

CALIFORNIA
High-Speed Rail Authority

2019 Sustainability Report

Energizing Economic Revitalization

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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.



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PHOTO: Flowering Datura under the viaduct construction at Road 27 in Madera County on the high-speed rail alignment.

MESSAGE FROM THE CEO

Imagine a fast, new way of traveling between California's population and economic centers in the Bay Area, the Central Valley and the Los Angeles Basin. Imagine California's Central Valley having some of the cleanest air in the nation. Imagine California entrepreneurs growing the next economy and creating high-quality jobs in cities connected by high-speed rail. Imagine these vibrant, livable cities surrounded by the beautiful scenery and hard-working agricultural lands that make California a state we love to live in.

Today, we are building that future while laying the groundwork for economic prosperity and opportunity that benefits all Californians while honoring our environment. Sustainability is at the core of our mission to deliver high-speed rail to California, and we remain committed to our goal of creating the greenest infrastructure project in the nation, both in its operations and its construction.

We are building a transportation system for the future; a fast, safe and sustainable system with high-speed trains that will be powered by 100-percent renewable energy.

Travel times to and from the Central Valley from the Bay Area and the Los Angeles Basin will be slashed in half. Trips between San Francisco and Los Angeles will take less than three hours. This new travel option will inspire millions of people to travel on clean, zero-emissions high-speed rail trains. It's good for the state, and it's good for the environment. Every mile traveled on high-speed rail will be a mile not traveled by car or airplane and the system will save 1.5 million metric tons of carbon per year, equivalent to taking 322,000 cars off the road.

As one of the thousands of people who are working hard to deliver high-speed rail to the state, I am keenly aware of the high expectations that Californians rightfully have for this transformative project. Our

commitment is to deliver a system whose operation will contribute significantly to a more sustainable California; to use leading-edge methods during construction; and to make the country's largest infrastructure program a national model for sustainable project delivery.



What We Are Doing Now

The high-speed rail project is already playing a role in helping California achieve its social equity, economic development and environmental objectives. Our progress in 2018 was marked by several milestones, including:

- Being named as the top sustainable rail infrastructure project in North America in 2018 by theGRESB Infrastructure Assessment, which benchmarks our environmental, social and governance policies, practices and performance;
- Preserving and restoring more than 2,600 acres of natural habitat;
- Working with the California Farmland Conservancy Program to secure 273 deeded acres of agricultural land for conservation;
- Continuing to partner with Tree Fresno to plant more than 1,200 trees in schools and parks in the Fresno area;
- Awarding grant funding in 2018 to the California Urban Forests Council, leading to 750 trees being planted in Southern California cities such as Glendale, South Los Angeles, Paramount and Norwalk to help offset greenhouse gas emissions;

- Avoiding nearly 70,000 pounds of criteria air pollutants during construction;
- Putting more than 3,000 people to work (as of September 2019), almost 40 percent of whom live in disadvantaged communities;^[1] and
- Generating economic opportunity for hundreds of businesses, including 164 Disabled Business Enterprises and 53 Disabled Veteran Business Enterprises.

The future is starting to take shape as major structural elements of the high-speed rail system in the Central Valley can be seen from Highway 99 or from passenger trains running along the San Joaquin line.

The importance of making the first major 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. High-speed rail investments have provided consistent stimulus to the Central Valley's economy, generating an estimated 4,550 job-years of employment and about \$750 million in economic output in FY 17-18, alone.

In the Central Valley, Fresno, Madera and Kern counties show the largest benefits of total direct job-years supported as a proportion of the statewide analysis in FY 17-18:

- Fresno County is home to the biggest impact, with 1,530 direct job-years supported;
- Madera County came in second, with 450 direct job-years supported; and
- Kern County rounds out the list, with 200 direct job-years supported.

In Northern California, 1,010 direct job-years were supported in Sacramento County and, in Southern California, 290 direct job-years were supported in Los Angeles County.

Transportation is the highest source of greenhouse gas emissions in California. High-speed rail is making a difference today by contributing vital funding to regional and local rail systems in Northern and Southern California.

For example, we are contributing \$713 million to the Caltrain Modernization Program and electrifying the Caltrain corridor between San Francisco and San José. Why electrification? Because it will replace 75 percent of Caltrain's diesel service with trains that are powered by electricity – providing cleaner and more sustainable service to the tens of thousands of Bay Area residents who ride Caltrain every day. This is also a key building block to high-speed rail operating in that corridor.

In Southern California, we are contributing \$77 million to the Rosecrans/Marquardt Grade Separation Project, improving safety, mobility and air quality in the Burbank to Anaheim rail corridor. We are also contributing \$423 million to the Link US Project, which will result in the development of a transportation facility that cost effectively meets the service needs of all operators, including Metro, Metrolink, LOSSAN, Amtrak, the Authority and other partners. We are also partnering with a private operator to develop a high-speed rail service connecting Victorville to Las Vegas, with the objective of eventually connecting our system in Palmdale.

Also in Southern California, we have contributed \$389 million to a range of regional and commuter rail connectivity projects being implemented by Caltrans, the Los Angeles County Metropolitan Transportation Authority, the San Diego Association of Governments and the Southern California Regional Rail Authority, among others. These include the Regional Connector Transit Project, improvements to the Metropolitan Transit System's Blue Line, new Tier 4 locomotives for Metrolink and installing positive train control on North County Transit District lines – these projects are helping to improve people's lives today.

By improving regional and local rail systems, we are advancing the state's policy to develop a modern, integrated statewide passenger rail system, giving people a reason to forgo their cars and take a train instead. We are giving people a way to improve their quality of life and reduce greenhouse gas emissions.

What Drives Us

We use sustainability as an organizing framework. Considering environmental, social, and financial impacts for both current and future generations is an organizational standard reflecting California's values. Sustainability influences all aspects of our organization and every element of the project life cycle.

Given our evolution to a delivery organization, the passage of recent legislation on climate adaptation considerations and carbon neutrality, we decided to update our Sustainability Policy in April 2019.

Our intent was to improve our Sustainability Policy and framework, 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. We continue to identify creative, cost-effective and direct approaches to achieving the Authority's sustainability objectives.

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

Full Circle

In 2008, the vision behind Proposition 1A offered Californians a transformative mobility option; high-speed rail service that would reduce travel times between the Bay Area and the Los Angeles Basin from 12 hours by conventional rail, or 7 to 8 hours by car, to less than 3 hours by high-speed rail. The vision promised to link California's major economic and population centers by connecting the cities of the Central Valley with the coastal regions of Northern and Southern California. That was the vision then, and that is the vision now.

We are working toward that vision through a building block approach, including our investments in all three regions. We are proposing to deliver the first 171-mile high-speed rail building block in the Central

Valley between Merced, Fresno and Bakersfield with convenient connections to speed passengers on their way to other destinations. This is where we are already building true high-speed-rail assets. We are a funding partner on the Caltrain electrification project along a 50-mile stretch in the Bay Area, and we are partners with a private operator seeking to run electric, high-speed trains between Las Vegas and Victorville, 130 miles of which will be in California. Altogether, that equals 350 miles of electrified high-speed rail being delivered in California – now!

This is the right thing to do because this will get fast, clean electric trains operating in California and help deliver California's commitment to sustainability, mobility, economic opportunity and addressing climate change.



Brian P. Kelly

Chief Executive Officer

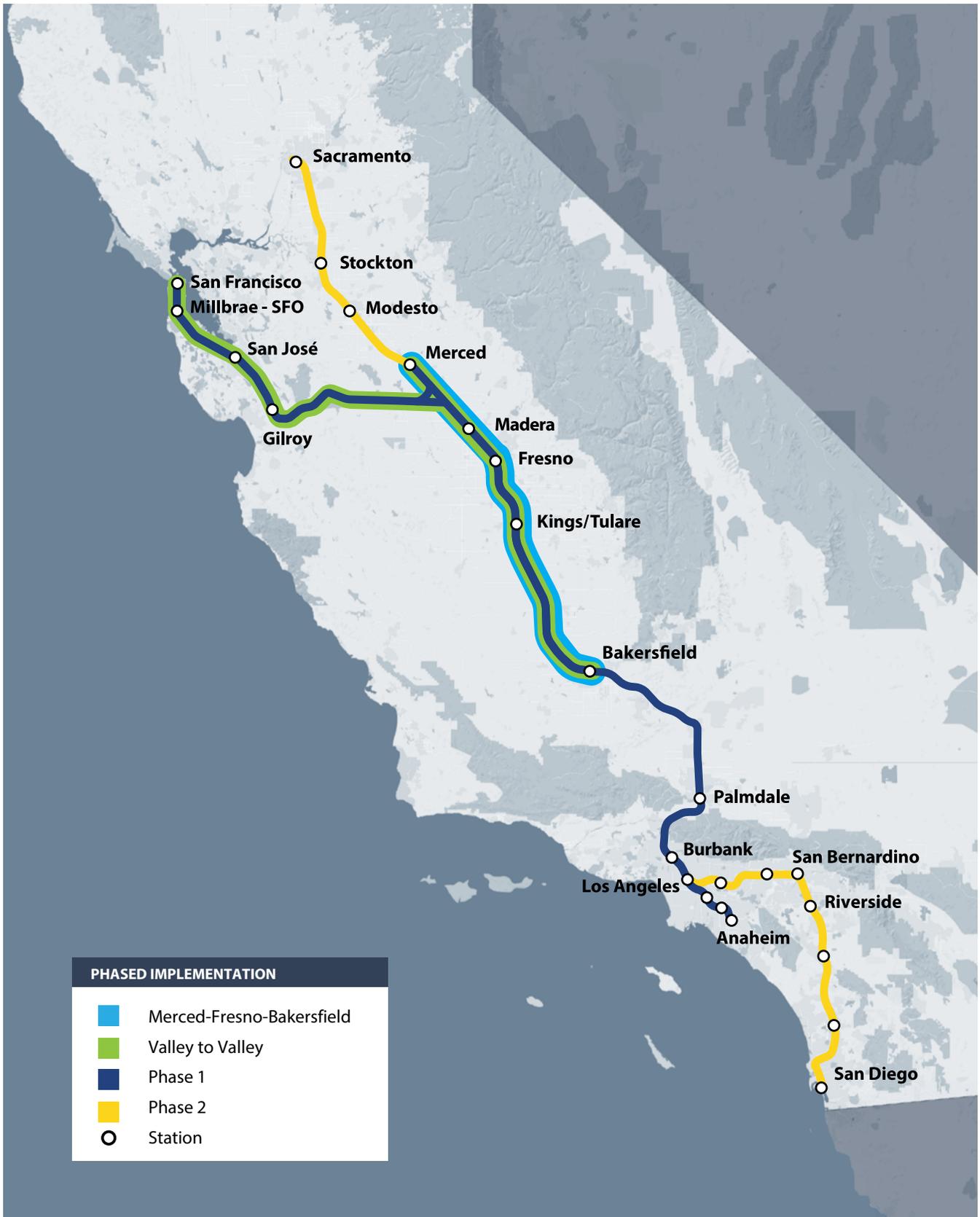


EXHIBIT 1.0: This map shows the Phased Implementation plan as described in the 2019 Project Update Report. https://www.hsr.ca.gov/about/legislative/project_update_reports.aspx

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, 2018, to December 31, 2018, except where indicated. This report is updated on an annual basis; our previous report was published in June 2018 and covered the 2017 calendar year.

There have been no significant changes in the reporting scope or boundaries, except for the addition of reporting on additional topics emerging from our 2018 materiality assessment and our delivery focus. 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 Legislature, station cities and other stakeholders. The contents of this report have not been externally assured, unless otherwise noted.

This report looks backward when discussing our progress and achievements during the reporting period but 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.

Exhibit 1.0 shows the high-speed rail alignment and the phases of system construction, Merced-Fresno-Bakersfield, Valley to Valley, and Phase 1 and Phase 2, as defined in the 2019 Project Update Report

Contact

We value all feedback. Please send comments and questions to [**info@hsr.ca.gov**](mailto:info@hsr.ca.gov).



PHOTO: Monkey flower, grass poly and Greene's popcorn flower in a restored vernal pool. Their presence indicates a healthy vernal pool.



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 strive to be the greenest infrastructure project in the nation, both in construction and operations.

The investments we are making are critical for the state to achieve its forward-looking policies to address climate change, develop clean energy, create equitable transit oriented development with affordable housing, protect the environment, and spur economic prosperity and opportunity while transitioning to a low-carbon economy. To that end, we constantly assess the actions we take 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 signed a comprehensive sustainability policy in September 2013 to honor several industry sustainability and stakeholder commitments. The Authority Board of Directors adopted an updated Sustainability Policy 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 objective of the policy is to minimize impacts to the natural and built environment, maximize safety and reliability, encourage compact, walkable land development around transit stations, encourage 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 <http://www.hsr.ca.gov/SustainabilityPolicy>.

Our Sustainability Priorities and Commitments

Our commitment is to not only deliver a high-speed rail system to achieve sustainable development for California, but also to employ leading methods during construction to make the country's largest infrastructure program a model for sustainable delivery.

It is vital that stakeholders are clearly aware of the sustainability priorities for the system and how these priorities will be achieved by the Authority and its delivery teams. In 2012, Authority staff and stakeholders identified five sustainability priorities. In 2015 and 2018, further stakeholder engagement confirmed the relevance of and refined these five priorities:

- **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, well as 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.

The following priorities and commitments are designed to act as a unified whole to advance the overall Sustainability Policy. As shown in Exhibits 1.1 through 1.5, priority and its commitments correspond to specific actions the Authority will undertake itself or through work with partners. The objectives allow the Authority to set qualitative and quantitative targets and monitor progress.



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 Disadvantaged Business Enterprises (DBE) participation and 3-percent Disabled Veteran Business Enterprises (DVBE). | Construction |
| Maximize opportunity for private investment. | Construction |
| Govern transparently and accountably. | Construction |
| Continuously improve program delivery and management. | Construction |
| Maximize opportunity for private investment and private-sector operations. | Operation |
| Achieve a self-sustaining financial structure. | Operation |



Exhibit 1.2: Energy and Emissions Priority and Commitments by Phase

| Commitments | Phase |
|--|--------------|
| 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 |

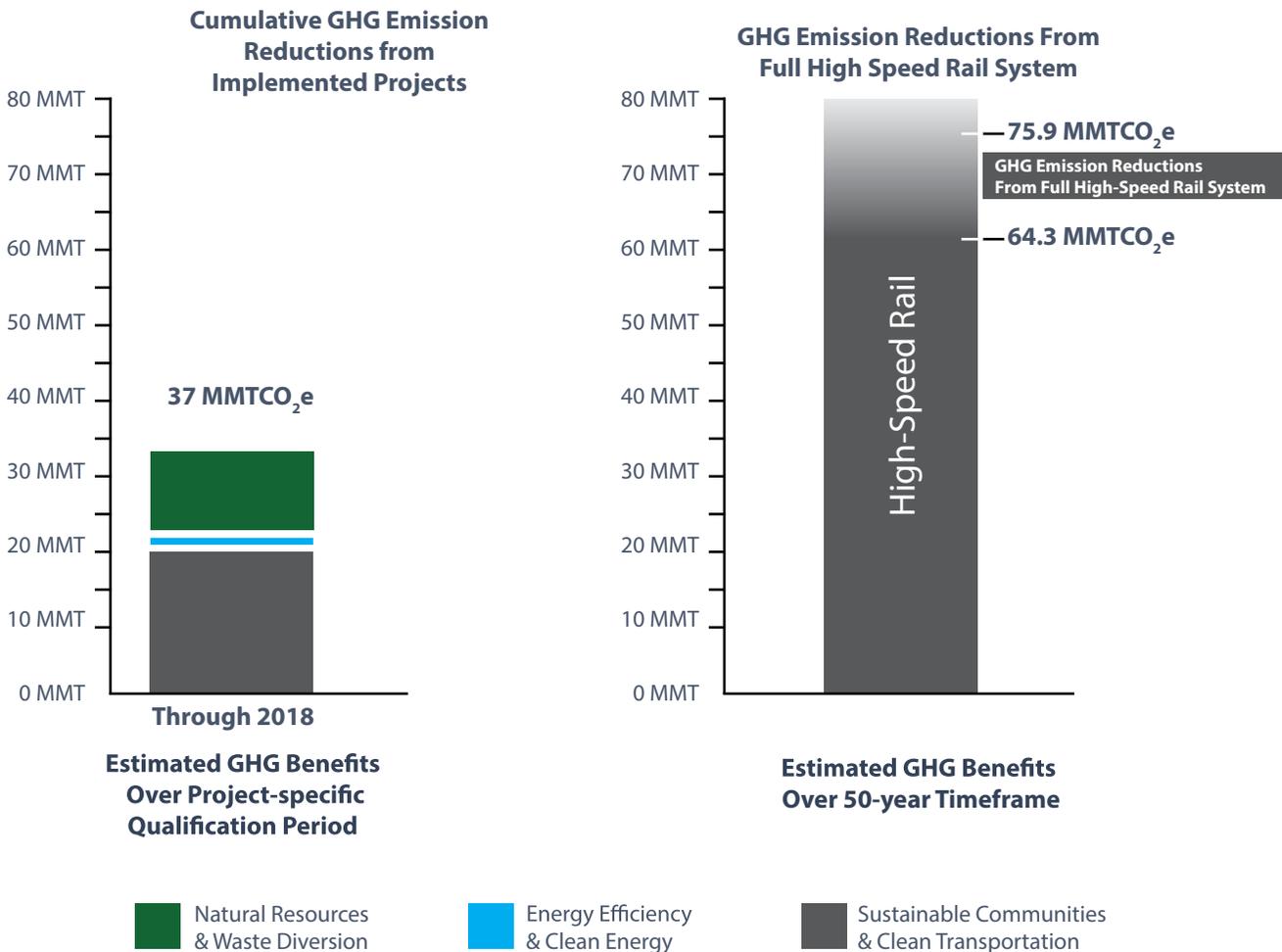
Implementation Plan

Also in 2018, we revised the internal Sustainability Implementation Plan 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 has invested proceeds from its signature Cap-and-Trade program into projects and programs that deliver on the requirements of Assembly Bill 32 and Senate Bill 32 (see sidebar). High-speed rail is integral to achieving those objectives, as shown in Exhibit 1.6, by directly delivering crucial reductions in the transportation sector. The potential for exponential greenhouse gas (GHG) emissions reductions through reduced vehicle miles traveled (VMT) is discussed in more detail in Chapter 6, Station Communities and Ridership.

EXHIBIT 1.6: CALIFORNIA CLIMATE INVESTMENTS AND GREENHOUSE GAS EMISSIONS REDUCTIONS



Important Climate Laws in California

Assembly Bill 32 (2006), the California Global Warming Solutions Act of 2006, established the goal for the state of California for 2020 to reduce emissions back to 1990 levels and created the Cap-and-Trade Program as a critical mechanism to reduce greenhouse gas emissions.

Senate Bill 32 (2016) updated AB 32 and set a national standard by establishing a greenhouse gas reduction target for California of 40 percent below 1990 levels by 2030, with the ultimate goal to reduce emissions 80 percent by 2050.

Assembly Bill 398 (2017) strengthened and extended the horizon of the Cap-and-Trade Program through December 31, 2030.

External Frameworks and Assessments

We have looked to external frameworks, as well, to benchmark our performance. The GRESB Infrastructure Assessment is a globally consistent, voluntary framework that benchmarks the environmental, social and governance performance of infrastructure assets and funds. It ranks the high-speed rail program in relation to its peers and provides useful insight into the integrity of the Authority's sustainability policies, practices and performance.

We were among the first entities to participate in this assessment, demonstrating our broader commitment to setting a new standard in sustainable high-speed rail infrastructure. We participated for the third time in 2018, 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 private investment. The assessment was developed at

the behest of major institutional investors, including CalPERS, PGGM Investments, AIMCo and others that collectively represent more than \$17 trillion in institutional capital. The assessment provides investors with tool to evaluate consistent sustainability information concerning the infrastructure investments within their portfolios. Anticipating the information that major investors could seek helps us align our reporting efforts with what investors find most important.

We also used sustainable rating systems, such as LEED® and Envision. These types of 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.

Working with Industry Partners

To demonstrate our commitment to sustainability, we work with established industry partners, including 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.

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.

As part of our work to refresh our materiality assessment, we discussed the SDGs with each of our stakeholders and asked whether it was important to reference 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.

Top-Ranked Project Internationally

The California high-speed rail program was awarded four stars and ranked as the one of the top infrastructure projects in North America, placing first among heavy rail projects in the 2018 GRESB Infrastructure Assessment*, and placing third among all participating transportation assets in North America.

Peer Comparison



Heavy Rail Lines
out of 6

More recently, in September 2019, the Authority was awarded five stars in the 2019 GRESB Assessment.

This achievement provides third-party validation that the Authority is meeting the highest North American and international sustainability standards.



G R E S B
★ ★ ★ ★ ★ 2019

Materiality Assessment

Listening to our stakeholders is vital. A materiality assessment is a process of stakeholder engagement and analysis undertaken to quantify the relative significance of different environmental, social and governance issues to the organization or project in question. To ensure that we continue to report on what matters most to our stakeholders, we repeated the materiality assessment process in 2018—a process that was last completed in 2014/2015.

The Authority and the high-speed rail program have passed various project milestones since 2014/2015, making it prudent to validate and refresh material topics covered in our sustainability program and reporting. In addition, repeating the materiality assessment supports our compliance with the latest Global Reporting Initiative (GRI) reporting standards, which are used to structure this report.

This exercise illustrated to us that the Authority focus on GHG emissions management, socioeconomic equity, and delivering transportation hubs remains fundamental. Restorative actions relative to air, land and water pollution, that build on environmental compliance, continue to rank among the most important issues for stakeholders. Transparency and accountability remain crucial underpinnings of the Authority's delivery of the high-speed rail project, and its commitments and objectives.

The 2018 materiality assessment that we conducted was completed in three main steps.

Step 1: Identify Topics

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

Step 2: Prioritize Topics

We identified stakeholders based on the extent to which the groups are interested in, affected by or potentially affected by our activities. We examined the groups' ability to influence the program's outcomes and the extent to which the groups are invested in the high-speed rail program's success or failure.

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 and Consulting USA (the United States arm of Deutsche Bahn AG, the entity that runs high-speed rail in Germany) was selected to be the ETO and is assisting the Authority with planning, designing and implementing the nation's first high-speed rail program.

Step 3: Validate Topics

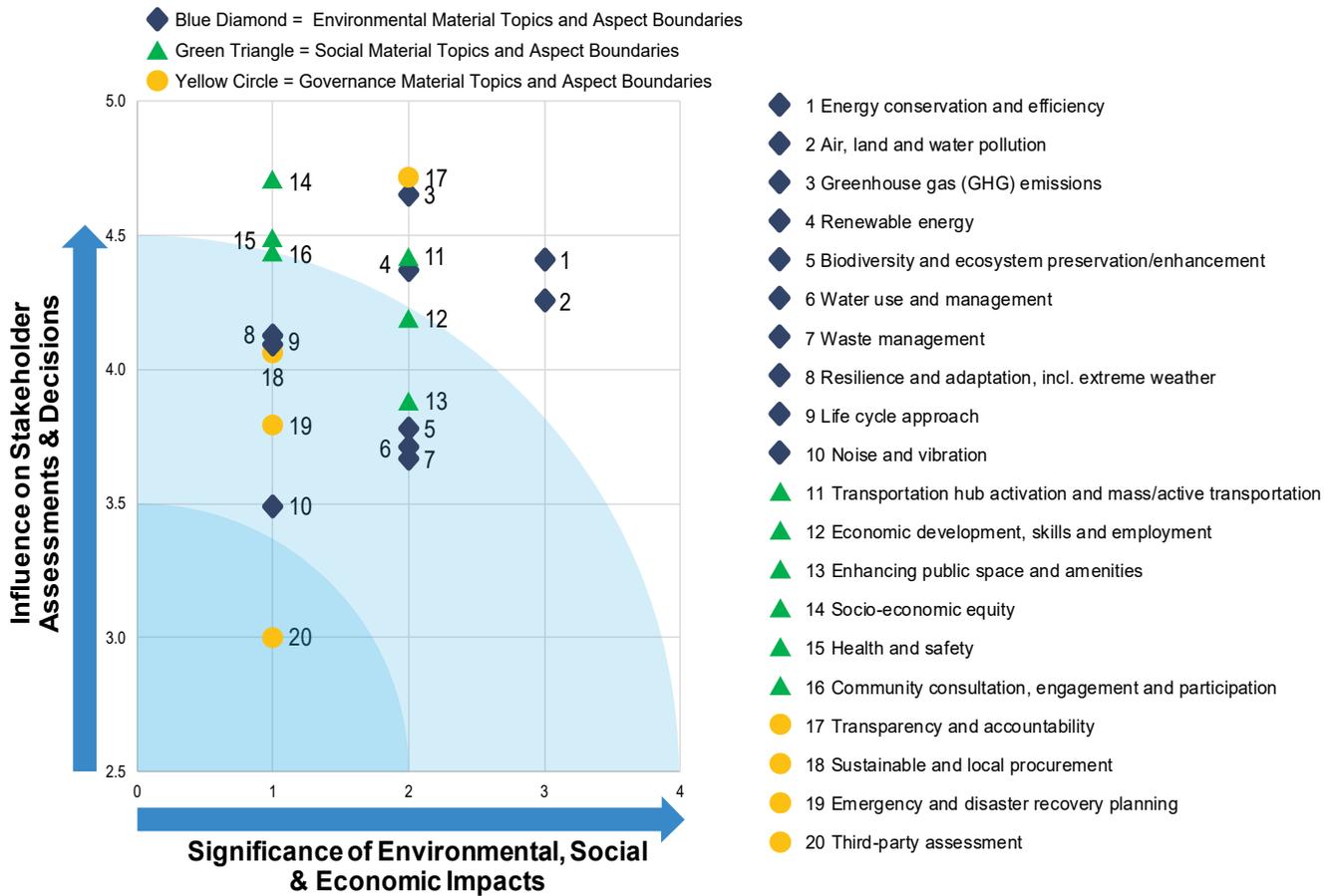
We analyzed all stakeholder feedback to determine which topics should be reported. We then validated the report content to ensure that it included the outcomes of stakeholder-engagement processes and covered significant organizational impacts in a balanced and transparent manner.

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 1.7) 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 aspect (Environmental, Social and Governance) were determined based on where the impacts occur, and the Authority’s involvement with the impacts, as shown on pages 16 through 19.

EXHIBIT 1.7: 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 through 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 through 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 lifecycle approach impacts the environment, as well as 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 Authority recycles and reuses materials as part of the high-speed rail project.

Social Material Topics and Aspect Boundaries

Transportation hub activation and mass/active transportation

Access to multiple modes of transportation and opportunities to transition between modes, such as from transit to active transportation (e.g., walking, cycling, non-motorized wheelchair use, etc.).

Boundary: Our approach to these topics 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.

Enhancing public space and amenities

Physical features benefiting neighborhoods and communities, such as public plazas, parks, recreation facilities, public art and historical/heritage features.

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.



PHOTO: Tree-planting event in Glendale, California.

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: Construction workers gather before starting their workday at Road 27 in Madera County.



CHAPTER 2: ECONOMIC DEVELOPMENT AND GOVERNANCE

Introduction

The Authority's mission is to deliver a functional, certified and commercially viable high-speed rail system in California, and we are making progress on achieving that mission despite the challenges facing this project. In our 2018 Business Plan, we clearly identified areas where our organizational capabilities were not fully developed, and we put plans in motion to address these areas. Later in 2018, the California State Auditor's report highlighted additional areas that deserved our focus. When we started construction, we struggled with making the transition from strategic planning to project delivery. We were transparent about these challenges in the 2018 Business Plan and presented our strategies to create a mature organization; one with sufficient delivery capacity and capabilities.

We are taking systematic steps to expedite the Authority's transition to a more rigorous program management and delivery organization. This includes establishing new governance structures in mid-2017, that were further strengthened in 2018, to more effectively manage the program through highly structured configuration management and change processes.

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 being a lean organization, are woven into our structure through governing statute and agency policy.

Our Sustainability Policy advises how we and our consultants and contractors tailor the program to deliver economic value to Californians.

Highlights

- 2,573 construction labor workers had been sent to work at various construction sites along the Central Valley alignment (by July 31, 2019, the number of workers increased to 3,074);
- The number of small businesses put to work on the project increased by nearly 49 percent since 2015, and the number of those businesses located in disadvantaged communities grew by 34 percent in the same timeframe;
- We hit a significant milestone in December 2018 when the number of small businesses working on the high-speed rail program hit 500.
- Participation by Certified Disadvantaged Business Enterprises (DBE) increased to 164 by the end of 2018, and Disabled Veteran Business Enterprises (DVBE) participation increased to 54 Certified DVBE working on the program.
- As construction advanced over 119 miles in the Central Valley, so, too, have our investments into the system statewide. From 2006 to mid-2018, our investments generated approximately \$7.6 billion in total economic activity in the state.

Effective Governance

2018 PROGRESS: The Authority's Program Delivery Committee and Business Oversight Committee 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 2018, we received no fines related to these regulations. Furthermore, we have identified no significant non-compliance with environmental laws and/or regulations.^[2]

Our oversight philosophy emphasizes stewardship, transparency and accountability. 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);
- Assembly Bill (AB) 32 (Nunez, 2006) Global Warming Solutions Act;
- Senate Bill (SB) 32 (Pavley, 2016) Global Warming Solutions Act, 2006: Emissions Limit;
- SB 375 (Steinberg, 2008) Sustainable Communities and Climate Protection Act;
- AB 75 (Strom-Martin, 1999) Waste Management for State Agencies;
- SB 1029 Budget Act of 2012;
- SB 852 Budget Act of 2014;
- SB 862 (2013-2014) Greenhouse Gases: Emissions Reduction;

- SB 535 (De Leon, 2012) Global Warming Solutions Act, 2006: Greenhouse Gas Reduction Fund;
- AB 1352 (Perez, 2012) Global Warming Solutions Act, 2006: Greenhouse Gas Reduction Fund;
- AB 262 (Bonata, 2017) Buy Clean California Act;
- SB 350 (De Leon, 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;
- 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; and
- AB 398 (Garcia, 2017) Update to Global Warming Solutions Act of 2006: market-based compliance mechanisms.

Financial Responsibility

2018 PROGRESS: As of January 31, 2019, the Authority had expended \$5.02 billion (or 35 percent) of the \$14.45 billion of authorized funding. Also, we continued annual reporting to the California Air Resources Board 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 December 31, 2018:

- The Authority has received funding commitments of \$3.5 billion from the federal government, \$9 billion from Proposition 1A bonds and 25 percent of annual Cap-and-Trade proceeds on a continuous basis plus one-time appropriations, facilitated by California Air Resources Board programs.^[3]
- \$10.6 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 \$4.7 billion in current and future Cap-and-Trade proceeds.
- Nearly \$5 billion was expended on construction in the Central Valley and planning for the wider system. Through a provision in our grant agreement with the Federal Railroad Administration (FRA), we were primarily expending federal ARRA funds to advance the program (51 percent of expenditures as of December 31, 2018).
- To date, approximately 97 percent of expenditures went to California firms and workers.
- Through December 2018, the Authority received nearly \$1.8 billion in Cap-and-Trade proceeds for high-speed rail.

This funding allowed us to execute the contracts necessary to begin construction and to fully fund Central Valley construction. It also allows us to complete environmental planning and other early work for the Phase 1 System, consistent with our federal grant agreements. Once operational, the high-speed rail system will be self-sufficient through revenues generated from ticket sales without an operating subsidy.

Financial Decision-making Statutes

- AB 115 (Com. on Budget, Chapter 38, Statutes of 2011): Budget Act of 2011;
- SB 1029 (Com. on Budget, Chapter 152, Statutes of 2012): Budget Act 2012; and
- SB 852 (Leno, Chapter 25, Statutes of 2014): Budget Act of 2014.

Additional 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 Reports 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 California Air Resources Board in compliance with requirements for California Climate Investments.

LINKS

Full details of program funding and financing are available in the 2018 Business Plan at: <https://www.hsr.ca.gov/2018BusinessPlan>.

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

2018 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 2017-18 yielded more than 9,000 direct, indirect and induced job-years.

The ongoing creation of jobs in designing, planning and constructing the system is one of the high-speed rail project's signature benefits. Focusing on creating 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, providing a significant boost to California's economy, as shown in Exhibit 2.0. The

Central Valley has faced challenges in recovering from the economic downturn from a decade ago, including an unemployment rate in the construction industry of more than 30 percent in recent years. The direct impact of the Authority's investment between July 2017 and June 2018 is equivalent to about 18 percent of the 14,000 jobs that the Central Valley economy added over the same period. Exhibits 2.1 and 2.2 on page 25 show the number of construction workers dispatched in the Central Valley and construction hours worked. In Fresno County, the overall investment is equivalent to roughly 50 percent of the total jobs added during this period, with direct jobs representing about 30 percent of the total.

Additionally, connectivity and bookend projects provide jobs in Southern and Northern California, as shown in Exhibit 2.3 on page 26. 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 2.0: THE ECONOMIC IMPACTS OF HIGH-SPEED RAIL INVESTMENTS (JULY 2006-JUNE 2018)^[4]



EXHIBIT 2.1: WORKERS DISPATCHED BY CONSTRUCTION PACKAGE SINCE INCEPTION (THROUGH JULY 31, 2019)

3,074 Construction Workers

846



1,763



465



EXHIBIT 2.2: CONSTRUCTION HOURS BY CONSTRUCTION PACKAGE SINCE INCEPTION (THROUGH JULY 31, 2019)

2,167,831 Construction Hours



375,070

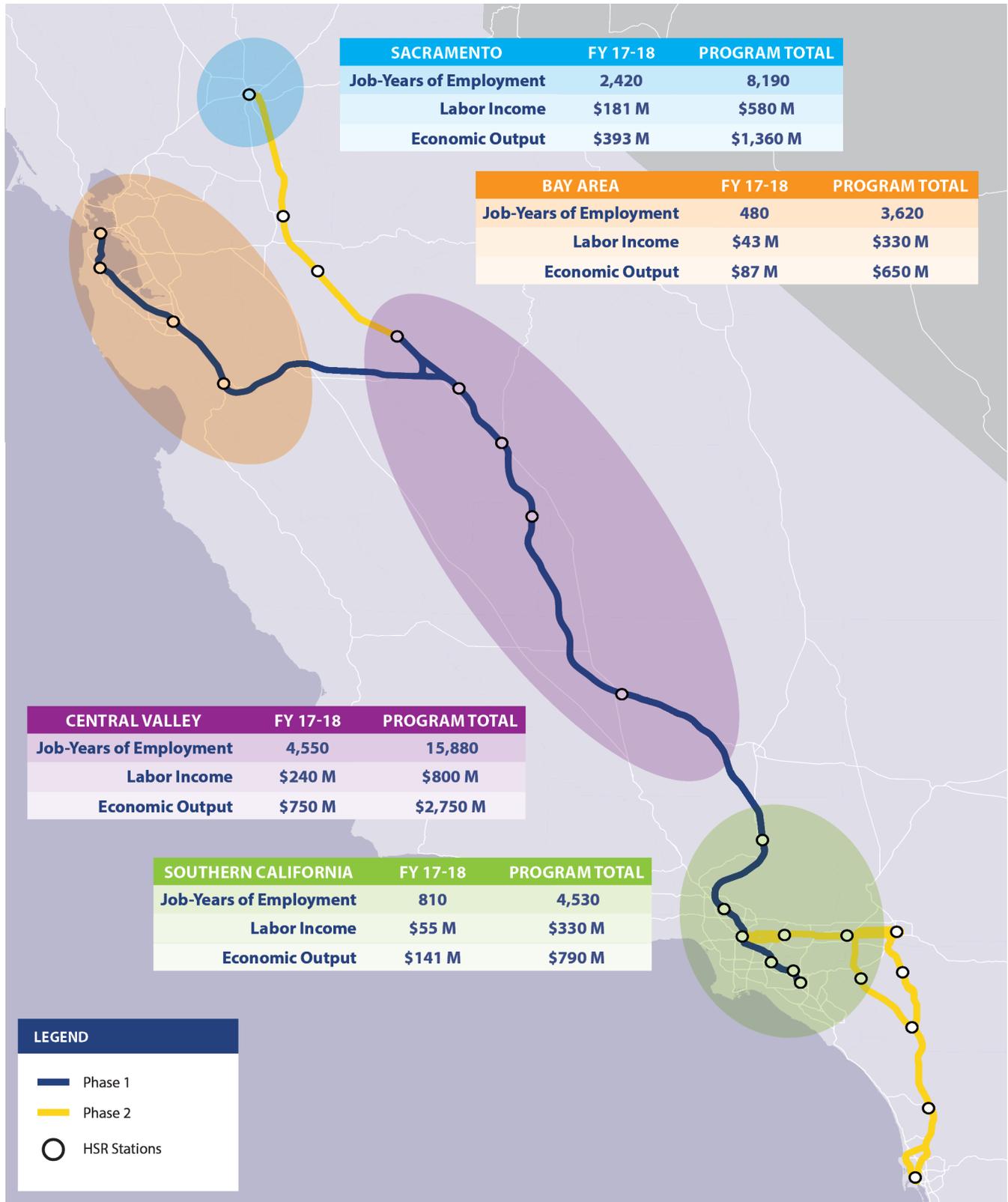


1,703,865



88,896

EXHIBIT 2.3: ECONOMIC BENEFITS BY REGION (JULY 2006-JUNE 2018)^[5] INCLUDING DIRECT, INDIRECT, AND INDUCED IMPACTS FROM FY 17-18 AND PROGRAM TOTALS (JULY 2006 - JUNE 2018)*



* Totals may not sum due to rounding - Data as of June 2018

Opportunities for Disadvantaged Workers

2018 PROGRESS: From mid-2006 through 2018, more than half (54 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.

About 54 percent of the investment in the system in FY 2017-2018 occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas. Additionally, more than half (54 percent) of the total program investment from July 2006 – June 2018 occurred in designated disadvantaged communities.

We use two mechanisms to ensure that the jobs created by building and operating the high-speed rail system benefit communities most in need.

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.

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” and that at least 10 percent of those work hours are performed by “Disadvantaged Workers.”

For more information on Targeted Workers and Disadvantaged Workers, see our Community Benefits Factsheet at https://www.hsr.ca.gov/docs/newsroom/fact%20sheets/CBA_Factsheet.pdf

Investing Cap-and-Trade Funds in Disadvantaged Communities

The Authority ensures that the funding it receives from the state’s Cap-and-Trade program is invested in disadvantaged communities in California. This supports the state’s goal of Cap-and-Trade funds being used to improve public health, quality of life and economic opportunity in communities that experience social, environmental and economic hardships. Focusing on jobs in disadvantaged communities bolsters local economic development. Construction employment and training opportunities benefit people residing in extremely economically disadvantaged areas.

Over the construction lifetime of the project, we forecast that almost 240,000 job-years of employment will be created in the state, which will generate a labor income of \$15.6 billion and nearly \$50 billion of economic output. To date, at least 630 private sector firms have been contracted to work on the program. The Authority is fully committed to small businesses playing a major role in building high-speed rail. To date, the Authority has paid more than \$300 million to certified Small Businesses, Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises in California for work on the high-speed rail program.

Fostering Diversity and Equal Opportunity

2018 PROGRESS: In 2018, nearly two-thirds (63 percent) of our outreach events took place in disadvantaged communities, and nearly 400 disadvantaged workers were dispatched to worksites since the project began. As of December 2018, 164 Disadvantaged Business Enterprises (DBE) and 54 Disadvantaged Veteran Business Enterprises (DVBE) were working on the project. The Authority reached a milestone of 500 certified small businesses at work on the program.

We believe strongly in equal opportunity for all and strength in diversity, as shown in Exhibit 2.4 on page 29. 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/.

Profile – Laryl Helberg

For the last two years, Laryl Helberg has worked on the Fresno Trench, a two-mile underground passage that will carry high-speed rail under State Route 180, a canal and existing train tracks. "I think it's a great job," Helberg said. "I came from the military, where I was a criminal investigator." Helberg joined the Navy in 1996. "I hadn't graduated from high school, and my recruiter got me to get my GED. Then I was off to the military, and I gave it my all. It taught me to grow up and how to succeed in life." She became a Navy Master-at-Arms 1st. Class and was a training instructor during a stint at Guantanamo Bay's detention camp where she served on the Navy Expeditionary Guard Battalion.

After 20 years, Helberg retired from the Navy and she signed up for apprenticeship classes with the Pile Drivers Union Local 34 in Oakland. In two weeks, she joined the union, and she was dispatched to the high-speed rail project in Fresno 10 months later. "I went from being a criminal investigator sitting behind a desk to working with large sheets of steel to make walls for coffer dams and building a trestle at the river," Helberg said. Today, she is a journeyman pile driver. She enjoys the people she works with and she's well paid. She's also proud of her time on high-speed rail. "We're building this project that is one-of-a-kind in the nation, and I'm glad to be a part of it."



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.

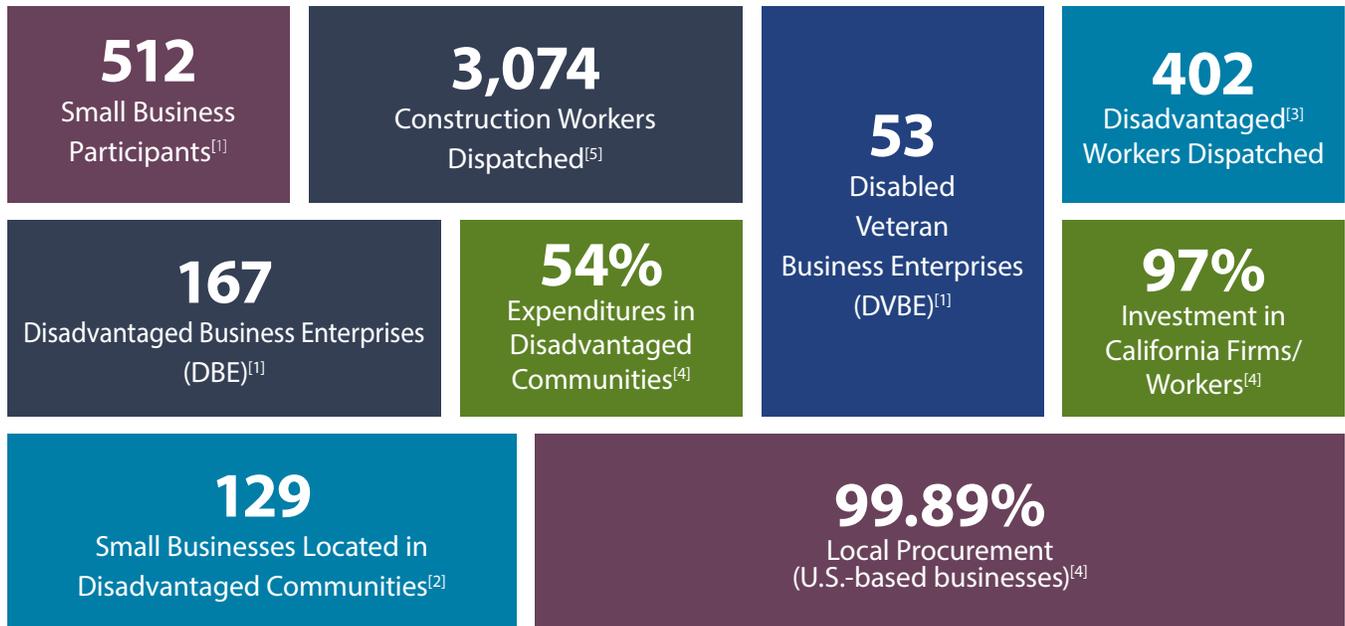
We are also committed to upholding Environmental Justice (EJ)—the fair treatment of people of all races, cultures and income levels, including minority and low-income populations, with respect to the development, adoption, implementation and enforcement of environmental laws and policies. We created an EJ program to ensure that our program, policies and activities incorporate EJ principles to mitigate disproportionate adverse impacts, particularly on minority LEP and low-income populations.

Worker Protections

2018 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 Fair Labor Standards Act (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.

EXHIBIT 2.4: CREATING OPPORTUNITIES FOR DISADVANTAGED WORKERS AND FOSTERING DIVERSITY



Notes:

1. To May 30, 2018. 2. As defined by CalEnviroScreen. 3. As defined in Article 4.0 of the “General Management to Community Benefits Policy – National Targeted Hiring Initiative Plan for CHSRA.” 4. July 2017 – June 2018. 5. As of July 31, 2019



PHOTO: Tier 4 emission standards require substantial reductions of nitrogen oxide (NOx) and particulate matter (PM), and place more stringent limits on hydrocarbons (HC).



CHAPTER 3: ENERGY AND EMISSIONS

Introduction

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. To meet this commitment, we work closely with the California Energy Commission (CEC), California Public Utilities Commission (CPUC) and the California Independent System Operator (ISO) to keep abreast of regulatory trends and requirements. We also work closely with local utilities to reinforce transmission connections to the rail system and strengthen grid connections.

Achieving excellent energy performance starts with design. All high-speed rail stations are required to be high-performance buildings, relying on the Leadership in Energy & Environmental Design (LEED®) rating system and California's 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 one year. Furthermore, we commit to reducing greenhouse gas (GHG) emissions through construction and operations, and to protect air quality by reducing the emissions of other criteria air pollutants.

We are also developing plans for how excess energy produced at our facilities can spur more restorative development in station districts. Working toward net-positive energy facilities, buildings that produce more energy on-site than they consume over the course of one year, includes partnering with adjacent developments and helping our local partner communities reach important milestones for renewable energy and sustainability.

Highlights

- We progressed toward our net-zero energy and renewable energy goals through continued implementation and refinement of the Sustainability Implementation Plan action items.
- Construction sites reported increases in energy consumption, corresponding to increases in the level of on-site activities and equipment.
- As our staffing levels increased, energy consumption in our offices increased by about 33 percent over 2017 levels.
- Criteria air pollutants emitted by the construction fleet were tracked, including nitrogen oxide, reactive organic gases, particulate matter and black carbon. The proportion of emissions avoided for each criteria air pollutant was similar to 2017, and ranged from 43 percent to 58 percent below a typical fleet.

Committing to Renewable Energy

2018 PROGRESS: We developed a more detailed physical model of the rail system and operations schedule to better understand how renewable energy and battery storage could serve to reduce peak demand. The model provides a slightly greater level of detail on where and how energy for the system is drawn, allowing a more realistic picture of energy costs. The model also provides much more insight into where in the system that devices such as batteries and solar systems provide cost savings or backup for the system in a more robust or cost effective way.

Since the inception of the high-speed rail program, the Authority has committed to using 100-percent renewable energy to operate trains and facilities. In 2016, we signed a renewable energy Memorandum of Understanding with the California Energy Commission. The agreement detailed our strategy and implementation plan for achieving our renewable energy goals and to work cooperatively with the Energy Commission to expand the use of renewable energy, net-zero energy buildings and zero-emission vehicles, including electric-vehicle charging and hydrogen-fueling infrastructure at rail stations.

Since 2016, the Authority has worked 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.

Designing Net-Zero Energy Stations

2018 PROGRESS: Through high-performance design criteria language specific to net energy-positive facilities, we have continued to lay a clear performance requirement path.

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.

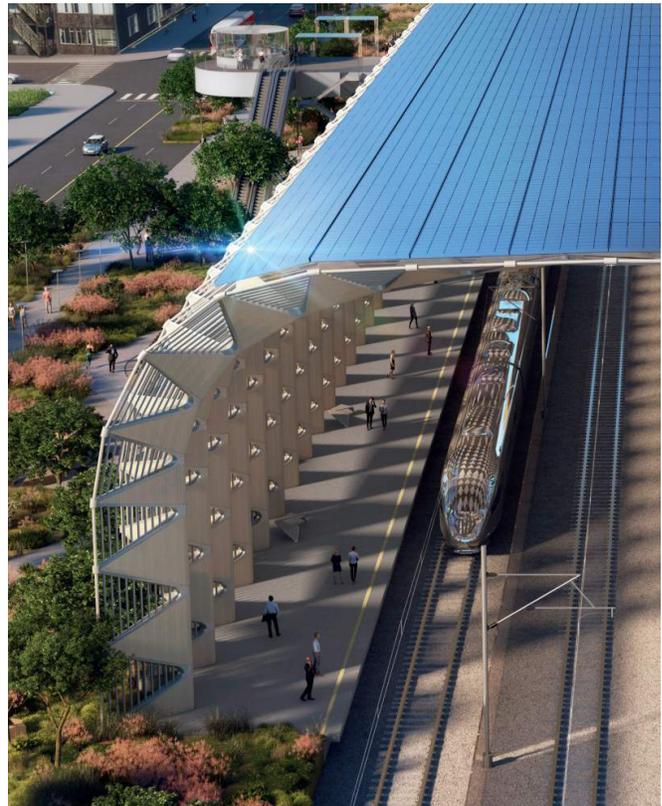


PHOTO: Artist concept of an energy efficient station.

Zero Emissions Vehicles

Executive Order B-48-18 (signed January 26, 2018) reaffirms the state's commitment to ZEVs and sets a new goal of 5 million ZEVs on California's roads by 2030. The Executive Order also established infrastructure targets for PEV chargers and hydrogen fueling stations to support the substantial growth of ZEVs. The Authority has determined, based on a review of the availability of ZEVs, that future high-speed rail construction contracts can reduce GHG emissions by requiring that contractors utilize ZEVs in their on-road fleet. For more information on California's commitment to ZEVs, see <http://www.business.ca.gov/Portals/0/ZEV/2018-ZEV-Action-Plan-Priorities-Update.pdf>

Energy Supply Resiliency and Distributed Energy Resources

In last year's report, we discussed the growing importance of distributed energy resources (DER), such as solar photovoltaics, batteries, electric vehicles, microgrids, and building/home energy management systems and dispatchable appliances (e.g., electric heat pumps), that are connected and controlled locally to support both customer needs/costs and the larger grid.

DER can play a key role in the state's grid management efforts. DER are located close to where energy is used, so that energy supply is delivered and managed with generally less need to rely on the traditional grid infrastructure.

The Energy Commission continues to prioritize research and funding focused on accelerating the penetration of DER. The agency solicited a "research roadmap" that will identify, describe and prioritize key research, development, demonstration and deployment needs to efficiently transform the electric system to enable high penetrations of DER.

The roadmap will be used to inform future objectives of the Electric Program Investment Change Program (EPIC), which funds clean energy research and demonstration and deployment projects that support California's energy policy goals and promote greater electricity reliability, lower costs and increased safety. For more information, see <https://gridworks.org/initiatives/der-research-roadmap1/>.

DER are now being examined even more closely for their use in providing resiliency (i.e., back-up power when the grid goes down), given increased concerns about the role of grid transmission and distribution equipment in starting wildfires. Critical service providers, such as fire departments and agencies, health-care entities, transit agencies and water treatment agencies, are investigating how they can use DER, especially solar plus storage-enabled microgrids. This increased attention on DER is a result of the California Public Utilities Commission directing utilities to proactively initiate planned shut-offs during periods of high fire risks.

The Authority developed a detailed power-draw model to enable investigation of a variety of energy scenarios, including use of solar plus storage, to reduce energy procurement costs. In addition, given the likely increased frequency of both planned and unplanned grid outages, the Group is examining how solar plus storage could also be used to provide additional redundancy for the Authority's train operations.

The Authority will continue to work closely with the Energy Commission, the Public Utilities Commission and other state partners and market innovators to explore how DER can help reduce energy costs and contribute to a more resilient approach to train operations.

Energy Use in Construction

2018 PROGRESS: Construction activities occurred across 17 sites on more than 100 miles of the system throughout 2018, and we continued monitoring fuel consumed by construction vehicles and equipment.

Diesel fuel consumption grew by 23 percent, an increase over the previous year that is attributable to increased construction activity, while gasoline fuel consumption reduced by 13 percent as shown in Exhibit 3.0. In total, energy consumption of vehicle fuels increased 4 percent compared to 2017. Since 2015, construction of the system has consumed approximately 295,100 Gigajoules of energy. During 2018, approximately 26 percent of the total kWh that each contractor reported consuming was sourced from renewable energy.

Energy Use in Authority Offices

2018 PROGRESS: As the Authority has grown to accommodate the needs of the project, energy consumption in offices has increased. In 2018, our electricity use to power computers, lights, and heating and cooling systems increased by 33 percent.

The Authority occupies energy-efficient office spaces that use metered lighting and automatic shut-off of computer monitors to minimize energy use.

Exhibit 3.0 shows the energy that’s consumed in high-speed rail construction and in the Authority’s offices.

EXHIBIT 3.0: ENERGY CONSUMPTION^[6]

| Consumption Source | Quantity |
|--|-------------------------------------|
| Off-Road Diesel Consumption | 292,662 gallons |
| On-Road Diesel Consumption | 115,495 gallons |
| On-Road Gasoline Consumption | 333,317 gallons |
| Energy Content of Fuel Consumed | 103,385 gigajoules |
| Construction Electricity Consumption | 1,018 ^[7] megawatt hours |
| Authority Office Electricity Consumption | 1,908 ^[8] megawatt hours |
| Construction Renewable electricity | 26 percent of total |
| Energy Content of Electricity Imported | 3,670,985 megajoules |

Regulatory Compliance (Energy)

2018 PROGRESS: The California high-speed rail program complied with all applicable policies, laws, standards and regulatory guidelines in 2018.

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.

Reducing GHG Emissions

2018 PROGRESS: We applied innovative construction practices, such as introducing special, durable concrete-mix designs in Construction Package 1 (CP 1) that use 25 percent fly ash for cement, and using 100-percent recycled steel with global warming potential scores below industry average.

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. The high-speed rail system has been planned to maximize the shift of 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)). California is now further focused on achieving carbon neutrality across all sectors by 2045 (Executive Order B-55-18).

Without 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. As shown in Exhibit 3.1, from its first year of operation, high-speed rail will reduce GHG emissions by giving travelers a more efficient option for mid- to long-range trips. Every mile traveled on high-speed rail is a mile not traveled by automobile or airplane, and the emissions associated with these less-efficient forms of travel will be significantly reduced.

Emissions Reduction Calculations

The Authority calculates emissions reductions for the initial 50-year span of operation (2029-2079, per the 2018 Business Plan). These reductions are reported at intervals corresponding to state reduction milestones (2030, 2050), program milestones (2040), and at year 50 (2079). On average, annual reductions are projected to be 1.5 million metric tons of carbon dioxide equivalent (MMTCO_{2e})^[9]

EXHIBIT 3.1: PROJECTED ANNUAL GHG EMISSIONS AVOIDED (IN MILLIONS OF METRIC TONS OF CARBON DIOXIDE EQUIVALENT MMTCO_{2E})

| Year | Low | High |
|------|------|------|
| 2030 | 0.26 | 0.32 |
| 2040 | 1.2 | 1.4 |
| 2050 | 1.3 | 1.5 |
| 2079 | 1.7 | 1.9 |

Over the first 50 years of operation, as shown in Exhibit 3.2 below, the cumulative reductions are projected to be between 64 and 75 million metric tons of CO_{2e} reduced, with only tailpipe emissions being analyzed.

EXHIBIT 3.2: PROJECTED CUMULATIVE GHG EMISSIONS AVOIDED: TAILPIPE (IN MILLIONS OF METRIC TONS OF CARBON DIOXIDE EQUIVALENT MMTCO_{2E})

| Year | Low | High |
|------|------|------|
| 2030 | 0.45 | 0.55 |
| 2040 | 9.3 | 11.0 |
| 2050 | 21.5 | 25.5 |
| 2079 | 64.3 | 75.9 |

The GHG emissions reduction scenarios reflect the ridership range expressed in the 2018 Business Plan. Ridership is expressed as both a medium case and as a 75th percentile, which provides the low and high emissions scenarios. This projection informs the baseline case for California’s plan to achieve GHG emissions reductions (Final 2017 Scoping Plan, California Air

Resources Board). The range of forecasted reductions reflects the two ridership scenarios presented in the 2018 Business Plan.

Projected avoided emissions reflect only riders shifting from automobile and air travel to high-speed rail. These projected avoided emissions reflect the Authority's goal of delivering an interconnected, well-designed system that attracts riders and provides safe, reliable and fast travel between California's population and employment centers. These 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 catalyze. 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 APTA's Transit Emissions Quantification Tool. The Station Communities and Ridership section discusses these issues in greater detail.

We have consistently reported the projected GHG emissions avoided through mode shift to high-speed rail service using a quantification method developed with the California Air Resources Board. This method relies on emissions factors for gasoline, diesel and jet fuel that are limited to the tailpipe emissions.^[10]

We also analyzed avoided emissions by assigning an emissions factor that illustrates the full lifecycle impacts of the fuels used for transportation; electricity, as well as gas, diesel and jet fuel. Using this analytic technique enables all fuel types to be evaluated on equal terms. In Exhibit 3.3, the "well-to-wheels" emissions factors were obtained from the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model (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. The results illustrate the full set of lifecycle emissions that can be avoided through mode shift to high-speed rail over the first 50 years – between 80 and 96 MMTCO_{2e}.

EXHIBIT 3.3: PROJECTED CUMULATIVE GHG EMISSIONS AVOIDED: WELL-TO-WHEELS (IN MILLIONS OF METRIC TONS OF CARBON DIOXIDE EQUIVALENT MMTCO_{2E})

| Year | Low | High |
|------|------|------|
| 2030 | 0.56 | 0.69 |
| 2040 | 11.5 | 13.8 |
| 2050 | 26.7 | 31.7 |
| 2079 | 80.8 | 96.1 |

Reporting Actual and Avoided Annual Emissions

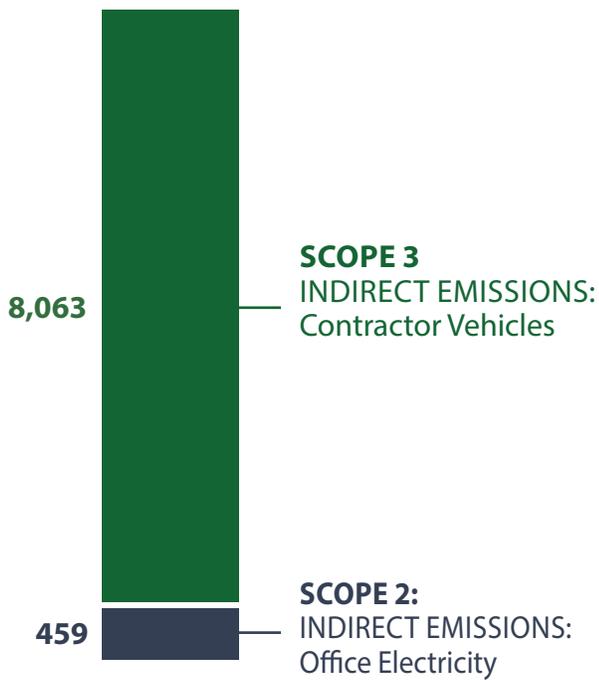
Building and operating the high-speed rail system generates GHG emissions from several sources, including the production of materials used in constructing the system, fuel burned in construction vehicles and equipment, electricity consumed in offices, and waste treatment and recycling. Future GHG emissions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

Using an operational control approach, the Authority tracks GHG emissions across emissions scopes, 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.

Exhibit 3.3.1 on page 37 shows the emissions by scope for 2018.

EXHIBIT 3.3.1: 2018 ANNUAL GHG EMISSIONS
(IN MTCO₂E)



In addition, 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 for construction site and office power.

As shown in Exhibit 3.3.2 below, we also track and report avoided emissions from construction recycling.

EXHIBIT 3.3.2: AVOIDED EMISSIONS FROM RECYCLING



Reducing and Managing GHG Emissions in Delivery

2018 PROGRESS: We applied innovative construction practices, such as introducing special, durable concrete-mix designs in Construction Package 1 (CP 1) that use 25 percent fly ash for cement, and using 100-percent recycled steel with global warming potential scores below industry average. 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.

The Authority uses binding contract provisions for construction contractors as the primary mechanism to minimize GHG emissions during construction. The Authority requires contractors to track and report their use of materials, fuel, water and electricity, recycling and reuse volumes, types of on- and off-road equipment, and hours or miles of operation. This information is vital for setting data-driven policy and strategies.

Contract 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 optimized lifecycle scores for major materials, including global warming potential, after satisfying 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

For the past several years, the Authority has partnered with the California Department of Forestry and Fire Protection on a tree-planting program in urban and rural areas of California that 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

Planting Trees to Reduce GHG Emissions

The Authority will compensate for the greenhouse gas emissions associated with construction of the rail line, and large-scale plantings of trees have been identified as the method of choice.

Trees help reduce atmospheric GHG levels by removing carbon dioxide from the atmosphere and turning it into tree matter: trunks, branches, roots, leaves, flowers, a process known as sequestration. When planted strategically to shade buildings, trees can also reduce GHG emissions by reducing energy use for cooling and therefore GHG emissions created at the power plant. Tree-planting projects also offer many environmental co-benefits such as improved air quality, reductions in stormwater runoff, and habitat for wildlife. Urban Ecos was hired to carry out the following:

- Determine the feasibility of using trees to compensate for the emissions produced by the construction of the high speed rail;
- Estimate the number, size, and planting site types of the trees;
- Work with stakeholders to find locations for trees; and
- Assist in developing educational materials.



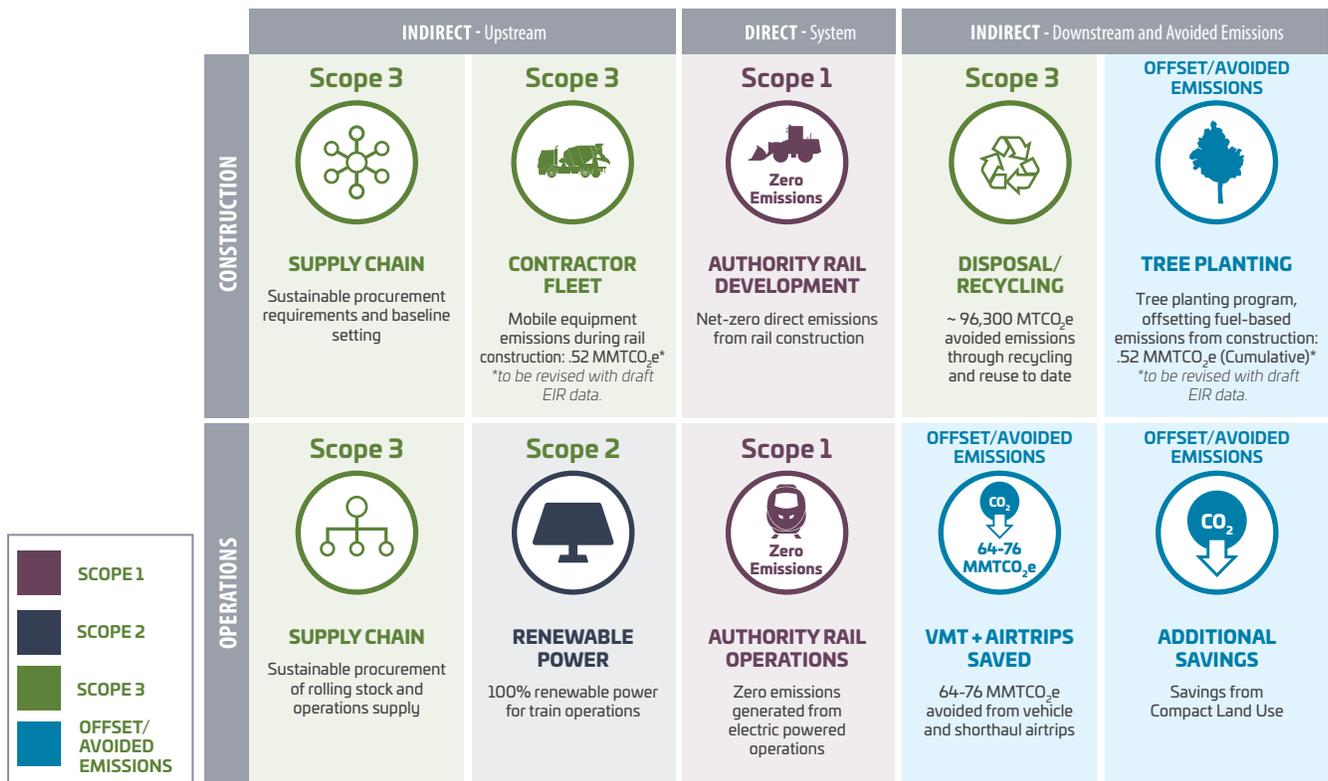
Extended Emissions by Scope

The Authority strives to tell 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 3.4 below 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.

Since January 2015, approximately 22,000 metric tons of carbon dioxide equivalent (MTCO_{2e}) have been generated during construction, 96,300 MTCO_{2e} have been avoided through recycling, and more than 450 trees planted, which will sequester 1,200 tons of CO₂ over the trees' lifecycle. In 2019, we will analyze the Early Train Operator's (ETO) service plans to revise projected emissions for early, interim service in the Central Valley. These emissions projections will be included as part of any study reports and will be accompanied by a methodology explaining the projections.

EXHIBIT 3.4: GHG EMISSIONS BY SCOPE: 2015-2019



Regulatory Compliance (Emissions)

Our role in reducing GHG emissions is detailed in and governed by the following policies and statutes:

- AB 32, the California Global Warming Solutions Act of 2006;
- SB 32 (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;
- The 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;
- SB 862 (2013-2014), Committee on Budget and Fiscal Review. Greenhouse gases: emissions reduction;
- AB 1550 (2015-2016), prescribing GHG reduction fund investment in disadvantaged communities; and
- AB 617 (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

2018 PROGRESS: We used best practices for construction fleets, such as Tier-4 equipment, to avoid thousands of tons of criteria air pollutant emissions.

We minimize air emissions from the fleets used by our contractors, as shown in Exhibits 3.5 and 3.6 on page 42. All contractors working on the high-speed rail system are required to use fleets that comply with California vehicle standards. Contractors are also subject to contract terms which require the fleets to meet U.S. Environmental Protection Agency standards for the cleanest off-road diesel engines (Tier 4 equipment, as available). This requirement was unique among infrastructure projects and pushed the adoption and use of cleaner off-road diesel engine technology in California in advance of regulatory requirements.



PHOTO: All contractors working on the high-speed rail system must use fleets that comply with California vehicle standards.

EXHIBIT 3.5: 2018 CRITERIA AIR POLLUTANTS EMITTED AND AVOIDED: TYPICAL CALIFORNIA FLEET COMPARISON

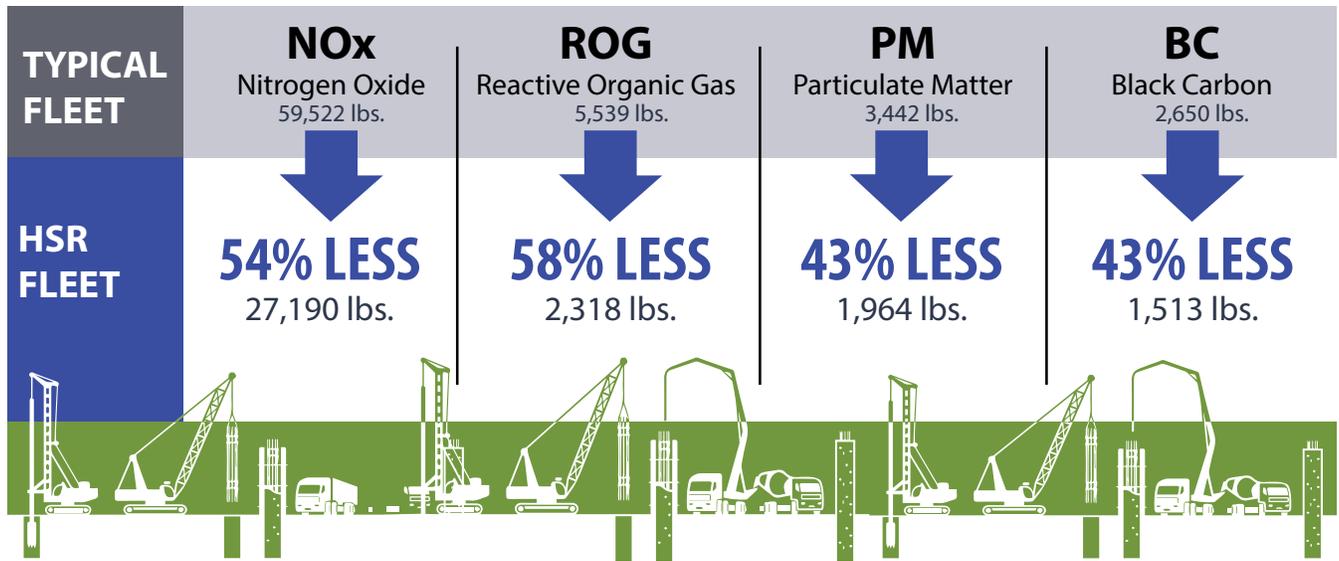
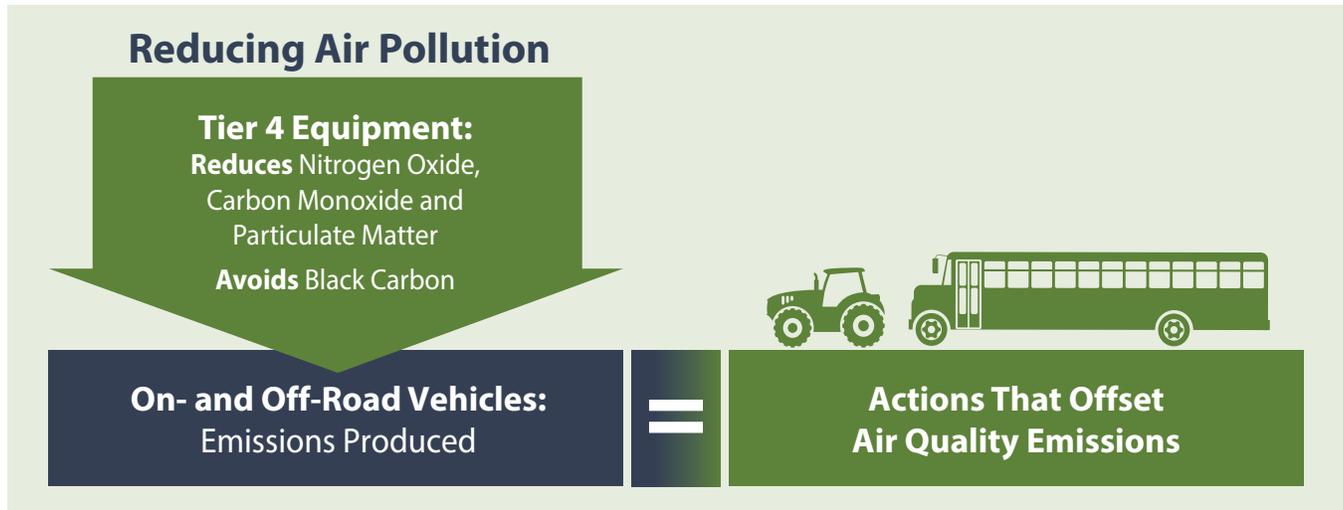


EXHIBIT 3.6: EMISSIONS FROM A HIGH-SPEED RAIL FLEET COMPARED TO A TYPICAL FLEET

| Criteria Air Pollutant | HSR Fleet Emissions | Typical Fleet Emissions | Percent Difference |
|-----------------------------------|---------------------|-------------------------|--------------------|
| NOx - Nitrogen Oxide | 27,190 (lbs) | 59,522 (lbs) | -54% |
| ROG - Reactive Organic Gas | 2,318 (lbs) | 5,539 (lbs) | -58% |
| PM - Particulate Matter | 1,964 (lbs) | 3,442 (lbs) | -43% |
| BC -Black Carbon | 1,513 (lbs) | 2,650 (lbs) | -43% |

We also enter into agreements with local agencies that are responsible for clean air in their jurisdictions. Our primary tool is the Voluntary Emissions Reductions Agreement (VERA) program. Under a VERA program, we pledge to offset each ton of air pollutants emitted during construction within the local air quality district.

Offsetting criteria air pollutants through formal programs is planned for all parts of the system located in districts with poor air quality. The minimization of emissions and offsetting are critically important for Central Valley cities, four of which have been identified by the American Lung Association as being among the top 10 most polluted cities in the United States in terms of air quality.

EXHIBIT 3.7: MINIMIZING CONSTRUCTION AIR QUALITY EMISSIONS

Our VERA program replaces older, polluting equipment, such as agricultural pumps, diesel bus engines and tractors, in local communities with new, cleaner and more efficient equipment – reducing air pollutants and providing immediate, tangible climate benefits. This offset is illustrated in Exhibit 3.7. Our progress to-date on our VERA program is shown in Exhibit 3.8.

From 2015 to 2018, on- and off-road vehicles produced 45 tons of criteria pollutants, including, NO_x, ROG, PM and black carbon. From 2015 to 2018, Tier 4 equipment reduced/avoided 64 tons of criteria pollutants, including NO_x, ROG, PM and black carbon. This is the difference between emissions produced and what would have been produced by a typical fleet.

For our VERA offsets, the total lifetime reductions committed to (as of the fourth quarter of 2018) were 1,375 tons.

EXHIBIT 3.8: 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: Fremont's goldfields flourishing in restored vernal pool, showing that the pool was successfully restored.



CHAPTER 4: NATURAL RESOURCES

Introduction

Protecting and enhancing natural resources is foundational for any sustainability program. The Authority's 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 California's environment.

Highlights

- Our Environmental Impact Report (EIR) on the Fresno to Bakersfield section found that construction activities will use only six percent of the current water consumption along the corridor. Once construction finishes, this project section will use less than two percent of the current water consumption for the project footprint. This represents a net decrease in water use.
- We increased the total area of habitat conserved by over 100 acres in 2018.
- In January 2018, California became the first state in the nation to formally apply to the Federal Railroad Administration (FRA) to assume the FRA's responsibilities under the National Environmental Policy Act and other federal environmental laws (Caltrans has had NEPA jurisdiction from the Federal Highway Administration since 2007).

Conserving Water Resources

2018 PROGRESS: The construction packages continued to comply with water-conservation measures initiated in compliance with state policy. Additionally, environmental review, which identifies the water savings associated with project operation, continued.

The Authority uses water in two ways; in our offices and on construction sites. As with energy usage, 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 beyond the Central Valley into other parts of the state, local regulations in Southern and Northern California will govern water consumption. However, the Authority's water conservation policy and water conservation guidance will still apply.

The applicable statutes and regulations that the Authority must comply with include:

Federal:

- Clean Water Act of the United States;
- The Rivers and Harbors Appropriation Act, Section 10; 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; and
- 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 are cognizant of water being a shared resource. Where applicable, we engage with local stakeholders, and we place high importance on water-conservation efforts. In addition, we prioritize the use of non-potable water for construction purposes.

We adopted a Water Conservation Policy in 2015 to establish water conservation as a continuing practice. We established uniform, program-wide requirements for water conservation during design and construction of high-speed rail projects. Contractors must submit a Water Conservation Plan that clearly describes how they will comply with our requirements, which include provisions 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 the contractor, 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

In construction, water use has increased year-over-year due to the expanding footprint of construction activities. Water is used on-site to compact soil for overpasses, cure concrete, and suppress dust and particulate matter. Exhibit 4.0 shows how much water is consumed, and where the water is used. Water use in offices remained comparable to last year.

EXHIBIT 4.0: WATER CONSUMPTION (IN GALLONS)⁽¹¹⁾

| Water consumption | Quantity |
|-------------------------------------|----------------------------|
| Construction Water Use: Non-potable | 58,927,468 |
| Construction Water Use: Potable | 13,150,724 ⁽¹²⁾ |
| Office Water Use | 1,952,640 ⁽¹³⁾ |

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 the National Environmental Policy Act (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 the contractor every month, and, quarterly, compares that 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://www.hsr.ca.gov/programs/environmental/stormwater.aspx>

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.

Managing Land Use

2018 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 2018, we conserved an additional 100 acres of habitat.

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. The TLU met once in 2018 and reviewed a presentation on the Authority's climate adaptation process.

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. Through this approach, the Authority's mitigation efforts create a positive affect 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 large scale and statewide reach provides the opportunity to implement regionally significant conservation efforts through preserving high-quality habitat. To-date, the Authority has secured habitat that includes approximately 2,680 acres at 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.

In 2017, the Authority, working through its contractor, Westervelt Ecological Services, secured the rights to establish a conservation easement on 1,220 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.

In 2018, the Authority secured 1,014 acres of additional mitigation at multiple sites:

- Poso Plains (318 acres);
- Cottonwood Creek (247 acres);
- CD Hillman (239 acres);
- Alkali Flats (158 acres); and
- Kings River (52 acres).



PHOTO: Various wildlife use Cottonwood Creek as a corridor to move through the Central Valley.

Preserving Agricultural Land

Our Board of Directors signed an agreement in 2012 with the Department of Conservation (DOC) for implementing agricultural preservation. The DOC will identify suitable agricultural land for mitigating project impacts and fund the purchase of agricultural conservation easements from willing participants. Solicitation for proposals for agricultural mitigation parcels began in November 2014. The DOC's California Farmland Conservancy Program (CFCP) will secure the easements on behalf of the Authority. As shown in Exhibit 4.1, a total of 273 deeded acres have been secured to date.

CD Hillman Mitigation Area

The CD Hillman Mitigation Area is a 239-acre property located in Kern County, adjacent to and contiguous with the Kern National Wildlife Refuge (KNWR). This parcel provides habitat and connectivity to support five special-status wildlife species:

- The San Joaquin kit fox;
- The San Joaquin antelope squirrel;
- The blunt-nosed leopard lizard;
- The Tipton kangaroo rat; and
- The Swainson's hawk.

Habitat features include alkali sinks and shallow slough formations associated with Poso Creek. Alkali sink communities commonly occur in these low-lying areas between wetland communities and the saltbush scrub communities found on higher ground. The endemic animals and plants that inhabit alkali sink communities are adapted to the seasonal flooding that occurs in this habitat.

According to the U.S. Fish and Wildlife Service (USFWS), "based on its location, the CD Hillman parcel would provide an important piece of mitigation property, and would continue the on-going effort to bring into secure preservation the large area surrounding the KNWR and Semitropic Ecological Reserve."

EXHIBIT 4.1: HABITAT AND AGRICULTURAL LAND PRESERVATION

2,680 acres

Habitat Preserved
and restored

1,200 acres

Agricultural Land
Protected

273 acres

Agricultural Land
Secured





PHOTO: Since 2015, more than 272,000 tons of material, including concrete, asphalt, wood and organics, have been stockpiled for reuse or recycled as part of the project.



CHAPTER 5: SUSTAINABLE INFRASTRUCTURE

Introduction

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

As previously discussed in this Sustainability Report, the high-speed rail system is being planned and designed to deliver benefits for Californians now. In addition, in operation, communities along the high-speed rail alignment will see air-quality improvements, as well as safety benefits from grade separations. 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 manifold positive returns for current and future communities.

Highlights

Revised our internal Sustainability Implementation Plan, updating key performance indicators, metrics, strategies and actions to advance the commitments made in our Sustainability Policy. A summary of the plan is available on our website at http://www.hsr.ca.gov/docs/programs/green_practices/sustainability/Sustainability_implementation_plan_SUMMARY.pdf;

- Enhanced documentation and training for contractors, project construction managers, and data quality reviewers for EMMA 2.0, our customized, web-based tool to enhance data collection, review and analysis;
- Continued revising our design requirements to incorporate initial results from analyzing the system against climate stressors and other sustainability criteria;
- Continued submitting responses to the GRESB Infrastructure Assessment; and
- Built upon the initial findings from the Sustainable Purchasing Leadership Council (SPLC) Benchmark exercise by assessing the impact of the sustainability requirements embedded in our procurement processes.

Principles for Sustainable Infrastructure

2018 PROGRESS: We continued updating the Sustainability Implementation Plan to refine targets, actions and accountable parties that will support adherence to the principles. The updates are a positive step toward achieving the principles, and demonstrate our continued commitment to seeing the principles through to implementation throughout the lifespan of the project. We further refreshed our sustainable infrastructure principles in 2018 to reflect regulatory updates and recent stakeholder input. We follow a transparent process that involves other state agencies, including state transit agencies, and our peer rail partners globally that are well-versed in sustainability issues.

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:

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

Lifecycle Approach

Taking a lifecycle approach is a key part of the Authority's sustainability program. In developing implementation strategies to improve sustainability performance, we consider direct, annual impacts; impacts that occur upstream or downstream from the system; and impacts that occurred in the past or may occur in the future.

Our updated Sustainability Policy encompasses our commitment to sustainable infrastructure and continues to include Sustainable Infrastructure Principles related to the lifecycle approach, such as:

- Requiring optimized lifecycle scores for major materials, including assessments of global warming potential, while maintaining competition, durability and quality;

- Requiring lifecycle performance of components, systems and materials where practicable; and
- Adaptively reusing existing structures and facilities whenever feasible.

To support these principles, we continuously revise specifications and contract provisions to require improved lifecycle scores for materials. We use a baseline of the materials currently being installed and preliminary design information for the entire 2018 Program Baseline to analyze the materials' environmental characteristics. The Authority's Sustainability Implementation Plan operationalizes the lifecycle approach. The Plan assesses sustainable-design strategies using lifecycle cost models and sustainability value models, and helps us develop a lifecycle vetting model to inform design decisions that will help the high-speed rail project meet sustainability goals and targets in operations.

As a next step, we plan to further the analysis of supply chain impacts of major materials to clarify their relative influence on the project's lifecycle footprint. We will regularly update our database, refined in 2018, with new environmental product declarations (EPDs) as they become available, and we will cross reference the lifecycle-assessment approaches defined in leading infrastructure standards such as Envision and LEED. By measuring and managing the impacts embodied in the materials we use to build the system, we can then demonstrate the benefits of lower lifecycle impacts achieved through construction decisions.

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

EMMA (Environmental Mitigation Management Application) is a custom web-based tool developed by the Authority. EMMA is the Authority's system of record for environmental and sustainability compliance in project construction. EMMA is a single, uniform platform that the Authority and its Project Construction Managers (PCM) use to ensure that design-build contractors' submittals demonstrate contract compliance.

EMMA enhances and streamlines data collection and management, and promote high levels of quality assurance and control. In 2018, the Authority updated data quality-control procedures, and, in early 2019, issued "Proc-Plan 03: Procedure for Assuring Data Quality in Environmental Management and Mitigation Application (EMMA) Sustainability Records." Authority staff continue bi-weekly, issues-review meetings with each PCM, provide regular field training and continue spot checks of field construction reporting.

■ Recycling Waste Responsibly

The Authority has required 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 of waste diverted from landfill by a given contractor.

Since 2015, more than 272,000 tons of material, including concrete, asphalt, wood and organics, have been stockpiled for reuse or recycled as part of the project. This is 97 percent of all waste to date,

according to the records reported and confirmed in our data-collection system. Based on information received from construction contractors, generally based on waste-hauler records, all concrete and metal was recycled or stockpiled and 78 percent of other demolition debris, including organic waste, was recycled to-date for 2018, as shown in Exhibit 5.0.

The Authority's recycling efforts avoided the emission of 12,900 metric tons of carbon dioxide equivalent in 2018. Keeping materials out of landfill, 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. As with water, fuel use, and construction equipment, waste and recycling information is collected directly from contractors and reviewed every month for compliance with contract requirements. These recycling rates, which far surpass the 50 percent minimum diversion rate recommended by the California Integrated Waste

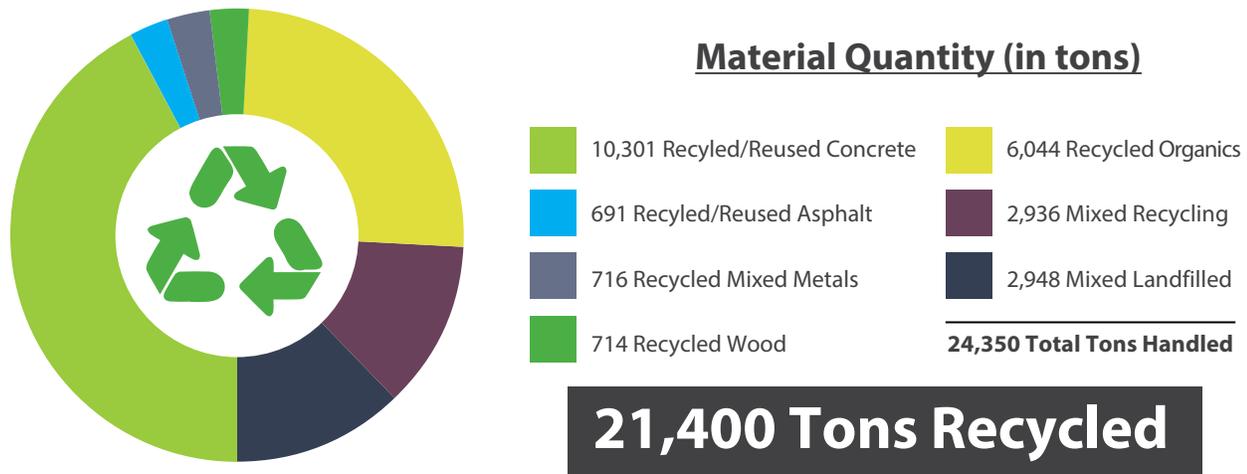
Management Board, demonstrate that the Authority is performing on par with leading international sustainable construction projects, as shown in Exhibit 5.1.

EXHIBIT 5.1: PERCENTAGE OF MATERIALS RECYCLED AND OVERALL RECYCLING RATE (2018)

| Material | Percentage |
|---------------------------------|------------|
| Concrete and Metal | 100 |
| Other Materials | 78 |
| Overall Material Recycling Rate | 88 |

The Authority produced no un-remediated hazardous waste in 2018. A small amount of hazardous waste was remediated by the Authority's contractors and disposed of, according to proper procedures.

EXHIBIT 5.0: 2018 NON-HAZARDOUS MATERIALS MANAGEMENT^[14]



Ensuring Health, Safety and Security

2018 PROGRESS: We updated our Safety and Security Management Plan 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 also 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 to the safety and security of passengers, employees, consultants, contractors, emergency responders and the public. In 2018, as an outcome of consultations with staff, local communities, law enforcement and first responders, the Authority designed and implemented a system to manage the safety and security of all stakeholders. The operationalization

of the system is captured in the Safety and Security Management Plan (SSMP), available internally.

The SSMP adheres to all state and federal regulations and has been developed to adhere to Federal Railroad Authority requirements. The SSMP defines the process for identifying, evaluating and resolving safety hazards and security vulnerabilities associated with future railroad operations of the system prior to the start of revenue service. The SSMP encompasses all equipment, infrastructure, operation, and maintenance plans and procedures associated with the system. The SSMP covers all authority employees, contractors, first responders, customers and the public.

Risk-based, safety-hazard management addresses system hazards based on the level of risk posed by the hazard. The Authority uses an iterative process to develop safety-hazard analyses and security-risk assessments. 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.

In addition to the SSMP, the Authority will incorporate applicable international high-speed rail industry best practices to plan, design, construct and operate the high-speed rail system. The Authority's senior leadership has empowered all Authority staff to implement the SSMP to work safely, report and correct unsafe work behavior, mitigate hazardous work conditions and to not perform any task that a person feels could injure themselves or others.

Our comprehensive SSMP 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 will take a holistic, layered and risk-based approach for securing the rail system, including:

- Using 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 and then stops 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 facilities-hardening techniques; and
- Developing security plans, procedures and protocols and maintaining a professional security force to monitor, patrol and respond to incidents.

Construction Safety

Exhibit 5.2 shows injury rates and lost days in 2018. 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 ^[15] | 2018 | State Benchmark ^[16] <small>[17], [18]</small> |
|-----------------------------|------|--|
| Construction Package 1 | 1.59 | - |
| Construction Package 2-3 | 0.29 | - |
| Construction Package 4 | 0 | - |
| Overall Weighted Average | 0.97 | 4.5 |
| Lost Days Rate | | |
| Construction Package 1 | 0.4 | - |
| Construction Package 2-3 | 0 | - |
| Construction Package 4 | 0 | - |
| Overall Weighted Average | 0.22 | 2.8 |
| Fatalities | | |
| Total Fatalities | 0 | 55 ^[19] |

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 employee 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 per day, 7 days per week to confidentially talk with employees and get them assistance when needed.

Each department also has an EAP coordinator, and a Statewide EAP Benefits Manager is also available.

This program is being operated by the California Department of Human Resources and more information is available here: <https://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 and economic benefits:

- Pedestrians and bicyclists to easily get from one part of the community to another;
- 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. Fifty existing at-grade crossings, including all Union Pacific Railroad crossings in Fresno, are being eliminated. We are also constructing a number of new grade separation projects along the 119-mile section that is currently under construction between Madera and Poplar Avenue. These will have tremendous local benefits in places like the City of Shafter where grade separations will also reduce horn noise from freight rail trains while increasing safety and eliminating idling vehicles, reducing vehicle emissions and improving local air quality.

In July 2019, two newly constructed overpasses on Avenue 8 and Avenue 11 in Madera County were opened that allow vehicles to travel over the high-speed rail system, marking the first completed high-speed rail grade separations for Madera County.

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.

For example, in Northern California we are working with Caltrain to take steps to prepare for service—in accordance with the Federal Railroad Administration’s High-Speed Passenger Rail Safety Strategy—and to implement blended service for high-speed rail and Caltrain commuter rail service within the existing corridor.

In Southern California, we are working with local partners to finalize agreements on several critically important grade separations that will improve safety and operations for passenger and freight rail in the near term. Many of these grade crossings identified for improvement are in or near disadvantaged communities. For example, we have contributed \$76.6 million to help fund the Rosecrans/Marquardt Grade Separation Project. This grade crossing, rated as one of the most hazardous grade crossings in California by the California Public Utilities Commission, 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.

Our goal is to reduce traffic congestion and improve safety at grade crossings while addressing the toxic pollutant and greenhouse gas emissions from idling vehicles.

Management, Resilience and Adaptation

2018 PROGRESS: An Authority representative was appointed to the California Climate Safe Infrastructure Working Group. Through participation in this group, we will contribute to examination of how climate change impacts can be included in infrastructure planning, design and implementation processes.

We participated in California's resilience and adaptation planning efforts and contributed to Safeguarding California Plan, the State's climate adaptation strategy document.

We formed a work group, the Climate Adaptation Implementation Committee, focused on developing a climate adaptation plan for the system, in alignment with new state guidance, "Planning and Investing for a Resilient California."

In 2017, we finalized a Program Risk Management Plan to replace the 2013 Project Risk Management Plan. We take a systemic, collaborative and cross-disciplinary approach to risk management. The Program Risk Management Plan 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 climate adaptation planning, which identifies actions to be taken even in the absence of complete certainty concerning a particular climate risk scenario. The actions to be identified in the climate adaptation plan will rely on reasonable evidence of considerable potential risk.

Grade Separation in San Mateo

The Authority, in partnership with the City of San Mateo, is helping to grade separate East 25th Avenue in San Mateo from the rail corridor. The Authority is contributing \$84 million in funding to this important project that is constructing grade separations today, with the potential to accommodate future construction of an overtake track that would allow trains to pass each other as the blended system expands service. In addition, the project will provide an opportunity to complete east-west street connections at 28th and 31st Avenues.

The rail-roadway crossing is considered a top priority for safety improvement by the California Public Utilities Commission (CPUC). The intersection sits between San Mateo County Events Center and a busy shopping center. Furthermore, Caltrain reports that 92 of its trains pass through the intersection each weekday. In addition to improving safety, this grade separation will eliminate the need for road traffic to idle while waiting for trains to pass, reducing congestion and emissions, and improving air quality.

"Like everyone else on the Peninsula, I have to plan my day around traffic," San Mateo City **Councilperson Maureen Freschet** noted to the San Mateo Daily at the groundbreaking ceremony. "There is no quick fix for regional traffic congestion, but the grade separation at 25th Avenue is certainly a good place to start. I know that our residents will appreciate and benefit from the elimination of train-vehicle conflicts as well as enjoy safer pedestrian options."

Emergency and Disaster Recovery Planning

The Authority is focused on planning for emergencies and disasters as a way to manage risk. The 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 early interim 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 operations and maintenance personnel to perform under emergency conditions;
- Effective coordination between railroad operations and emergency response agencies, such as police, fire and emergency medical services; and
- Familiarization of fire, police and emergency medical services personnel with the physical and operating characteristics of high-speed rail system operations and the system's 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 startup 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

Another key focus of resilience and preparedness is planning to adapt to the disruption of climate change. Scientists agree that climate change is driving increasing extreme weather and climate-related disasters. In recent years, California residents have experienced natural disasters including drought, wildfires, floods and mudslides, events which may have been triggered or worsened because 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.

Climate-Safe Infrastructure Working Group

Climate-safe infrastructure is defined as an infrastructure that is sustainable, adaptive and that meets the design criteria that aim for resilience in the face of shocks and stresses caused by current and future climate.

The Authority is participating in the California Climate Safe Infrastructure Working Group (CSIWG), which examines how climate change impacts can be included in infrastructure planning, design and implementation processes. The group consists of scientific experts, engineers and architects from multiple disciplines, with a goal of establishing research dialogues with concerned stakeholders.

We are focused on integrating the State's sustainability and resilience goals and objectives with ours. The working group's report was issued September 2018.^[20]



PHOTO: Artist concept of high-speed rail station. Stations will be designed to provide easy access to low-carbon modes of travel.



CHAPTER 6: STATION COMMUNITIES AND RIDERSHIP

Introduction

The high-speed rail system provides a unique opportunity to help 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. Changing how the state grows and how people get around is necessary to achieve the state's climate goals and to meet the vision of a carbon-neutral future. Well-planned high-speed rail station areas and the access to and from them is the critical lynchpin that unlocks the potential of the rail system to meet these transformative statewide goals.

Even in an era of zero-emissions vehicles, compact, mixed-use, dense 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 to realize broad-based sustainable economic development, environmental benefits and social resilience.

Highlights

- The City of San José, the Santa Clara Valley Transportation Authority (VTA), the Peninsula Corridor Joint Powers Board and the Authority formed a public-agency partnership to redesign and expand Diridon Station in San José.
- 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 an approximately one-mile radius around Los Angeles Union Station.
- The Authority is partnering 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 a contract with the City of Millbrae to advance station area work, with an emphasis on integration with BART and access to SFO airport.
- Ongoing collaboration with Fresno to unveil its Station Area Master Plan (STAMP).

Enhancing Public Space and Amenities

2018 PROGRESS: The Authority continued to partner with station communities in 2018 to ensure that community impacts of station design are aligned with the communities' needs and goals.

To realize the opportunity of the high-speed rail investment, the Authority worked with local governments over the last several years to prepare for future high-speed rail stations. In partnership with the FRA, we dedicated funding to support station cities in completing station area plans that are consistent with and support local and regional planning efforts required by SB 375 and our Station Area Development Policies.

To date, we have executed planning agreements with the cities of Gilroy, Merced, Fresno, San José, Bakersfield, Millbrae, Palmdale and Burbank, as well as the Tulare County Association of Governments, 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 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 megaregions 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 kiss-and-ride locations for passenger pick-up/drop-off. During 2018, we continued our focus on station-area planning through ongoing participation in regional working groups on rail integration and station-specific development tools.

In 2019, we intend to focus our efforts on engaging 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. The Authority 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. The Authority will work with local jurisdictions to leverage the potential presented by Opportunity Zones.

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 in proximity to each station. For example, 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 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. The Authority is committed to this approach and will be initiating, in the next year, 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, and reinforces the potential for the system to reduce not just VMT at the regional scale, but also for the first-mile/last mile access to the station and within station districts.

We are engaging with local and regional transit providers to enable provision of bike facilities at station sites, including making bike racks available in the stations. Stations are being designed to facilitate pedestrian access by having direct connections to sidewalks. In 2019, 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.

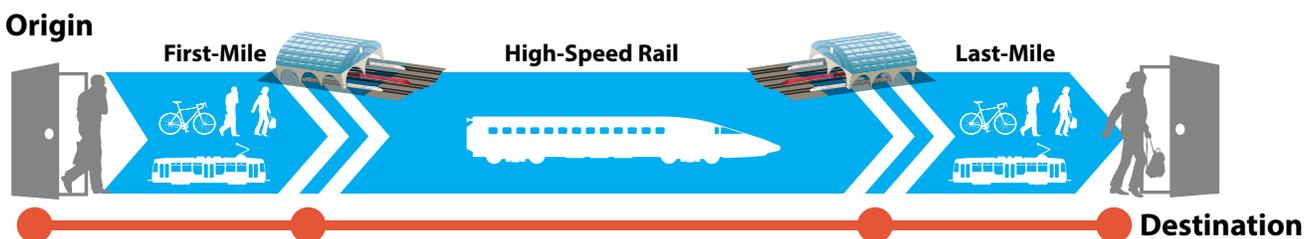
Access Planning

Intermodal Working Groups (IWG) are making critical station area decisions and allocating funding for first- and last-mile projects that are designed to link nearby sidewalks and cycling paths to stations, as shown in Exhibit 6.0, and make it easy for passengers to walk, bus or bike to high-speed rail stations.

High-speed rail will provide a clean, energy-efficient mode of transportation to handle the core, or middle, of a person's journey from origin to destination. In 2018, the Authority continued participating in regional rail working groups to work on how the system will integrate with existing and planned rail and transit service.

In 2019, the Authority will initiate access-planning work with communities along the initial operating segments. 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: END-TO-END JOURNEY SOLUTION



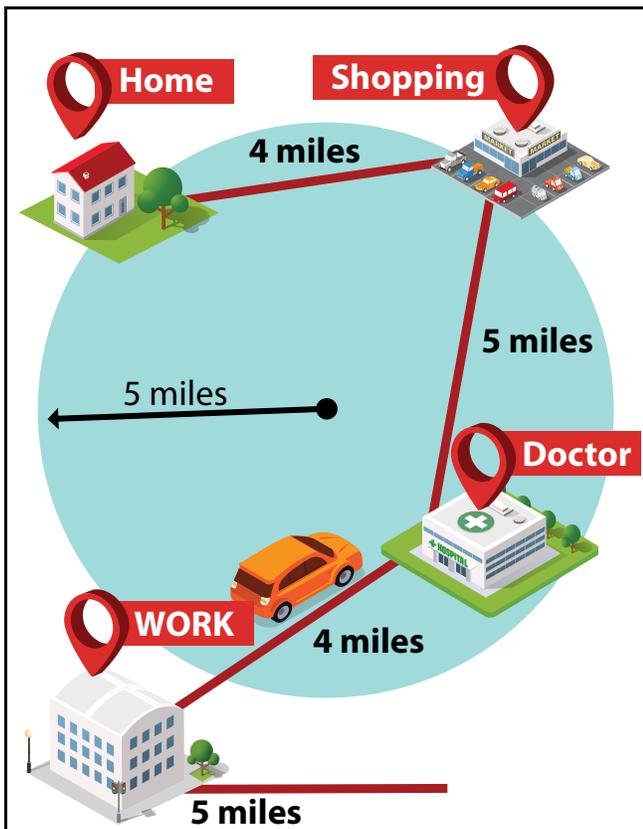
Community Partnerships Reduce Vehicle Miles Traveled (VMT)

Federal, state and local funds allow station cities and their stakeholders to engage in extensive station-area planning activities in partnership with the Authority. We use SAP agreements to work closely with station jurisdictions and other mobility service providers to promote urban regeneration and district-scale sustainable development at and around the stations.

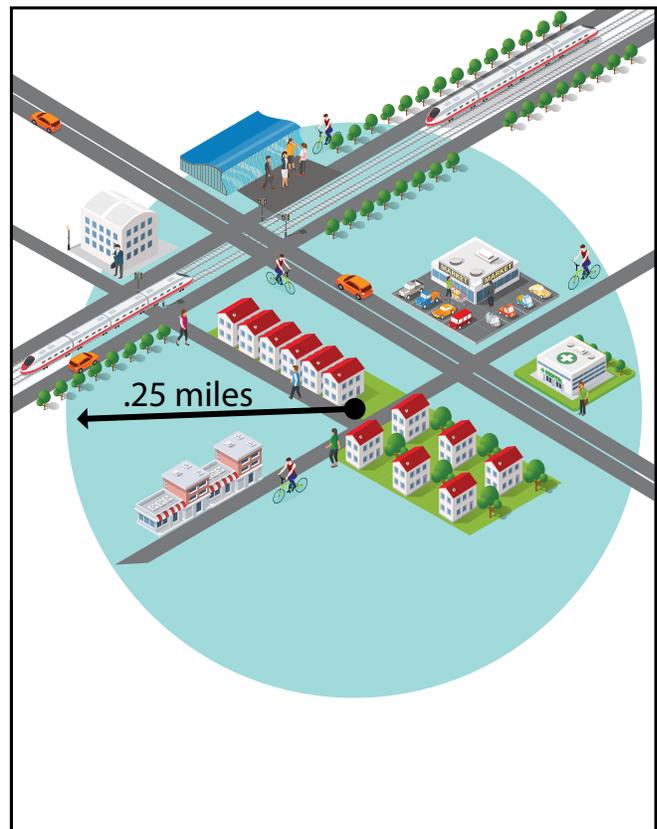
SAP funding helps stimulate local planning for smart development, updates to local land-use plans and zoning codes, and promoting transit-oriented

development around high-speed rail stations. Exhibit 6.1 illustrates how development around high-speed rail stations, in response to high-speed service, has the potential to chip away at the average daily vehicle miles traveled 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. ^[21] Locating high speed rail stations in areas with good access to transit, as envisioned by Proposition 1A, and in existing downtown cores, will assist with infill development, stimulate the local economy, reinforce SB 375 regional plans and reduce pressure on agricultural land.

EXHIBIT 6.1: REDUCING VMT EMISSIONS THROUGH INFILL DEVELOPMENT AROUND STATIONS



Above: Today, destinations in our communities are spread out, requiring the need to drive many miles every day.



Above: High-speed rail attracts businesses and others to locate near the stations, reducing the need to drive to every destination.

Diridon Integrated Station Concept Plan (DISC) in San José

The San José Diridon Station, owned by the Peninsula Corridor Joint Powers Board (PCJPB), is the primary public transportation hub of the South Bay, currently serving approximately 17,000 daily passengers. Diridon Station service providers include Caltrain, Amtrak and the Altamont Corridor Express (ACE), Santa Clara Valley Transportation Authority (VTA) light rail and bus service, as well as other regional bus transportation providers.

In 2018, the City of San José, the VTA, the PCJPB and the Authority formed a public-agency partnership to redesign and expand Diridon Station. The agencies are working to coordinate their respective capital projects in a manner that integrates the transit station facilities and the surrounding development area. The vision is to deliver a transportation hub that provides seamless customer experience for movement between transit modes within the station and into the surrounding neighborhoods and downtown San José. The partner agencies' work is focusing on shared, key objectives to create a station that is:

- A multimodal, integrated and human-centered;
- A catalyst for the urban environment;
- A destination in its own right; and is
- Future-proof, flexible, adaptive and innovative.

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 an approximately one-mile radius around LAUS. The study will gather and prepare information on the 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. The Authority and its partners have completed site selection and phase 1 assessments.

Kings/Tulare Station and the Tulare County Association of Governments

Planning work will continue around the Kings/Tulare Station in the future. The planning work includes regional/corridor planning and a community engagement to understand how the project would potentially link to public transit in the cities and communities of Huron, Naval Air Station Lemoore, Lemoore, Hanford, Goshen, Visalia, Farmersville, Exeter, Lindsay and Porterville.

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 this issue and to measure potential noise impacts. These FRA procedures help guide the Authority in designing its system to address these concerns. As shown in Exhibit 6.2, 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 and in the Central Valley, trains will no longer have to sound noisy horns at many crossings. At areas where the train will need to travel through at-grade crossings, establishing “quiet zones,” where additional safety measures remove the need to sound train horns, will help significantly reduce noise-disturbance.

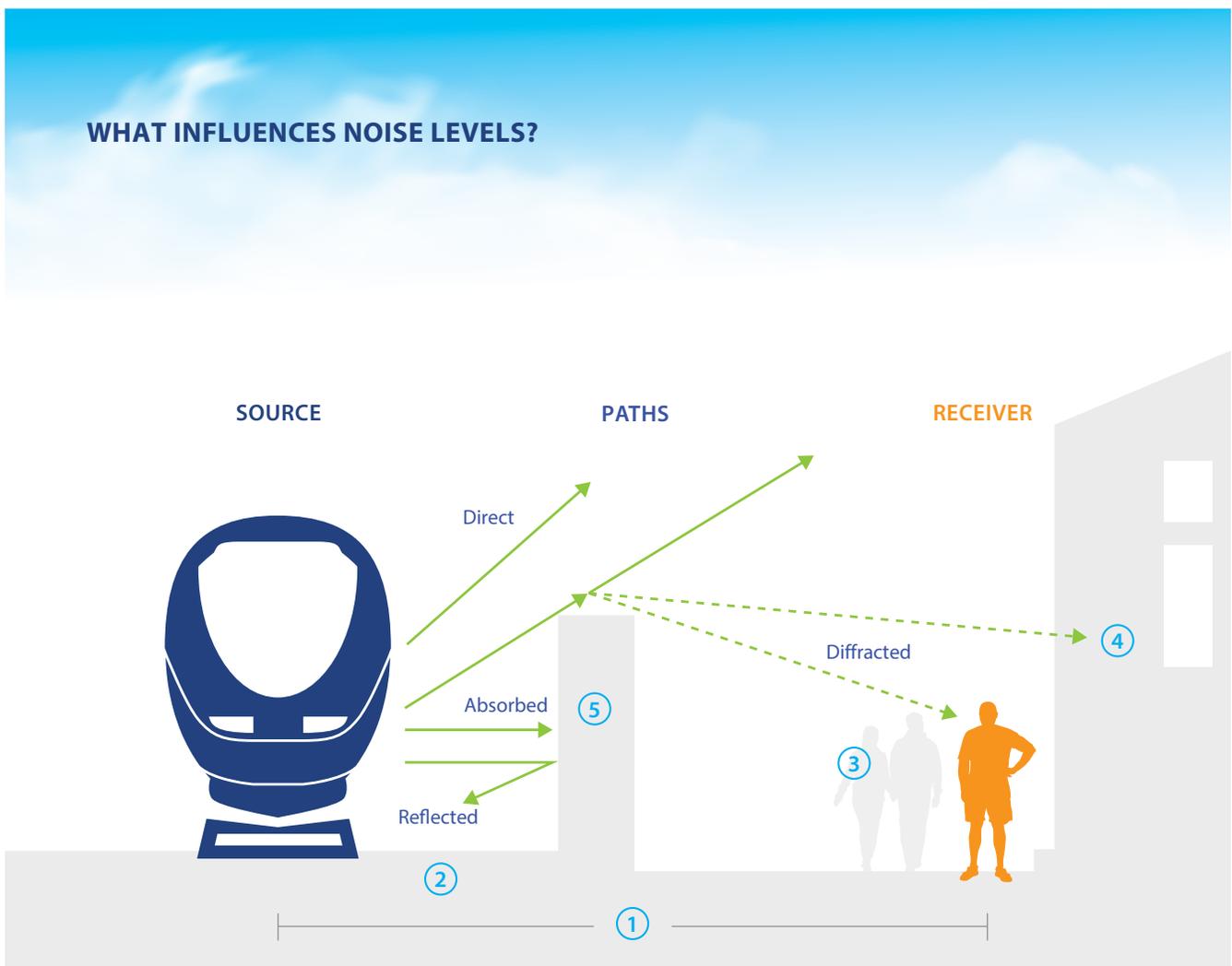


EXHIBIT 6.2: The distance (1) between the train tracks and the listener, the type of ground surface (2), ambient noise (3), and the presence of buildings (4) or sound barriers (5) will all influence the noise level that is heard by a listener at any given location.



New Housing Instead of Sound Barriers

In early January 2019, a new housing complex, Rosaleda Village, opened to residents. The City of Wasco opened Rosaleda Village with the help of several federal and state agencies, including the Authority. The new, 17-acre complex features more than 200 units and allows for easier access to schools, shopping centers and other activities. The former housing facility was located next to the high-speed rail alignment being constructed through Wasco.

As an alternative to building a sound barrier wall to mitigate noise impacts, the Authority instead allocated \$10 million to the Wasco Farmworkers Housing Relocation Project. These funds helped leverage several other existing resources and funding programs to improve the living conditions for residents.

“This project represents the positive impact that can be made when federal, state and local agencies work together to better the quality of life for local residents,” said Wasco City Manager Daniel Ortiz-Hernandez. “The City of Wasco is proud to be a partner on this project that will better integrate over 200 local families in to the community and provide easier access to community resources including local schools, shopping and services.”

Multiple groups helped to make the project a reality, including the Wasco Housing Authority, the California Strategic Growth Council and the Governor’s Rural Community Outreach program. “Our team recognized the long-term benefits of relocating this community to an area that would allow for safety improvements and faster response times for emergency personnel,” said Central Valley Regional Director Diana Gomez. “Families will no longer need to cross the railroad tracks to get to school and the rest of the city.”

Engaging Communities

2018 PROGRESS: Throughout 2018, the Authority undertook 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 at the federal, statewide and local community levels 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 allowed Authority planners to include local preferences for unique landmarks in infrastructure designs.

Statewide, through community engagement and public-outreach events, we work with more than 200 local community organizations and elected officials to educate and inform the public about the high-speed rail program, as shown in Exhibit 6.3 on page 69.

We seek public input through various outreach methods, including, but not limited to:

- Engaging people within their own communities and at regularly scheduled community meetings;
- Participating in public involvement activities (meetings, hearings, advisory groups, workshops and task forces) to help the community understand the project, as well as

to identify community interests and needs and define project goals;

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

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 Deputy Director of External Affairs supports the Authority's regional stakeholder-related activities to help ensure consistent and accurate 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 website; presentations; information 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.

Connecting Existing Transportation Systems

2018 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.

The high-speed rail program is delivering benefits now through early investments in bookend and connectivity projects involving 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 the California State Transportation Agency (CalSTA) and other regional partners on planning and implementing the overall Statewide Rail Modernization Program. The goal is to incorporate high-speed rail into a single, integrated state rail improvement strategy.

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.

Caltrain Electrification Reduces Emissions

Ahead of system operations, we are partnering with other regional and local rail agencies to advance rail transit in California. The Authority has committed \$713 million of funding to the Caltrain Electrification Project, including \$600 million of Proposition 1A funding. The project will see the Caltrain commuter rail line between San Francisco and San José upgraded and electrified by 2022. These upgrades will improve performance, enhance operating efficiency, and increase the capacity, safety and reliability of Caltrain's service. During 2018, work continued on this project, including installation of poles for overhead systems, and wires that will ultimately power the trains. Once the high-speed rail is operational, it will be able to use the same corridor for blended operations with Caltrain, likewise benefiting from a highly efficient, low-emissions electrified infrastructure.



EXHIBIT 6.3: COMMUNITY OUTREACH

377

Open Houses and
Community Meetings

15,000+

Attendees

238

Events in
Disadvantaged
Communities

7,350+

Attendees at
Disadvantaged
Community Events

It focuses on the benefits of being able to reliably connect between systems with well-planned transfers, and to purchase and plan travel with one easy transaction, including travel on the high-speed rail system.

The State Rail Plan envisions coordinated investments that will allow for high-speed rail to connect to improved rail, express bus and transit services at all stations. By planning and partnering with these agencies and projects, the Authority can further identify ways that investments may yield near-term benefits that enhance current rail and transit services and provide significant improvements and access to future high-speed rail service.

This coordinated strategy will address the state's most heavily congested urban passenger rail corridors in Northern and Southern California. The goal is to ensure significant, near-term direct benefits from expanded capacity, service frequency and reliability, with added benefits of improved safety, air quality and goods movement.

Engaging Suppliers

2018 PROGRESS: The Authority continued to partner with station communities in 2018 to ensure that community impacts of station design are aligned with the communities' needs and goals.

Our 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 that are designed to benefit local, small and disadvantaged businesses. 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 2018, we took part in the State of California Cohort Benchmarking exercise managed by the Sustainable Purchasing Leadership Council. We learned where our policies and procedures are making an impact and compared our performance against other state agencies. We have implemented a range of actions to advance sustainable procurement work over the past year, including planning for a supplier symposium in 2019.

Small Business Program

2018 PROGRESS: The small business program continued to grow in 2018, with an additional 37 businesses joining and benefiting from the program. In December 2018, the Authority hit an important milestone; 500 certified small businesses working 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 6.4 on page 71. 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).

For more information, see the Small Business Program page on our website at

https://www.hsr.ca.gov/small_business/

SMALL BUSINESS PARTICIPATION

AS OF JULY 31, 2019

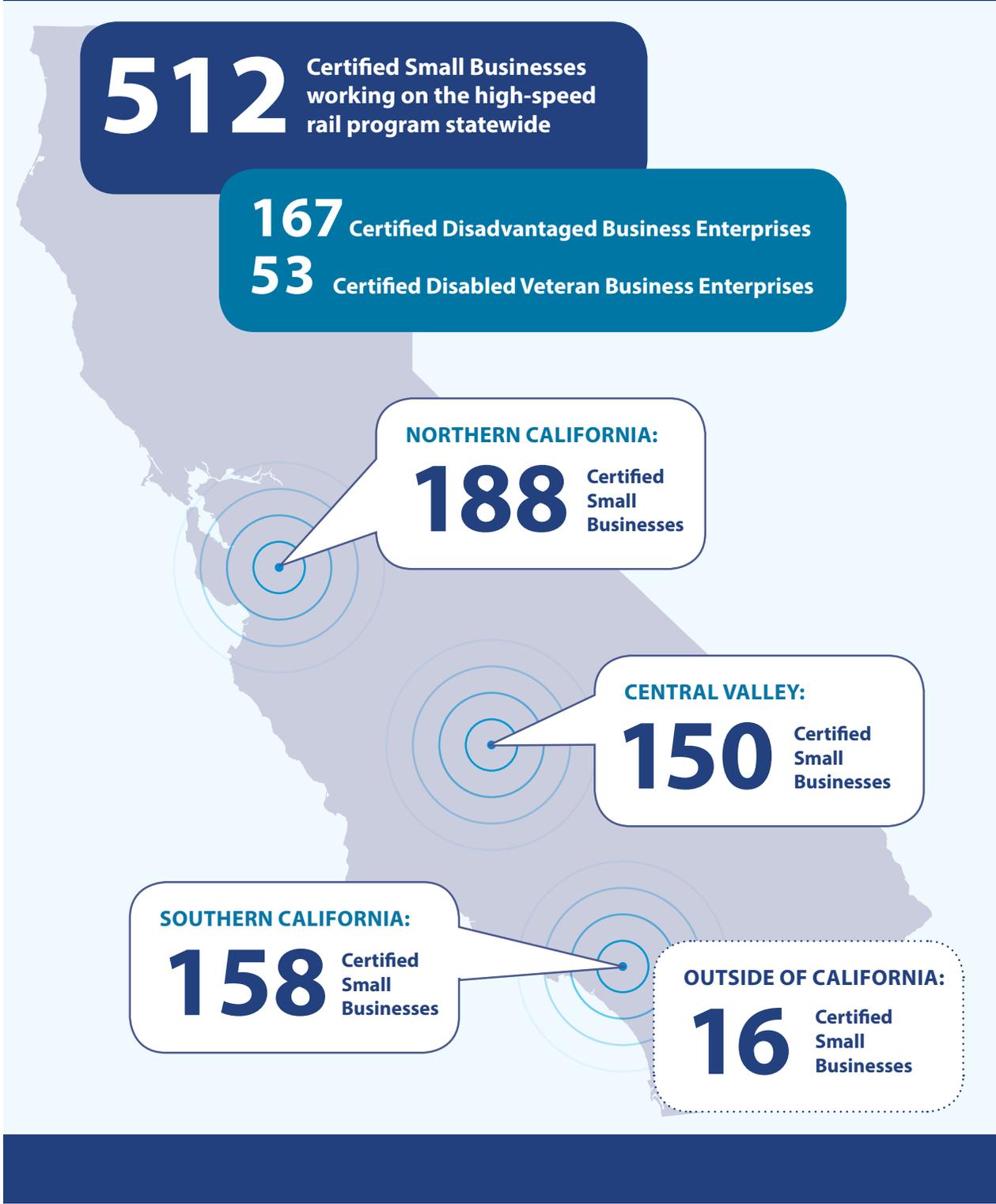


EXHIBIT 6.4: INVESTMENT IN HIGH-SPEED RAIL IS PUTTING SMALL, MINORITY, WOMEN, AND VETERAN OWNED BUSINESSES TO WORK IN CALIFORNIA.



PHOTO: Artist concept of a California high-speed rail train traversing the Cedar Avenue Viaduct. It features double arches representing the southern gateway into Fresno.



CHAPTER 7: MOVING FORWARD

This report highlights the progress we made in 2018 toward advancing our sustainability policies and commitments. In 2019, we are or have already:

- Revising our Sustainability Implementation Plan, which details how we align sustainability actions and policy with our evolving organizational structure.
- 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.
- Working with other state agencies and local and regional transit and rail providers to learn and apply best sustainability practices.
- Integrating district-scale sustainability features into the discussion of station phasing and commercial opportunities.
- Assessing the risks and opportunities to the sustainability, adaptability and resiliency of the system we are developing, which is vital for delivery of robust, reliable service.
- Continuing quarterly contractor dashboard reporting in addition to ongoing monthly program delivery status reporting that, together, will supply timely information on our actions and progress.
- Providing continuing transparency on sustainability metrics through quarterly reporting to the executive and program delivery leadership.
- Improving how we monitor and evaluate construction impacts through ongoing refinements to the EMMA 2.0 management system, increasing timeliness, accuracy, validity and efficiency of our reporting. We also undertake rigorous, periodic data-assurance reviews.
- Advancing the high-performance design of our system that will deliver operational cost savings for facilities on the high-speed rail alignment.
- Coordinating 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.
- Implementing an action plan and convening an internal, multidisciplinary working team to continue to advance our demonstrated leadership in sustainable procurement.
- Targeting project materials' sustainability through our procurement strategy and contracts.
- Using our partners (Rail Delivery and the Early Train Operator) to leverage worldwide best practices in sustainability, climate adaptation and resiliency.
- Listening to external stakeholders to identify social, environmental and economic shocks and stressors that could diminish the resiliency of the system and negatively affect priority communities.
- Documenting the program for Envision verification.

All 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 to spur continued economic prosperity and greater economic opportunity for all Californians as we transition to a sustainable, low-carbon future.



PHOTO: Doublehorn Calicoflower is native to the area and shows that the restored vernal pool is healthy.



CHAPTER 8: WHO WE ARE

The California High-Speed Rail 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, create jobs, and preserve 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 already 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 rail service. It is located under the California State Transportation Agency (CalSTA) under Secretary David Kim. There were no significant changes in the Authority's structure or ownership during the reporting period.

Authority 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. During 2018, it consisted 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 and currently a Vice-Chair. During 2018, the Board included six men and three women.^[22] In 2016, Governor 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, including Business Plans, financial plans and strategic plans, including those related to sustainability and environmental, social and governance issues. The Authority's Chief Executive Officer 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-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 review of and monitoring of 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 and Housing;
- 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 conducts analyses of 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 remain committed to delivering high-speed rail and achieving our mission in a way that reflects our highest values:

- Sustainability;
- Safety;
- Collaboration;
- Excellence;
- Diversity; and
- Innovation.

Our Team

As of December 31, 2018, the Authority had 205 employees on staff, including full-time employees, retired annuitants, part-time employees, student assistants and employees on loan from other state agencies as shown in Exhibits 8.0 (below) and 8.1 (page 85). During the reporting period, the only significant variation in staff numbers was due to the addition of new staff and turnover.

In 2018, the Authority hired 45 new employees, for a new hire rate of 22 percent^[23] There was a turnover rate of 25 percent for 2018. The Authority also includes a significant number of private sector consultants integrated with state employees.

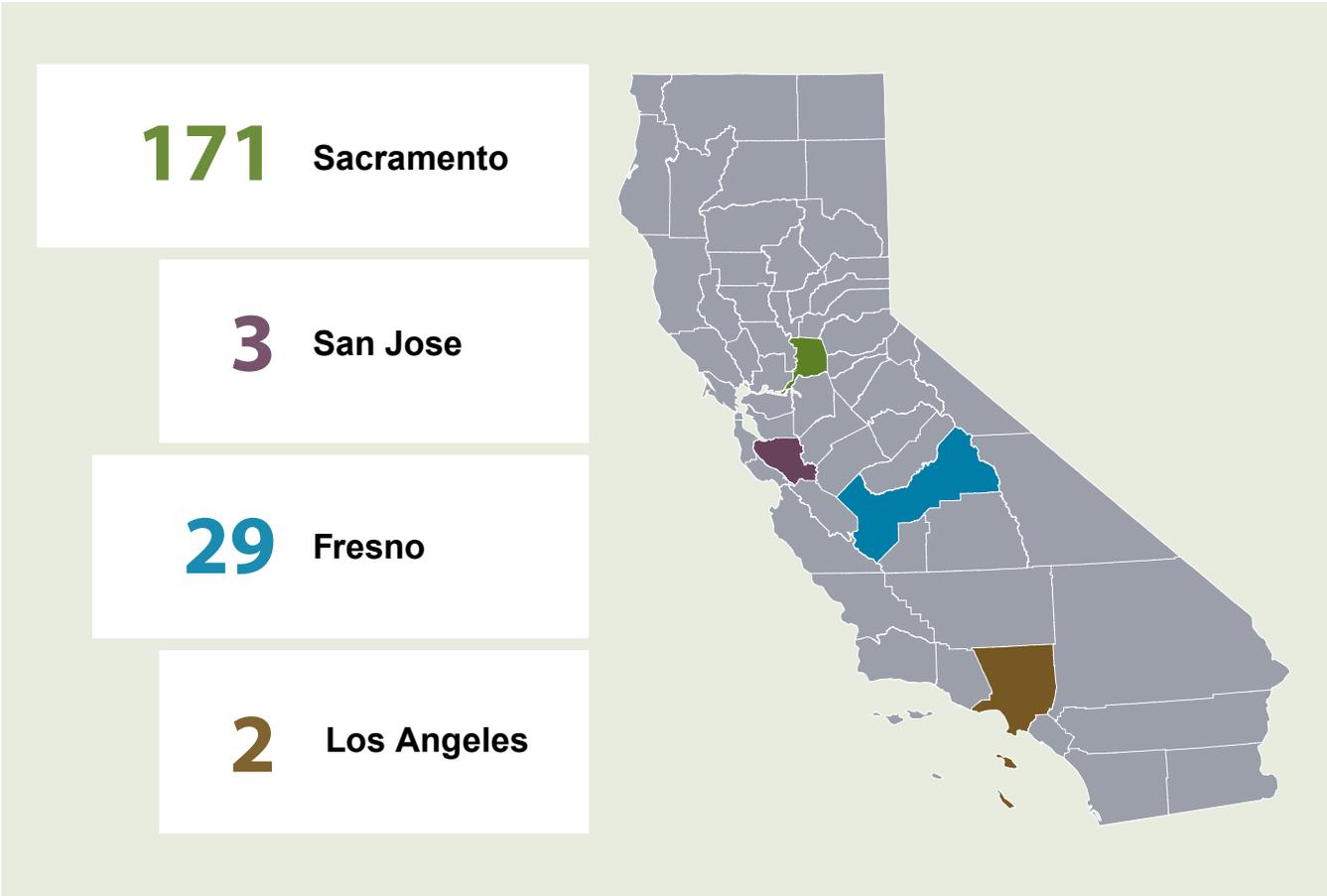
EXHIBIT 8.0: 2018 EMPLOYEE BREAKDOWN BY GENDER AND EMPLOYEE CATEGORY

| Category | Male | Female |
|--|------------|--------|
| Rank and File | 41 | 49 |
| Managerial | 31 | 18 |
| Supervisory | 12 | 31 |
| Exempt | 13 | 8 |
| Confidential | 0 | 2 |
| Total | 97 | 108 |
| Employees - Total (Including Board Members) | 205 | |

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 201.^[24]

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

EXHIBIT 8.1: 2018 EMPLOYEE BREAKDOWN BY REGION[25]



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. 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.



PHOTO: Rebar cages are one of the early stages in creating columns that will support a pergola.

GRI CONTENT INDEX

This index allows GRI report users to quickly find the disclosure information they are seeking. The GRI indicators listed correspond to the information that the Authority's stakeholders noted was important to disclose. Consistent with the majority of GRI reports, the information presented here was not subject to third-party verification or external assurance, except for the methodology used to estimate future 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 | 75 |
| 102-2 Activities, Brands, Products and Services | Who We Are | 75 |
| 102-3 Location of Headquarters | Who We Are | 75 |
| 102-4 Location of Operations | Who We Are | 75 |
| 102-5 Ownership and Legal Form | Who We Are | 75 |
| 102-6 Markets Served | Who We Are | 75 |
| 102-7 Scale of the Organization | Economic Development and Governance; Who We Are | 21, 75 |
| 102-8 Information on Employees and Other Workers | Who We Are | 75 |
| 102-9 Supply Chain | Our Supply Chain | 77 |
| 102-10 Significant Changes to the Organization and its Supply Chain | Who We Are | 75 |
| 102-11 Precautionary Principle or Approach | Management, Resilience and Adaptation | 58 |
| 102-12 External Initiatives | Our Sustainability Approach | 7 |
| 102-13 Membership of Associations | Our Sustainability Approach | 7 |

| Strategy | | |
|---|--------------------------------|----------------|
| Strategy Disclosure | Section | Page(s) |
| 102-14 Statement from Senior Decision-Maker | Message from the CEO | 1 |
| Ethics and Integrity | | |
| Ethics and Integrity Disclosure | Section | Page(s) |
| 102-16 Values, Principles, Standards, and Norms of Behavior | Our Sustainability Approach | 7 |
| Governance | | |
| Governance Disclosure | Section | Page(s) |
| 102-18 Governance Structure | Authority Governance Structure | 75 |
| Stakeholder Engagement | | |
| Stakeholder Engagement Disclosures | Section | Page(s) |
| 102-40 List of Stakeholder Groups | Engaging Communities | 68 |
| 102-41 Collective Bargaining Agreements | Engaging Communities | 68 |
| 102-42 Identifying and Selecting Stakeholders | Engaging Communities | 68 |
| 102-43 Approach to Stakeholder Engagement | Engaging Communities | 68 |
| 102-44 Key Topics and Concerns Raised | Engaging Communities | 68 |
| Reporting Practices | | |
| Reporting Practices Disclosures | Section | Page(s) |
| 102-45 Entities Included in the Consolidated Financial Statements | Our Sustainability Approach | 7 |
| 102-46 Defining Report Content and Topic Boundaries | Our Sustainability Approach | 7 |
| 102-47 List of Material Topics | Our Sustainability Approach | 7 |
| 102-48 Restatements of Information | About this Report | 5 |
| 102-49 Changes in Reporting | About this Report | 5 |
| 102-50 Reporting Period | About this Report | 5 |
| 102-51 Date of Most Recent Report | About this Report | 5 |
| 102-52 Reporting Cycle | About this Report | 5 |
| 102-53 Contact Point for Questions Regarding the Report | About this Report | 5 |
| 102-54 Claims of Reporting in Accordance With the GRI Standards | About this Report | 5 |
| 102-55 GRI Content Index | GRI Index | 79 |
| 102-56 External Assurance | External Assurance | 5 |

Specific Standard Disclosures

| GRI Standard | Disclosure | Section | Page(s) | Omission |
|--|---|--|--------------------|----------|
| Economic Performance (2016) | 201-4 Financial assistance received from government | Economic Development and Governance | 21 | NO |
| Indirect Economic Impacts (2016) | 203-1 Infrastructure investments and services supported | Economic Development and Governance; Station Communities and Ridership | 21, 61 | NO |
| | 203-2 Significant indirect economic impacts | Economic Development and Governance; Station Communities and Ridership | 21, 61 | NO |
| Procurement Practices (2016) | 204-1 Proportion of spending on local suppliers | Economic Development and Governance; | 21 | NO |
| Energy (2016) | 302-1 Energy consumption within the organization | Energy and Emissions; Quantification Methodologies; Performance | 31, 85, 88 | NO |
| Water and Effluents (2018) | 303-3 Water withdrawal | Natural Resources | 45 | NO |
| Biodiversity (2016) | 304-3 Habitats protected or restored | Natural Resources | 45 | NO |
| Emissions (2016) | 305-1 Direct (Scope 1) GHG emissions | Energy and Emissions; Performance, Reducing and Managing GHG Emissions in Delivery; Extended Emissions by Scope | 36, 40 | NO |
| | 305-2 Energy indirect (Scope 2) GHG emissions | Energy and Emissions; Performance, Reducing and Managing GHG Emissions in Delivery; Extended Emissions by Scope; Quantification Methodologies; Performance | 36, 40, 85, 89 | NO |
| | 305-3 Other indirect (Scope 3) GHG emissions | Energy and Emissions; Performance, Reducing and Managing GHG Emissions in Delivery; Extended Emissions by Scope; Performance | 36, 38, 40, 85, 89 | NO |
| | 305-5 Reduction of GHG emissions | Reducing GHG Emissions | 35 | NO |
| | 305-7 Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions | Reducing GHG Emissions, Protecting Air Quality During Construction | 35, 41 | NO |
| Effluents and Waste (2016) | 306-2 Waste by type and disposal method | Sustainable Infrastructure | 51 | NO |
| Environmental Compliance (2016) | 307-1 Non-compliance with environmental laws and regulations | Economic Development and Governance; Regulatory Compliance (Emissions) | 21, 41 | NO |
| Supplier Environmental Assessment (2016) | 308-1 New suppliers that were screened using environmental criteria | Engaging Suppliers | 70 | NO |
| Employment (2016) | 401-1 New employee hires and employee turnover | Our Team | 76 | YES |
| Occupational Health and Safety (2018) | 403-9 Work-related injuries | Ensuring Health, Safety and Security | 55 | NO |
| | 403-10 Work-related ill health | Ensuring Health, Safety and Security | 55 | NO |

| GRI Standard | Disclosure | Section | Page(s) | Omission |
|--|--|--|---------|----------|
| Training and Education (2016) | 404-1 Average hours of training per year per employee | Sustainable Infrastructure Principals for Sustainable Infrastructure | 51, 53 | YES |
| Diversity and Equal Opportunity (2016) | 405-1 Diversity of governance bodies and employees | Our Team | 76 | YES |
| Local Communities (2016) | 413-1 Operations with local community engagement, impact assessments, and development programs | Station Communities and Ridership | 68 | NO |

Additional Disclosures

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

| Material Topic | Section | Page(s) |
|--|---|------------|
| Emergency and Disaster Recovery Planning | Our Sustainability Approach; Sustainable Infrastructure | 15, 19, 59 |
| Enhancing Public Space and Amenities | Our Sustainability Approach ; Station Communities and Ridership | 18, 62 |
| Land and Water Pollution* | Our Sustainability Approach; Materiality Assessment Results | 14, 15, 16 |
| Lifecycle Approach | Sustainable Infrastructure | 52 |
| Noise and Vibration | Station Communities and Ridership | 66 |
| Resilience and Adaptation, Including Extreme Weather | Sustainable Infrastructure | 59 |
| Third-Party Assessment | Our Sustainability Approach ; Materiality Assessment | 12, 15, 19 |
| Transportation Hub Activation and Mass/Active Transportation | Our Sustainability Approach ; Station Communities and Ridership | 15, 18, 62 |

*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

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 (CO), 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 from sources owned or controlled by another entity.

Disadvantaged Community: A community that is distinguished by higher risk of environmental hazards and/or lower socioeconomic status. Disadvantaged communities are the target of some high-speed rail programs. The California Environmental Protection Agency uses several criteria to identify disadvantaged communities, including, but not limited to:

- Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure or environmental degradation; and
- 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 lifecycle. EPDs may include information about global warming potential, ozone depletion, acidification, eutrophication, smog or other environmental impact areas.

Envision: Envision is a framework that provides guidance needed to initiate driving success in sustainable infrastructure projects through systemic change in the planning, design and delivery of sustainable and resilient infrastructure. A decision-making guide, not a set of prescriptive measures, Envision provides industry-wide sustainability metrics for all types and sizes of infrastructure to help users assess and measure the extent to which a project contributes to conditions of sustainability across the full range of social, economic, and environmental indicators.

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).

REET: The Greenhouse Gases, Regulated Emissions, and Energy use in Transportation (REET) model allows researchers and analysts to fully evaluate the energy and emission impacts of advanced vehicle technologies and new transportation fuels.

GRI Standards: The GRI Standards are one of the first global standards for sustainability reporting. They feature a modular, interrelated structure, and represent the global best practice for reporting on a range of economic, environmental and social impacts.

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 one year (or another 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): SB 375 sets regional targets for GHG 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 do not rely on the use of fossil fuels.

Vehicle Miles Traveled (VMT): The total number of miles traveled by vehicles within a given geographic boundary over a specified 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 the Environmental Protection Agency (EPA) publication, 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 the 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. EPA models. All relevant greenhouse gases are included.

Scope 2 GHG emissions are calculated from annual electricity consumption and emissions factors sourced from the 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/ci-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 analysis 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, and the number of workers is based on monthly submittals from prime contractors in compliance with the National Targeted Hiring Initiative (NTHI).

PERFORMANCE

ECONOMIC DEVELOPMENT AND GOVERNANCE

FUNDING AND INVESTMENT

| Funding and investments | 2015 | 2016 | 2017 | 2018 |
|--|------|---------------|---------------|-------------|
| Total Invested | - | \$2.3 billion | \$3.5 billion | \$5 billion |
| Investment in California Firms/ Workers | - | 94% | 97% | 97% |
| Federally Funded Investment | - | 70% | 70% | 73% |

DISPATCHED WORKERS BY CONSTRUCTION PACKAGE

| Dispatched workers | 2015 | 2016 | 2017 | 2018 |
|--------------------------|------|-------|-------|-------|
| Construction Package 1 | 214 | 1,089 | 1,239 | 1,716 |
| Construction Package 2-3 | - | 257 | 318 | 750 |
| Construction Package 4 | - | 106 | 142 | 293 |

CONSTRUCTION HOURS BY CONSTRUCTION PACKAGE

| Construction hours | 2015 | 2016 | 2017 | 2018 |
|--------------------------|--------|---------|---------|-----------|
| Construction Package 1 | 83,154 | 666,033 | 539,547 | 1,538,063 |
| Construction Package 2-3 | - | 59,638 | 60,032 | 297,334 |
| Construction Package 4 | - | 8,219 | 8,627 | 47,037 |

CREATING OPPORTUNITIES FOR DISADVANTAGED WORKERS AND FOSTERING DIVERSITY: WORKER SUMMARY

| Workers | 2015 | 2016 | 2017 | 2018 |
|----------------------------------|------|-------|-------|-------|
| Construction Workers Dispatched | 214 | 1,525 | 1,699 | 2,759 |
| Disadvantaged Workers Dispatched | - | 174 | 149 | 402 |

SMALL AND DISADVANTAGED BUSINESS SUMMARY

| Small and disadvantaged businesses | 2015 | 2016 | 2017 | 2018 |
|--|------|------|------|------|
| Small Business Participants – Total | 318 | 417 | 427 | 474 |
| Disadvantaged Business Enterprises (DBE) | 100 | 130 | 139 | 157 |
| Disabled Veteran Business Enterprises (DVBE) | 36 | 49 | 51 | 52 |
| Small Business Located in Disadvantaged Communities | - | 96 | 115 | 129 |

PROCUREMENT SUMMARY

| Procurement location | 2015 | 2016 | 2017 | 2018 |
|---|-------------|-------------|-------------|-------------|
| Local Procurement (U.S.-based businesses) | Nearly 100% | Nearly 100% | Nearly 100% | Nearly 100% |
| Expenditures in Disadvantaged Communities | - | 52% | Nearly 60% | 54% |

ENERGY AND EMISSIONS**ENERGY CONSUMPTION**

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

PROJECTED ANNUAL GHG EMISSIONS AVOIDED (MMTCO₂E)*

| YEAR | LOW | HIGH |
|------|-----|------|
| 2030 | .26 | .32 |
| 2040 | 1.2 | 1.4 |
| 2050 | 1.3 | 1.5 |
| 2079 | 1.7 | 1.9 |

* The greenhouse gas emissions reduction scenarios reflect the ridership range expressed in the 2018 Business Plan. Ridership is expressed as both a medium case, and a 75 % percentile, which provides the low and high emissions scenarios. The Authority calculates emissions reductions for the initial 50-year span of operation (2029-2079, per the 2018 Business Plan). These reductions are reported at intervals corresponding to state reduction milestones (2030,2050), program milestones (2040), and at year 50 (2079).

PROJECTED CUMULATIVE GHG EMISSIONS AVOIDED: TAILPIPE (MMTCO2E)*

| YEAR | LOW | HIGH |
|------|------|------|
| 2030 | .45 | .55 |
| 2040 | 9.3 | 11 |
| 2050 | 21.5 | 25.5 |
| 2079 | 64.3 | 75.9 |

*The greenhouse gas emissions reduction scenarios reflect the ridership range expressed in the 2018 Business Plan. Ridership is expressed as both a medium case, and a 75 % percentile, which provides the low and high emissions scenarios. The Authority calculates emissions reductions for the initial 50-year span of operation (2029-2079, per the 2018 Business Plan). These reductions are reported at intervals corresponding to state reduction milestones (2030,2050), program milestones (2040), and at year 50 (2079).

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

| YEAR | LOW | HIGH |
|------|------|------|
| 2030 | .56 | .69 |
| 2040 | 11.5 | 13.8 |
| 2050 | 26.7 | 31.7 |
| 2079 | 80.8 | 96.1 |

*We have consistently reported the projected GHG emissions avoided through mode shift to high-speed rail service, using a quantification method developed with the California Air Resources Board. This method relies on an emissions factor for gasoline, diesel and jet fuel that is limited to the tailpipe emissions. https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/hsra_hsr_finalqm_16-17.pdf

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.

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

| Emissions source | 2015 | 2016 | 2017 | 2018 |
|---------------------------------------|-------|-------|-------|-------|
| Office Energy Emissions: Scope 2 | 307 | 381 | 344 | 459 |
| Contractor Vehicle Emissions: Scope 3 | 1,400 | 4,282 | 6,795 | 8,063 |

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

| Emissions avoided source | 2015 | 2016 | 2017 | 2018 |
|---------------------------|---------|---------|---------|---------|
| Recycling | 12,000 | 19,774 | 51,665 | 12,900 |
| Bookend and Connectivity* | 142,519 | 142,519 | 142,519 | 142,519 |

**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 |
|----------------------------|----------------|------------------------|----------------|------------------------|----------------|------------------------|----------------|------------------------|
| NOx – Nitrogen Oxide | 4,006 | -49% | 23,024 | -51% | 20,944 | -70% | 27,190 | -54% |
| ROG – Reactive Organic Gas | 549 | -41% | 1,715 | -58% | 2,441 | -59% | 2,318 | -58% |
| PM – Particulate Matter | 341 | -41% | 1,082 | -60% | 1,467 | -61% | 1,964 | -43% |
| BC – Black Carbon | 254 | -42% | 833 | -60% | 1,130 | -61% | 1,513 | -43% |

VOLUNTARY EMISSIONS REDUCTION AGREEMENTS (VERA)

| vera details | 2015 | 2016 | 2017 | 2018 |
|--|------|-------|-------|------|
| VERA Offsets: Total Lifetime Emissions in tons | 26 | 1,006 | 1,369 | 1375 |
| VERA Investment - \$ million | - | 9 | 13 | 13 |
| VERA Equipment – Tractors | 20 | 46 | 82 | 84 |
| VERA Equipment – Trucks | - | 104 | 161 | 162 |
| VERA Equipment – School Bus | - | - | 1 | 1 |

NATURAL RESOURCES**WATER CONSUMPTION (IN GALLONS)**

| Water Usage | 2015 | 2016 | 2017 | 2018 |
|--------------|-----------|------------|------------|--|
| Office | 1,060,560 | 1,317,600 | 1,464,480 | 1,952,640 |
| Construction | 2,517,153 | 14,500,000 | 31,207,986 | 13,150,724 (potable) 58,927,468 (non-potable) |

HABITAT AND AGRICULTURAL LAND PRESERVATION (IN ACRES)

| Land | type of preservation | 2015 | 2016 | 2017 | 2018 |
|--------------|---------------------------|------|-------|-------|-------|
| Habitat | Preserved and Restored | 400 | 2,000 | 2,510 | 2,680 |
| Agricultural | Approved for Conservation | - | 1,200 | 1,200 | 1,200 |
| Agricultural | Secured | - | - | 273 | 273 |

SUSTAINABLE INFRASTRUCTURE

RECYCLING AND REUSE (IN TONS)

| Material | 2015 | 2016 | 2017 | 2018 |
|-----------------------------|--------|--------|--------|--------|
| Recycled/Reused Concrete | 37,000 | 70,414 | 64,489 | 10,301 |
| Recycled/Reused Asphalt | - | 10,544 | 38,802 | 691 |
| Recycled Mixed Metals | 2,700 | 1,284 | 3,311 | 716 |
| Recycled Wood | - | 513 | 361 | 714 |
| Recycled Organics | - | 2 | 2,306 | 6,044 |
| Mixed Recycling | 3,500 | 4,088 | 11,063 | 2,936 |
| Materials Landfilled | 360 | 327 | 326 | 2,948 |

MATERIALS RECYCLING PERCENTAGES AND OVERALL RECYCLING RATE

| Recycling Details | 2015 | 2016 | 2017 | 2018 |
|-----------------------------|------|-------|-------|-------|
| Recycled Concrete and Metal | 100% | 99.9% | 100% | 100% |
| Recycled Other Materials | 91% | 98.2% | 99.4% | 77.9% |
| Overall Recycling Rate | - | 99.6% | 99.7% | 87.9% |

WORKER HEALTH AND SAFETY, INJURY RATE

| Injury Rate ^[26] | 2015 | 2016 | 2017 | 2018 | State Benchmark ^{[27],[28], [29]} |
|-----------------------------|------|------|------|------|--|
| Construction Package 1 | 3.56 | 1.12 | 1.76 | 1.59 | - |
| Construction Package 2-3 | 0 | 0 | 0 | 0.29 | - |
| Construction Package 4 | N/A | N/A | 0 | 0 | - |
| Overall Weighted Average | 2.09 | 0.54 | 1.1 | 0.97 | 4.5 |
| Lost Days Rate | | | | | |
| Construction Package 1 | 0 | 0.37 | 0.7 | 0.4 | - |
| Construction Package 2-3 | 0 | 0 | 0 | 0 | - |
| Construction Package 4 | N/A | N/A | 0 | 0 | - |
| Overall Weighted Average | 0 | 0.18 | 0.44 | 0.22 | 2.8 |
| Fatalities | | | | | |
| Total Fatalities | 0 | 0 | 0 | 0 | 55 ^[30] |

STATION COMMUNITIES

COMMUNITY OUTREACH

| Event Information | 2015 | 2016* | 2017** | 2018*** |
|-------------------------------------|------|-------|--------|---------|
| Open Houses and Community Meetings | 85 | 85 | 40 | 377 |
| Attendees | 6000 | 6000 | 953 | 15,000+ |
| Events in Disadvantaged Communities | 130 | 130 | 15 | 238 |

Notes:

* 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)

END NOTES

1. As defined by CalEnviroScreen. (Page 2)
2. 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. (Page 22)
3. Approximately \$929 million of unexpended FY2010 grant agreement funding was terminated by the Federal Railroad Administration on March, 4, 2019. The termination is now subject to a legal suit filed by the State of California on behalf of the Authority. (Page 23)
4. Direct, indirect and induced effects. (Page 24)
5. When summed, the total of the four regions shown in this graphic do not equal the total benefits to the state. Exhibit 2.6 shows results for the four regions only, not including the many counties in California where economic effects have taken place over this 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_FINAL_031219.pdf (Page 26)
6. Energy consumption 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. (Page 34)
7. Approximately 24 percent of construction electricity use has been estimated/extrapolated to fill gaps in available information. (Page 34)
8. Authority Office electricity consumption is estimated based on number of Authority and Rail Delivery Partner staff working on the project in 2018. (Page 34)
9. Details of the emissions reduction calculation methodology are available online at: https://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 because of the service provided by high-speed rail, so they are classified as Scope 3 emissions reductions. (Page 35)
10. For more information, see https://ww3.arb.ca.gov/cc/capandtrade/auctionproceeds/hsra_hsr_finalqtr_16-17.pdf (Page 36)

11. 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 be validated for accuracy. If necessary, final updated figures will be published in the next Sustainability report. (Page 46)
12. Approximately 3% of construction water use has been estimated/extrapolated to fill gaps in available information. Approximately 3% of construction water use has been estimated/ extrapolated to fill gaps in available information. (Page 46)
13. Office water use is estimated based on number of Authority and Rail Delivery Partner staff working on the project in 2018. Office water use is estimated based on number of Authority and Rail Delivery Partner staff working on the project in 2018. (Page 46)
14. 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. (Page 54)
15. Reported as rate per 200,000 hours of work. (Page 56)
16. California Heavy and Civil Construction Industry 2016. (Page 56)
17. California Heavy and Civil Construction Industry 2016. (Page 56)
18. California Heavy and Civil Construction Industry 2016. (Page 56)
19. Fatal occupational injuries by selected characteristics, by major event or exposure. California, U.S. Bureau of Labor Statistics, 2016. (Page 56)
20. Paying it Forward: The path toward climate-safe infrastructure in California, A Report of the Climate-Safe Infrastructure Working Group to the California State Legislature and the Strategic Growth Council, September 2018. (Page 59)
21. Vision California; "Charting Our Future: Statewide Scenarios Report", May 201. (Page 64)
22. Board member diversity is not reported by age or minority group. (Page 75)
23. New hire and turnover rates are not reported by age group, gender or region. (Page 76)
24. Training hours are not reported. (Page 76)
25. Employee diversity is not reported by age or minority group. (Page 77)
26. Reported as rate per 200,000 hours of work. (Page 91)
27. California Heavy and Civil Construction Industry 2016. (Page 91)
28. California Heavy and Civil Construction Industry 2016. (Page 91)
29. California Heavy and Civil Construction Industry 2016. (Page 91)
30. Fatal occupational injuries by selected characteristics, by major event or exposure. California, U.S. Bureau of Labor Statistics, 2016. (Page 91)



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