

California High-Speed Rail

Sustainability Report

December 2017





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Letter from the CEO

A Transformative Investment in California's Future

It is my pleasure to present the California High-Speed Rail Authority's (Authority) second Sustainability Report. Our inaugural **Sustainability Report** was published in December 2016 and covered our 2015 calendar year performance. This issue covers our 2016 calendar year accomplishments.

The Authority uses this annual report to share our progress in advancing sustainability priorities throughout the past 12 months, and to consider future opportunities and challenges. As with last year, we are proud of the progress we are making toward building this vital infrastructure program, which will benefit Californians for generations to come.

California is a land of innovators who take bold action. The high-speed rail system reflects this legacy of invention and investment as we strive to realize a better future. Simply put, our goal is to create the greenest infrastructure project in the nation, both in construction and operations, honoring California's culture of environmental stewardship, economic progress, and social justice. To that end, this report reflects the priorities and concerns of our many stakeholders – including community leaders, elected officials, partner organizations, our employees and contractors, sustainability peers and organizations – and ultimately, the people who will travel on this system. During 2016, the Authority continued its work as a sustainability leader. This program is notable among infrastructure projects for establishing and sharing sustainable techniques and processes in coordination with the daily business of building a high-speed rail system.

In 2016, we accomplished the following in furthering our sustainability and other program objectives:

- ▶ Advanced construction on several new sites in the Central Valley.
- ▶ Recycled 99 percent of all construction materials, including 100 percent of all concrete and steel, keeping 87,100 tons of waste material out of landfills.
- ▶ Continued safe and clean construction practices resulting in no work-related fatalities, and air quality on site that was 50 to 60 percent cleaner than an average California construction site.
- ▶ Participated in the inaugural Global ESG Benchmark for Real Assets (GRESB) Infrastructure Asset Assessment program, ranking fourth globally.
- ▶ Completed analysis showing that more than 52 percent of our investments through 2016 were made in disadvantaged communities, contributing over a billion dollars to those economies.
- ▶ Further showed that our investment has resulted in approximately 20,000 job-years of employment.



Our goal is to deliver the greenest infrastructure project in the nation. High-speed rail is a critical part of future mobility and achieving California's climate goals.

- ▶ We ensure that the actions we take today enable current and future generations to lead healthy and rewarding lives
- ▶ We will deliver a zero-emissions transportation system
- ▶ We are committed to Net-Zero Energy and LEED Platinum facilities

- ▶ Approved a Peninsula Corridor Improvement Plan which provided additional funding support for Caltrain Electrification.
- ▶ Signed a Memorandum of Understanding with the City of San Mateo to support three grade separation projects to improve safety, including the 25th Avenue Grade Separation, in the San Francisco Peninsula corridor.
- ▶ Signed a Memorandum of Understanding with the California Energy Commission to help explore the latest in green technology and renewable energy, which will help inform the operations and maintenance of the high-speed rail system.
- ▶ Adopted a revised Sustainability Policy which guides our approach to managing environmental, social and governance issues.
- ▶ Adopted the 2016 Business Plan which identified the Silicon Valley to the Central Valley Line as the initial segment for passenger service.

This Sustainability Report outlines the many ways that the Authority is addressing our sustainability priorities including agency policies, agreements, a jobs training program, small business workshops, environmental sustainability practices, and construction activities. Our stakeholders value up-to-date information on our performance in these areas and reporting at this level of transparency allows us to improve over time. For example, tracking the disadvantaged communities reached helps us focus relevant information for those seeking work on the project; monitoring construction site emissions reveals areas where we can improve construction processes and strengthen contract requirements, such as using electric vehicles in the on-road fleet to further reduce emissions.

To support this report, we have also prepared a [Global Reporting Initiative \(GRI\) Content Index](#) and [GRI Supplement](#) – containing additional sustainability performance and management details in accordance with [GRI G4 Sustainability Reporting Guidelines](#). It is included as a technical appendix.

Transforming California by delivering a zero-emissions transportation system that inspires sustainable development is at the core of the Authority's mission. High-speed rail will be the backbone of an integrated, modern, statewide rail network which we are advancing together with our state, regional and local partners. It will forge new connections between cities, enhancing access to jobs and affordable housing. Linking high-speed rail with intercity and metropolitan rail systems will significantly improve access, mobility and connectivity throughout California as our state's population grows to 50 million people by 2050.

The risks and uncertainty presented by climate change also drive our responsibility to deliver a safe, reliable and clean project for the future. Building high-speed rail requires a significant commitment of resources and we are dedicated to ensuring that we use these resources responsibly while evolving to meet the demands of a changing project and environment. We are proud to provide sustainability leadership for the state and the nation, guiding the delivery of this visionary high-speed rail program that benefits all Californians.



Tom Fellenz,
Interim Chief Executive Officer

Statewide High-Speed Rail System



LEGEND

- Phase 1
- Phase 2
- Station

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About This Report

Report Structure

To ensure that this report is transparent and presents meaningful information in a credible and consistent way, the Authority used the world's leading and most widely adopted sustainability reporting framework – the Global Reporting Initiative (GRI) Reporting Guidelines.

This report is written in accordance with the GRI G4 Core Reporting Guidelines. It covers the period from January 1, 2016 to December 31, 2016 and will be updated annually. Some indicators have been updated for the most current data available. It provides a concise summary of the high-speed rail program's performance and highlights of our progress. This report is accompanied by a GRI Content Index and **GRI Supplement**, which contains additional information in accordance with the GRI G4 Core Guidelines. The contents of this report have not been externally assured.

This report is organized around the five areas of the Authority's sustainability framework:

- ▶ Business and Management
- ▶ Energy
- ▶ Natural Resources
- ▶ Sustainable Infrastructure
- ▶ Communities

Some sustainability issues are relevant to more than one area. For example, the program's procurement practices could be reported under Communities because they benefit local communities, or under Business and Management as they pertain to how the business is governed. For consistency and transparency, topics are reported under the same priority sections in both the **2016** and 2017 Sustainability Reports.

These priorities are central categories in monitoring progress and examining options for improvement. As categorized below, and throughout this report, the highlighted objectives, actions and 2016 accomplishments demonstrate and renew our commitment to sustainable policies and methods as we build the nation's first high-speed rail system.

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

Any printed original version of this report will be printed on 30 percent post-consumer paper, bound with (recycled) bindery material and delivered to the California State Legislature. To minimize paper use, respect our environment and preserve natural resources, we encourage sharing printed copies and/or reading this document online. Please print additional copies only when necessary.



Our Sustainability Approach

Our approach to sustainability ensures that actions taken today enable current and future generations to lead healthy and rewarding lives. To that end, we focus on life-cycle decision making to optimize outcomes for the communities in which we work, the ecosystems through which the system will operate, and the ongoing finances for the system. We use a Sustainability Framework, developed through consultation with key state and federal partners as well as our Board of Directors, as the organizational structure for sustainability action and policies. Details on that framework, our Sustainability Policy, and implementation can be found at http://www.hsr.ca.gov/docs/programs/green_practices/sustainability/Sustainability_signed_policy.pdf.

In March 2016, the Authority’s Board of Directors adopted the revised **Sustainability Policy** which renewed and strengthened the program’s commitment to:

- ▶ Targeting net-zero greenhouse gas and criteria pollutant emissions in construction
- ▶ Operating the system entirely on renewable energy
- ▶ Developing Net-Zero Energy and LEED Platinum facilities
- ▶ Planning for climate change adaptation
- ▶ Prioritizing life-cycle considerations

Evaluating Environmental, Social and Governance Indicator Performance

In 2016, we participated in the inaugural assessment of the environmental, social and governance (ESG) performance of infrastructure assets – the **GRESB Infrastructure Assessment**. We also used sustainable infrastructure rating systems, such as **Envision**, and assessed the high-speed rail program using other global sustainable infrastructure metrics. Using these types of third party assessments helps us understand our performance relative to peer infrastructure projects and, more importantly, it shows us areas where we can improve.

The GRESB Infrastructure Assessment is of value as we consider ways to attract private investment. GRESB Infrastructure was launched to provide a globally consistent, voluntary assessment, objective scoring, and peer benchmarking for environmental, social, and governance performance of infrastructure assets and funds. The Authority was among the first entities to participate in this Assessment, demonstrating our broader commitment to setting a new standard in sustainable high-speed rail and infrastructure. Results of this assessment rank the program in relation to our peers on environmental, social and governance policies, practices, and performance.

In the GRESB framework, the California High-Speed Rail program was awarded five stars and ranked the top infrastructure project in North America, placing first among similar projects, as well as fourth among all global participating infrastructure assets in 2016. The Authority participated in the GRESB Infrastructure Asset Assessment again in **2017**, and maintained the high-speed rail program’s standing among leading infrastructure projects in North America.

Business and Management

We focus on the issues of job creation, economic benefits, continuous improvement, transparency, accountability, and maximizing opportunity for private investment because these are hallmarks of doing business in California and are encoded into the program's structure through governing statute and agency policy. The Authority's **Sustainability Policy** identifies several objectives under the priority of Business and Management (also referred to as governance) that relate to how the Authority and its consultants and contractors help tailor the program to deliver economic value to California and Californians.

This section of the report focuses on actions including job creation and economic development results, topics that rank high among our stakeholders, while the GRI Supplement provides additional information on management and delivery.

Job Creation

The ongoing creation of jobs in the design, planning, and construction of the system is one of the key benefits of the project. Focusing on jobs in disadvantaged communities is a direct result of the Authority's governance process (policies and procedures that govern actions for the program) and has enabled local economic development through job creation. Currently there are three design-build construction packages underway in the Central Valley. Current job hours for each construction package are shown in **Exhibit 1.0**.

Jobs supported by high-speed rail investment have grown significantly over the past several years as construction commenced and ramped up in the Central Valley – with over 200 percent job growth from 2014 to 2016. Investment in California's economy in Fiscal Year 2015-16 yielded 9,450 direct, indirect, and induced job-years. As the program's focus has shifted from planning to project delivery, the types of jobs supported by the program have also shifted from primarily engineering and environmental planning services to construction. Additionally, from mid-2006 to mid-2016, 52 percent of project expenditures occurred in designated disadvantaged communities as defined by CalEnviroScreen. This percentage will increase as construction spending increases along the Central Valley alignment.

For more information on the economic effects of the program, visit www.buildhsr.com/hsrinvestment.

Exhibit 1.0: Construction Hours and Numbers of Workers

CONSTRUCTION PACKAGE	HOURS WORKED	NUMBER OF DISPATCH WORKERS
Construction Package 1	666,033	1,089
Construction Package 2-3	59,638	257
Construction Package 4	8,219	106
TOTAL	733,890	1,452

Information as of September 30, 2017

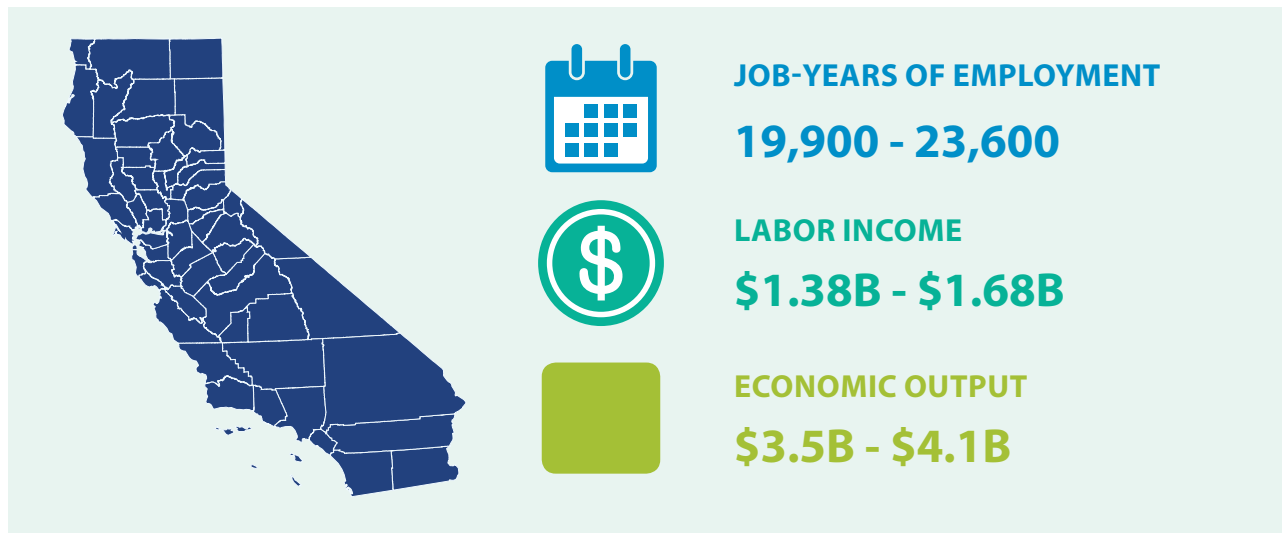
Exhibit 1.1: High-Speed Rail Construction Package 1-4



Exhibit 1.2: High-Speed Rail Direct Investment & Results



Exhibit 1.3: Total California Benefits, July 2006 - June 2016



Opportunities for Disadvantaged Workers

The Authority is committed to ensuring that jobs are created to benefit communities most in need. The Authority's **Community Benefits Agreement (CBA)** is a cooperative partnership between the Authority, skilled craft unions, and contractors. Under the CBA, training opportunities are advanced and promoted for all individuals. It is based on the Authority's **Community Benefits Policy**, which promotes employment and business opportunities for small and disadvantaged businesses and workers during the construction of the high-speed rail project.

Through the CBA, we are continually focused on engaging disadvantaged communities and achieving employment targets for individuals who reside in disadvantaged areas, and those designated as Disadvantaged Workers, including veterans. The Authority's activities to engage disadvantaged communities through small business advocacy and environmental planning work reached more than 8,200 people at approximately 130 events in 2016.

For additional Business and Management indicators, please see the **GRI Supplement**.

Exhibit 1.4: Disadvantaged Community Benefits

52%

of project expenditure occurred in disadvantaged communities throughout California, spurring economic activity in these areas.



FERNANDO MADRIGAL, JR. From Security Guard to Electrician

In the more than two years since the official groundbreaking, the high-speed rail project has created hundreds of well-paying jobs for workers throughout the Central Valley. Fernando Madrigal, Jr. personifies the opportunities associated with high-speed rail.

Madrigal left the Marine Corps after 12 years of service. After working a few security guard jobs, he signed up for a 10-week training program sponsored by PG&E to introduce workers to the various construction trades. Madrigal settled on a career path as an electrician and worked his way up to a third-year apprentice union electrician with Local 100 of the International Brotherhood of Electrical Workers (IBEW). He is employed by AC Electric Company and has worked on the high-speed rail project for nine months. He helped build a new administration building and a school-bus refueling station for the Kings Canyon Unified School District. He is currently part of a crew that's working near the site of the new Clinton Avenue Bridge, which is being rebuilt as part of the realignment of State Route 99. Madrigal's crew is identifying underground utility locations and setting up power connections for new traffic signals.



Energy

INVESTMENT IN ENERGY STORAGE PROJECTS

Benefiting Disadvantaged and Low-Income Communities

In October 2017, the CPUC announced a new equity program that will direct 25 percent of funds for distributed energy storage to low income households and environmentally at-risk communities throughout California. Additional customers who will benefit include state and local government agencies, educational institutions, non-profits and small businesses. The CPUC will allocate 25 percent of the funds collected in the Self-Generation Incentive Program (SGIP) for energy storage projects, an estimated \$55 million through 2020.

We focus on energy because it will comprise one of the largest costs for operating the system. Since 2008, the Board of Directors has committed to efficiently running the system entirely on renewable energy. All high-speed rail stations will be high-performance buildings and certified using Leadership in Energy & Environmental Design (LEED®). 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 is consumed by the facility over the course of a year.

The Authority is also developing plans for how excess energy produced at stations can help achieve more restorative development in station districts. Working towards net-positive energy facilities includes partnering with adjacent developments and helping our local partner communities reach important milestones for renewable energy and sustainability.

To advance our commitment to use 100 percent renewable energy to operate trains and facilities, we are working with the California Public Utilities Commission (CPUC) and the California Independent System Operator (CAISO) to keep abreast of regulatory trends and requirements.

We are also working closely with local utilities to reinforce transmission connections to the rail system and strengthen grid connections. In October 2016, the Board of Directors approved a contract with Pacific Gas and Electric (PG&E) for the design and acquisition of permits for improvements to ten PG&E substations. These facility upgrades will provide electricity for high-speed rail within corresponding service areas and is a significant step towards delivering electricity to the system.

In 2016, the Authority also continued developing its renewable energy policy to reflect emerging opportunities, such as battery storage and distributed energy systems. This further refines the strategy and implementation measures needed to achieve our renewable energy goals through collaboration with the Energy Commission, other state agencies and the energy industry.

We also finalized performance requirements and design direction regarding renewable energy in station facilities and continued active engagement with local jurisdictions on energy issues, including participation in the Energize Fresno Technical Advisory Committee.

Energy Use Indicators

We track energy use in two distinct areas: the energy Authority employees use in our offices, and the energy that our contractors use in constructing the system. Tracking both independently allows for more focused implementation actions to minimize our energy footprint.

We estimate that, in 2016, our offices consumed approximately 1,287 MWh of electricity to power computers and lights and supply heating and cooling.

Construction activities occurred on more than 100 miles of the system throughout 2016, and we continued monitoring fuel consumed by construction vehicles and equipment. In 2016, construction vehicles and equipment burned nearly 200,000 gallons of diesel and just over 200,000 gallons of gasoline fuel, equivalent to approximately 55,800 gigajoules (GJ) of energy.

For additional Energy indicators, please see the [GRI Supplement](#).



Exhibit 2.0: 2015 and 2016 Construction Equipment Fuel Summary

FUEL TYPE	2015 CONSUMPTION (REVISED)*	2016 CONSUMPTION
Diesel – Off-Road Equipment	26,816 gallons	172,684 gallons
Diesel – On-Road Equipment	5,859 gallons	26,665 gallons
Gasoline – On-Road Equipment	116,947 gallons	203,304 gallons

**Occasionally information published in previous reports is restated as updated information.*

Natural Resources

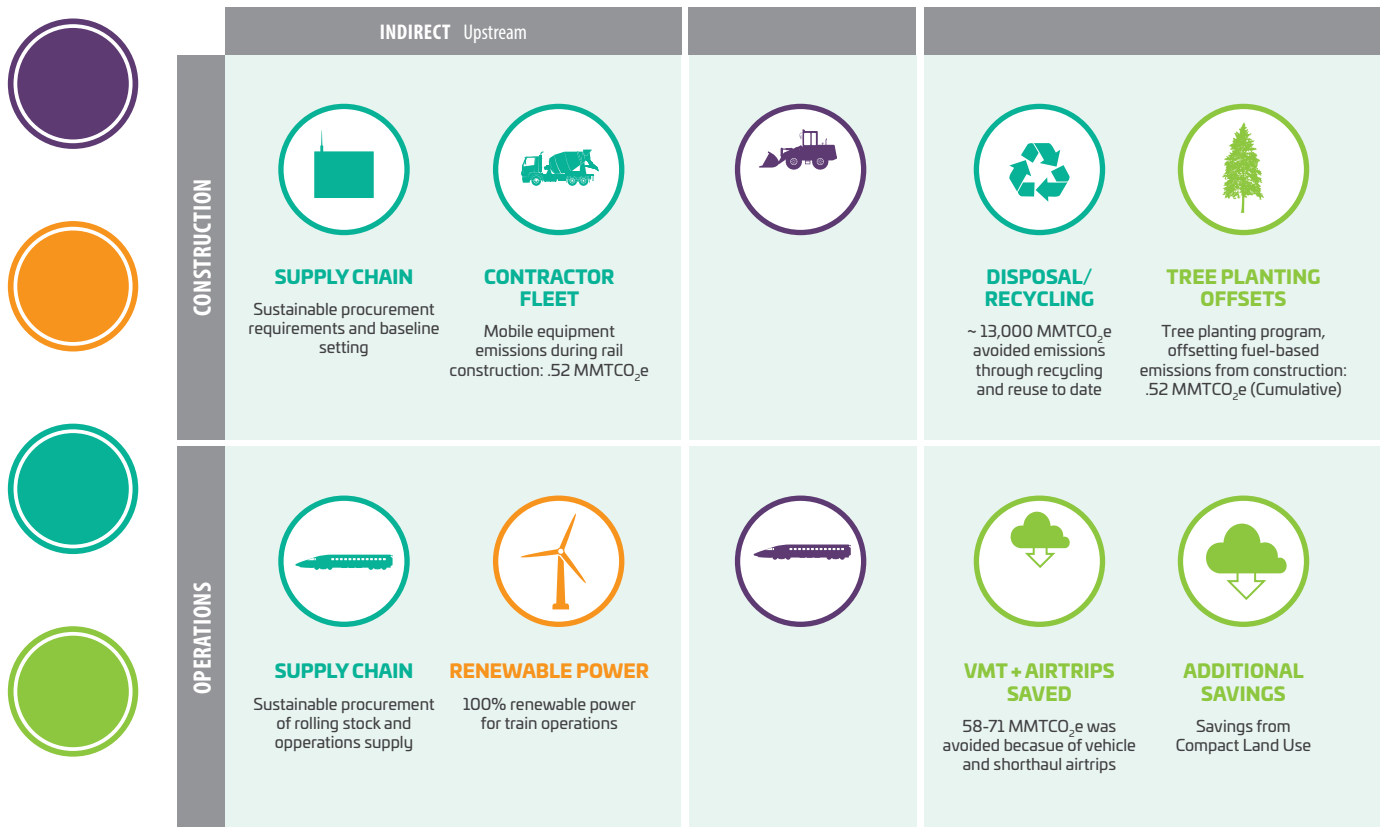
Protecting and enhancing natural resources is essential for any sustainability program. Our policies and practices are helping to ensure that future generations have the resources necessary to lead meaningful and productive lives.

Minimizing GHG Emissions

The State of California continues to be at the national forefront and is a global leader among subnational jurisdictions in establishing targets for reducing GHG emissions and transitioning to a sustainable, low-carbon future. The high-speed rail system has always been consciously planned as a key means to reduce transportation GHG emissions by shifting travel away from automobiles and short-haul air travel. Tracking GHG emissions illustrates the relationship of the system to global natural resources.

The Authority understands that a program of this magnitude can shape practices by other entities in the delivery of the infrastructure to reduce the production of GHG emissions during construction. We discuss these sustainable infrastructure activities in more detail in the following section (Sustainable Infrastructure) but also provide Exhibit 3.0 to summarize the sources of GHG emissions and savings across the aspects of the program (construction and operation) over time. These are presented by scopes of emissions, which is a standard reporting practice that categorizes emissions.

Exhibit 3.0: Emissions Generated by Scope: 2015-2075*



*MMTCO₂e stands for million metric tons of carbon dioxide equivalent.

In addition, the Authority values the transparent reporting of annual emissions. As with energy, the Authority tracks GHG emissions produced from employee activities in offices and produced at construction sites. Because the Authority has very different means to control these activities, it is important to separate these two categories. In 2016, the Authority emitted 381 metric tons of carbon dioxide equivalent (MTCO_{2e}) from energy use in its offices and accounted for 4,282 MTCO_{2e} of upstream emissions from contractor vehicle fuel use.

Tracking this information provides valuable insight into how we can further leverage contract provisions, develop pilot programs, include additional specifications and establish new policies to reduce or minimize emissions. We also look for opportunities to avoid emissions, such as through recycling materials arising from the construction process (e.g., demolition). In 2016, approximately 13,251 MTCO_{2e} emissions were avoided through recycling construction materials.

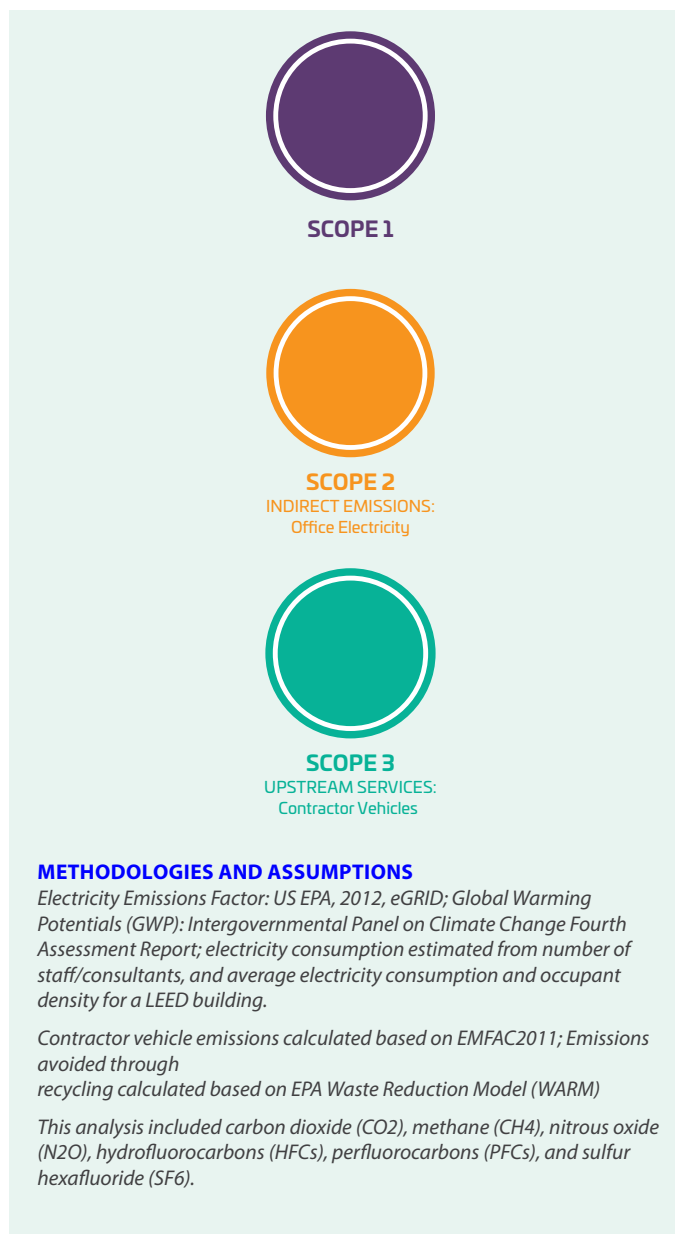
Exhibit 3.1 provides greater detail on the GHG emissions specific to 2016, including the amounts, the types of gases involved and the methodologies used for calculations.

Reducing GHG Emissions During Construction

The Authority's approach to GHG management begins with minimizing emissions as shown in Exhibit 3.2. The primary way in which we minimize GHG emissions during construction is through binding contract provisions that construction contractors must meet and which are governed by the Authority's Sustainability Policy. This policy includes specific measures to decrease the Authority's indirect (Scope 3) emissions associated with construction contractors, materials, and waste.

To offset remaining direct (tailpipe) GHG emissions associated with constructing the initial segment of the high-speed rail system, the Authority is implementing a tree planting program in rural and urban areas of California. In 2016, we finalized an agreement with CalFIRE to fund existing programs for tree planting and worked with CalFIRE to confirm program priorities. As of November 2017, CalFIRE had issued the notice of funding availability, had received competitive proposals and awarded two contracts.

Exhibit 3.1: 2015 GHG Emissions Summary



Reducing GHG Emissions During Operations

High-speed rail's most significant contribution to sustainability and quality of life may be its role in reducing California's GHG emissions by reducing automobile and air travel. High-speed rail creates a fast, efficient and clean alternative to these forms of travel. The positive net impact of high-speed rail on GHG emissions is projected to average at least 1.0 to 1.3 million metric tons of carbon dioxide equivalent avoided per year (MMTCO_{2e}/year) at full system ridership in 2030.

More specifically, by 2030, high-speed rail is projected to cumulatively avoid 2.1 to 2.8 million metric tons of GHG emissions, equivalent to taking

URBAN AND RURAL TREE PLANTING PROGRAM

California High-Speed Rail's commitment to net zero emissions from construction is unique not only in California, but among infrastructure projects nationally. Our urban tree planting program will target communities near the rail system and focus on providing benefits to disadvantaged communities.

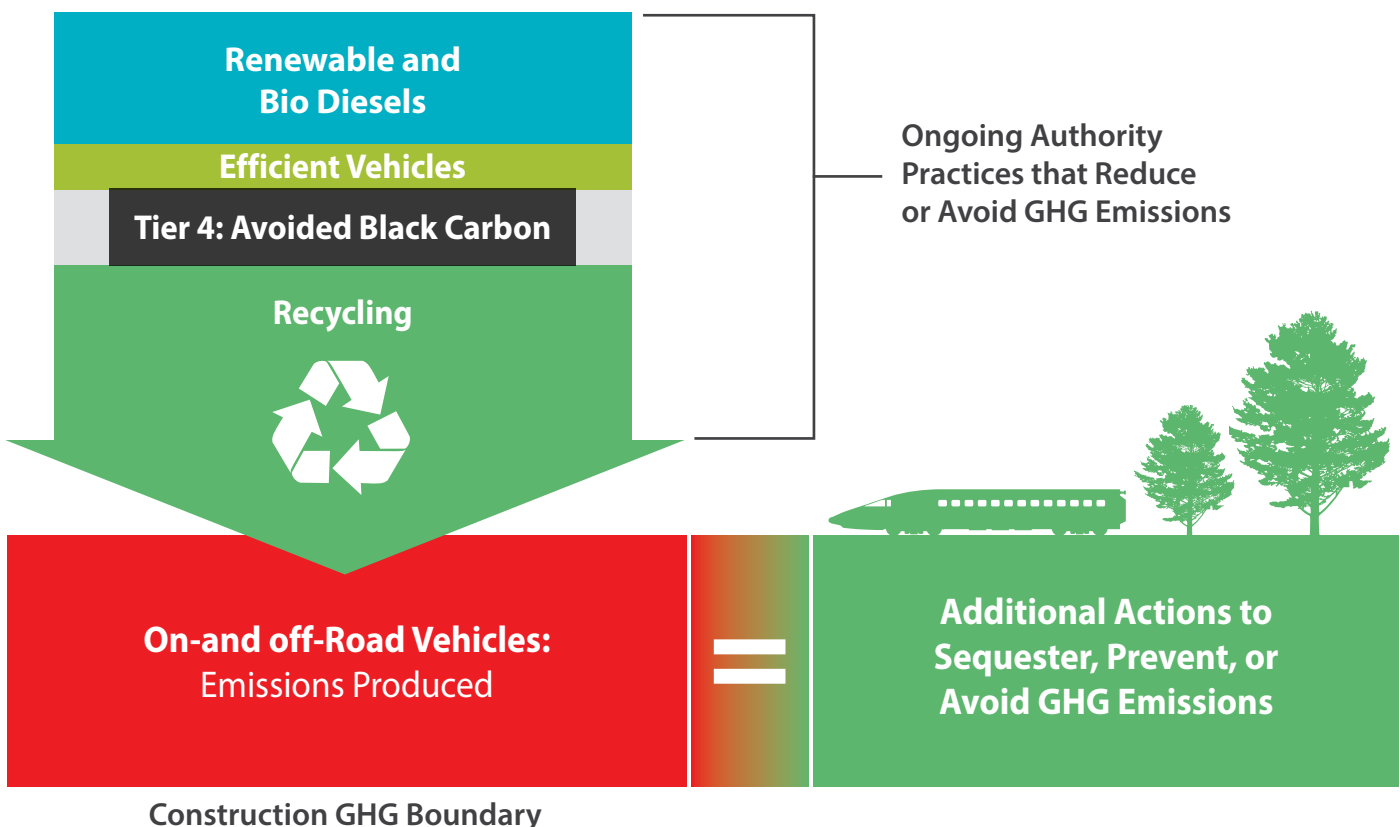


half a million cars off the road for one year and making an important contribution to California's GHG emissions reduction goals.

However, this is just the start in terms of the total impact that high-speed rail will have due to the influence that station locations and development can have to catalyze development of underused parcels in existing cities. High-speed rail will help spur more transit and pedestrian-oriented, and less automobile dependent development in the station areas it runs through. In addition, the synergy between a modern, statewide rail network, with high-speed rail as its backbone, will create a unique opportunity for local municipalities to redevelop their growth plans and financing mechanisms toward more compact land use patterns and high-speed rail oriented development, further accelerating development and multimodal connectivity around the stations. The combined effect of this integrated rail network and more sustainable land use practices will lead to even greater reductions in GHG emissions through efficient buildings and reductions in vehicle miles travelled (VMT).

Exhibit 3.3 and Exhibit 3.4 show forecasts for both average annual emission savings and cumulative

Exhibit 3.2: Minimizing Construction GHG Emissions



emission savings at key system implementation milestones as projected in the Authority's **2016 Business Plan**. These emission savings forecasts are based on the ridership projections presented in the 2016 Business Plan, which include a high and low forecasts. Estimated GHG emissions reductions are associated with lower VMT and fewer short-haul airplane flights between California's major cities.

California's investment in high-speed rail includes early improvements to regional rail systems that will serve as a foundation for the overall program. These early bookend and connectivity investments, such as the electrification of the Caltrain corridor in the Bay Area and the Rosecrans/Marquardt Grade Separation Project in Southern California, are expected to reduce emissions by a further 142,519 MTCO₂e, as shown in Exhibit 3.5.



ROSECRANS-MARQUARDT GRADE SEPARATION

The Authority is funding a portion of the project to grade separate Rosecrans and Marquardt Avenues in Santa Fe Springs. This intersection has been rated by the California Public Utilities Commission as the most hazardous grade crossing in the State of California – with over 52,000 vehicles and around 110 trains using this grade crossing every day. To see more, visit <https://www.youtube.com/watch?v=h-z9ESXw0iE>.

Exhibit 3.3: Forecast of Average Annual Savings for Key Milestones (MMTCO₂e)

	2025 FIRST YEAR OF SILICON VALLEY TO CENTRAL VALLEY SERVICE	2029 2040 PHASE 1 SERVICE	2041 2075 PHASE 1 SERVICE
High Scenario	0.17	1.3	1.8
Low Scenario	0.12	1.0	1.4

Exhibit 3.4: 2016 Business Plan Forecast of Cumulative Savings (MMTCO₂e)

	2030	2040	2050	2075
High Scenario	2.8	16.8	32.5	71.84
Low Scenario	2.1	13.2	25.7	58.70

Exhibit 3.5: Examples of Bookend & Connectivity Project GHG Reductions (MTCO₂e) Metric Tons Carbon Dioxide Equivalent

PROJECT	GHG REDUCTION BY 2020
Caltrain Electrification (Bay Area)	79,319
Central Subway (San Francisco)	1,200
Regional Rail Connector (Los Angeles)	59,600
LINK US (Los Angeles)	600
Southern California Grade Separations	1,800
TOTAL:	142,519

Protecting Air Quality During Construction

Improving air quality is an important objective for all Californians. The Authority minimizes construction air quality emissions through the fleets used by its contractors. Specifically, all contractors working on the high-speed rail system are required to use fleets that are compliant with California vehicle standards and meet U.S. Environmental Protection Agency standards for the cleanest off-road diesel engines (which is called Tier 4 equipment).

In 2016, construction sites achieved a 51 percent reduction in nitrogen oxide, 58 percent reduction in reactive organic gases and nearly 60 percent reduction in particulate matter and black carbon, relative to a typical construction fleet in California. By reducing emissions of criteria air pollutants, the program is reducing potential health risks.

Exhibit 3.6 illustrates the effect of the Tier 4 requirement by comparing emissions from equipment fleets used in high-speed rail construction to the emissions from a typical construction equipment fleet.

The Authority addresses remaining air pollutant emissions by funding offset projects through Voluntary Emissions Reduction Agreements (VERA) with local air districts. Through 2016, the Authority's agreement with the San Joaquin Valley Air District has delivered 1,006 tons of total lifetime reductions of criteria air pollutant emissions. This has been achieved through a range of projects funded under the Air District's Heavy-Duty Engine Program, including the purchase of low-pollution agricultural tractors, trucks and school buses.

Tracking Water Use

As with energy, the Authority tracks the use of water by its employees in addition to, and separately from, water used in project construction. Tracking water use remains important as our state faces inconsistent rainfall and snowfall and ever-increasing demands on water resources from both residential and commercial users.

In 2016, Authority employees consumed an estimated 1,317,600 gallons of water, which



TIER 4 EQUIPMENT

The Authority has already minimized construction air quality emissions through the fleets used by contractors. Specifically, all contractors working on the high-speed rail system are required to use fleets that are compliant with California requirements and Tier 4 equipment that reduces the amount of criteria air pollutants released during construction. The fleets comply with stringent U.S. Environmental Protection Agency (US EPA) limits on air pollutants through clean and efficient exhaust systems, electronically controlled engines, and selective catalytic reduction systems to significantly reduce the levels of harmful pollutants.

Exhibit 3.6: 2016 Fleet Criteria Pollutant Emissions

	CP 1 FLEET	TYPICAL FLEET	% DECREASE
Nitrogen Oxide (NOx) (lbs.)	23,024	46,548	-51%
Reactive Organic Gas (ROG) (lbs.)	1,715	4,085	-58%
Particulate Matter (PM) (lbs.)	1,082	2,689	-60%
Black Carbon (lbs.)	833	2,071	-60%

corresponds to standard consumption rates for LEED certified buildings in California. The Authority's offices contain low-flow, automatic shut-off sink fixtures and low-flow toilets that minimize water use per person.

In 2016, work on construction sites used nearly 14,500,000 gallons of water for compaction and dust suppression, which helps with site air quality. Construction sites are also subject to water conservation measures per contractual requirements. Water was withdrawn from municipal water supplies for construction activities.

Preserving the California Environment

There has been significant progress protecting environmental resources, specifically natural habitat. As of October 2017, the program has successfully preserved more than 2,000 acres of natural habitat. With the help of the California Department of Conservation, the Authority has protected over 1,200 acres of agricultural lands and is in the process of closing escrows on an additional 500 acres by 2017 year end.

The Authority is using an innovative regional approach to a selection of mitigation parcels to achieve better habitat outcomes.

The process to preserve these vital lands includes:

- ▶ Incorporating existing regional conservation priorities
- ▶ Gathering input from natural resource agencies, conservation scientists and interested stakeholders
- ▶ Selecting parcels with higher-quality habitat connectivity
- ▶ Creating larger preserves and better conservation outcomes

Preservation activities include engagement with stakeholders and is a vital element of overall program delivery. Meetings, site visits, workshops and webinars are all used to coordinate and learn from local environmental organizations whose support is invaluable and essential to protecting important habitat into perpetuity.

As part of this engagement, two Wildlife Corridor Assessments have been successfully completed in Northern and Southern California. Preservation of wildlife corridors and mitigating impacts to wildlife movement, where feasible, is a part of the Authority's charge from Proposition 1A.

For additional Natural Resources indicators, please see the [GRI Supplement](#).

CASE STUDY

ERTEC Environmental Systems

LOCATION: Sacramento/Alameda

BUSINESS TYPE: Manufactures erosion, sediment and wildlife control systems

NO. OF EMPLOYEES: 20

Vince Morris is the president and CEO of ERTEC Environmental Systems, a certified small business and innovator in wildlife protection barriers. ERTEC delivered wildlife exclusion fencing for use in the construction work underway between Madera and Fresno. The fences, designed and manufactured in Sacramento, protect small endangered or threatened species by preventing them from gaining access to construction areas. This growing company is continually improving its environmentally safe fences to address many types of animal behaviors as well as construction site challenges for high-speed rail.



SAFEGUARDING CALIFORNIA

Adapting to a Changing Climate

While California continues to reduce GHG emissions and set new emission reduction targets, the state is also requiring agencies to consider the impacts of climate change. This requirement stems from Executive Order (EO) B-30-15, which states that every California agency shall consider the effects of climate in investment decisions.

The California High-Speed Rail Authority has been actively considering the potential effects of climate change on the system and contributed to the Technical Advisory Group on EO B-30-15, developing guidance on the EO.

The Authority is currently working to identify the best methods to incorporate this guidance into program functions and holistically consider climate change in all decision making associated with major capital planning, design and operation.

The Authority has also provided information on the program for the 2017 update to the Safeguarding California Plan, which is a comprehensive suite of ongoing adaptation actions by state agencies.

Sustainable Infrastructure

The high-speed rail system is a critical piece of infrastructure to help California transition to carbon-free mobility while enhancing statewide transportation access, contributing to economic development and protecting the State's natural resources.

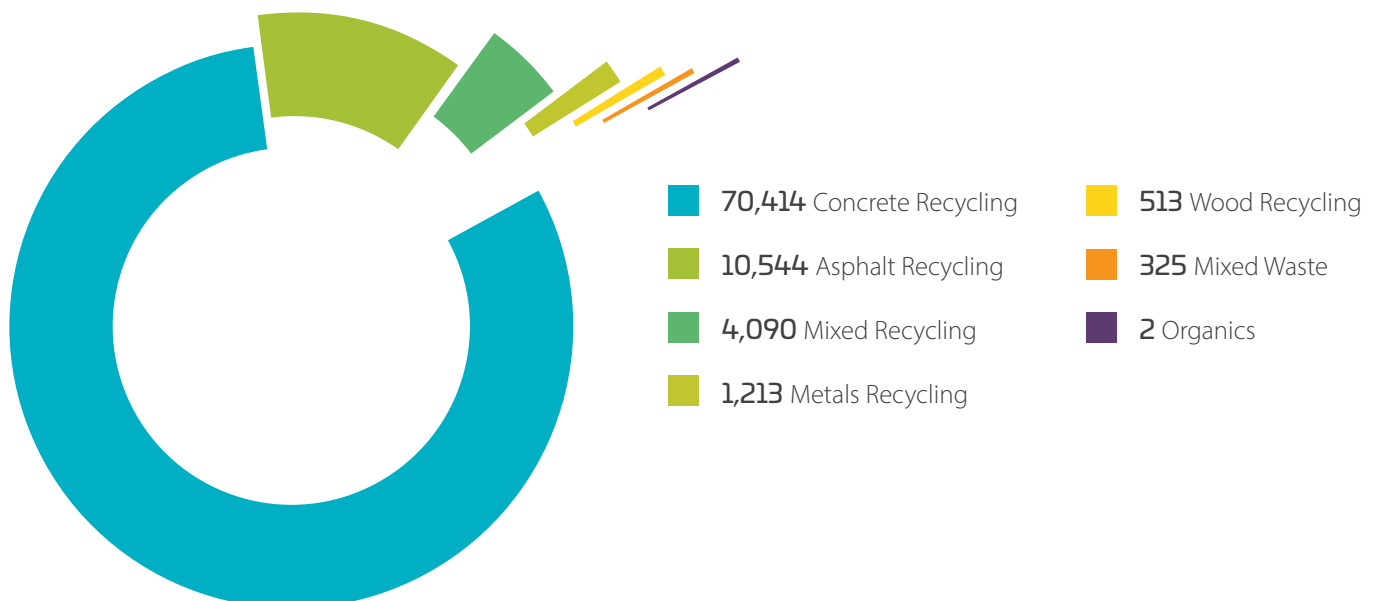
In 2016, the Authority continued work on an exposure analysis, analyzing the overlap of potential future climate threats with the high-speed rail track alignment and the system's assets. This work included coordination with regional agencies throughout the state to understand common methodologies and assumptions regarding climate change, as well as with the State's Technical Advisory Group developing guidance on climate analysis to conform with Executive Order B-30-15 (see inset).

In addition to the energy and natural resource benefits identified previously in this report, the high-speed rail system is transforming infrastructure delivery by increasing transparency surrounding construction activities, reducing air pollution and moving to eliminate waste to landfill.

Recycling Waste Responsibly

The Authority has committed to recycling 100 percent of the steel and concrete from construction and demolition and to 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 at its sites.

Exhibit 4.0: 2016 Materials Management (in tons)



In 2016, over 99 percent of the approximately 87,100 tons of rail system construction-related waste material was recycled. All concrete and metal was recycled or stockpiled for reuse, while 98 percent of other demolition debris, including organic waste, was recycled. As with water, fuel use, and construction equipment, waste and recycling information is collected directly from contractors. These recycling rates far surpass the 50 percent minimum diversion rate recommended by the California Integrated Waste Management Board and are an indicator that the Authority is performing on par with leading international sustainable construction projects.

No un-remediated hazardous waste was produced by the Authority in 2016. A small amount of hazardous waste was remediated by the Authority's contractors and disposed of according to proper procedure.

Safety and Connectivity

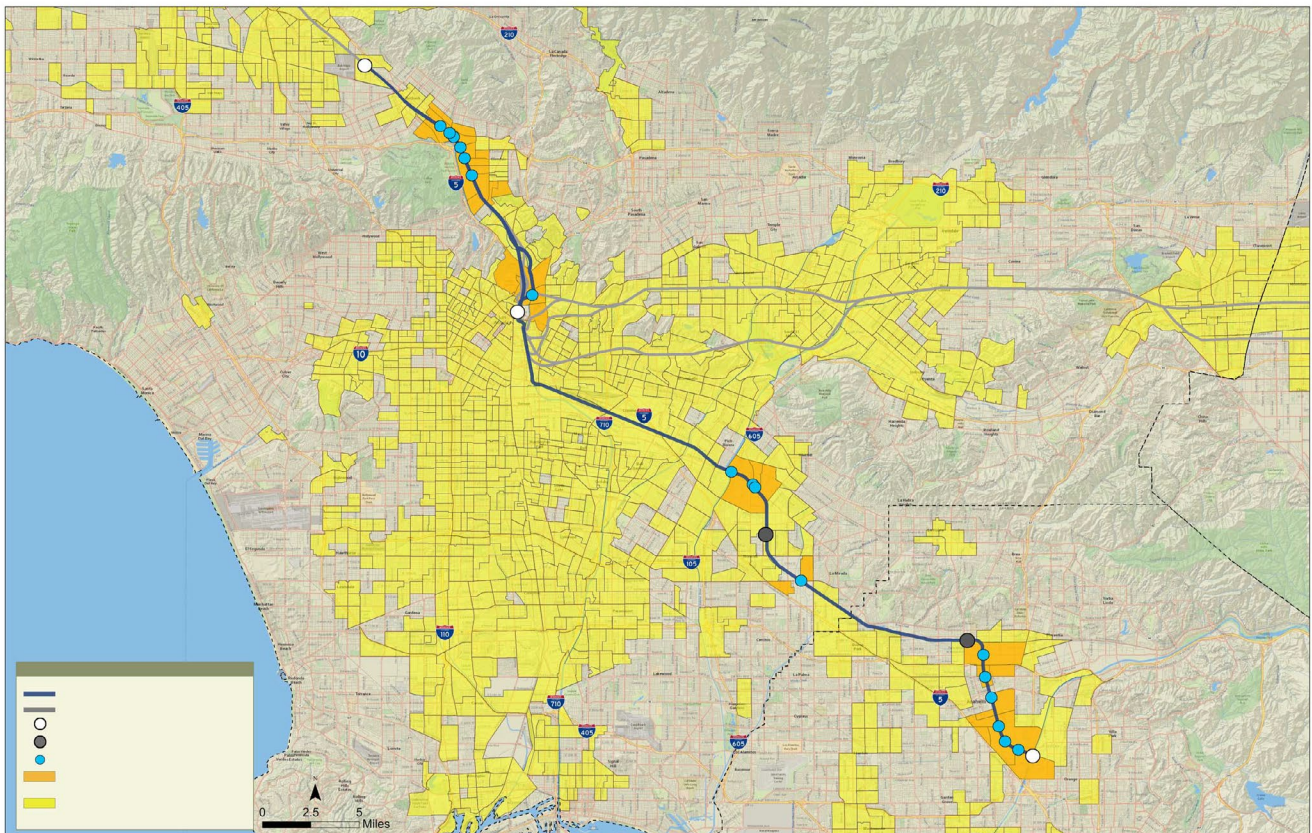
Sustainable infrastructure can make communities safer places to live and can restore multimodal

connections previously severed by ill-placed infrastructure projects. The Authority is working with its local municipal partners to fund several grade separation projects at key locations along the high-speed rail alignment. In the near term, these grade separations will not only greatly improve safety but also increase access to adjacent communities, including many disadvantaged communities. Furthermore, because cars will no longer sit idling at rail crossings, there will be local air quality improvements and reductions in GHG emissions.

Sustainable infrastructure also focuses on employee and worker safety. In 2016, there were no work-related fatalities among Authority employees, contractors, consultants or the general public. Health and safety incidents are recorded and reported according to Occupational Health and Safety Administration (OSHA) regulations. Safety rates during calendar year 2016 are shown in Exhibit 4.2.

For additional Sustainable Infrastructure indicators, please see the [GRI Supplement](#).

Exhibit 4.1: Safety Improvements at Grade Separations in Disadvantaged Communities in Southern California



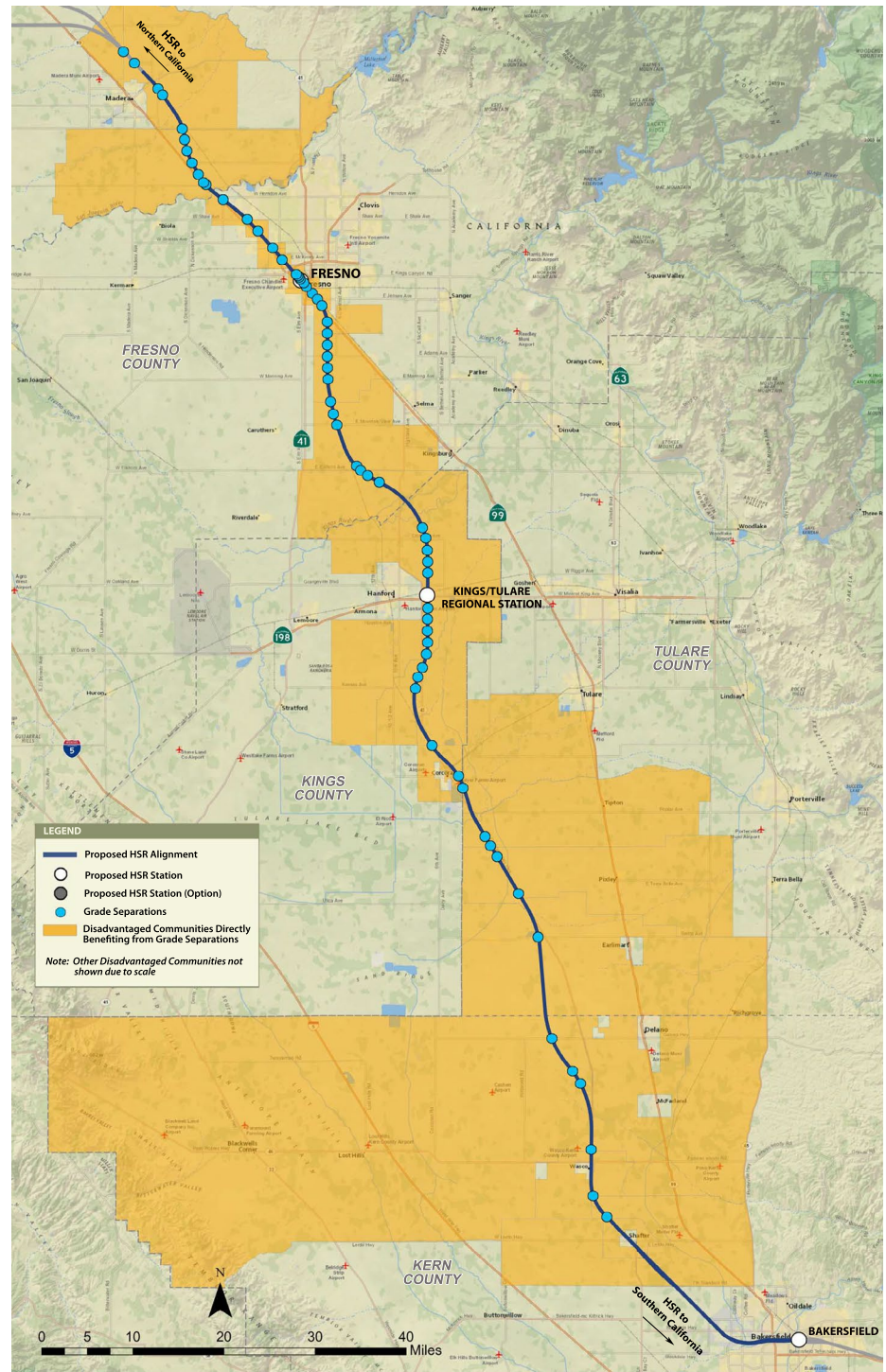
The Authority is working with its partners to fund several grade separations at key locations in Southern California. These will provide near term safety and access benefits to adjacent disadvantaged communities as well as local air quality improvements and global greenhouse gas emission reductions.

Exhibit 4.2: 2016 Construction Safety Incidents

Number of Incidents per 200,000 Hours Worked

	CP1	CP 2-3	OVERALL WEIGHTED AVERAGE
Injury Rate	1.12	0	0.54
Lost Days Rate	0.37	0	0.18

Exhibit 4.3: Safety Improvements at Grade Separations in Disadvantaged Communities in Central Valley



Station Communities and Community Benefit

One of the underlying premises of Proposition 1A – which was approved by voters in 2008 – was that the high-speed rail system would link California’s major population centers and reinforce existing downtown cores, while enhancing connectivity to existing rail and transit service. These key community-focused priorities are reflected in the work of the Authority.

To further these objectives, the Authority has entered into Station Area Planning (SAP) agreements with a number of station cities and local agencies to help support land use planning, access, and zoning changes to achieve highest and best use of land nearest to the stations. These agreements allow the Authority to work closely with station jurisdictions and other mobility service providers to promote city regeneration opportunities and enable more sustainable district-scale development near the proposed stations. Ideally, the partnerships developed through station area planning will evolve to serve future development. These partnerships are vital to implementing urban regeneration on a greater scale than what any individual organization could accomplish.

Through the station area planning agreements, the Authority helped create intermodal working groups (IWG) that include local governments and transit service providers. The IWGs will help inform important decisions around stations and identify funds for first and last mile connectivity projects that will better link nearby sidewalks and bike paths to stations.

Exhibit 5.0: Station Area Planning Status (as of June 2017)

CITY	SAP FUNDING AGREEMENT	CONSULTANT(S)	LAND USE AND ACCESS TOOLS, UPDATES & IMPLEMENTATION PLANS
Fresno	2012 - 2018	AECOM	2018
Gilroy	2014 - 2019	PlaceWorks	2019
Merced	2013 - 2019	Mott MacDonald	2019
Palmdale	2015 - 2018	Parsons	2018
Burbank	2015 - 2019	AECOM	2019
Bakersfield	2015 - 2018	SOM	2018
San Jose	2016 - 2018	Kimley Horn HR&A	2018
Santa Clara VTA	2016 - 2018	AECOM	2018
Tulare County Association of Governments	2016 - 2018	Mott MacDonald	2018
Millbrae	TBD	TBD	TBD

Additionally, Station Area Planning assists in developing partnerships that could attract private sector investments in sustainable development around future high-speed rail stations. Exhibit 5.0 shows the Station Area Planning agreements currently in place and their status.

In 2016, the Authority Board of Directors created the **Transit-Land Use (TLU) Committee** as a platform for linking transportation decisions with land use decisions. The TLU Committee's objectives are to better understand transportation and land use decisions made around stations as well as discuss, develop and propose policies and guidelines for interactions with local governments and transit agencies and other important stakeholders. Achieving the highest and best land use around stations, as well as connecting people to stations via all transportation modes, is important to system ridership and revenue and the mandate that the system operate without an operations subsidy. The Authority also explores opportunities that use station and station area development to generate revenue for the system and is considering strategies that have proven successful for peer global rail operators.

Engaging Communities

In addition to station planning work, the Authority has a comprehensive outreach program to engage with communities along the entire alignment. During 2016, we conducted a total of 85 open houses and community meetings throughout the state reaching more than 6,000 people. Community meetings and

open houses are a valuable way 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 the Authority to incorporate each community's unique values and priorities into program plans and helps improve community benefits.

Our contractors also perform vital engagement with California communities. In 2015 and 2016, the Authority's design-build contractor for Construction Package 1 in the Central Valley held public meetings in the construction area to keep residents and businesses informed. In addition, the design-build contractor for Construction Package 2-3 held its first series of public meetings in the fall to introduce the team to the community and discuss next steps. Since then, additional meetings have been held in Corcoran, Hanford, Selma and Fresno to provide updates on pre-construction activities.

Training and Education: Pre-Apprenticeship and Journeyman Upgrade Programs

The high-speed rail program provides a unique opportunity to expand sustainable, quality employment throughout California. Focusing job opportunities on those areas hardest hit by the economic downturn helps deliver benefits to communities that need jobs the most. The Authority's Community Benefits Agreement (CBA) is a cooperative partnership between the Authority, skilled craft unions and contractors and is based on its Community Benefit Policy, which promotes employment and business opportunities for small and disadvantaged businesses and workers during the construction of the project. Additionally, under the CBA, training opportunities are advanced and promoted for all individuals so that workers gain necessary skills to advance their employment opportunities.

Many training program participants go on to become apprentices and join unions for electrical workers, carpenters, laborers, and the Teamsters. As of October 2017, 1,525 construction workers were dispatched to work on the rail system, including 174 disadvantaged workers.

High-Speed Rail Open House meeting in Wasco, California in 2016.



LOCATION: Lemoore

BUSINESS TYPE: Utility relocation

NO. OF EMPLOYEES: 20

Virginia Villa is the owner of West Pacific Electric Company (WPEC), a woman-owned small business. WPEC is playing an important role in the construction of high-speed rail by relocating utilities. Her team is working on underground conduits packed with wires or fibers and enclosing them in concrete or metal cases to protect them from water damage and physical stress. Her company will provide trenching and installation services. To complete this work on high-speed rail, Villa will hire 10 to 12 more workers to help her core group of 8 to 10 employees.



Small Business Program

While the Community Benefits Agreement focuses on workers and businesses, the Authority has targets for working with Small Businesses, Disadvantaged Business Enterprises (DBE) and Disabled Veteran Business Enterprises (DVBE), as well as businesses located in disadvantaged communities. This target means that more businesses, particularly local businesses that are incubating new ideas and new employees, can participate in the delivery of the program. As of September 2017, there were 417 small businesses including 130 DBE and 49 DVBE, with 96 located in disadvantaged communities as identified by CalEnviroScreen, providing goods and services to high-speed rail.

Engaging Suppliers

The Authority has examined the supply chain for the system components to determine the best opportunities for achieving state and Authority goals related to minimizing impacts or improving the environmental and social outcomes related to materials choices.

The Authority's current design-build procurements include sustainability requirements as part of the general provisions and all contracts include sustainability requirements. For example, as Construction Package 4 began design, the Authority required the contractor to collect environmental product declarations for concrete and steel products for this construction segment. This requirement is being included in future procurements. Collecting data specific to the materials used in the system infrastructure, rather than relying on national or industry averages and planning estimates, represents a key step in materials disclosure and baselining.

To assist with clear reporting of its contract requirements, the Authority developed the Environmental Mitigation and Management and Assessment (EMMA) online data tool to collect and archive data and information from all of its contractors and suppliers. This tool allows us to track performance against targets based on contractor data, which is an essential step to managing and improving performance. In 2016, we significantly revised this tool based on feedback from the field to better enable data collection and streamline analysis.

Local Procurement

In the first half of 2016, nearly 100 percent of the Authority's spending went to businesses located within the United States, on services and equipment. The Authority endeavors to support American businesses and is required to comply with the **Buy America Act** as well as Assembly Bill 16 (Perea, Chapter 413, Statutes of 2012), which encourages the Authority to acquire equipment manufactured in California. Local procurement means that the

high-speed rail investment returns funds to the local economy, spurring additional economic growth. For more on the investment in California's economy, please visit www.buildhsr.com/hsrinvestment/.

For additional Communities indicators, please see the **GRI Supplement**.

CASE STUDY

Con-Fab California

LOCATION: Lathrop

BUSINESS TYPE: Steel Girder Producer

NO. OF EMPLOYEES: 30 Employees on the program

Producing steel girders for high-speed rail bridges is a big undertaking for Con-Fab California. Workers at the firm's Lathrop plant recently started fabricating girders for several overcrossings located in and around Fresno. In total, they will manufacturer 700 girders for 22 high-speed rail bridges. Known as concrete bridge girders, the beams are the longest of their kind ever made in California. While the girders are assembled in the Central Valley by local workers, many of the materials needed come from other parts of the country including Arizona, Wisconsin, Wyoming and Tennessee.

Because the work they are doing is federally funded, the beams have to be in compliance with the Buy American Act. Chief Engineer Brent Koch explained that means, "all steel used in the manufacture of these girders must be produced in the United States of America. Not only that, the cement being used for the concrete comes from Lehigh (Southwest) Cement's Cupertino terminal, and the aggregates come from Knife River (Corporation's) Vernalis quarry just south of Tracy." Currently, the company has 30 employees assigned to the job. More are expected to join the effort when the firm's Shafter plant starts producing high-speed rail materials.



Moving Forward

In 2016, the Authority continued its work in advancing sustainability objectives through every aspect of its program. As the project progresses, and as an evolving organization, we will continue to monitor and refine our sustainability priorities and practices to meet the needs of the program and the broader objectives of the State of California. We look forward to continued collaboration with our peers across the state who are pioneering approaches for delivering sustainability in operation and procurement and applying innovative methodologies for climate analysis. We will also continue to provide annual reports on our performance.

As we progress, we expect the community, resource and economic benefits described in this report to grow exponentially as construction continues and expands, as partnerships are strengthened and as additional metrics are developed and monitored. As we guide the delivery of this transformative high-speed rail program, we are committed to continuing to set an example and provide sustainability leadership for both the state and the nation.





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