Federal Railroad Administration (FRA) as well as annual reporting to the California Air Resources Board (CARB) in compliance with requirements for California climate investments.

The State of California and the federal government committed significant amounts of funding to implement this program. As of June 30, 2020:

- The Authority has received funding commitments of \$3.5 billion from the federal government, \$9.0 billion from Proposition 1A bonds (\$8.5 billion for capital outlay expenditures), and 25 percent of annual Cap-and-Trade proceeds on a continuous basis plus one-time appropriations, facilitated by CARB programs.
- \$12.4 billion in federal and state funding will be allocated to the planning and construction of the Central Valley Segment, including \$3.1 billion from the federal government, \$2.8 billion from Proposition 1A bond proceeds and \$6.5 billion in current and future Cap-and-Trade proceeds.

Nearly \$5.6 billion was expended on planning and construction of the Central Valley Segment. 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.⁵

To date, approximately 95 percent of expenditures went to California contractors, consultants, and small businesses.

- Through June 2020, the Authority received nearly \$3.3 billion in Cap-and-Trade proceeds for high-speed rail.

This funding has allowed us to execute the contracts necessary to continue the Central Valley construction and to initiate the Track and Systems procurement. It has also allowed us to advance the environmental clearance of and other early work for the entire Phase 1 System, consistent with our federal grant agreements.

Risk Assessments

We still recommend that we remain on the path we set in 2018, refined last year in the 2019 Project Update Report and further examined in the Draft 2020 Business Plan—complete the commitments that have already been made to the Central Valley and other partners and strategically build on those investments incrementally as funding is available.

However, because of the uncertainty surrounding the COVID-19 pandemic, whether we can deliver the Merced to Bakersfield line as an initial operating line exactly as described in the Draft 2020 Business Plan is less clear today than when the draft was issued on February 12. For that reason, we intend to advance in a deliberative way to determine how to align our mission and implementation strategy with new risks and realities.

In order to identify the most prudent way to navigate through and beyond this uncertain time to deliver the program, we are conducting a comprehensive assessment of risks to account for COVID-19 impacts on the high-speed rail program.

Our intent is to advance construction in the Central Valley and complete environmental reviews to fulfill our federal grant commitments; to keep Californians working on this transformative project; to steadily recalibrate where we are in the face of COVID-19 impacts; and to chart where we must go in light of those impacts.

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; and
- Senate Bill 852 (Leno, Chapter 25, Statutes of 2014): Budget Act of 2014

Financial Responsibility Activities

- Managing our Administrative Budget in conformance with State of California requirements;
- 100 percent compliance with all existing financial obligations and tracking mechanisms;
- Preparing biennial Business Plans for submittal to the Legislature (even years);
- Preparing biennial Project Update Report for submittal to the Legislature (odd years);
- Board of Director and Finance and Audit Committee public meetings and monthly reports; and
- Annual reporting to the CARB in compliance with requirements for California Climate Investments.

Links

Full details of program funding and financing are available in the 2018 Business Plan at: http://hsr.ca.gov/About/Business_Plans/2018_Business_Plan.html

Monthly Finance and Audit Committee updates to the Board can be found here: <https://www.hsr.ca.gov/FinanceAuditCommittee>

Details of funding agreements can be viewed online here: <https://www.hsr.ca.gov/FundingAgreements>

Job Creation

2019 PROGRESS: Jobs supported by high-speed rail investment increased significantly as construction ramped up in the Central Valley over the past several years. Investment in California's economy in Fiscal Year 2018-19 yielded more than 50,000 direct, indirect and induced job-years.

The ongoing creation of jobs in designing, planning and constructing the system is one of high-speed rail project's signature benefits. Focusing on jobs in disadvantaged communities is a direct result of our governance process and has bolstered local economic development. High-speed rail construction jobs go to the people who need them most, including disadvantaged workers, and provide a significant boost to California's economy, as shown in Exhibit 2.1.

EXHIBIT 2.1: THE ECONOMIC IMPACTS OF HIGH-SPEED RAIL INVESTMENTS (JULY 2006 - JUNE 2019)* (DOLLARS IN BILLIONS)



*Direct, indirect and induced effects.



PHOTO: Work continues at the San Joaquin River (2020)

Construction Jobs in the Central Valley

The Central Valley has faced challenges in recovering from the economic downturn from the recession in 2007 to 2009, including an unemployment rate in the

construction industry of more than 30 percent in recent years. The direct impact of the Authority's investment equates to 3,380 job-years in the Central Valley Region in FY 2018-2019. Exhibits 2.2 and 2.3 show the number of construction workers dispatched in the Central Valley and construction hours worked through July 2020.

EXHIBIT 2.2: WORKERS DISPATCHED BY CONSTRUCTION PACKAGE (CP) SINCE INCEPTION

4,439 Construction Workers

1,561



2,048



830



EXHIBIT 2.3: CONSTRUCTION HOURS BY CONSTRUCTION PACKAGE (CP) SINCE INCEPTION

3,120,766 Construction Hours



789,721



2,087,882



243,163

Jobs in Other Regions

Additionally, connectivity and bookend projects are providing jobs in Southern and Northern California, as shown in Exhibit 2.4. These projects, part of the California State Transportation Agency’s (CalSTA) statewide rail modernization program, are designed to strengthen and improve existing rail networks and to connect them to the high-speed rail system. In time,

permanent jobs will be created 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://www.hsr.ca.gov/programs/economic_investment/.

EXHIBIT 2.4: ECONOMIC IMPACTS BY REGION
(PROGRAM TOTALS FROM JULY 2006 THROUGH JUNE 2019; \$ IN MILLIONS)*

Economic Impacts	Northern California (Sacramento and the Bay Area)	Central Valley	Southern California
Job-Years of Employment	15,220	18,970	5,170
Labor Income	\$1,180	\$1,010	\$370
Economic Output	\$2,610	\$3,340	\$900

*When summed, the total of the four regions shown in this graphic do not equal the total benefits to the state. Exhibit 2.1, The Economic impacts of High-Speed Rail, shows results for the entirety of California. Exhibit 2.4 shows results for the four regions only, not including the many counties in California where economic effects have taken place over this time period. For more information on the methodologies used to estimate these impacts, please see this report: https://www.hsr.ca.gov/programs/economic_investment/pdf/Economic_Impact_Technical_Support_Document.pdf



PHOTO: Workers at the Golden State Realignment (June 2020)

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 (OCC), ultimately a Heavy Maintenance Facility (HMF) for trains, an operations management headquarters location and Light Maintenance Facilities (LMF).

Siting of the first facilities will begin in 2020. In the Central Valley, the HMF will be staged based on the operational needs starting in the Central Valley. This site will receive and prepare the trains for service through a testing, commissioning and acceptance process. Once passenger service begins, train inspections and repairs will occur at this facility. Staffing will begin with around 60 to 80 positions and, as the system grows, will increase to approximately 300 employees including machinists, welders, electronic technicians, and other operations and management staff.

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

The operations of the system will generate ongoing economic benefits to communities and businesses. A total economic output of \$1.6 billion is anticipated, which includes the direct, indirect and induced effects that flow from these investments and staffing.

Exhibit 2.5 shows the total economic impacts of staffing the five maintenance facilities over a 10-year span of operation, starting in 2025 with facilities for initial testing of trains and continuing through operations in 2034.

EXHIBIT 2.5: HIGH-SPEED RAIL FACILITIES AND THEIR ECONOMIC IMPACTS (\$ IN MILLIONS)

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

Exhibit 2.6 shows the total job years created by staffing the five maintenance facilities over a 10-year span of operation (2025-2034).

EXHIBIT 2.6: HIGH-SPEED RAIL FACILITIES AND JOB YEARS

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

Fiscal Impacts for State and Local Governments

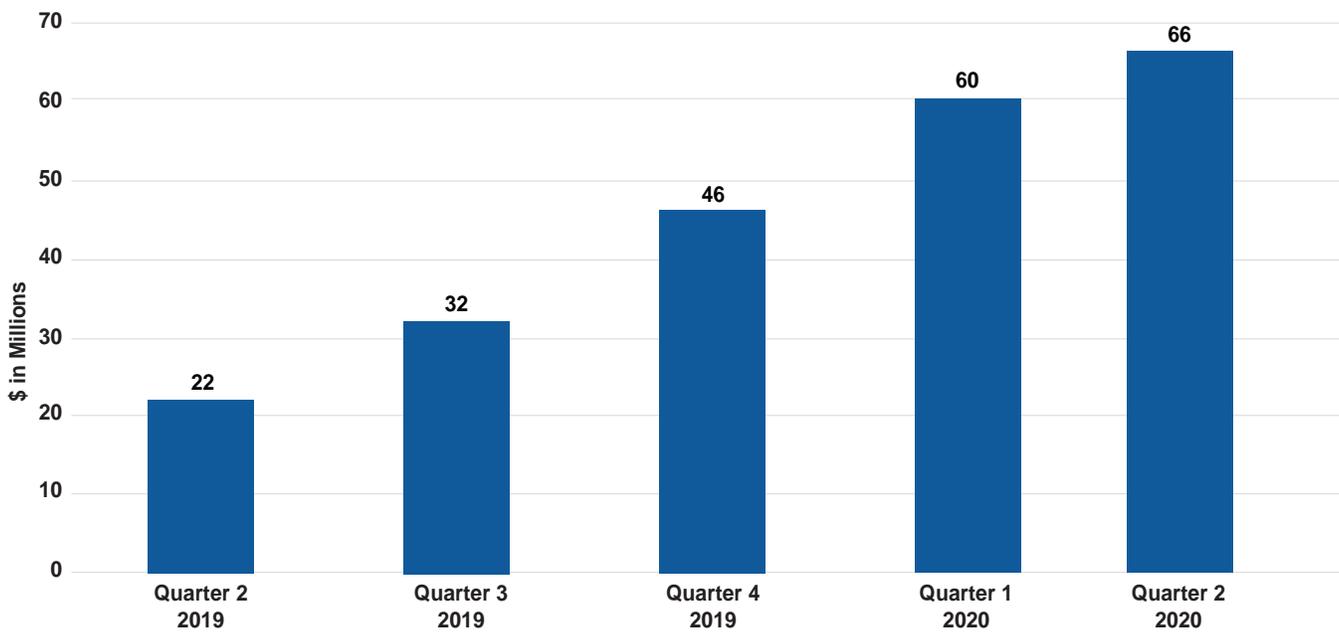
The Authority’s average quarterly expenditures in the Central Valley construction packages has tripled since the second quarter of 2019, as shown in Exhibit 2.7. In addition to jobs and economic output, the Authority’s investment through 2019 also produced new net revenue for the state and local governments.

As the Authority pays invoices for construction and other work on the project, those payments translate into higher incomes for small and large businesses working

on the project, as well as wages for the workforce. When companies and individuals receive and spend this income, tax revenue is generated to support the services provided by state and local governments.

These fiscal impacts include state income tax and corporate taxes, state and local sales taxes, and local property taxes. The Authority estimates that \$220 million in total net revenue was generated for California state and local governments over the 12-year period between fiscal year 2006-2007 and 2018-2019.

EXHIBIT 2.7: AVERAGE QUARTERLY EXPENDITURES IN CONSTRUCTION PACKAGES (\$ IN MILLIONS)



Catalyzing Regional Economic Development

The dramatic travel time savings through high-speed rail open regions of the state to new economic opportunities. The recovery from the economic crisis will depend upon rebuilding diverse economies, with a range of jobs and sectors that foster inclusive and sustainable economic growth. Regions have been looking at how they can develop collective approaches to development.

In 2019, the Fresno region launched the DRIVE initiative, which developed region-specific investment themes and initiatives. Building off the success of the Fresno DRIVE initiative in 2019 and the Governor's Office of Planning and Research/GO-Biz Regions Rise Together initiative, state staff have been working in partnership with leaders in the city of Bakersfield and Kern County to launch "B3K" (A Better Bakersfield and Boundless Kern).

The Bakersfield-Kern region is at a turning point. Despite years of steady job creation based on energy, agriculture and population growth, the region faces serious challenges to its future vitality. It lags the nation and its peers on productivity, wages, new businesses and other measures of competitiveness. Access to quality jobs has impacted all demographic groups, with disparities creating a drag on the economy overall. Fragmentation in the county undermines the economic competitiveness of the region.

B3K is a collaboration among business, government and civic stakeholders to jointly create and deliver a shared strategy for economic growth and opportunity, as well as an investment plan for the Bakersfield-Kern region.

The initiative is answering key issues such as how to respond to economic disruptions and regional competitiveness challenges and how to improve job quality and access for broader prosperity.

The B3K initiative aligns diverse efforts to maximize impact in advancing a common agenda for regional prosperity with quality job creation that is enduring and accessible to all residents.

This effort is funded, in part, with a \$700,000 grant from the State's Employment Development Department. The local conveners are the Kern Community Foundation and the Bakersfield Chamber with a range of community groups and regional institutions, such as the City of Bakersfield, Kern County and CSU Bakersfield, as participants. That effort has stood up a steering committee and executive committee, hired a team from Brookings Institution, and has begun a process of gathering data.

Connectivity through high-speed rail is a key to regional economic diversification and inclusive, sustainable growth.

Opportunities for Disadvantaged Workers

2019 PROGRESS: From mid-2006 through 2019, more than half (53 percent) of project expenditures occurred in designated disadvantaged communities, as defined by CalEnviroScreen. This percentage will increase as construction spending expands along the Central Valley alignment.

In addition, approximately 50 percent of the investment in the system in FY 2018-2019 occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas. We use two mechanisms to ensure that the jobs created by building and operating the high-speed rail system benefit communities most in need.

Community Benefits Policy

Under our Community Benefits Policy, we and our contractors adopt and implement programs designed to promote and advance construction employment and training opportunities for all individuals, especially those residing in extremely economically disadvantaged areas and veterans returning from military service.

Community Benefits Agreement

Our Community Benefits Agreement (CBA) focuses on engaging disadvantaged communities and achieving employment targets for individuals who reside in disadvantaged areas and those individuals designated as “Disadvantaged Workers,” including veterans. The CBA, a cooperative partnership between the Authority, skilled craft unions and contractors, is designed to advance and promote training opportunities for all individuals. The job training that people receive through this policy will enable workers to be employed on other construction projects, delivering lifetime benefits.

The CBA’s Targeted Worker Program ensures that 30 percent of all project work hours are performed by “National Targeted Workers” who come from disadvantaged communities where household income ranges from \$32,000 to \$40,000 annually. The program also requires that at least 10 percent of those work hours are performed by “Disadvantaged Workers.”

More than 73 percent of the workers dispatched to various construction sites reported living within the Central Valley. Out of the 4,000-plus workers dispatched to the project, 62 reported living in Merced County, 223 reported living in Madera County, 1,969 in Fresno County, 121 in Kings County, 395 in Tulare County, and 572 in Kern County.

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

Workforce Development Center in Selma

In April 2020, the Authority partnered with the City of Selma to announce the creation of a workforce development center to provide 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. In September 2020, the Authority and the City of Selma launched the Central Valley Training Center Program’s website to allow students to review the training program’s qualifications and sign up for classes.

Pre-apprenticeship classes and hands-on construction industry training started on October 5, 2020.

In coordination with the Federal Railroad Administration, the Authority established the training center to address impacts to environmental justice populations and maximize high-speed rail employment opportunities. The center and its programs will serve veterans, at-risk young adults, minority and low-income populations within Fresno, Kings, Tulare, Kern, Madera and Merced counties. The approach is modeled after the successful Cypress Mandela Center in Oakland, which trained community residents to work on the freeway replacement for the Cypress freeway damaged by the 1989 Loma Prieta earthquake. The center will help provide expanded employment opportunities for individuals whose employment has been affected by the COVID-19 pandemic.

“The partnership the City and the Authority have developed to provide pre-apprenticeship training will give residents of Selma and the Central Valley the opportunity to enter into a career pathway that will afford a better quality of life for themselves and their families,” said Selma Mayor Louis Franco.

Fostering Diversity and Equal Opportunity

2019 PROGRESS: Nearly one-half (43.5 percent) of our outreach events took place in disadvantaged communities, and more than 400 disadvantaged workers were dispatched to worksites since the project began. As of December 2019, 172 Disadvantaged Business Enterprises (DBE) and 56 Disadvantaged Veteran Business Enterprises (DVBE) were working on the project. The Authority has surpassed its milestone of 500 certified small businesses (currently 530) at work on the program.

We believe strongly in equal opportunity for all and strength in diversity, as shown in Exhibit 2.8. We are committed to ensuring that no person is excluded from participating in any program or activity associated with the design, construction and operation of the high-speed rail system based on that person’s race, color, national origin, sex, age or disability. 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.

Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color or national origin in programs or activities receiving federal financial assistance. The rights of women, the elderly and the disabled are protected under related statutes. More about our Title VI program can be found on our website at https://www.hsr.ca.gov/programs/title_vi/.

We administer a Title VI Program in accordance with applicable non-discrimination laws and regulations. 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 his/her primary language and who has limited ability to read, write, speak or understand English.

EXHIBIT 2.8: CREATING OPPORTUNITIES FOR DISADVANTAGED WORKERS AND FOSTERING DIVERSITY



Notes: * Through July 2020. ** As defined by CalEnviroScreen. *** As defined in Article 3.0 of the “General Management to Community Benefits Policy-National Targeted Hiring Initiative Plan” for the California High-Speed Rail Authority. **** July 2006 to June 2019.

Profile – Rebecca Robison

Rebecca Robison's company, She Marine Construction Supply (SMCS), is helping to bring high-speed rail to California. The former U.S. Marine and combat veteran earned a Master of Business Administration before retiring from the military and opening SMCS, a Disabled Veteran Business Enterprise (DVBE), in Lake Isabella.

In 2015, Robison attended a Bakersfield outreach event on high-speed rail opportunities, which led to a contract providing office supplies to Dragados-Flatiron Joint Venture, the design-builder for Construction Package 2-3 in the Central Valley. Recently, the SMCS team provided nearly 65,000 feet of color-coded conduit and couplings for high-speed rail utility relocation in Fresno County.

She hopes to hire more workers to meet future demand. But before they join her company, prospective employees must be familiar with Post Traumatic Stress Disorder (PTSD). "My staff has to be prepared for the impacts of PTSD. It's chronic and something I manage daily. They can decide if they want to join a team led by a disabled veteran," explained Robison.



Environmental Justice

Despite the United States' progress toward the goal of a clean, safe and healthy environment for all Americans, environmental research has raised awareness of the fact that members of minority and low-income communities disproportionately bear the burdens of a polluted environment.

As the causes and effects of this distribution of environmental burdens have been examined, stakeholders began to advocate for policies to either halt or reduce such environmental hazards, if possible, or to distribute such burdens fairly. This has come to be identified by the term "environmental justice." 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.

As a federal project, we created an EJ program in compliance with Executive Order (EO) 12898 to ensure that our program, policies and activities incorporate EJ principles to address disproportionate adverse impacts, particularly on minority and low-income populations. Environmental justice is considered throughout the project lifecycle but is analyzed in depth as part of the environmental clearance process in each project section.

As we work to develop and analyze each project section, we identify reference populations and minority and low-income populations along the project section's routes, as shown in Exhibit 2.9. We identify effects to the reference population, compare them to the effects to low-income and minority populations and then determine if the effects are disproportionate for low-income and minority populations versus the reference population.

Where there may be disproportionate effects, the Authority works with communities to identify appropriate enhancements that can provide direct benefit to communities to help offset the potential disproportionate effects.

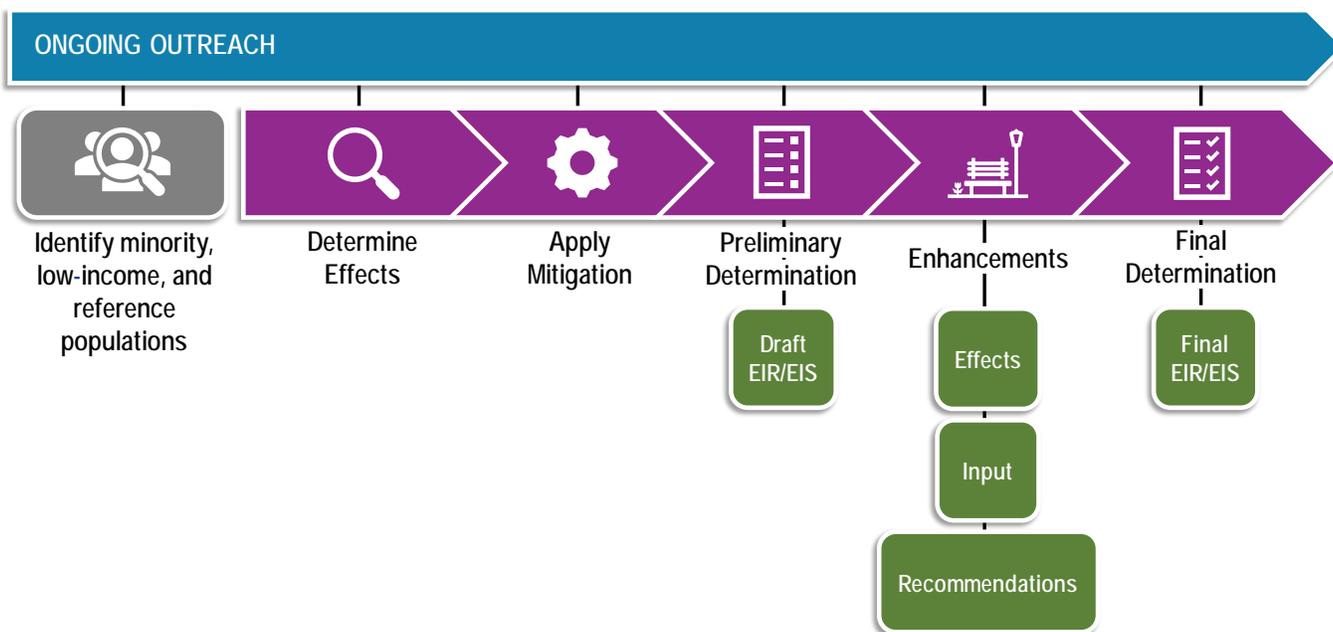
The Authority has been engaging with EJ populations along the potential route for the system throughout the project development process to gather feedback and inform the analysis environmental analysis process. In 2019, our analyses of potential significant environmental and community impacts revealed disproportionately high and adverse impacts to low income or minority populations in eight communities in the San José to Central Valley Wye project extent.

Having identified these potential disproportionate effects, the Authority embarked on a process in late 2019 and into 2020 to identify potential measures to minimize harm resulting from residual disproportionate high and adverse effects. The measures will likely be enhancement actions that would be implemented as part of the high-speed rail project to provide benefits to EJ populations disproportionately affected by the project.

An enhancement is defined as “any upgrading of an existing community facility, structure, function or action, or addition of a facility, structure, function or action that is made solely for the benefit of the local community, including an increase in the capacity, capability, efficiency, duration, function, or action over existing conditions.”

Working directly with affected communities, the Authority is developing an Enhancement Plan that will be part of the final environmental documents for this project section. The Enhancement Plan will lay out the steps that the Authority will take to offset disproportionately high and adverse effects on low income and minority populations. The outcomes of that process will be included in the 2021 Sustainability Report.

EXHIBIT 2.9: MITIGATION AND ENHANCEMENTS PROCESS



Worker Protections

2019 PROGRESS: All Authority staff and consultants are covered by the Fair Labor Standards Act (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.

The FLSA and/or union bargaining agreements that define labor conditions and wages cover all Authority staff and consultants. All construction workers follow a bargaining unit agreement or are protected by the FLSA.

Safety During the Pandemic

We work closely with our contractors to continue construction in 2020 during the 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.

Engaging Suppliers

2019 PROGRESS: The Authority participated in a multi-jurisdictional workshop on California-specific concrete sustainability to help narrow its focus on ways for all suppliers to participate in the high-speed rail program while also reducing the embodied carbon of concrete. The Authority 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 Small Business Program philosophy 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. As we establish environmental, social, and governance targets and requirements for the supply chain, we identify how they can be scaled so that small businesses can participate. We also monitor the environmental impacts of the purchases we make, and we engage 100 percent of significant new suppliers through procedures, guideline specifications and contract documents to ensure that high-speed rail procurements meet our sustainability criteria.

In 2019, we held our first Small Business supportive services symposium. Organized by the Authority's Small Business Advocate, more than 100 individuals attended the symposium and were educated, informed and connected to the various resources available to enable them to become successful in the contracting marketplace, including the sustainability requirements of the Authority. We were able to engage the local small businesses, facilitate networking and help them answer any questions they had for navigating the difficulties of government contracting.

Small Business Program

2019 PROGRESS: The small business program continued to grow in 2019, with an additional 56 small businesses joining and benefiting from the program. There are now 530 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 2.10. Our Small Business Advocate oversees our Small Business Program and guides our efforts to meet our aggressive 30 percent small business participation goal. This goal includes 10 percent participation for Disadvantaged Business Enterprises (DBE), and 3 percent for Disabled Veteran Business Enterprises (DVBE) and Micro-Businesses (MB).

We continually seek new and innovative approaches to improve our policies and procedures to eliminate any barriers and increase small business utilization. Our Business Advisory Council is one way that we achieve these goals.

The council is representative of statewide construction and professional services business trade associations that serve as a forum to provide essential input and advisement to the Authority in implementing practices that effect and/or impact the small business community.

The council cultivates a partnership between the Authority and its Small Business and contracting community. The council also serves as a forum to provide essential input and advisement to the

Authority in implementing its policies and practices that affect and/or impact Small Business utilization and participation in all the Authority's contracting programs. The collaboration and insight will serve to advance the Authority's success in meeting its 30 percent Small Business Goal on this historic infrastructure project.

For more information, see the Small Business Program page on our website at <http://www.hsr.ca.gov/small-business/>.



PHOTO: Small Business Outreach Specialists talk to attendees at the Authority's matchmaking event about how they can get involved in the high-speed rail project.

EXHIBIT 2.10: INVESTMENT IN HIGH-SPEED RAIL IS PUTTING SMALL, MINORITY, WOMEN, AND VETERAN OWNED BUSINESSES TO WORK IN CALIFORNIA.

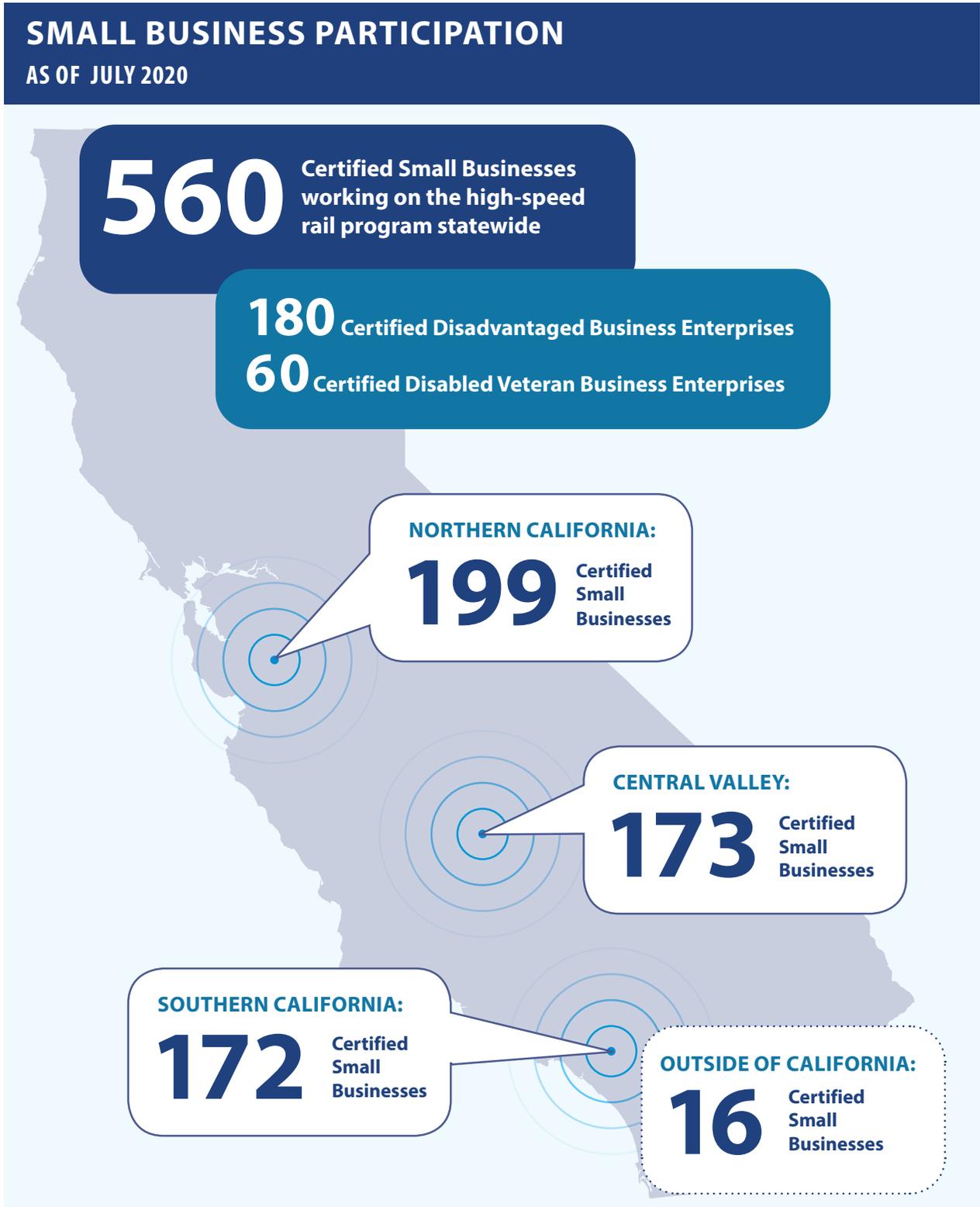




PHOTO: This Tier 4 gantry is being used at the Excelsior Avenue grade separation.



CHAPTER 3: ENERGY AND EMISSIONS

Introduction

California must invest in projects that reduce pollution for communities and deliver short- and long-term greenhouse gas emissions reductions. California has also clearly set itself on the path to carbon neutrality. Electrified high-speed rail, running on renewable energy, is the spine of clean, long-distance travel in California.

Ten years ago, we committed to running the high-speed rail system's trains and facilities entirely on 100-percent renewable energy. California is one of the best places in the world to do this. Operating on renewable energy is an opportunity to reduce our operating costs and reduce system risks from climate change. To meet this commitment, we work closely with the California Energy Commission, the California Public Utilities Commission (CPUC) and the California Independent System Operator (ISO) to keep abreast of regulatory trends and requirements. We coordinate closely with local utilities to reinforce transmission connections to the rail system and strengthen grid connections.

We will design all high-speed rail stations to be high-performance buildings, relying on the Leadership in Energy and Environmental Design (LEED®) rating system, and we will integrate design elements in pursuance of the Envision certification and also California's robust green-building requirements. We will design high-speed rail stations and service facilities to be net-zero energy buildings, meaning they will produce at least as much energy on-site as they consume over the course of a year. Furthermore, we are committed to reducing greenhouse gas (GHG) emissions through construction and operations, as well as protecting air quality by reducing the emissions associated with other criteria air pollutants.

The station facilities and operations and maintenance facilities will achieve net positive energy consumption by supplying 105 percent of the project's energy

needs through on-site renewable energy generation. We are developing plans for how this excess energy produced at our facilities can spur more restorative development in station districts. Working toward net-positive energy facilities includes partnering with adjacent developments and helping our local partner communities reach important milestones for renewable energy and sustainability.

Highlights

- The Program Delivery Committee approved a logical strategy for achieving the Authority's renewable energy commitment: on-site generation coupled with battery electric storage strategy. This strategy presents operating cost savings and resilience opportunities.
- We advanced other aspects of our net-zero energy and renewable energy goals through continued implementation, monitoring, planning and refinement of the Sustainability Implementation Plan action items.
- Contractors reported an increase in energy consumption that corresponds to the increase in construction activity (68 percent in guideway and 50 percent in structures).
- Energy consumption in our offices remained similar to 2018 levels at 1908 MWh, as our staffing levels remained stable.
- The Authority continued to track criteria air pollutants for nitrogen oxide, reactive organic gases (ROG), particulate matter (PM) and black carbon quarterly for each construction package. The quantitative results continued to be positive. The proportion of emissions avoided for ROG, PM and black carbon ranged from 50 percent to 65 percent below a typical fleet. The emission avoided for nitrogen oxide was 49 percent.

Designing Net-Zero Energy Stations

2019 PROGRESS: The Authority used design criteria and performance requirements to implement net energy-positive facilities.

We are committed to using clean energy efficiently. 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-zero energy, meaning they will produce at least as much energy on-site as they consume over the course of a year. Energy could be supplied by building integrated elements, such as solar thermal or photovoltaics. Good passive solar and energy efficiency design will also reduce energy demand.

Committing to Renewable Energy

2019 PROGRESS: We refined a physics-based model of the rail system and operations schedule to refine a strategy for delivering renewable energy to the system for operation that would enhance resilience, lower operating costs, and meet our commitment. This activity clarified the sizing and scale of how renewable energy and battery storage could serve to reduce peak demand. We improved our understanding of energy costs and opportunities for streamlining solar opportunities.

The Authority continues to work with state partners, such as the California Energy Commission, to better understand the use and availability of renewable energy to supply the system’s needs over the project’s life. According to an Energy Commission analysis of state renewable energy data and trends, California’s renewable energy resources provide more than enough capacity to meet the relatively small demands of the high-speed rail system.



RENDERING: Artist concept of canopy design.

Building Sustainable Power

Cost-efficiency and reliability are critical to successful operation. Our commitment to operating on 100-percent renewable energy achieves operating cost reductions and mitigates risks to the system's power supply. The Authority has identified its preferred strategy for 100% renewable energy: generation on Authority-owned land matched with battery storage. Staff are further refining the steps for power generation and renewable power purchases. Over the next two years, we will finalize and initiate procurement for the power needs of the system, aligned and scaled with the delivery of Track and Systems and operating segments.

The current strategy is to use land that we already own for solar generation and battery storage resources. The capital construction, operations and maintenance of these resources will be undertaken by a private entity engaged through a power-purchase agreement. We already have an integrated team of renewable energy experts, along with right-of-way, environmental, contracting and legal staff, finalizing the strategy and approach. Staff has already begun to assess the right of way available from current construction to identify any unused parcels for future power generation use.

Staff will continue refining energy specifications and requirements that will inform future procurement documents for solar and storage solutions. This work will require close coordination with the Track and Systems contractor for power-connection points, as well as the train manufacturer for train energy requirements. Ultimately, this will lead to the construction and testing of energy generation and battery storage for power delivery systems and train needs.

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

- Reduces overall power demands, decreasing operating costs;
- Provides a source of back-up power should the grid unexpectedly shut off, enabling us to continue service for an extended period;

- Enables us to cost-effectively meet renewable energy commitments;
- Enables maximizing benefits from the low-carbon fuel standard program; and
- Enables us to test the battery storage system prior to commercial operation and to identify additional potential capital cost savings.

Energy Use in Construction

2019 PROGRESS: Construction activities occurred across 30 sites on more than 119 miles of the system throughout 2019. We continued monitoring fuel consumed by construction vehicles and equipment.

As construction continues in the Central Valley, the contractors engaged by the Authority use energy sources, such as fuel and electricity, to power construction and related equipment (front-loaders, bulldozers and graders, as well as pick-up trucks and other motor vehicles) and site/field offices.

Fuel Consumption

Diesel fuel consumption increased by 68 percent from 2018, attributable to increased construction activity, while gasoline fuel consumption also increased by 79 percent. In total, energy consumption of vehicle fuels increased 87 percent compared to 2018.

Electricity Consumption

Since 2015, construction of the system has consumed approximately 473,757 Gigajoules of energy. During 2018, approximately 28 percent of the total kWh that each contractor reported consuming was sourced from renewable energy.

Energy Use in Authority Offices

2019 PROGRESS: As the number of personnel dedicated to the program remained stable between 2018 and 2019, our energy consumption in offices has remained stable over the past year. In 2019, our electricity consumption for powering computers, lights, and heating and cooling systems remained stable compared to 2018. We occupy energy-efficient office spaces, and we have implemented multiple initiatives to reduce demand, such as metered lighting, automatic shut-off of computer monitors, etc.

The Authority occupies energy-efficient office spaces 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. In addition, the Authority’s Building Services Unit regularly corresponds with staff on energy-related issues, such as reminders on how to reduce energy loads or notices of “green” events, such as “bike to work month.” Exhibit 3.0 shows the energy that’s consumed in high-speed rail construction and in the Authority’s offices.

Regulatory Compliance (Energy)

2019 PROGRESS: California high-speed rail complied with all applicable policies, laws, standards and regulatory guidelines in 2019.

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;
- 2010 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.

EXHIBIT 3.0: ENERGY CONSUMPTION

Consumption Source	Units	Quantity
Off-Road Diesel Consumption	Gallons	443,935
On-Road Diesel Consumption	Gallons	241,737
On-Road Gasoline Consumption	Gallons	598,208
Energy Content of Fuel Consumed	Gigajoules	178,725
Construction Electricity Consumption	MWh	1,818
Authority Office Electricity Consumption	MWh	1,908*
Construction Renewable electricity	%	28% of total
Energy Content of Electricity Imported	Megajoules	6,552,224

* Authority Office electricity consumption is estimated based on number of Authority and Rail Delivery Partner staff working on the project in 2019.

Reducing GHG Emissions

2019 PROGRESS: We continue to apply innovative construction practices, such as the durable concrete mix designs in Construction Package 1 (CP 1) that use 25 percent fly ash for cement, and 100 percent recycled steel with global warming potential scores below industry average.

In addition, our early investments in upgrading regional rail systems, referred to as “bookend” and “connectivity” projects, will reduce GHG emissions. For example, electrification of the Caltrain corridor, upgrades to sensor and signal systems, more energy-efficient equipment and processes, and additional grade separations will reduce emissions and air pollution from idling vehicles.

California continues to be at the national forefront 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 was planned to shift travel away from automobiles and short-haul air travel and to play a crucial role in California’s ambitious plan to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030 (Executive Order B-30-15 and California Global Warming Solutions Act of 2006 (SB 32)).

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—to 70 billion miles annually—between 2021 and 2040. From its first year of operation, high-speed rail will contribute to reducing GHG emissions in the state. Every mile traveled on high-speed rail is a mile of avoided travel by automobile or airplane. The emissions associated with these less-efficient forms of travel will be significantly avoided by travelling on the high-speed rail. On average, annual GHG emissions reductions are projected to be 2 million metric tons of carbon dioxide equivalent (MMTCO₂e).⁶

■ Emissions Reduction Calculations

Over the first 50 years of operation, as shown in Exhibit 3.1, the cumulative reductions of tailpipe emissions are projected to be between 65 and 79 million metric tons of carbon dioxide avoided. The GHG emissions reduction scenarios reflect the ridership range expressed in the 2020 Business Plan. Ridership is expressed as both a medium case and as a 75th percentile, which provides the medium and high emissions scenarios. This projection informs the baseline case in California’s Scoping Plan.

EXHIBIT 3.1: PROJECTED CUMULATIVE GHG EMISSIONS AVOIDED FOR PHASE 1: TAILPIPE (IN MMTCO₂E)

Year	Medium	High
2030	0.121	0.121
2040	8.6	10.5
2050	21.3	25.9
2079	65.9	79.9

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 for gasoline, diesel and jet fuel that are limited to the tailpipe emissions. For more information, see https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/hsra_hsr_finalqm_16-17.pdf.

For this sustainability report, we analyze 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.

In Exhibits 3.2 and 3.3, the “well-to-wheels” emissions factors were obtained from the Argonne Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model (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. As shown in Exhibit 3.2, the results illustrate

the full set of life cycle emissions that can be avoided through mode shift to high-speed rail over the first 50 years—between 83 and 102 MMTCO₂e.

EXHIBIT 3.2: PROJECTED CUMULATIVE GHG EMISSIONS AVOIDED: WELL TO WHEELS (IN MMTCO₂E)

Year	Medium	High
2030	0.15	0.15
Year	Medium	High
2040	10.9	13.3
2050	27.1	33.1
2079	83	102

As shown in Exhibit 3.3, the results illustrate the full set of life cycle emissions that can be avoided annually through mode shift to high-speed rail for the Phase 1 system—between 2.201 and 2.681 MMTCO₂e.

EXHIBIT 3.3: PROJECTED ANNUAL GHG EMISSIONS AVOIDED FOR PHASE 1: WELL TO WHEELS (IN MMTCO₂E)

Year	Medium	High
2030	0.075	0.077
2040	1.540	1.875
2050	1.693	2.062
2079	2.201	2.681

Projected avoided emissions reflect riders shifting from automobile and air travel to 100-percent renewable energy powered high-speed rail based on the ridership on ramped up models for the high-speed rail. The shift reflects our goal of delivering an interconnected, sustainably approached, well-designed system that attracts riders and provides safe, reliable and fast travel between California’s population and employment centers.

Projections do not account for related direct and indirect benefits, such as the additive effect of compact, infill development in station areas that the system is expected to underpin. That effect can realize exponentially greater GHG emissions reductions, as illustrated by methodologies associated

with California’s Climate Investments for Affordable Housing and Community Development, and the American Public Transportation Association’s Transit Emissions Quantification Tool. These quantification tools estimate the additional effect of transit on compact land use and the consequent vehicle miles traveled reductions and express that as GHG emissions savings.

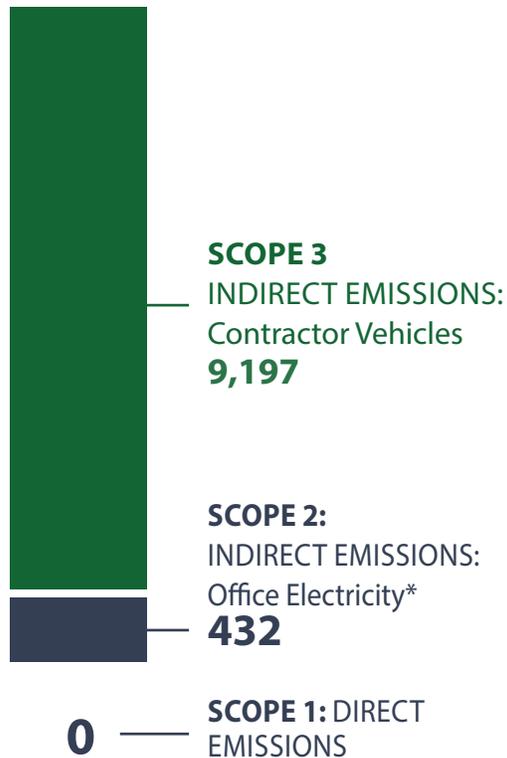
Reporting Actual and Avoided Annual Emissions

Building and operating the high-speed rail system does generate GHG emissions from several sources, including the production of materials used in constructing the system, fuel burned in construction vehicles and equipment, electricity consumed in offices, and waste treatment and recycling. Future GHG emissions also come from materials produced for use in rail system operations.

Using an operational control approach, the Authority tracks GHG emissions across emissions scopes, as shown in Exhibit 3.4, 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; and
- Scope 3 are indirect emissions associated with contractor vehicles.

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.

EXHIBIT 3.4: 2019 ANNUAL GHG EMISSIONS
(IN MTCO₂E)

*Scope 2 market-based emissions are quantified to be the same as location-based emissions. At this time, the Authority does not procure electricity with known attributes that differ from the grid average.

As shown in Exhibit 3.5, we also monitor, record and report avoided emissions from construction recycling. Construction recycling has decreased from previous years due to the construction phase transitioning from demolition of roadways and buildings to constructing.

EXHIBIT 3.5: 2019 ANNUAL AVOIDED EMISSIONS FROM RECYCLING

Reducing and Managing GHG Emissions in Delivery

2019 PROGRESS: The Authority continues to govern construction contractors by clearly specified binding contract provisions to minimize GHG emissions during construction.

The Authority has relied on industry- and public-policy leading practices to manage and reduce GHG emissions in construction. We require all contractors to abide by the signed contract, and require contractors to monitor and report their material use, energy consumption, electricity purchase 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 of 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, which can be viewed here: https://www.hsr.ca.gov/Programs/Green_Practices/sustainability.html.

Our policy details specific measures to decrease our indirect (Scope 3) emissions associated with construction contractors, materials and waste. These measures include:

- Minimizing GHG emissions through design requirements;
- 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 allowing 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.

Sequestering and Reducing Emissions Now

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

The Urban Forestry program focuses on communities that are near the rail system, with special emphasis on providing benefits to disadvantaged communities. The first phase of urban tree planting at West Fresno Middle School kicked off on May 25, 2018, when nearly 200 trees were planted, and this effort was complemented with additional tree planting in the fall. Tree planting continued in 2019 throughout California.

The Authority anticipates planting hundreds of thousands of trees across California, with the goal of improving air quality and quality of life in priority communities, reducing energy use and storm water runoff.

The rural tree planting program will also achieve important goals, such as preventing soil erosion and restoring habitats and natural ecosystems by planting native tree species on lands damaged by wildfires. For more information about the Urban Forestry program, see the Authority's Sustainability webpage at https://www.hsr.ca.gov/programs/green_practices/sustainability.aspx

Creating Urban Forests

The Authority uses several strategies to offset construction-related greenhouse gas (GHG) emissions related to building California's high-speed rail system. One of these strategies, the Authority's Urban Forestry Program, is designed to reduce emissions over the long haul by implementing several urban forestry projects. The California Department of Forestry and Fire Protection, in partnership with the Authority, awarded \$2.5 million in tree-planting grants to date to offset GHG emissions associated with construction of the first portion of the high-speed rail system.

These grants fund tree planting projects to reduce GHG levels; arrest the decline of urban forests and improve their structure and function; increase climate change resilience; and improve the quality of the environment in urban areas.

The more than 6,000 trees to be planted will also provide numerous environmental, social and economic benefits to disadvantaged communities in the vicinity of the rail line between San José to Anaheim.

From October 2018 to the end of the planting season in May 2019, West Coast Arborists, Inc. (WCA, Inc.) arborists and volunteers hosted 21 tree planting events or workshops in primarily low-income and disadvantaged California communities. All told, WCA, Inc. has helped plant 2,500 trees, including Coast Live Oak, Indian Rosewood, Chinese Pistache, Brisbane Box and Australian Willow.



Extended 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 greenhouse gas emissions, 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.

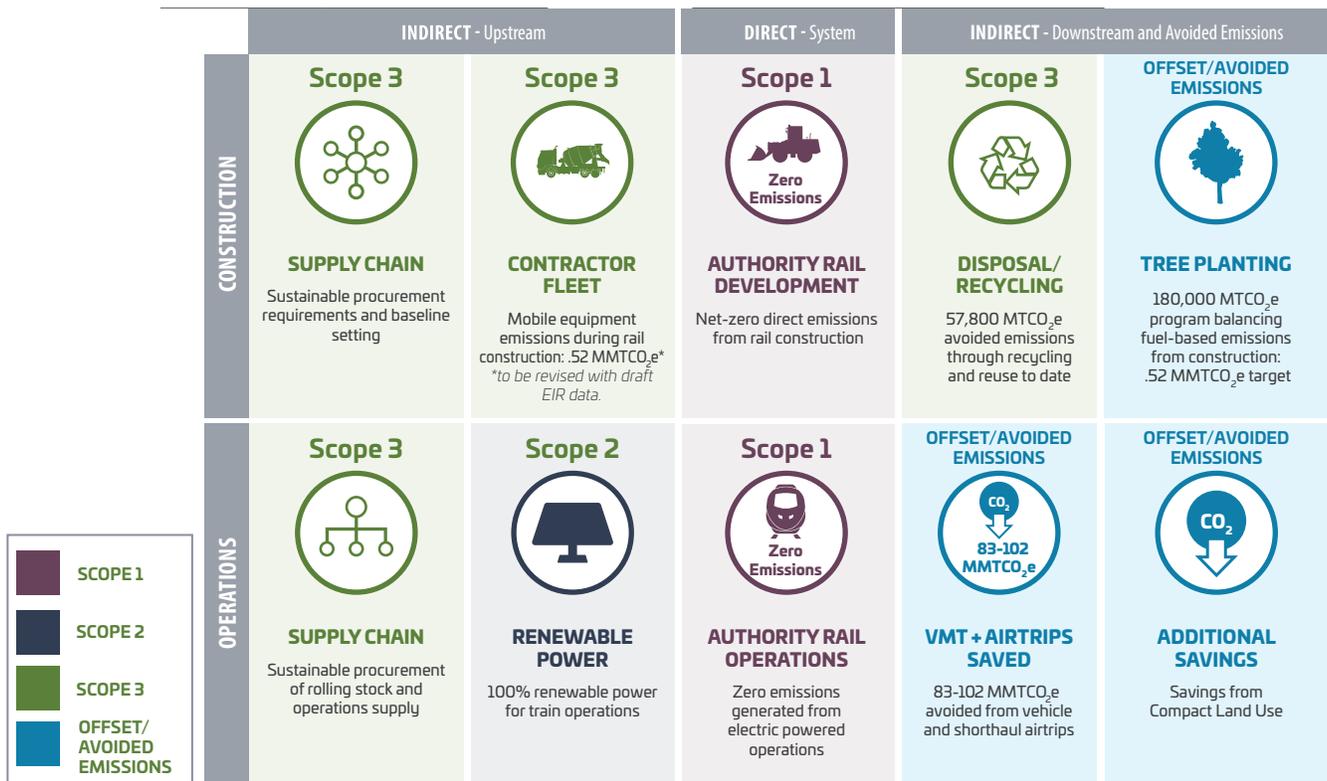
Exhibit 3.6 shows information to date on emissions by scope across the project over the initial six decades. It is a combination of modeled and actual emissions

and is based on the best available information. It is periodically updated.

Since January 2016, approximately 29,737 MTCO₂e have been generated during construction. Positively, through more than 4,900 trees planted and more than 2,200 acres of rural projects, approximately 180,000 MTCO₂e will be sequestered over the trees' lifecycle. More than 46,000 MTCO₂ have been sequestered or avoided through habitat and agricultural land conservation. Finally, more than 57,800 MTCO₂e have been avoided through recycling.

In 2019, we will continue to analyze Early Train Operator (ETO) service plans to revise projected emissions for early operations in the Central Valley. These emissions projections will be included as part of any study reports, accompanied by a methodology

EXHIBIT 3.6: GHG EMISSIONS BY SCOPE: 2015-2079



Regulatory Compliance (Emissions)

Our role in reducing GHG emissions is detailed in and governed by the following policies and 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 percent below the 1990 levels by 2030;
- 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;
- 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; and
- 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.

Protecting Air Quality During Construction

2019 PROGRESS: We used best practices for construction fleets to avoid significant quantities of criteria air pollutant emissions in 2019. We also required the next construction fleets to incorporate 25% ZEVs.

The Authority minimizes air emissions from the fleets used by our contractors, as shown in Exhibits 3.7 and 3.8 on page 48. All contractors are required to use fleets that comply with California vehicle standards. Contractors are also subject to contract terms which require the fleets 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. The Authority has also continued to track the feasibility of using ZEVs for on-road hauling and electrified off-road equipment.

Zero Emissions Vehicles: New Rule on Diesel Trucks, Vans

In mid-2020, the California Air Resources Board adopted a first-in-the-world rule requiring truck manufacturers to transition from diesel trucks and vans to electric zero-emission trucks beginning in 2024. By 2045, every new truck sold in California will be zero-emission.

The rule targets air pollution in California neighborhoods—especially Black and Brown, low-income and vulnerable communities—that experience heavy truck traffic because they are located adjacent to ports, railyards, distribution centers and freight corridors. This new rule puts the state on the path for an all zero-emission short-haul drayage fleet in ports and railyards by 2035, and zero-emission “last-mile” delivery trucks and vans by 2040.

Starting from 2025, the High-Speed Rail Authority is planning to increase the ZEV requirement for light-duty vehicles in contractors’ fleets, from the current requirement of 25 percent. The Authority will also require contractors to acquire more ZEV on-road heavy-duty vehicles, based on the market availability of those vehicles in 2025 and beyond.

Trucks are the largest single source of air pollution from vehicles, responsible for 70 percent of the smog-causing pollution and 80 percent of carcinogenic diesel soot. Shifting to zero-emission trucks will help California meet its climate goals and federal air quality standards, especially in the Los Angeles region and the San Joaquin Valley—areas that suffer the highest levels of air pollution in the nation. Statewide, the Advanced Clean Truck regulation will lower related premature deaths by 1,000.



Photo: *Courtesy of the California Air Resources Board*

Between 2015 and 2019, on- and off-road vehicles emitted 67 tons of criteria pollutants, including, NOx, ROG, PM and black carbon. From 2015 to 2019, Tier 4 equipment reduced/avoided 89 tons of criteria pollutants, including NOx, ROG, PM and black carbon. The difference reflects the difference between emissions

produced by using Tier 4 equipment and what would have been produced by a typical fleet. In that time, projects that will deliver 1,375 tons of offsets were carried out.

EXHIBIT 3.7: 2019 CRITERIA AIR POLLUTANTS EMITTED AND AVOIDED: TYPICAL CALIFORNIA FLEET COMPARISON

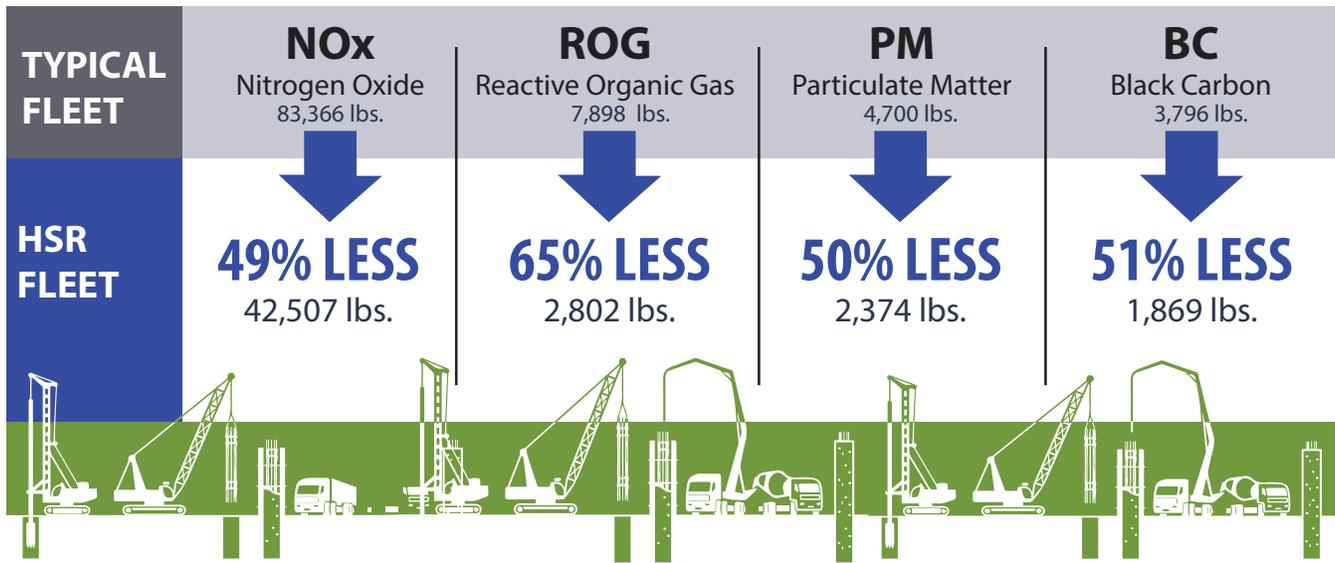


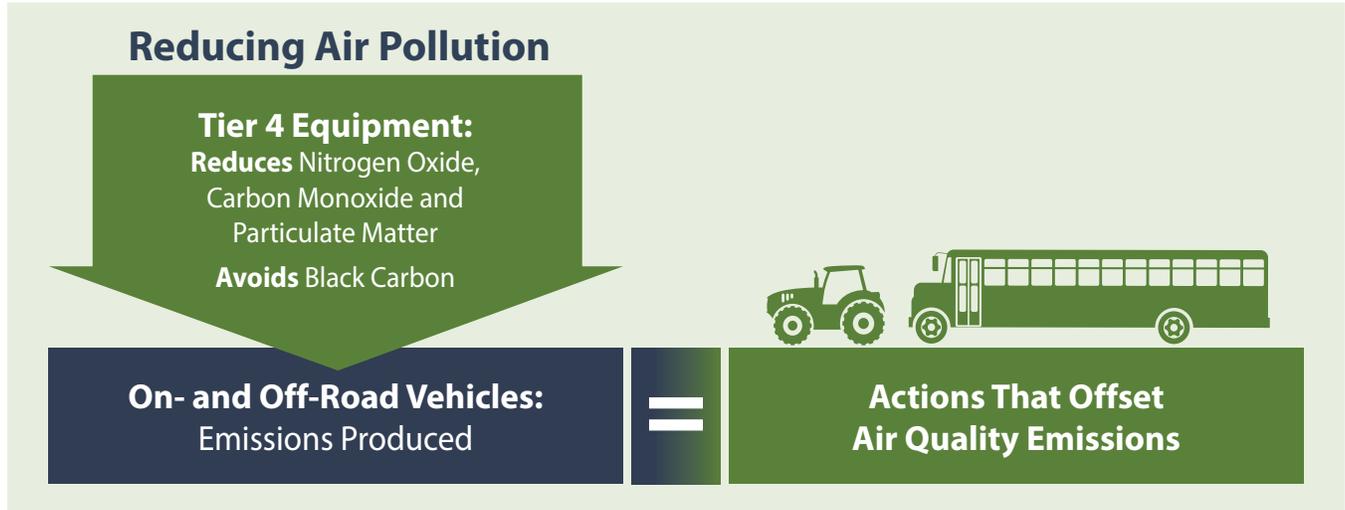
EXHIBIT 3.8: EMISSIONS FROM A HIGH-SPEED RAIL FLEET COMPARED TO A TYPICAL FLEET

Criteria Air Pollutant	High-Speed Rail Fleet Emissions	Typical Fleet Emissions	Percent Difference
NOx - Nitrogen Oxide	42,507	83,366	-49%
ROG - Reactive Organic Gas	2,802	7,898	-65%
PM - Particulate Matter	2,374	4,700	-50%
BC -Black Carbon	1,869	3,796	-51%

We also continue to 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 pollutant emitted during construction within the local air quality district, as shown in Exhibit 3.9. This tool is used within all parts of the system located in districts with poor air quality. The minimization and offsetting of criteria air pollutants is critically important.

EXHIBIT 3.9: MINIMIZING CONSTRUCTION AIR QUALITY EMISSIONS



The Central Valley and Southern California suffer from some of the worst air pollution in the nation. These are places where we must strive to deliver truly clean transportation. Children under the age of 4 in the Central Valley visit the emergency room or are hospitalized with asthma related issues at twice the rate compared to the rest of California. Adults in Kings County head to the emergency room or are hospitalized with asthma related

illness 80 percent more than the rest of California; in Fresno County, 50 percent more. The VERA program is designed to replace conventional polluting equipment with more efficient equipment. For our VERA offsets, the total lifetime reductions committed to were 1,375 tons with a total investment of \$13 million, as shown in Exhibit 3.10.

EXHIBIT 3.10: VOLUNTARY EMISSIONS REDUCTION AGREEMENTS

Total Lifetime VERA Offsets 1,375 tons	VERA Investment \$13 million	VERA Equipment 84 Tractors
VERA Equipment 162 Trucks		VERA Equipment 1 School Bus

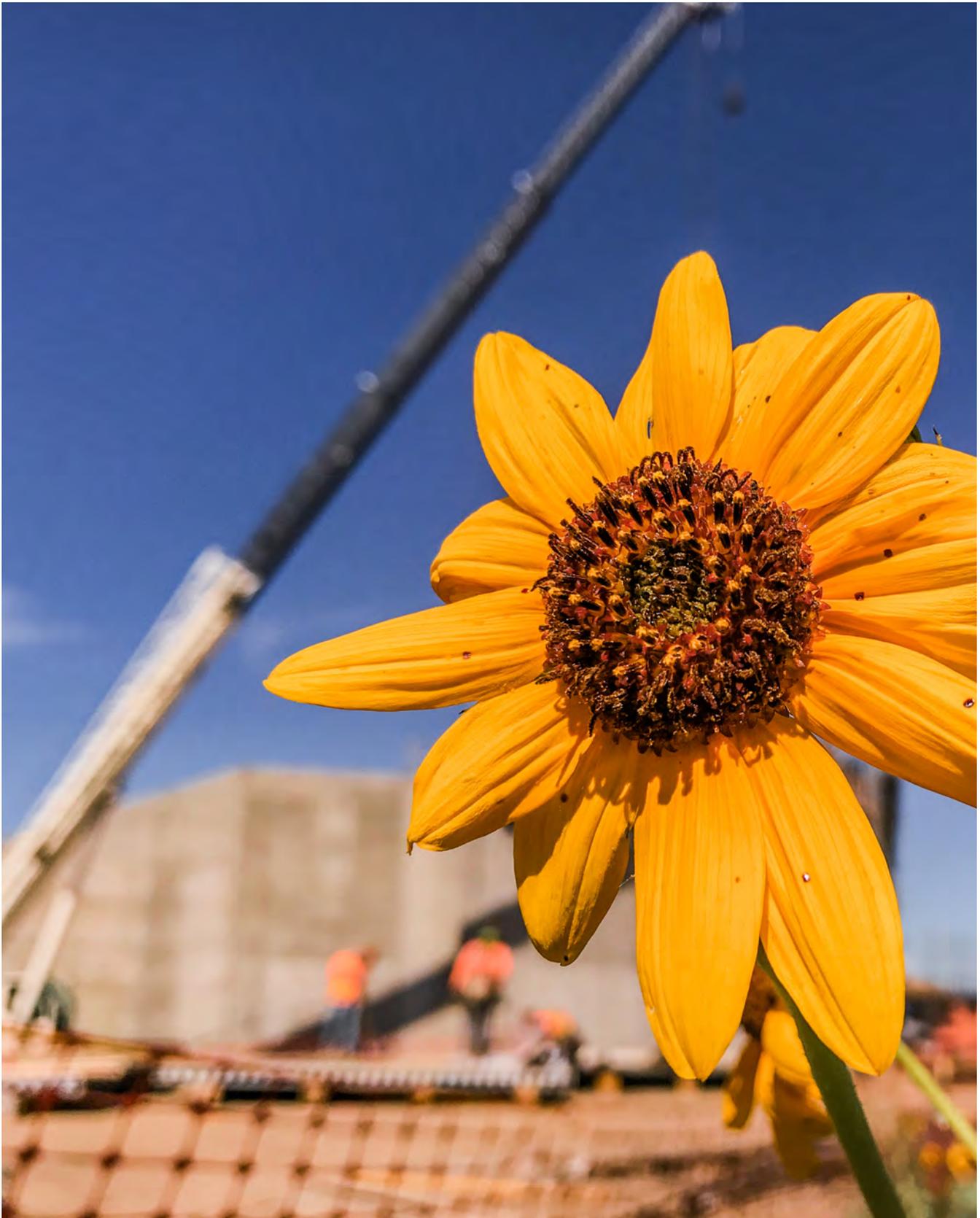


PHOTO: Construction crews make sure that the natural environment is protected at Avenue 15 in Madera.



CHAPTER 4: NATURAL RESOURCES

Introduction

Protecting and enhancing natural resources is foundational for any sustainability program. Our policies and practices help ensure that future generations have the resources necessary to lead meaningful and productive lives. We preserve and enhance natural resources by tracking water use and preserving the California environment.

Natural resources are additionally critical as sinks for carbon emissions, sequestering carbon dioxide in plants, trees, roots and soil. Their restoration, care and maintenance are also crucial climate adaptation strategies that the Authority has prioritized in its climate adaptation approach.

Highlights

- Our Environmental Impact Report (EIR) on the Central Valley Wye section found that construction activities will use only 14 percent of the current water consumption along the corridor. Once construction finishes, water use will be less than the current water consumption for the project footprint. This represents a net decrease in water use.
- We increased the total area of habitat preserved and restored by more than 975 acres in 2019—a 36.6 percent increase compared the area preserved and restored at the end of 2018. This land represents 2,537.6 tons of sequestered carbon.
- Effective July 2019, California became the first and only state in the nation to receive assignment of the Federal Railroad Administration's (FRA) responsibilities under the National Environmental Policy Act

(NEPA) and other federal environmental laws (Caltrans has had NEPA jurisdiction from the Federal Highway Administration since 2007). This will enable the Authority to accelerate project delivery while protecting the environment, by conducting more efficient environmental reviews and approvals of the environmental documents required to advance the high-speed rail project.

Conserving Water Resources

2019 PROGRESS: The construction packages continued to comply with water-conservation measures initiated in compliance with state policy. Additionally, environmental review continued, which identified the water savings associated with project operation.

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; 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. The applicable statutes and regulations that we must comply with include:

Federal:

- Clean Water Act of the United States;
- Section 10: Rivers and Harbors Appropriation Act; and the
- 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; and the
- Metropolitan Bakersfield General Plan/ Update and Environmental Impact Report.

Responding to Stakeholder Concerns

Several stakeholders expressed concerns that construction activities could compete with California farmers for water, an issue of significant importance in the Central Valley. We understand these concerns, and we know that water is a shared resource. Where applicable, we engage with local stakeholders and place high importance on water-conservation efforts and prioritize the use of non-potable water for construction purposes.

We updated our Water Conservation Policy to establish water conservation as a continuing practice through all phases of the project—including operations and maintenance. We established uniform, program-wide requirements for water conservation during design, construction, operations and maintenance of high-speed rail project sections, and contractors must submit a Water Conservation Plan that clearly describes how they will comply with our requirements.

These include requirements related to water conservation, rationing and drinking water shortage situations that are communicated by local and state agencies. The water conservation requirements mitigate impacts within areas of water stress. The Authority did not set a limit on water consumption by contractors, due to the potential negative effects on construction timing, quality and worker health. Instead, the Authority requires contractors to follow water conservation practices.

Water Consumption

Construction water use has increased year-over-year due to the expanding footprint of construction activities, as shown in Exhibit 4.0. The Authority accelerated the pace of construction throughout 2019, which means that in 2019, water use increased 44 percent compared to 2018. Water is used on site to compact soil for overpasses, cure concrete, and suppress dust and particulate matter. Water stress can refer to the availability, quality, or accessibility of water. Areas of high water stress are those areas where the ratio of total annual water withdrawal to total available annual renewable water supply is high (40-80%) or extremely high (>80%). The current construction sites are in areas defined as high water stress.

EXHIBIT 4.0: WATER CONSUMPTION (IN GALLONS)*

Water Consumption	Quantity
Construction Water Use: Non-potable	105,632,701
Construction Water Use: Potable	10,003,936
Construction Water Withdrawn from High Water Stress Areas	63,095,390
Office Water Use	1,952,640**

*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, final updated figures will be published in the next Sustainability Report.

** Office water use is estimated based on number of Authority and Rail Delivery Partner staff working on the project in 2018

To identify and assess water-related impacts, the Authority prepares comprehensive Environmental Impact Reports (EIR) and Environmental Impact Statements (EIS) for each project section of the system to comply with NEPA and California’s Environmental Quality Act (CEQA), respectively. 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; every quarter, the Authority compares the monthly consumption 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://www.hsr.ca.gov/programs/environmental/>

To manage water discharge-related impacts, the Authority complies with the National Pollutant Discharge Elimination System (NPDES) water quality order no. 2013-0001-dwq National Pollutant Discharge Elimination System (NPDES) general permit no. Cas000004, and follows the State Water Resources Control Board (SWRBC) construction general permit (order 2009-00009-dwq). More information on stormwater management is available on our website: <https://hsr.ca.gov/programs/environmental/stormwater.aspx>.

Protecting the San Joaquin River

Sediment, or dirt, is the biggest polluter at a construction site, and every construction project must have a plan in place to prevent sediment from being picked up by stormwater and washing into rivers or lakes.

This is especially important at the San Joaquin River—the second largest river in California and the high-speed rail project’s most sensitive site. Construction crews work with environmental specialists to create and follow a stormwater pollution prevention plan. Crews must ensure that sediment dislodged by construction activities does not flow into the river, while allowing clean water to flow into the river.

Sediment has an adverse effect on certain species that live in the San Joaquin River. The river is home to benthic animals, organisms such as sponges, bristle worms, mollusks and crustaceans, that live at the lowest level of the river.

Some benthic animals are attached to stones or other organisms, while others bury themselves in the sediment at the bottom of the river. They’re also an important part of the food chain because fish—including flatfishes, catfish and haddock—feed on them.

Benthic animals need to breathe, and if sediment from the construction site is deposited into the river by stormwater runoff, the animals become covered and then suffocate.

Soar Environmental Services, a certified small business, makes sure the conditions at Construction Package 1 and Construction Packages 2-3 adhere to all environmental mitigation measures and permit conditions.

Water and Future Operation

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.

Once the system is built, it will not require significant water volumes or threaten water security for the region. At our offices, water use is minimized using low-flow, automatic shut-off sink fixtures and low-flow toilets.

Furthermore, the comprehensive EIR/EIS documents completed for each project section include an assessment of water consumption and detailed projections of water required during operations. Because of the large scale of the project, the rail system will run through areas of the state with extremely different geographical, environmental and economic issues; thus, the project has been broken into 10 separate sections.

Treatment Plant Upgrades for Construction

The Bakersfield to Palmdale section passes through arid lands where natural water sources are limited. Our Sustainability Policy sets forth our sustainability priorities and reiterates our commitment to “reduce potable water use in design, construction, and operation to the maximum extent practicable.”

Generally, wastewater that has been treated to a tertiary level to be sufficient quality to support construction activities.

The City of Lancaster and the City of Palmdale operate treatment plants that treat wastewater to a tertiary level, and this water could be used for construction purposes with minor upgrades to the existing infrastructure to transport the treated water to the high-speed rail alignment. The City of Tehachapi operates a treatment plant that currently provides secondary treatment and is working on a project to upgrade the treatment plant to a tertiary level of treatment.

We are in preliminary discussions with the City of Tehachapi pertaining to an agreement under which we might participate in the treatment-plant upgrade



PHOTO: Work continues on high-speed rail guideway in Wasco.

in exchange for guarantees of future water supplies. The unincorporated community of Rosamond also operates a treatment plant that currently provides secondary treatment. An agreement like the one being discussed with Tehachapi could also be feasible for Rosamond.

Because the treatment-plant upgrades will take several years to complete and become operational, it is important that these discussions occur soon so that water for construction can become available when needed.

Managing Land Use

2019 PROGRESS: We developed regional mitigation strategies in 2017 to advance construction in a way that preserves biodiversity. These strategies prioritize the conservation and enhancement of larger, higher-value ecological areas and their linkages. In 2019, we secured an additional 978 acres for habitat protection.

We are committed to working with federal, state and local agencies and with local stakeholders to develop a high-speed rail system that preserves California’s open spaces and environmental resources. Our Board of Directors created the Transit and Land Use (TLU)

Committee to link transportation decisions with land use decisions through interactions with regional and local stakeholders.

The TLU Committee examines how system decision-making and potential land-management policies interact with local land use. Ideally, system stations should incentivize land use toward urban regeneration and important local planning changes, such as allowing mixed land uses, maximizing density and building height, and achieving highest and best land uses associated with a high-speed rail station.

In addition, we maintain mitigation activities associated with conservation and preservation of habitat and open space.

Preserving Habitat

As one way of mitigating its impacts on natural habitats, the high-speed rail project preserves habitats elsewhere, as shown in Exhibit 4.1. Through this approach, the Authority’s mitigation efforts create a positive effect by preserving high-quality habitats occupied by special-status species; these high-quality habitats effectively replace a large portion of affected habitats of lesser-quality that special-status species make only limited use of.

The project’s scale and statewide reach provides the opportunity to implement regionally significant

EXHIBIT 4.1: HABITAT AND AGRICULTURAL LAND PRESERVATION

3,645 acres

Habitat Preserved and restored

1,250 acres

Agricultural Land Protected

273 acres

Agricultural Land Secured



conservation efforts through preserving high-quality habitat. To-date, the Authority has secured habitat that includes approximately 3,645 acres at more than seven sites. 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. This easement protects a distinctive landscape of vernal pools, an endemic type of seasonal wetland. 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. Furthermore, 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.

In 2019, the Authority secured 978 acres of additional mitigation at multiple sites:

- Hog Flats (144 acres);
- Hog Hills (401 acres);
- CD Hillman Expansion (77 acres); and
- Lost Hills (356 acres).

Preserving Agricultural Land

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).

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 nonprofit 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. As shown in Exhibit 4.1 on page 55, a total of 1,250 deeded acres have been protected to-date.

The DOC routinely reports on the benefits of conservation projects that protect land from development; specifically, the DOC quantifies the greenhouse gas (GHG) emissions reductions that are created 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 buildings; and the
- 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.

Project Results

Out of the 1,250 acres protected by the ALMP on behalf of the Authority, the DOC estimates that 1,162 acres would have been subject to development risk. The DOC estimates that 104 houses were eliminated as a result of this conservation effort, resulting in an estimated 86,827,609 VMT being avoided, or 36,654 metric tons of CO₂e in GHG emissions being avoided.

Project Methods

The DOC calculated its estimate by starting with the number of acres protected with funding provided by the Authority and then subtracting acres funded by other sources (as applicable). The DOC's calculations assumed the following:

- Relative flatness—Most of the farmland protected by the ALMP on behalf of the Authority is relatively flat, with no steep grades that would have otherwise precluded development from occurring there.
- Low density development—The DOC assesses avoided development density by analyzing nearby development patterns. The DOC estimated a density of one house per 10 acres of land. The DOC excluded undevelopable acreage, such as waterways, and applied the 1:10 density. This resulted in an estimated 104 forgone homes.

The DOC then applied the California Air Resources Board's Agricultural Lands Easement Benefits Calculator Tool, which estimates GHG emissions produced as a result of several key factors, such as PM_{2.5} reduction, diesel PM reductions, NO_x reductions, ROG reductions, passenger VMT Reductions, Fossil Fuel Based Transportation Fuel Use Reductions, Land Conserved, and Travel Cost Savings. The DOC excluded soil carbon sequestration benefits, under the assumption that equal amounts of soil carbon was disturbed during the high-speed rail alignment's construction. For more information on the quantification methodology, please read the Agricultural Lands Conservation QM description.

Protecting Sensitive Species

Construction projects must take measures to comply with myriad federal and state environmental protection rules. As a megaproject, the high-speed rail project must take these measures on many diverse project sections—each of which presents unique challenges.

Project teams work closely with biologists on a range of measures designed to protect habitat and sensitive species. This often involves contracting with firms such as Bancroft Construction Services, which specializes in biological and stormwater consulting services.

Bancroft’s biologists are on the high-speed rail project site daily supporting the project team, conducting pre-construction surveys, sensitive species trapping and burrow excavations. Biologists are conducting a survey to make sure sensitive species won’t be harmed by high-speed rail construction near Poso Creek and the high-speed rail alignment in Kern County (in Construction Package 4).

The biologists must adhere to strict protocols while trapping sensitive species. Once the species are successfully trapped, biologists then must excavate any burrows dug by small mammals. This is painstaking work because the burrows typically must be excavated by using only hand tools, such as shovels and picks.





PHOTO: Recycling construction materials plays an important part in the Authority's sustainability goals. Fresno, CA.



CHAPTER 5: SUSTAINABLE INFRASTRUCTURE

Introduction

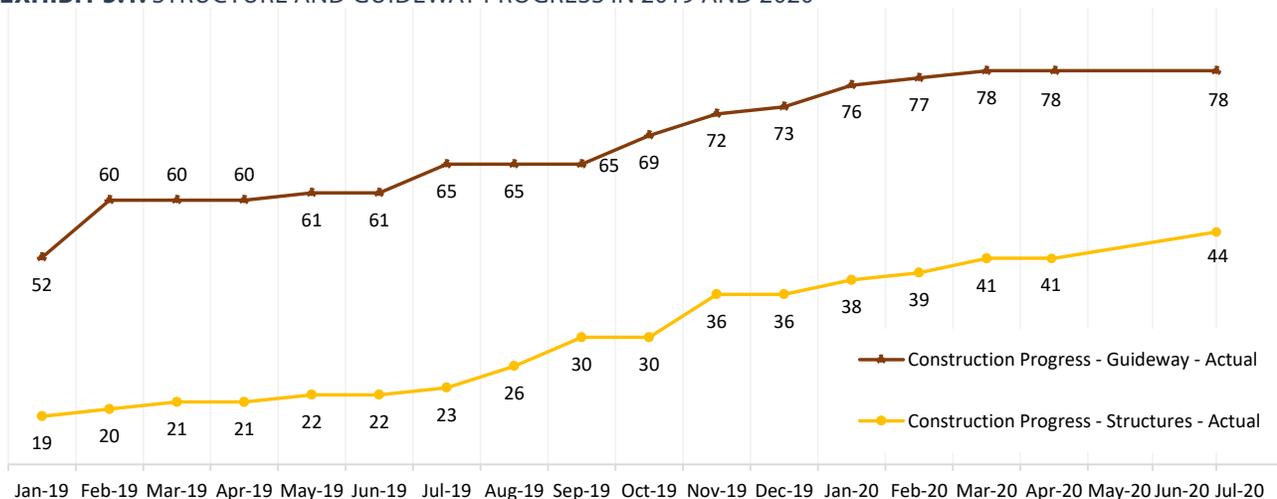
California uses its infrastructure investment to advance sustainable development. The Authority honors this by implementing infrastructure in a way that enhances well-being of communities, economies and ecosystems across an array of context-specific metrics. In practical terms, this means we integrate sustainability actions into project development and operations as a strategy for managing risks, including climate risk, and identify opportunities to benefit California’s communities and economy.

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 also create significant negative impacts to the environment from their construction and operations. High-speed rail is a significant investment that delivers positive returns for current and future communities. Over 2019, the pace of construction accelerated dramatically, as shown in Exhibit 5.1.

Highlights

- Maintained progress against targets and objective requirements for sustainable construction even as the pace of construction quadrupled.
- Continued to customize our web-based tool, EMMA 2.0, to streamline and enhance data collection, review and analysis.
- Incorporated considerations of climate stressors into design requirements.
- Pursued designations under internationally regarded infrastructure sustainability benchmarks such as GRESB.
- Aligned the project’s sustainability design criteria and goals with the Institute of Sustainable Infrastructure’s Envision benchmarking framework in efforts of pursuing a Platinum certification rating level, while providing increased transparency behind the methodology of the advanced sustainability commitments.
- Built upon the Sustainable Purchasing Leadership Council (SPLC) Benchmark to assess the impact of the sustainability requirements embedded in our procurement processes

EXHIBIT 5.1: STRUCTURE AND GUIDEWAY PROGRESS IN 2019 AND 2020



Principles for Sustainable Infrastructure

2019 PROGRESS: We continued to update the Sustainability Implementation Plan to refine targets, actions and accountable parties that will support adherence to the principles. These updates are a positive step toward achieving the principles and demonstrate our continued commitment to seeing them through to implementation throughout the lifespan of the project.

Furthermore, we are pursuing the highest level of certification under the Institute for Sustainable Infrastructure's benchmarking system, Envision. The Envision submission will receive third-party verification to ensure the project's comprehensive sustainable commitments meet the rigorous Envision evaluation criteria.

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 here:

http://www.hsr.ca.gov/docs/programs/green_practices/sustainability/Sustainability_signed_policy.pdf

In addition to these principles, we adhere to other commitments and requirements, including:

- All Environmental Impact Reports/ Environmental Impact Statements (EIR/ EIS) include a Mitigation Monitoring and Reporting Program (MMRP) for implementation. Specifically, the:
 - MMRP for the Statewide Program EIR/EIS has 250 mitigation commitments;
 - MMRP for the Bay Area to Central Valley Program EIR/EIS has 290 mitigation commitments; and

- MMRP for the Merced to Fresno Project EIR/EIS has 610 mitigation commitments.
- Sustainability policy and periodic reporting which provide overarching guidance and transparency;
- American Public Transportation Association (APTA) sustainability commitment; and
- International Union of Railways (UIC) Railway Climate Responsibility Pledge.

Eco-Friendly Hydraulic Fluids

Pile driving is a critical aspect of construction projects along the high-speed rail alignment, and it's extremely important in areas where soils are subject to liquefaction during an earthquake. Liquefaction occurs when soil loses its strength or stiffness and behaves like a liquid. Piles are driven deep into the ground to provide support for structures even if the soil around them doesn't.

Pile-driving equipment is massive, and specialized drills and augers are used as part of the pile-driving process. Forefront Deep Foundations, one of the many small businesses working on the high-speed rail project, uses biodegradable, vegetable hydraulic oil in the power units used to run the drills and augers to avoid any environmental impact in the unlikely event of a spill.

Oils extracted from soy, sunflower and canola seeds are the most widely used "eco-friendly" hydraulic fluid. Vegetable based oils are 90 to 98 percent biodegradable in standard 28-day tests. Also, vegetable oils have been determined to be non-toxic to fish.

Life Cycle Approach

Taking a life cycle approach is a foundation of the Authority's sustainability program. In developing implementation strategies to improve sustainability

performance, we consider both 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 updated Sustainability Policy and the construction package specific design criteria continue to include Sustainable Infrastructure Principles related to the life cycle approach, encompassing our commitment to sustainable infrastructure:

- Require optimized Environmental Product Declarations for major materials, detailing the life cycle assessment of global warming potential, while maintaining competition, durability and quality;
- Require life cycle performance of components, systems and materials where practicable. (including mandating specific embodied carbon thresholds for concrete and reinforcing steel); and
- Adaptively reuse existing structures and facilities whenever feasible.

To support these principles, we continuously revise specifications and contract provisions to require improved materials life cycle scores for materials. In 2019, we set global warming potential performance thresholds for major system materials. We drew on a baseline of the materials currently being installed and preliminary design information for the system to analyze the materials' environmental characteristics. The Authority's Sustainability Implementation Plan operationalizes the life cycle approach. The Plan assesses sustainable-design strategies using life cycle cost models and sustainability value models. This helps us develop a life cycle vetting model to inform design decisions that will help the high-speed rail project meet sustainability goals and targets during operations and maintenance.

As a next step, we will further analyze supply chain impacts of major materials to clarify their relative influence on the project's life cycle footprint. We will regularly update our database, refined in 2019,

with new environmental product declarations (EPDs) as they become available. We will also draw on results from the current construction projects. The leading infrastructure life cycle assessment standard, outlined in a specific Envision credit, 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)⁷ benchmarking system for the life cycle 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 life cycle impacts achieved through construction decisions.

After gathering and processing materials information, we will be able to provide important context as we compare the embodied impacts of construction against the much greater benefits of reducing vehicle miles travelled and lowering California's emissions footprint through providing an operational high-speed rail system. The intention of this work is to express the impacts and benefits—metrics—normalized at a range of scales: per mile, per alignment methodology, per construction segment, and per operational segment.

■ Reporting and Transparency

The Authority developed 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 dashboarding to track contractor performance against requirements.

EMMA complements PCM oversight of construction activity, and vice versa. PCMs review EMMA data submittals, with an eye to evaluate whether reported data conforms with field observations. Similarly, EMMA data can reveal trends or patterns that can highlight issues that PCMs may have missed in oversight. As

a result, PCMs can use EMMA data to better inform oversight of construction activity.

Reported data is also evaluated against supporting documentation provided by the contractor to demonstrate the accuracy and verifiability of the data. The reported data is compared with what is stated in the supporting documentation, ensuring the figures align. Any reported estimates are grounded in sound methodologies and external databases or systems are used to ensure other key data can be properly verified. For instance, the Authority uses the California Air Resources Board’s (ARB’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, helping clarify changes in data based upon season or schedule. The Authority also audits the contractors and PCMs 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 percent of the steel and concrete from construction and demolition and diverting at least 75 percent 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. Every month, the Authority manages toward a critical metric: the percent waste diverted from landfill by a given contractor.

In addition, waste and recycling information is collected directly from contractors and reviewed every month for compliance with contract requirements. These recycling rates, as shown in Exhibit 5.0, far surpass the 50 percent minimum diversion rate recommended by the California

Integrated Waste Management Board, demonstrate that the Authority is performing on par with leading international sustainable construction projects.

As shown in Exhibit 5.0, all concrete and metal was recycled or stockpiled and 86 percent of other demolition debris, including organic waste, was recycled. We receive this information from construction contractors, and the information is generally based on waste hauler records. In addition, our recycling efforts have avoided the emission of 3,292 metric tons of carbon dioxide equivalent in 2019, and 57,800 metric tons of carbon dioxide equivalent to date.

EXHIBIT 5.0: PERCENTAGE OF MATERIALS RECYCLED AND OVERALL RECYCLING RATE (2019)

Material	Percentage
Concrete and Metal	100
Other Materials	86
Overall Material Recycling Rate	88

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. In 2019, we recycled 5,971.79 tons of materials, as shown in Exhibit 5.1, and we landfilled 804 tons.

We have recycled 97 percent (183,290 tons) of all waste to date, as shown in Exhibit 5.2, and have sent only 3 percent (4,973 tons) to be landfilled, according to the records reported and confirmed in our data-collection system.

The Authority produced no un-remediated hazardous waste in 2019. A small amount of hazardous waste was remediated by the Authority’s contractors and disposed of, according to proper procedures.

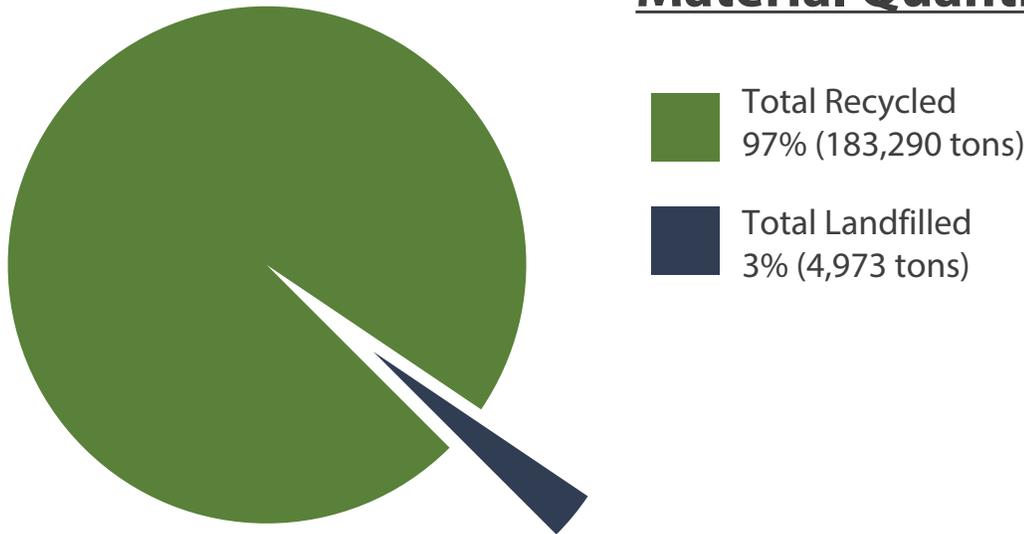
EXHIBIT 5.1: 2019 NON-HAZARDOUS MATERIALS MANAGEMENT (IN TONS)*

Material	Units	Quantity
Recycled/Reused Concrete	Tons	265
Recycled/Reused Asphalt	Tons	0
Recycled Mixed Metals	Tons	78
Recycled Wood	Tons	33
Recycled Organics	Tons	4,633
Recycled/Reused Mixed Materials	Tons	393
Stockpiled Concrete	Tons	569
Stockpiled Mixed Materials	Tons	0.79
Materials Landfilled	Tons	804
Total Materials Handled	Tons	6,776
Total Materials Recycled	Tons	5,971.79

*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.

EXHIBIT 5.2: CUMULATIVE RECYCLING TO-DATE

Material Quantity (In Tons)



Ensuring Health, Safety and Security

2019 PROGRESS: We updated our Safety and Security Management Plan (SSMP) for the statewide program that includes the following elements. First, the safety-assurance portion of the RAMS (Reliability-Availability- Maintainability-Safety) program. Second, a hazard-management program that includes hazard identification and hazard assessment in the form of preliminary hazard analyses, as well as threat and vulnerability assessments. Third, coordination with fire and life safety agencies, such as the Office of the State Fire Marshal, the Federal Railroad Administration, the Department of Homeland Security and local emergency response agencies.

The hazard-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 Safety and Security Management Plan 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.

Safety and security is our highest priority. 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 approach is detailed in the SSMP, a comprehensive system wide framework for identifying risks, implementing mitigation measures to decrease the risk of incidence.

The SSMP was developed through consultation with Authority staff, local communities, law enforcement and first responders to manage the safety and security of all stakeholders. The SSMP adheres to all

state and federal regulations, including requirements of the Federal Railroad Administration. 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.

Risk-based safety hazard management addresses system hazards during the project's construction and operational phases based on the level of risk posed by the hazard. Safety hazard analyses and security risk assessments are developed through an iterative process. These analyses are created in close collaboration with employees and other project staff and are readily available to all. The Safety and Security Program Committee (SSPC) is responsible for reviewing and approving all hazard analyses and vulnerability assessments to ensure that significant safety hazards and security threats and vulnerabilities are identified and that the proposed countermeasures adequately resolve the issues.

Our comprehensive safety and security program addresses operations and facilities and will also ensure that these measures enhance our passengers' experience. For example, 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.

Train Operations

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 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.

Construction Safety

Exhibit 5.2 shows injury rates and lost days in 2019. These are significantly lower than similar metrics for the construction industry statewide. The main types of injury include those to the upper body and upper extremities (arm, hand, fingers), requiring first aid.

EXHIBIT 5.2: WORKER HEALTH AND SAFETY, INJURY RATE

Injury Rate**	2019	State Benchmark*
Construction Package 1	1.78	-
Construction Package 2-3	1.00	-
Construction Package 4	1.47	-
Overall Weighted Average	1.38	4.5
Lost Days Rate		
Construction Package 1	0.30	-
Construction Package 2-3	0	-
Construction Package 4	0	-
Overall Weighted Average	0.11	2.8
Fatalities		
Total Fatalities	0	55***

*California Heavy and Civil Construction Industry 2016

** Reported as rate per 200,000 hours of work

*** Fatal occupational injuries by selected characteristics, by major event or exposure. California, U.S. Bureau of Labor Statistics, 2016

Employee Programs

To facilitate positive health outcomes, State of California employees and their eligible dependents have access to an Employee Assistance Program (EAP). This program is provided by the State of California as part of the state's commitment to promote employee health and well-being.

It is offered at no charge to the employees and provides a valuable resource for support and information during difficult times, as well as consultation on day-to-day concerns. Specially trained customer service representatives and professional EAP counselors are available 24 hours a day, 7 days a week to confidentially talk with employees and get them assistance when needed.

Each department also has an EAP coordinator and there is a Statewide EAP Benefits Manager available. This program is being operated by the California Department of Human Resources and more information is available here <http://www.calhr.ca.gov/employees/pages/eap.aspx>.

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

- Improved safety for pedestrians, 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.

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.

In July 2019, two newly constructed overpasses on Avenue 8 and Avenue 11 in Madera County were opened. These overpasses will allow vehicles to travel over the high-speed rail system, and they mark the first completed high-speed rail grade separations for Madera County. Construction of various grade separation projects is currently underway in the Central Valley. For example, in 2019, the initial paving of the Avenue 12 overcrossing over the BNSF freight lines east of Madera was completed. Once complete, the overpass will carry Avenue 12 traffic over the high-speed rail line and eliminate the existing freight rail crossing. The Avenue 12 overcrossing will eliminate

the at-grade crossing outside the town of Madera, improving safety for residents of the area.

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. We have also identified additional grade separations to be constructed in these corridors.

In Southern California, we have been coordinating with local agencies to advance grade-separation projects at specific locations south of Bakersfield. These projects provide important short-term safety and traffic flow benefits but also prepare for future high-speed rail construction.

Some examples of projects that are currently being environmentally cleared as part of the high-speed rail program include the following:

- Morning Drive (SR-184) at the UPRR along Edison Highway on the eastern edge of Bakersfield;
- Rancho Vista Boulevard at the UPRR and Sierra Highway in the City of Palmdale; and
- Palmdale Boulevard at the UPRR and Sierra Highway in the City of Palmdale.

These projects build on our earlier efforts in the region. For example, we contributed \$76.6 million to help fund the Rosecrans/Marquardt Grade Separation Project. The grade crossing at the intersection of Rosecrans and Marquardt avenues was once rated as one of the most hazardous grade crossings in California by the California Public Utilities Commission. The corridor is currently used by freight rail, Amtrak passenger rail and Metrolink commuter rail service and will be used by high-speed rail in the future.

Management, Resilience and Adaptation

In 2017, we finalized a Program Risk Management Plan, which supersedes the June 2013 Project Risk Management Plan. In 2019, our risk mitigation approach was incorporated into the Climate Adaptation Plan (draft). Our approach to risk management is systemic, collaborative and cross-disciplinary and 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 particular climate risk scenarios. The actions to be identified in the climate adaptation plan will rely on reasonable evidence of considerable potential risk.

To foster efficiency, redundancy and diversity, the Authority ensures a high degree of integration between its various infrastructure networks, specifically in the bookends.

Emergency and Disaster Recovery Planning

One way the Authority seeks to manage risk focuses on planning for emergencies and disasters. The Authority's Safety and Security Management Plan (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, the Authority will develop an Emergency Management Plan (EMP) and 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 PTEPP's goal 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: police, fire, and emergency medical services; and
- Familiarization of fire, police, and emergency medical services personnel with the physical and operating characteristics of Program operations and inherent hazards.

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 FLSSC 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.

Climate Adaptation Planning

2019 PROGRESS: The Authority formed a work group, the Climate Adaptation Implementation Committee (CAIC), focused on developing a climate adaptation plan for the system, in alignment with new state guidance, “Planning and Investing for a Resilient California.” In 2019, the CAIC discussed adaptation implementation opportunities for the system and worked collaboratively with the Safety and Security team to identify relevant climate risks in the Authority’s Risk Management framework.

As the Authority looks toward the future, another key consideration is planning to adapt to the effects of climate change. Scientists agree that climate change is driving temperature rise, increasing extreme weather and related disasters. In recent years, California residents have experienced natural disasters, such as drought, wildfires, floods and mudslides, events which may have been worsened or even triggered as a result of climate change. As we look to develop the infrastructure of the future, it is important to consider what is known and explore what is unknown about the future climate impacts.

Preparing for future conditions and designing resilient infrastructure is important to the State of California and its communities. 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.

The Authority’s 2018 Materiality Assessment results revealed that resilience and adaptation are of high importance to our stakeholders as well. In response

to these statewide goals and stakeholder requests, the Authority formed the Climate Adaptation Implementation Committee (CAIC) to develop resiliency outcomes for the system, identify system infrastructure that would be most severely affected by climate change, and review potential responses to increase project and community resiliency.

In 2019, the CAIC discussed adaptation implementation opportunities for the system and worked collaboratively with the Safety and Security team to incorporate climate risks into the Authority’s risk assessment process. This collaboration is ongoing in 2020 and will ultimately lead to the integration of a climate risk evaluation approach into the Authority’s Safety and Security Management Plan (SSMP), in an effort to provide a consistent and streamlined way to evaluate climate change impacts to the program.

The SSMP risk assessment process involves defining the severity and frequency of hazards through proper hazard analysis processes used for risk estimation and mitigation development. When developing mitigations, or adaptation strategies, the SSMP requires a benefit-cost comparison to choose the most cost-effective option.

Furthermore, to ensure resiliency is incorporated into system design, the Authority mandated new climate change adaptation and resiliency requirements in its procurements. The Authority will require the completion of site-specific hazard analyses as defined in the SSMP for climate change related hazards including, but not limited to, sea level rise and surge and average and extreme precipitation.

These site-specific assessments will be required where future climate change projections demonstrate a risk to project assets in these locations. These assessments must be provided by contractors in a climate risk and resiliency report outlining any present day and future, potential impacts of climate change-related risks—such as sea level rise and surge, average and extreme

precipitation, average and extreme temperatures, and wildfire—to system assets.

In addition to new assessment requirements, the Authority has developed or included new criteria in its procurement documents related to maintaining defensible space, use of fire-resistant and drought tolerant landscaping, proper floodplain management, emergency and disaster preparedness at stations, use of passive heating and cooling at stations, and rainwater collection.

These efforts—including climate change impact assessments, the initiation of the CAIC, integration with the SSMP, and updates to procurement documents—are currently being documented in an Authority Climate Adaptation Plan (CAP). The Authority will compile its ongoing climate change assessment and adaptation efforts into one central location, as well as share some of the next steps for the program to build a resilient and future ready system.



PHOTO: The canopy design incorporated future temperature data as well as local microclimate context to appreciate what design adaptations allow customer comfort to be maintained over its service life.



ARTIST CONCEPT OF A HIGH-SPEED RAIL PLATFORM CANOPY: Station sites will be designed to provide easy access to low-carbon modes of travel.



CHAPTER 6: STATION COMMUNITIES AND RIDERSHIP

Introduction

California continues to grow, and the high-speed rail system serves as an organizing principle for that growth. Fixed-rail systems are a unique opportunity to focus urban growth within existing communities, protect natural landscapes and dramatically reduce transportation greenhouse gas emissions.

Transportation is now the largest source of emissions in California. Providing an incentive for how the state grows and how people move is necessary to achieve the state's climate goals. Transportation electrification is essential to meet the vision of a carbon-neutral future. Several cities have used the opportunity of high-speed rail stations to craft visions for development, underpinned with adopted plans that capitalize on the system potential. Well-planned high-speed rail station areas and the access to and from them is critical in unlocking the potential of the rail system to meet transformative statewide goals.

Even in an era of zero-emissions vehicles, compact and mixed-use development, reflecting coordinated land-use planning around high-speed rail is necessary to achieve long-term sustainability goals. Putting development adjacent to low-carbon transportation investments, such as high-speed rail, is a crucial means 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.

No other state investment provides this opportunity for sustainable economic development, environmental benefit, and social resilience.

Highlights

- A vital public-agency partnership was formed with the City of San José, the Santa Clara Valley Transportation Authority (VTA), the Peninsula Corridor Joint Powers Board and the Authority to redesign and expand Diridon Station in San José. In 2019, this partnership completed a concept design.
- In partnership with SPUR, the Governor's Office of Planning and Research and GO-Biz, the Authority hosted a convening of station cities at the California Museum that explored financing and development tools and implementation strategies for station-area development.
- 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), has continued a brownfield study around Los Angeles Union Station
- The Authority partnered with Metro on the Link US project, which involves improvements to Los Angeles Union Station that accommodate expanded regional and inter-city rail service and high-speed rail trains.
- The Authority initiated station site planning work in Fresno and Bakersfield; critical project development work to advance for early service.
- In October 2019, the Authority hosted a small-business forum at Bitwise in Fresno, connecting potential subs and primes, and featuring the sustainability requirements.

Enhancing Public Space and Amenities

2019 PROGRESS: The Authority continued to partner with each of the station communities to identify how station design and implementation are aligned with the communities' needs and goals.

To best realize the value of the high-speed rail investment, the Authority has worked with local governments over the last several years to prepare for future high-speed rail stations. In partnership with the Federal Railroad Administration (FRA), we 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 SB 375 and our Station Area Development Policies.

To date, we have executed or completed 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 Santa Clara Valley Transportation Authority.

These agreements allow the Authority to work closely with station jurisdictions and other service providers to promote regeneration opportunities and enable more sustainable, district-scale development.

The vision for station planning is to create community hubs and help transform cities. The goals being advanced through this program include:

- Fostering sustainable development and operations;
- Reducing greenhouse gas (GHG) emissions;
- Helping maximize system performance;
- Creating economic engines for local communities; and
- Making great places.

Planning Process

Our station planning process focuses on transforming the communities in which we operate. The aim is to connect California's mega-regions while contributing to sustainable development, job creation, downtown revitalization and protection of important agriculture land and other open spaces.

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

In 2019, we focused our efforts on initiating project delivery work with the stations along the initial Central Valley service segment. This work is grounded in the building block approach expressed in the 2019 Project Update Report. As a consequence, at each station site, project delivery work will result in a Station Site and Adjacent Development Plan that includes subplans for access, transit orientated development, station facilities, and early site activation. This work happens in close coordination with station cities to identify phasing for each station so that the stations fit with and enhance the local context. This phasing is intended to align station investments with station-area market drivers, Authority funding and the vision of local jurisdictions. We will continue to work closely with environmental and public interest groups, developers, investors and others to pursue the development of public spaces and amenities near rail stations.

Some stations are located in areas designated as Opportunity Zones. These zones provide tax incentives for investment in designated areas, supporting objectives of sustainable development, responsible growth and affordable housing. We will work with local jurisdictions to leverage the potential presented by Opportunity Zones.

Planning for the New Diridon Station

Diridon Station is the primary transit hub in the San José area, currently serving approximately 17,000 daily passengers and anticipated to grow to more

than 100,000 passengers per day by 2040. The station currently connects Caltrain, the Capitol Corridor, the Altamont Commuter Express (ACE) and Amtrak passengers with VTA light rail and bus service, as well as other regional bus transportation providers.

Diridon Station is the major hub of the high-speed rail system in Silicon Valley due to its important connectivity to downtown San José and the rest of the Bay Area. Bay Area Rapid Transit (BART) also has plans to extend service from the new Berryessa station to Diridon by 2030, further increasing connectivity and ridership.

The Authority joined the Santa Clara Valley Transportation Authority (VTA), the City of San José and Caltrain to lay the groundwork for developing the first phase of the Diridon Integrated Station Concept (DISC)—a shared vision for the future of Diridon Station.

DISC envisions the gradual transformation of the station area from a predominantly auto-orientation to a transit-oriented, world-class multimodal transit hub and gateway to Silicon Valley. The planning effort seeks to leverage billions of dollars spent on transit systems and connectivity to maximize transit ridership, reduce auto dependence, create travel choice and attract investment.

This has been an early conceptual planning process, in which the Authority is one of four partner agencies working under a cooperative agreement to form a collaborative process for station planning.

The planning effort seeks to leverage billions of dollars spent on transit systems and connectivity to maximize transit ridership, reduce auto dependence, create travel choice and attract investment. The partner agencies developed a unified vision for the spatial layout of the station. The next phases of work will include developing a cohesive strategy for investment at the station and the broader station area.

Transportation Hub Activation and Mass/Active Transportation

We are designing high-speed rail stations to be more than stations; they will create community hubs, anchor intermodal networks and act as catalysts for transit-

oriented development as California's major population and employment centers are connected in a new way.

The high-speed rail stations are being designed to function as a transportation hub for a seamless interregional travel experience. Adopting an integrated approach, the Authority is planning for access to other modes of public transport located within close proximity of each station. For example, both bus stops with frequent service and access to other rail services may be located within a 5-minute walk of the high-speed rail platform, where applicable.

Developing stations as mobility hubs will serve to increase ridership on all systems, including the local and regional transit networks that connect to the high-speed rail system. It also supports our ability to develop a commercially successful high-speed rail system that operates without a subsidy. We remain committed to this approach, and, within the next year, we will be initiating access planning that prioritizes seamless connections.

More compact, bike- and pedestrian-friendly development and connecting people to stations via all transportation modes increases access to the high-speed rail system. This reinforces the potential for the system to reduce not just vehicle-miles traveled (VMT) at the regional scale, but also for first-mile/last-mile access to the station and within the station district.

In 2020, we will continue this work by partnering with local active transportation organizations to develop supportive policies and optimize the use of state funding available to for active transportation facilities.

Station access that prioritizes active transportation, seamlessly integrates mass transportation modes and nurtures infill development is critical to achieving the state's climate goals through reducing vehicle miles traveled.

Access Planning

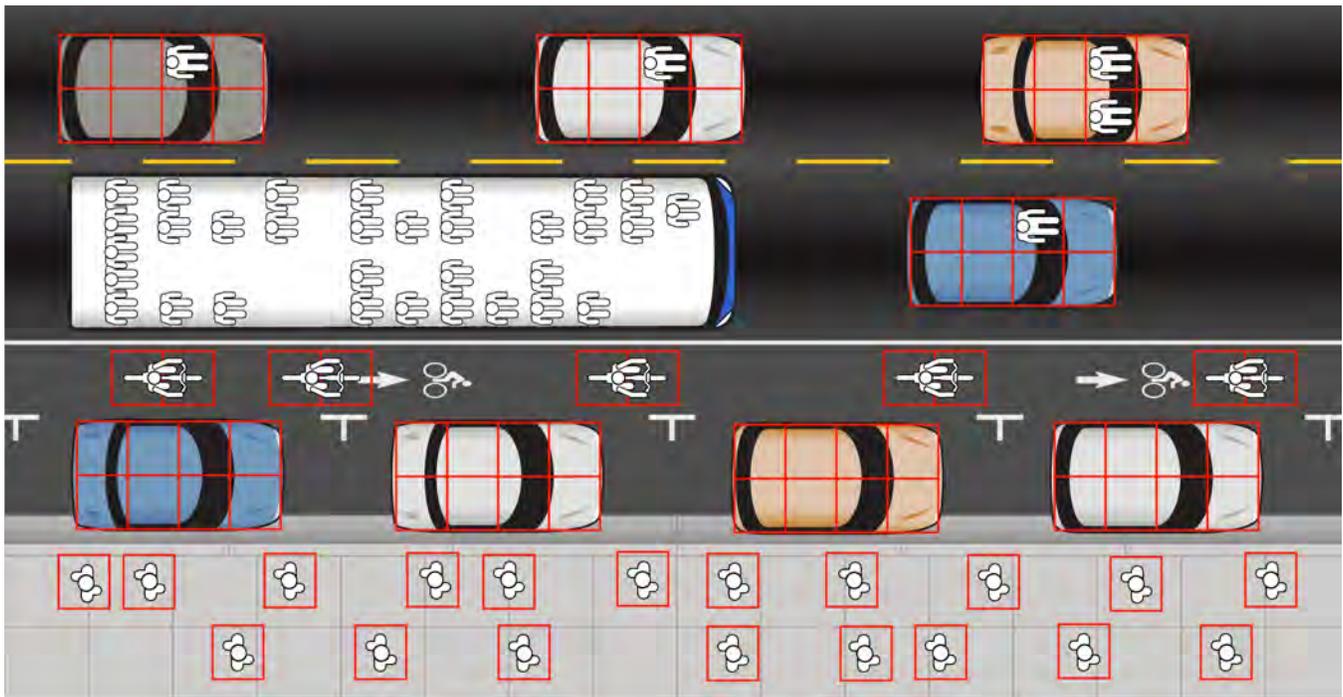
The Authority has steadily evolved its planning functions to focus not just on environmental clearance, but project development and delivery activities at its station sites. In some station cities, Intermodal Working Groups

(IWG) helped identify critical station area investments concerning decisions and allocating funding for first- and last-mile projects.

The Authority is drawing on that work, station area plan documents, and functional requirements to lay out the station site with clear linkages to nearby sidewalks, cycling paths and transit nodes to stations, and make it easy for passengers to walk, bus or bike to high-speed rail stations. Walking, biking, and transit are clean, energy-efficient modes. They are also incredibly efficient from a space perspective, as shown in Exhibit 6.0. More people can move by transit, walking and biking in less space.

In 2019, the Authority advanced more detailed access planning for the stations in the initial operating section to support the delivery of service. Access improvements and parking are focal points for early discussion and investment. We are mindful of how 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.

EXHIBIT 6.0: A VARIATION ON THE CLASSIC ILLUSTRATION OF HOW EFFICIENTLY TRANSIT, BICYCLES AND PEDESTRIANS USE SPACE FOR MOBILITY

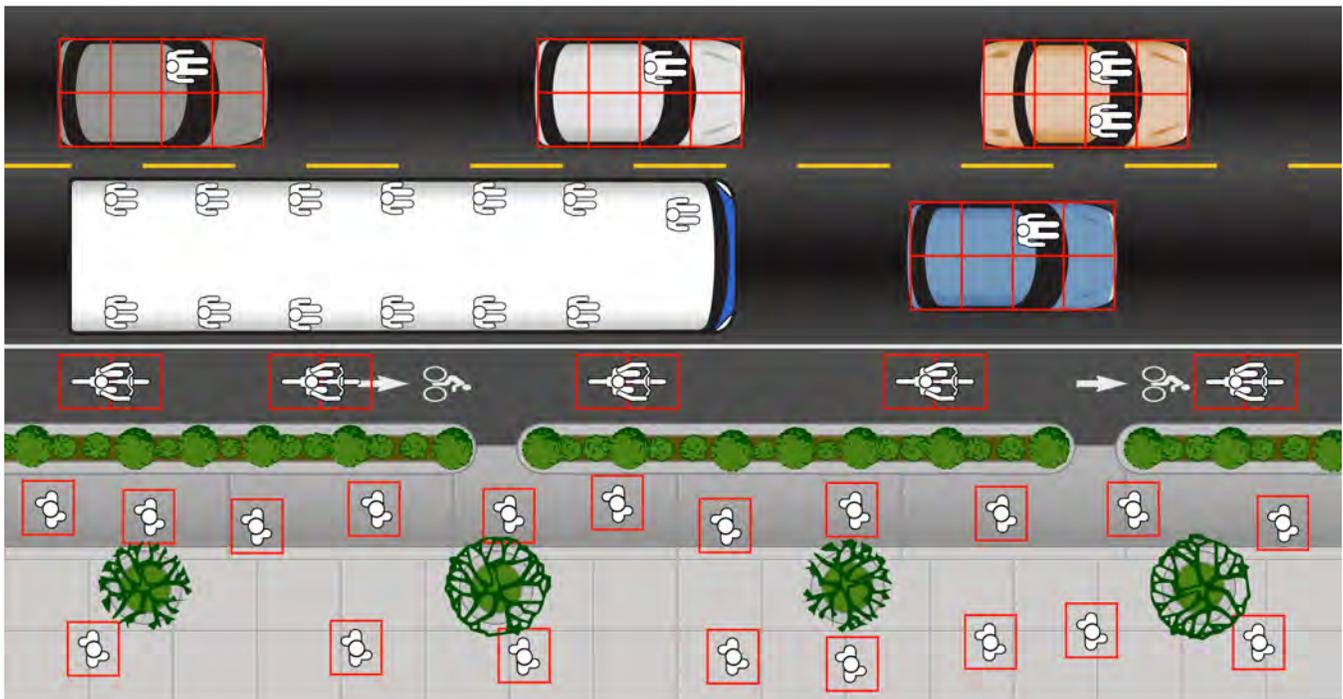


Infrastructure investment supports development in most markets. We also recognize how vital it is to prioritize walking, biking and transit over single-occupancy-vehicle use to reflect demographic and market trends.

In this era, as we contend with both the public health and economic crisis resulting from the COVID-19 pandemic, the design and functioning of our transit systems and public realm is ever-more crucial.

We need our public realm, sidewalks and roadways to allow us space to move and interact safely. Our communities and economic recovery depend on transit. Even in a post COVID-19 era, where social distance is vital to maintain public health, Exhibit 6.1 shows that transit is still substantially more spatially efficient than automobiles.

EXHIBIT 6.1: THE SAME ILLUSTRATION TAKING INTO ACCOUNT THE NECESSARY SPATIAL DISTANCE FOR PUBLIC HEALTH.



Credit to Harvard's Zofnass Program for Sustainable Infrastructure Virtual Session "Impact of Covid-19 on Transportation and Outlook for Recovery" and Timothy Papandreu

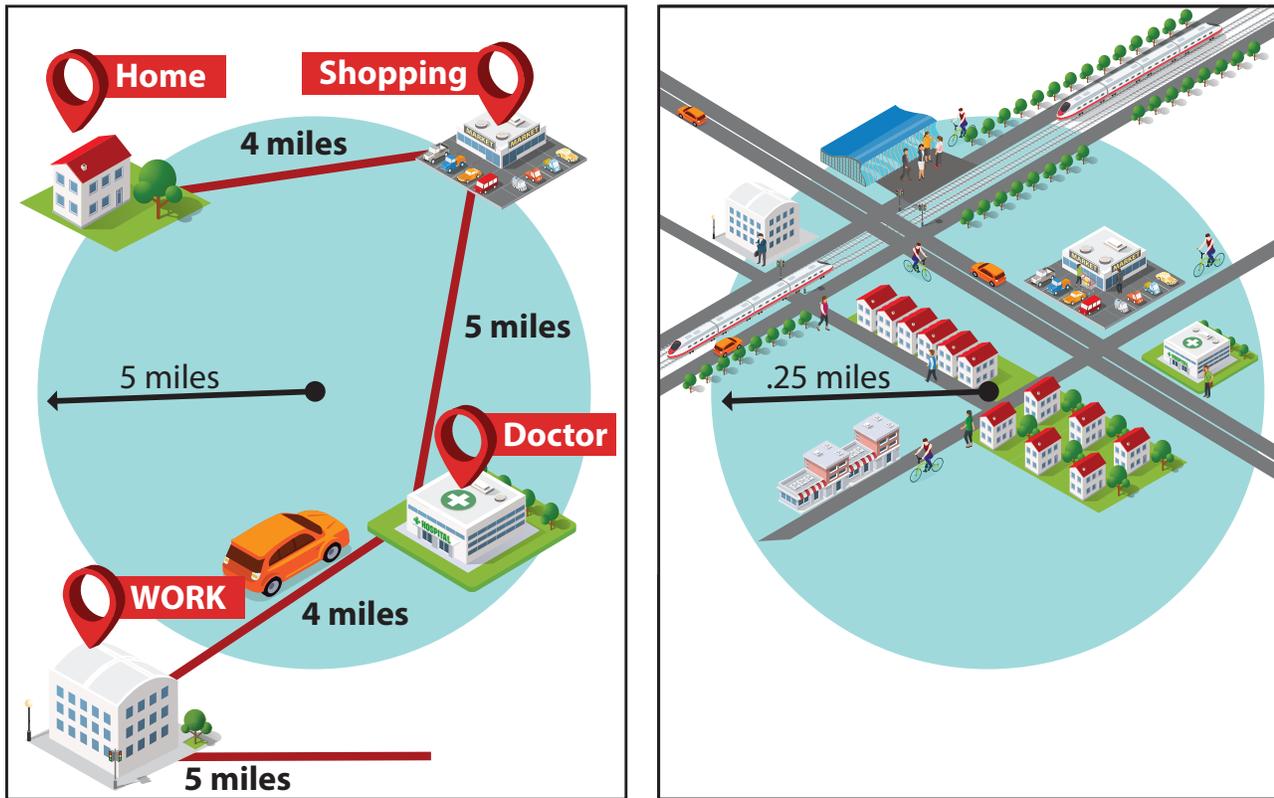
Community Partnerships Reduce Vehicle Miles Travelled (VMT)

California has been clear about the need to reduce vehicle miles travel. 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. Station area planning funding is helping stimulate local planning for smart development, updates to local land use plans and zoning codes, and promoting transit-oriented

development around high-speed rail stations. Exhibit 6.2 illustrates how development around high-speed rail stations, in response to high-speed service, has the potential to lower the average daily vehicle miles travelled (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.⁸

EXHIBIT 6.2: 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.

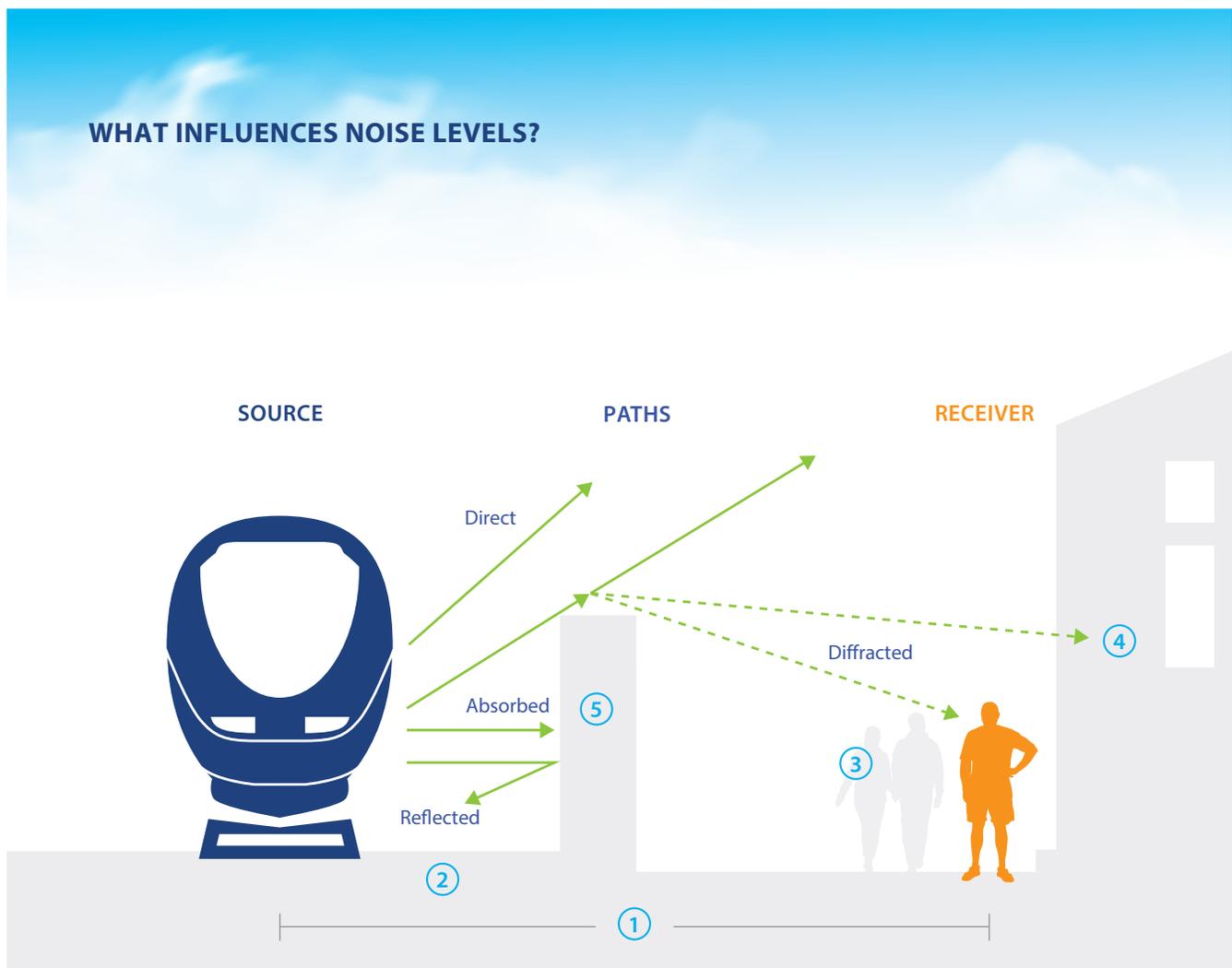
Mitigating Noise and Vibration

Sound is a key concern for those who live or work near rail systems. The Federal Railroad Administration (FRA) developed rigorous procedures to manage potential noise impacts, and we use the FRA procedures as guides in systems design. As shown in Exhibit 6.3, the Authority is making plans to mitigate potential noise disturbances associated with train service through sound walls, sound barriers (solid and/or transparent) or earthen berms built between the train tracks and residential or other noise-sensitive areas. Because high-speed trains are electrically

powered, they are generally quieter than conventional diesel trains.

With the planned upgrades and eliminations of grade crossings along the system through Northern and Southern California, trains will no longer have to sound noisy horns at crossings. At areas where the train will need to travel through at-grade crossings, the establishment of “quiet zones,” where additional safety measures remove the need to sound train horns, will help significantly reduce noise-disturbance.

EXHIBIT 6.3: MITIGATING NOISE DISTURBANCES



Above: The distance (1) between the train tracks and the listener, the type of ground surface (2), ambient noise (3), and the presence of buildings (4) or sound barriers (5) will all influence the noise level that is heard by a listener at any given location

Engaging Communities

2019 PROGRESS: Throughout 2019, the Authority continued a focused and comprehensive engagement process with the community of Fairmead to best identify and address community issues and capture ideas for mitigation.

We recognize that trust and support are vitally important to what we do. Engaging our many stakeholders from a federal, statewide and local community level provides us with invaluable insight and helps inform and strengthen our decisions. We value community meetings and open houses as opportunities to gather comments and feedback from those communities that may be directly affected by the high-speed rail program.

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. For example, community meetings on aesthetics have enabled local preferences for unique landmarks to be included in the infrastructure design.

Outreach Efforts

Statewide, through community engagement and public-outreach events, we work with more than 200 local community organizations and elected officials to educate and inform and seek input from the public about the high-speed rail program, as shown in Exhibit 6.3.

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. We are continuing these activities in a virtual environment in 2020;
- Encouraging collaboration between diverse groups of community leaders;

EXHIBIT 6.3: COMMUNITY OUTREACH



*This includes one event, the California Poppy Festival in Lancaster, CA, which is attended by approximately 40,000 people over the two-day period of the event.

- Hosting tables or booths at community-based events;
- Partnering with state agencies and community-based organizations that serve underrepresented populations, and minority and women business organizations;
- Encouraging public comments at monthly Board of Directors' meetings and quarterly Business Advisory Council meetings;
- Streaming a live webcast of the monthly Board of Directors' meetings; and
- Maintaining a toll-free hotline that includes multiple language options.

In addition, our I Will Ride education initiative is designed to inform, engage and connect students to the nation's first public high-speed rail system. Since the inception of I Will Ride, we have welcomed hundreds of college and university students on construction tours in the Central Valley as part of the initiative's I Will Ride Day. We have engaged in numerous outreach events, classroom presentations and networking opportunities connecting students to high-speed rail professionals.

Working With Stakeholders

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 exclusively 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 on addressing stakeholder interests and concerns related to potential project effects.

The Chief of the Strategic Communications Office 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 the publication and regular updates of project information on the Authority's website; 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.



PHOTO: California High-Speed Rail Authority outreach staff visit with community members in Fresno to explain where the high-speed rail alignment will be located in the community.

Working With Partners to Transform Brownfields

Los Angeles Union Station (LAUS) is centrally located in downtown Los Angeles. It is one of the busiest transportation hubs in the nation, with almost 160,000 trips per day.

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), applied for and received a grant from the Environmental Protection Agency (EPA) to study candidate brownfield properties in approximately a one-mile radius around LAUS.

The study will gather and prepare information on environmental contamination of the properties so ongoing regional planning initiatives can identify suitable locations for potential redevelopment opportunities. The grant will help prepare land for potential repurposing, which would fulfill the objectives of local, regional, state and federal policies, and move the LAUS target area from planning into an implementation stage.

The Authority, Metro, LOSSAN, and other stakeholder agencies share a vested interest in revitalizing land around LAUS to support system ridership and transit-oriented development. 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, environment and viability criteria	Completed Fall 2018	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles
Phase I Assessments	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 Assessments	Determine the specific nature and extent of pollutants through sampling and analysis for up to eight of the Phase I sites	2022	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles
Cleanup Plans	Produce cleanup plans and schematic site plans for the Phase II sites	2022	EPA, Authority, Metro, LOSSAN, City of Los Angeles, County of Los Angeles

Connecting Existing Transportation Systems

2019 PROGRESS: The 13 connectivity projects identified in SB 1029 are being implemented across the state. They include the Central Subway project in San Francisco, the Regional Rail Connector in Los Angeles, new rail cars for the Bay Area Rapid Transit (BART) system and an upgrade of the Blue Line light-rail system in San Diego. These projects were fully funded in 2015, and we worked with our rail and transit partners on agreements to initiate and/or advance these projects through 2018. In 2019, the Authority continued its participation in regional rail coordination meetings organized by the California State Transportation Agency (CalSTA) and Caltrans.

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.

The Authority coordinates extensively with CalSTA and other regional partners on planning and implementing the California State Rail Plan. The goal is to incorporate high-speed rail into a single, integrated state rail improvement strategy.

The 2018 State Rail Plan lays out a vision for statewide, integrated passenger rail and transit service, allowing for rail to connect all urban, suburban and rural communities with frequent, reliable service by 2040. One crucial element of the plan is a practical focus on pulsed schedules. "State network planning in the Rail Plan is based on pulse scheduling, which represents uniform train service patterns that repeat throughout the day on regular, recurring time intervals. This

timetable-based planning approach allows for timed transfers between services at hub stations where a transfer is required to complete a trip across the state, or to a location served by local transit. The benefit to users of pulse scheduling is that a repeating timetable allows for easy trip planning and seamless travel by ensuring that connections between trains can be made throughout the day, with minimal transfer times."

High-speed rail serves as the statewide artery for this planned integrated system.

The state has also tackled additional critical integration issues, namely fare payment and trip planning. The intention is to further ease transfers among various modes, across the state. The California Integrated Travel Project (Cal-ITP) is the result of cooperation between CalSTA, Caltrans, the Capitol Corridor Joint Powers Authority (CCJPA), as well as local, regional and state partners. Initial research found that, according to the private sector, "the most effective course of action for Cal-ITP to advance the dual potentials of interoperability and equity in the face of accelerating disruption is:

- Drive the adoption and improvement of global standards, as well as the creation of missing standards;
- Leverage California's buying power to lower the cost of revenue collection;
- Forge partnerships with market parties; and
- Consider standardized statewide solutions to reduce the cost of special local programs."



PHOTO: Artist concept of a high-speed train in the Fresno Trench.



CHAPTER 7: MOVING FORWARD

The imperatives are clear; more must be done to reduce the emissions associated with transportation and to invest in projects that enable our communities and economy to adapt to and be resilient within the new conditions resulting from the changing climate.

All of our actions and activities are guided by the recognition that delivering high-speed rail to California is critical to our state's success in achieving its far-reaching policies to address climate change, develop clean energy, curb air pollution and greenhouse gas emissions and protect endangered species. Our goal is also to help spur continued economic prosperity and greater economic opportunity for all Californians as we transition to a sustainable, low-carbon future.

The reality is that California is not on track to meet the greenhouse gas reductions expected for 2030 because emissions from statewide passenger vehicle travel per capita are increasing, according to the California Air Resources Board (CARB):

"With emissions from the transportation sector continuing to rise despite increases in fuel efficiency and decreases in the carbon content of fuel, California will not achieve the necessary greenhouse gas emissions reductions to meet mandates for 2030 and beyond without significant changes to how communities and transportation systems are planned, funded, and built." *2018 Progress Report: California's Sustainable Communities and Climate Protection Act (November 2018)*

High-speed rail is a crucial investment offering essential benefits within these scenarios. As a major state investment in clean, zero-emissions transportation, high-speed rail will provide a vital long- and medium-distance choice for travelers. High-speed rail, unique among current climate investments projects, is a competitive

service to air travel, a sector that is slower in reducing carbon emissions.

High-speed rail stations present additional opportunities to resolve the issues presented by the CARB report. Station communities are being designed for people, and the station sites are designed to bring local bus, rail and active transportation projects physically together so that services can be synchronized to benefit community residents.

Bringing diverse destinations close together in station communities, within biking, walking and short bus rides, helps deliver the reductions in vehicle miles travelled required to achieve long term state climate goals. Aligning land use and development decisions with the investment of state funds at high-speed rail stations can incentivize infill development. Tied with affordable housing options, this means that Californians who may not be able to afford cars, have access to employment, educational, and social opportunities, even if they never take high-speed rail.

Further, reducing the development pressure on agricultural and working lands, as well as within the wild-land interface, enables those lands continue to deliver critical economic and ecosystem services. High-speed rail design and delivery is incorporating adaptation measures that reduce the risk posed to the system from sea level rise, temperature increase, increased extreme precipitation events, and other climate stressors.

Building Even Better

We will continue to advance public policy and industry-leading construction practices, including the implementation of carbon targets for overall construction activity as well as embodied carbon performance targets for major materials. We will also look to telematics and other automated, data integration techniques to streamline how information on site performance is collected and analyzed.

Responding to Climate Change

We are convening follow up and regular meetings of the climate working group to ensure that we integrate climate considerations into planning and investment decisions as we prepare for the 2020 Business Plan and upcoming procurements. This work requires us to continually assess the risks and opportunities to the sustainability, adaptability and resiliency of the high-speed rail system that we are developing.

We are reaching out and listening to external stakeholders to identify social, environmental and economic shocks and stressors that could diminish the resiliency of the system and, consequently, negatively affect priority communities.

Curbing Air Pollution and Reducing Greenhouse Gas Emissions

We continue to coordinate with our partners to make concurrent investments that can have early benefits to communities and the environment, while also laying the foundation for future high-speed rail operations. We also work with other state agencies and local and regional transit and rail providers to learn and apply best sustainability practices. Our goal is to integrate district-scale sustainability features into the discussion of station phasing and commercial opportunities. We continue to focus on practical means for reducing embodied energy in materials used for our guideway.

Resilient Clean Energy

We are working on the renewable power generation and battery storage strategy. Our plan is to use land that we already own for solar generation and battery storage resources. The capital construction, operations and maintenance of these resources will be undertaken by a private entity engaged through a power-purchase agreement. We already have an integrated team of renewable energy experts, along with right-of-way, environmental, contracting and legal staff, finalizing the modelling and procurement approach.

Staff has already begun to refine the assessment of non-operational parcels suitable for solar development. Over the next two years, we will finalize and initiate procurement for the power needs of the system, aligned and scaled with the delivery of Track and Systems and operating segments.



PHOTO: California's aggressive policies to reduce greenhouse gas emissions will protect the state's natural resources.

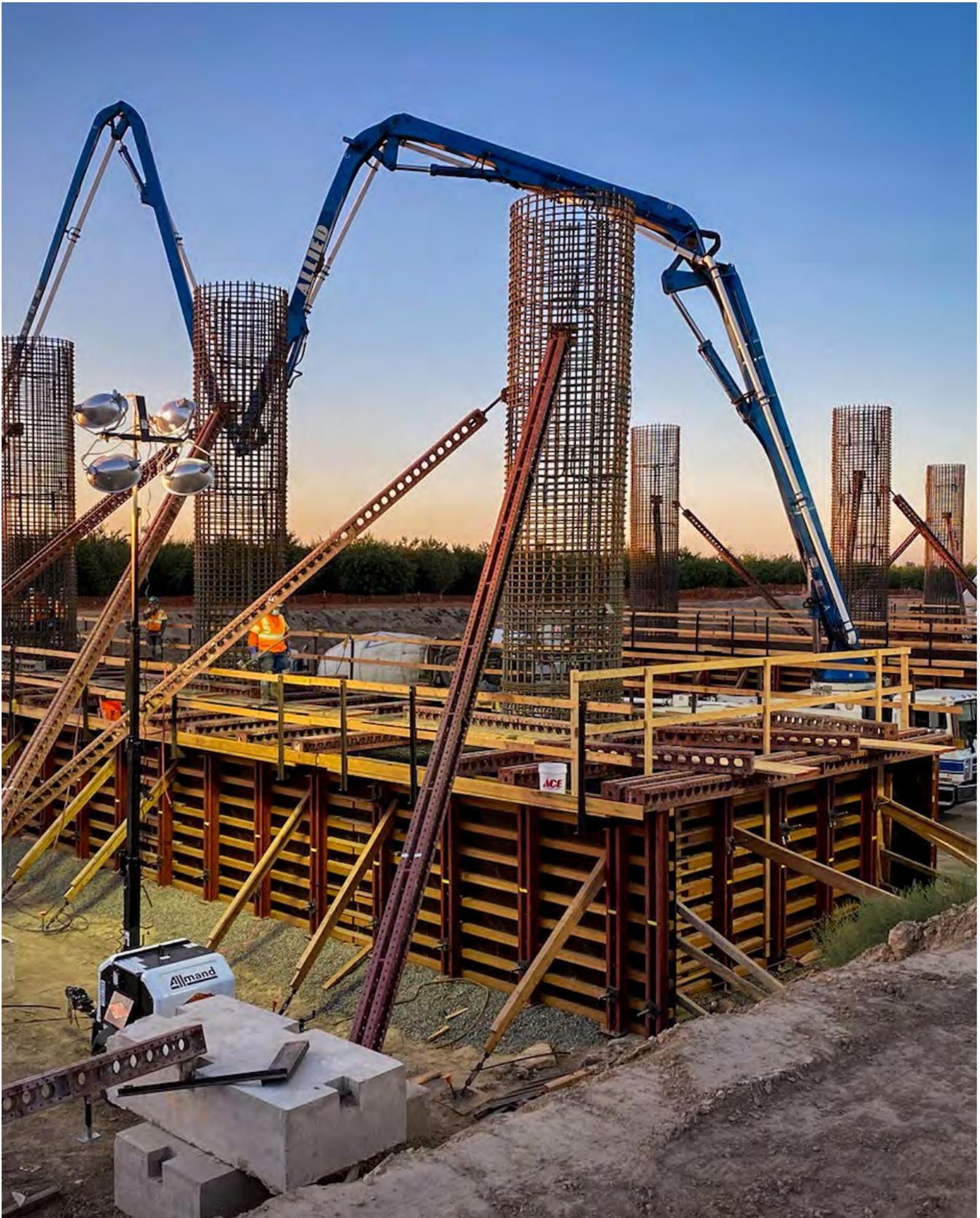


PHOTO: Work continues on rebar columns for the Hanford Viaduct.

GLOBAL REPORTING INITIATIVE

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 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.

General Standard Disclosures

Organizational Profile

Organizational Profile Disclosures	Section	Page(s)
102-1 Name of the organization	Who We Are	1
102-2 Activities, brands, products, and services	Who We Are	1
102-3 Location of headquarters	Who We Are	1
102-4 Location of operations	Who We Are	1
102-5 Ownership and legal form	Who We Are	1
102-6 Markets served	Who We Are	1
102-7 Scale of the organization	Economic Development and Governance; Who We Are	1
102-8 Information on employees and other workers	Who We Are	1
102-9 Supply chain	Our Supply Chain	3
102-10 Significant changes to the organization and its supply chain	Who We Are	1
102-11 Precautionary Principle or approach	Management, Resilience and Adaptation	67
102-12 External initiatives	Our Sustainability Approach	5
102-13 Membership of associations	Our Sustainability Approach	11

Strategy

Strategy	Section	Page(s)
102-14 Statement from senior decision-maker	Message from the CEO	vi-ix

Ethics and Integrity

Ethics And Integrity	Section	Page(s)
102-16 Values, principles, standards, and norms of behavior	Our Sustainability Approach	6

Governance

Governance	Section	Page(s)
102-18 Governance structure	Who We Are	1

Stakeholder Engagement

Stakeholder Engagement	Section	Page(s)
102-40 List of stakeholder groups	Engaging Communities	80-81
102-41 Collective bargaining agreements	Engaging Communities	80-81
102-42 Identifying and selecting stakeholders	Engaging Communities	80-81
102-43 Approach to stakeholder engagement	Engaging Communities	80-81
102-44 Key topics and concerns raised	Engaging Communities	80-81

Reporting Practices

Reporting Practices	Section	Page(s)
102-45 Entities included in the consolidated financial statements	Our Sustainability Approach	5
102-46 Defining report content and topic Boundaries	Our Sustainability Approach	5
102-47 List of material topics	Our Sustainability Approach	5
102-48 Restatements of information	About this Report	1
102-49 Changes in reporting	About this Report	1
102-50 Reporting period	About this Report	1
102-51 Date of most recent report	About this Report	1
102-52 Reporting cycle	About this Report	1
102-53 Contact point for questions regarding the report	About this Report	1
102-54 Claims of reporting in accordance with the GRI Standards	About this Report	1
102-55 GRI content index	GRI Index	89
102-56 External assurance	External Assurance	1

Specific Standard Disclosures

GRI Standard	Disclosure	Section	Page(s)	Omission
Economic Performance (2016)	201-4 Financial assistance received from government	Economic Development and Governance	19	NO
Indirect Economic Impacts (2016)	203-1 Infrastructure investments and services supported	Economic Development and Governance; Station Communities and Ridership	19,71	NO
	203-2 Significant indirect economic impacts	Economic Development and Governance; Station Communities and Ridership	19,71	NO
Procurement Practices (2016)	204-1 Proportion of spending on local suppliers	Economic Development and Governance	19	NO
Energy (2016)	302-1 Energy consumption within the organization	Energy and Emissions; Quantification Methodologies; Performance	37, 93, 96	NO
Water and Effluents (2018)	303-3 Water withdrawal	Natural Resources	51	NO
Biodiversity (2016)	304-3 Habitats protected or restored	Natural Resources	51	NO
Emissions (2016)	305-1 Direct (Scope 1) GHG emissions	Energy and Emissions; Reducing and Managing; GHG Emissions in Delivery; Quantification Methodologies; Performance	37, 43, 93, 96	NO
	305-2 Energy indirect (Scope 2) GHG emissions	Energy and Emissions; Reducing and Managing GHG Emissions in Delivery; Quantification Methodologies; Performance	37, 43, 93, 96	NO
	305-3 Other indirect (Scope 3) GHG emissions	Energy and Emissions; Reducing and Managing GHG Emissions in Delivery; Quantification Methodologies; Performance	37, 43, 93, 96	NO
	305-5 Reduction of GHG emissions	Reducing GHG Emissions	41	NO
	305-7 Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions	Reducing GHG Emissions; Protecting Air Quality During Construction	41, 46	NO
Effluents and Waste (2016)	306-2 Waste by type and disposal method	Sustainable Infrastructure	59	NO
Environmental Compliance (2016)	307-1 Non-compliance with environmental laws and regulations	Economic Development and Governance; Regulatory Compliance (Emissions)	19, 46	NO
Supplier Environmental Assessment (2016)	308-1 New suppliers that were screened using environmental criteria	Engaging Suppliers	33	NO
Employment (2016)	401-1 New employee hires and employee turnover	Our Team	3	YES

GRI Standard	Disclosure	Section	Page(s)	Omission
Occupational Health and Safety (2018)	403-9 Work-related injuries	Ensuring Health, Safety and Security	64	NO
	403-10 Work-related ill health	Ensuring Health, Safety and Security	64	NO
Training and Education (2016)	404-1 Average hours of training per year per employee	Sustainable Infrastructure; Principals for Sustainable Infrastructure	59, 60	YES
Diversity and Equal Opportunity (2016)	405-1 Diversity of governance bodies and employees	Our Team	3	YES
Local Communities (2016)	413-1 Operations with local community engagement, impact assessments, and development programs	Station Communities and Ridership	71	NO

Additional Disclosures

During the 2019 materiality assessment, the Authority identified a number of material topics that are not covered by available GRI Standards and disclosures. The location of this information in the report is summarized below.

Material Topic	Section	Page(s)
Emergency and disaster recovery planning	Our Sustainability Approach; Sustainable Infrastructure	5, 59
Enhancing public space and amenities	Our Sustainability Approach; Station Communities and Ridership	5, 71
Land and water pollution*	Our Sustainability Approach; Materiality Assessment Results	5, 12-13
Life cycle approach	Sustainable Infrastructure	59
Noise and vibration	Station Communities and Ridership	71
Resilience and adaptation, incl. extreme weather	Sustainable Infrastructure	59
Third-party assessment	Our Sustainability Approach; Materiality Assessment	5, 12-13
Transportation hub activation and mass/active transportation	Our Sustainability Approach; Station Communities and Ridership	5, 71

*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.

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.

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.

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.

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).

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.

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.

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.

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

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. All relevant greenhouse gases are included.

Scope 2 GHG emissions are calculated from annual electricity consumption, and emissions factors sourced from the U.S. EPA (2016) and eGRID for California (CAMX).

Scope 3 emissions from contractor vehicles are calculated using EMFAC2011 emissions rates from the California Air Resources Board.

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 (CO₂, CH₄, N₂O). 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.

Air Pollutant Emissions

Air pollutant emissions from construction vehicles are calculated using the methodology and EMFAC2011 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).

Exhibit 1.7: High-Speed Rail Is a Valuable Investment

Carbon Sequestered and Avoided

The carbon sequestered in-situ by habitat land approved for conservation and preservation, and agricultural land secured and approved for conservation is calculated based on the vegetation type present at the location. A conservative approach in estimating carbon sequestration is followed. The calculations are based on the approach laid down in the United Nations Land Use Land Use Change and Forestry recommendations for calculating carbon sequestration from natural land areas.

The California Department of Conservation (DOC) calculations for avoided emission due to mitigated development on important agricultural land which was protected using funding received from the Authority. Typically, the DOC's analysis involves an estimate of the vehicle miles traveled that are avoided by limiting development in a given area, as well as the avoided building energy use and avoided soil disturbance as a result of housing construction. In an attempt to be conservative, avoided emissions due to soil carbon liberation have not been considered for this calculation. This amount also captures the lifetime tons associated with tree planting by the Authority to-date.

Emissions Reductions

This includes emissions avoided from air pollutant emissions from construction vehicles and from avoided development of sensitive agricultural land. Air pollutant emissions are calculated using the methodology and EMFAC2017 emissions rates from the California Air Resources Board. The emissions figures account for the changes due to the Safer Affordable Fuel-Efficient (SAFE) Vehicle Rule.

Renewable Energy Generation

The rail system will be run completely on renewable power. The Authority is currently refining its calculations and will provide a renewable energy report in 2021.

Disadvantaged Communities Investment

Nearly \$2,400,000,000 from June 2006 through July 2019. Source: Fiscal Year 2018-2019 Impact Analysis Technical Supporting Document Economic Impact Methodology Documentation, California High Speed Rail, January 2020 (https://hsr.ca.gov/programs/economic_investment/pdf/Economic_Impact_Technical_Support_Document.pdf). All other information was assembled from report findings.

PERFORMANCE

Economic Development and Governance

Funding and Investment (\$ In Billions)

Funding and Investments	2015	2016	2017	2018	2019
Total Invested	-	\$2.3	\$3.5	\$5	\$5.7
Investment in California Firms/ Workers	-	94%	97%	97%	98%
Federally Funded Investment	-	70%	70%	73%	73%*

* The Authority has received \$2.55 billion of the \$3.5 billion in federal funds anticipated for the project. The remaining \$928 million FY10 grant agreement is unexpended at this time and was terminated by FRA on March 4, 2019. The termination is now subject to a legal suit filed by the State of California on behalf of the Authority on May 21, 2019.

Dispatched Workers by Construction Package

Dispatched Workers	2015	2016	2017	2018	2019
Dispatched Workers – CP1	214	1,089	1,239	1,716	1,872
Dispatched Workers – CP2/3		257	318	750	1,060
Dispatched Workers – CP4		106	142	293	648

Construction Hours by Construction Package

Construction Hours	2015	2016	2017	2018	2019
Construction Hours – CP1	83,154	666,033	539,547	1,538,063	1,884,039
Construction Hours – CP2/3		59,638	60,032	297,334	487,560
Construction Hours – CP4		8,219	8,627	47,037	158,151

Creating Opportunities for Disadvantaged Workers and Fostering Diversity: Worker Summary

Workers	2015	2016	2017	2018	2019
Construction Workers Dispatched	214	1,525	1,699	2,759	3,580
Disadvantaged Workers Dispatched	-	174	149	402	426

Small and Disadvantaged Business Summary

Small and Disadvantaged Businesses	2015	2016	2017	2018	2019
Small Business Participants – Total	318	417	427	474	530*
Disadvantaged Business Enterprises (DBE)	100	130	139	157	172*
Disabled Veteran Business Enterprises (DVBE)	36	49	51	52	56*
Small Business Located in Disadvantaged Communities	-	96	115	129	156
Local Procurement (U.S.-based businesses)	Nearly 100%				
Expenditures in Disadvantaged Communities	-	52%	Nearly 60%	54%	50%

*As of March 2019

Energy and Emissions

Energy Consumption

Priority	2015	2016	2017	2018	2019
Office Energy Consumption* (Megawatt hours)	1,036	1,287	1,431	1,908	1,908
Off-Road Diesel Consumption (Gallons)	26,816	172,684	276,556	292,662	443,935
On-Road Diesel Consumption (Gallons)	5,859	26,665	54,524	115,495	241,737
On-Road Gasoline Consumption (Gallons)	116,947	203,304	383,994	333,317	598,208
Energy Content of Fuel Consumed (Gigajoules)	37,000	55,800	98,846	103,385	178,725

* Office energy 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. No changes between 2018 & 2019 are recorded as total number of employees and RDP staff is unchanged between the years.

Projected Cumulative GHG Emissions Avoided: Tailpipe (MMTCO₂e)*

Year	Low	High
2030	.121	.121
2040	8.6	10.5
2050	21.3	25.9
2079	65.9	79.9

* 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 (MMTCO₂e)*

Year	Medium	High
2030	.15	.15
2040	10.9	13.3
2050	27.1	33.1
2079	83	102

*For this sustainability report, we also analyzed the avoided emissions by assigning an emissions factor that illustrates the full lifecycle 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 lifecycle emissions factor was also applied to the electricity required for system operation.

Projected Annual GHG Emissions Avoided: Well to Wheels (MMTCO₂e)*

Year	Medium	High
2030	.075	.077
2040	1.540	1.875
2050	1.693	2.062
2079	2.201	2.681

* 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).

Greenhouse Gas Emissions in Metric Tons of Carbon Dioxide Equivalent (MTCO₂e)

Emissions Source	2015	2016	2017	2018	2019
Office Energy Emissions: Scope 2	307	381	344	459	432
Contractor Vehicle Emissions: Scope 3	1,400	4,282	6,795	8,063	9,197

Greenhouse Gas Emissions in Metric Tons of Carbon Dioxide Equivalent (MTCO₂e)

Emissions Avoided Source	2015	2016	2017	2018	2019
Recycling	12,000	19,774	7,053.01	15,814.32	3,292
Bookend and Connectivity*	142,519	142,519	142,519	142,519	142,519
Agricultural Conservation Easements (in MTCO ₂ e)					36,654
Habitat Mitigation (in MTCO ₂)					9,400
Tree Programs (in MTCO ₂ e)					180,000

*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.pdf

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
NOx – Nitrogen Oxide	4,006	-49%	23,024	-51%	20,0944	-70%	27,190	-54%	42,507	-49%
ROG – Reactive Organic Gas	549	-41%	1,715	-58%	2,441	-59%	2,318	-58%	2,802	-65%
PM – Particulate Matter	341	-41%	1,082	-60%	1,467	-61%	1,964	-43%	2,374	-50%
BC – Black Carbon	254	-42%	833	-60%	1,130	-61%	1,513	-43%	1,869	-51%

Voluntary Emissions Reduction Agreements (VERA)

VERA Details	2015	2016	2017	2018	2019
VERA Offsets: Total Lifetime Emissions in tons	26	1,006	1,369	1,375	1,375
VERA Investment – \$ million		9	13	13	13
VERA Equipment – Tractors	20	46	82	84	84
VERA Equipment – Trucks		104	161	162	162
VERA Equipment – School Bus			1	1	1

Natural Resources

Water Consumption (in Gallons)

Water Usage	2015	2016	2017	2018	2019
Office*	1,060,560	1,317,600	1,464,480	1,952,640	1,952,640
Construction**	2,517,153	14,500,000	31,207,986	13,150,724 (potable) 58,927,468 (non-potable)	10,003,936 (potable) 105,632,701 (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 & 2019 are recorded as total number of employees and RDP staff is unchanged between the years.

** 2019 Construction water consumption includes both approved and in-review water consumption data as reported by the contractors

Habitat and Agricultural Land Preservation (In Acres)

Land	Type of Preservation	2015	2016	2017	2018	2019
Habitat	Preserved and Restored	400	2,000	2,510	2,680	3,645*
Agricultural	Approved for Conservation	-	1,200	1,200	1,200	1,250
Agricultural	Secured	-	-	273	273	273

*3,645 acres have been secured for preservation, out of which 2,349 acres are already under preservation, while the remaining 1,296 acres are currently undergoing approval process with regulatory agencies for preservation and restoration.

Sustainable Infrastructure

Recycling and Reuse (in tons)

Material	2015	2016	2017	2018	2019**
Recycled/Reused Concrete	37,000	70,414	25,088	10,301	265
Recycled/Reused Asphalt*	-	10,544	53	0	0
Recycled Mixed Metals	2,700	1,284	784	255	78
Recycled Wood	-	513	242	615	33***
Recycled Organics	-	2	699	3,250	4,633
Mixed Recycling	3,500	4,088	5,602	955	393
Materials Landfilled	360	327	813	2,669	804
Materials Stockpiled	-	-	-	-	569.79

*Contractors have not indicated any asphalt waste generated in 2019

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

***Wood data has been estimated by the waste disposal facility.

Recycling Details	2015	2016	2017	2018	2019
Recycled Concrete and Metal	100%	99.9%	100%	98%	100%*
Recycled Other Materials	91%	98.2%	90.7%	76.8%	86.3%**
Overall Recycling Rate	-	99.6%	97.7%	87.2%	88.1%***

*The concrete and metal recycling rate excludes the stockpiled concrete.

**The other materials recycling rate excludes the stockpiled mixed materials.

*** The overall recycling rate excludes the stockpiled concrete and mixed materials.

Worker Health & Safety, Injury Rate

Injury Rate	2015	2016	2017	2018	2019	State Benchmark*
Construction Package 1	3.56	1.12	1.76	1.59	1.78	
Construction Package 2-3	0	0	0	0.29	1.00	
Construction Package 4	N/A	N/A	0	0	1.47	
Overall Weighted Average	2.09	0.54	1.1	0.97	1.38	4.5
Lost Days Rate						
Construction Package 1	0	0.37	0.7	0.4	0.3	
Construction Package 2-3	0	0	0	0	0	
Construction Package 4	N/A	N/A	0	0	0	
Overall Weighted Average	0	0.18	0.44	0.22	0.11	2.8
Fatalities						
Total Fatalities	0	0	0	0	0	55

* California Heavy and Civil Construction Industry 2016

Station Communities

Community Outreach

Event Information	2015	2016*	2017**	2018***	2019****
Open Houses and Community Meetings	85	85	40	377	200
Attendees	6,000	6,000	953	15,000+	55,800+
Events in Disadvantaged Communities	130	130	15	238	87

* 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 event, the California Poppy Festival in Lancaster, CA, which is attended by approximately 40,000 people over the two-day period of the event.

END NOTES

1. Board member diversity is not reported by age or minority group.
2. New hire and turnover rates are not reported by age group, gender or region.
3. Training hours are not reported.
4. We have not identified any significant noncompliance with environmental laws and/or regulations. Monitoring of monthly reporting has identified noncompliance with construction fleet requirements, per the Authority's contract with its design-builders. Corrective actions are underway.
5. Approximately \$928 million of unexpended FY2010 grant agreement funding was terminated by the Federal Railroad Administration on 4 March, 2019. The termination is now subject to a legal suit filed by the State of California on behalf of the Authority.
6. "Details of the emissions reduction calculation methodology are available online at: http://www.hsr.ca.gov/docs/programs/green_practices/HSR_Reducing_CA_GHG_Emissions_2013.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. 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.
8. Vision California; "Charting Our Future: Statewide Scenarios Report", May 2010. https://www.hsr.ca.gov/Programs/Green_Practices/sustainability.html



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

