



CALIFORNIA
High-Speed Rail Authority

2017 Sustainability Report

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Board of Directors Meeting, Agenda Item #3
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Sacramento, CA



HIGH-SPEED RAIL: Part of California's Climate Solutions

- **High-Speed Rail's Role in Climate Change Mitigation & Adaptation**

"Build high-speed rail to provide reliable access to urban centers across the state with increased public transit and active transportation opportunities around stations"

-Safeguarding California Plan 2017 Update

- **Delivery Sets a New, Green Standard for Infrastructure**

"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."

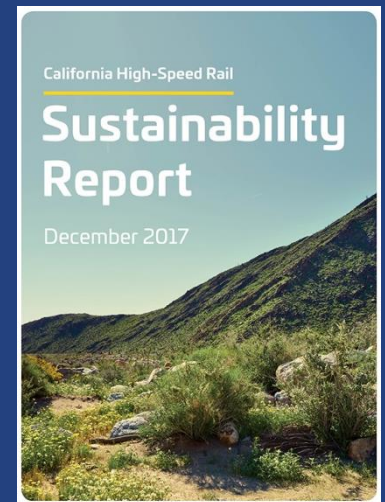
-Authority Sustainability Policy

- **Prop 1A Expressed Californian's Goal for Sustainable Development:**

- » Fostering Mobility and Economic Development without Sacrificing the Environment, or Bequeathing Future Generations With Debt

2017 ANNUAL REPORT

- **Highlights a Range of Topics Including Energy, Natural Resources, Infrastructure, Station Communities, And Business & Management**
- **Updates Progress Over the Past Year Toward Commitments:**
 - » Net-zero Greenhouse Gas and Criteria Pollutant Emissions in Construction
 - » Operating the System Entirely on Renewable Energy
 - » Net-Zero Energy, Leed-Platinum Facilities
 - » Planning For Climate Change Adaptation
 - » Prioritizing Life-cycle Considerations
- **Key Indicators of High Interest to our Stakeholders**
- **Uses Global Reporting Initiative Standard, a Global Best Practice**

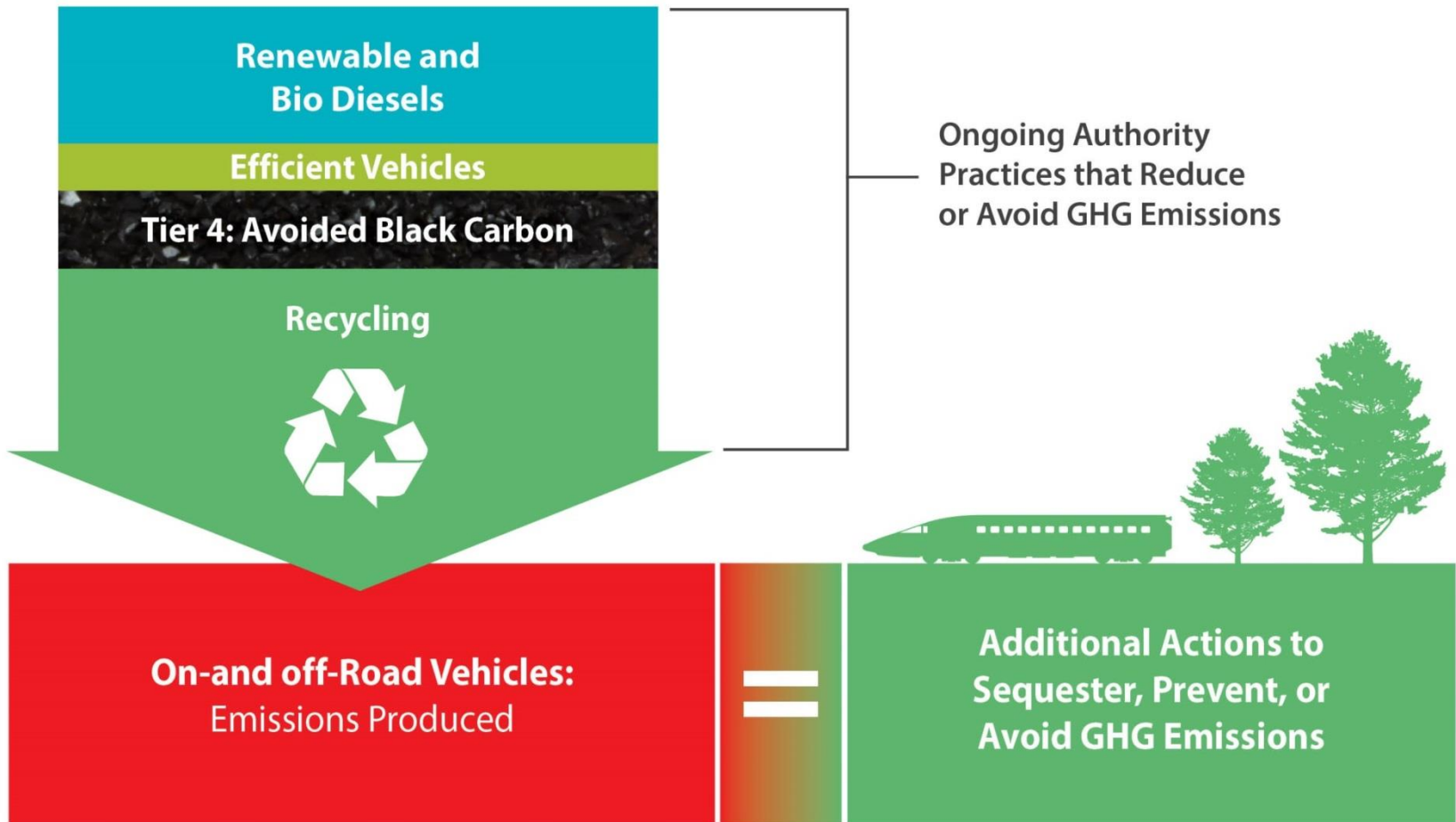


2017 ANNUAL REPORT: Key Highlights

- **Recycled 99% of all construction materials, including**
 - » 100% of all Concrete and Steel
 - » Keeping 87,100 Tons of Waste Material out of Landfills
- **Avoided 13,251 Metric Tons of Carbon Dioxide Equivalent Emissions through Recycling Construction Materials**
- **Continued Safe and Clean Construction Practices**
 - » Resulting in No Work-Related Fatalities
 - » Air quality on Site was 50-60% Cleaner than an Average California Construction Site
- **Signed a Memorandum of Understanding with the California Energy Commission**
- **Preserved More Than 2,000 Acres of Natural Habitat**

RESULTS: Net-zero GHG & Criteria Air Pollutants In Construction

Minimizing Construction GHG Emissions



Construction GHG Boundary

RESULTS: Greenhouse Gas & Air Pollution Reductions

- **Global and Local Benefits**

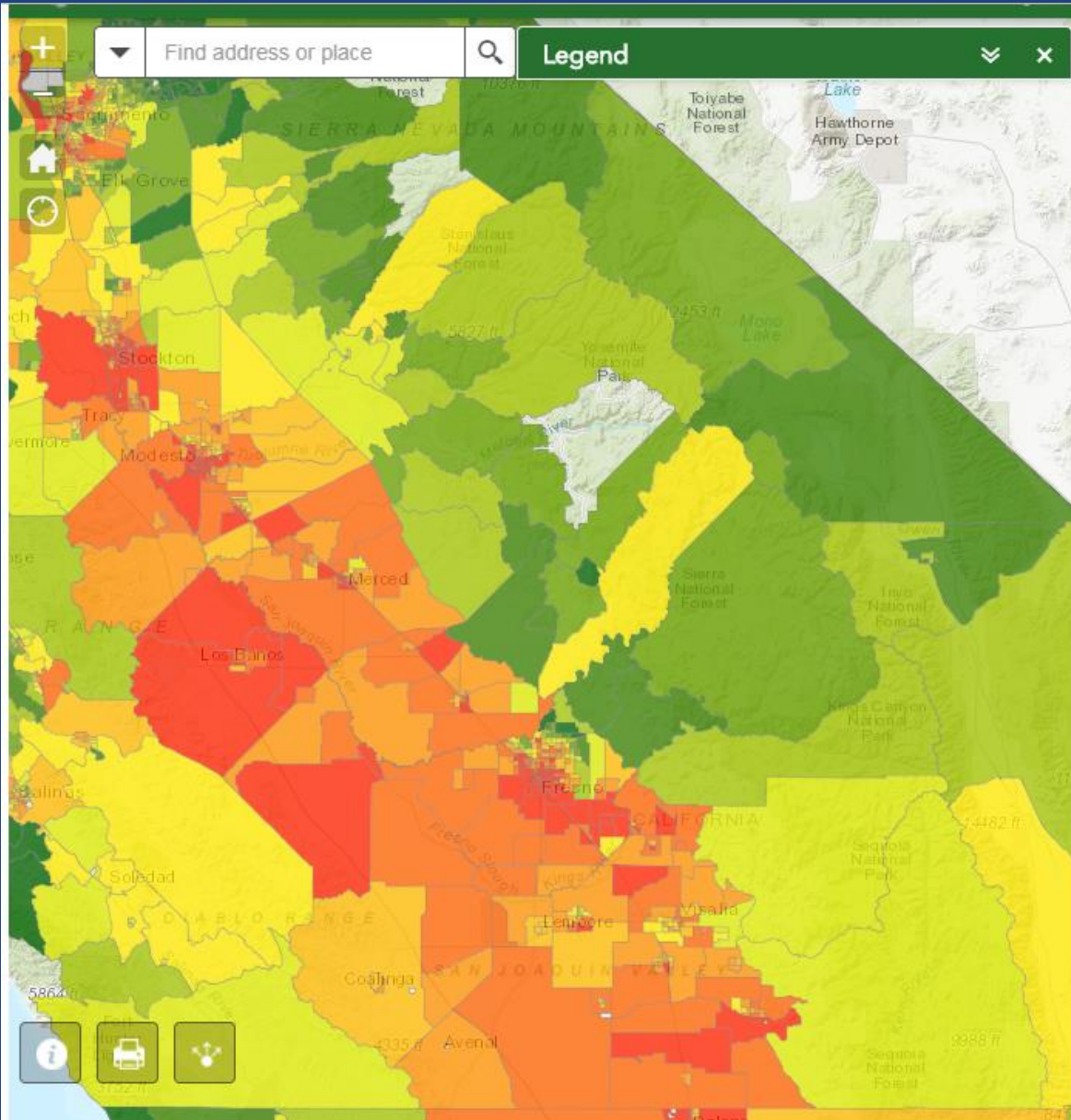
- » 58-72 Million Metric Tons of Carbon Dioxide Equivalent Reductions Forecasted from High-speed Rail Operations
- » 132,000 Tons of Criteria Air Pollutant Emissions Forecasted for Reduction in Operation

- **Requirements are Reducing Air Pollutants From Construction:**

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%

RESULTS: Disadvantaged Communities Benefits



RESULTS: Benefits for California Communities

52%

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



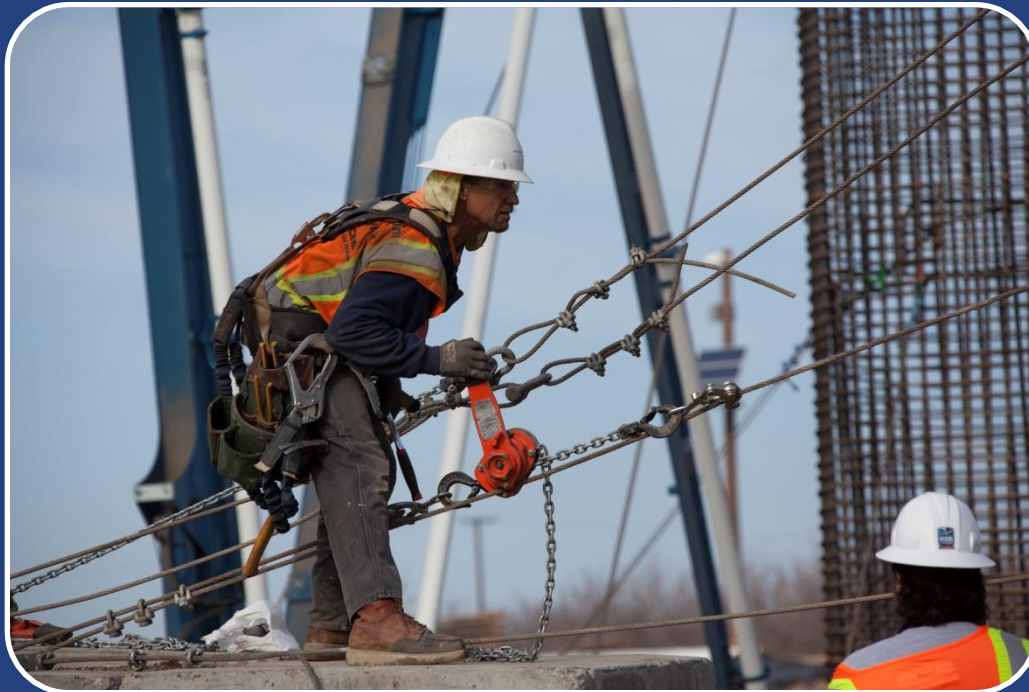
96 of 417

small businesses under contract located in disadvantaged communities



RESULTS: Construction Jobs

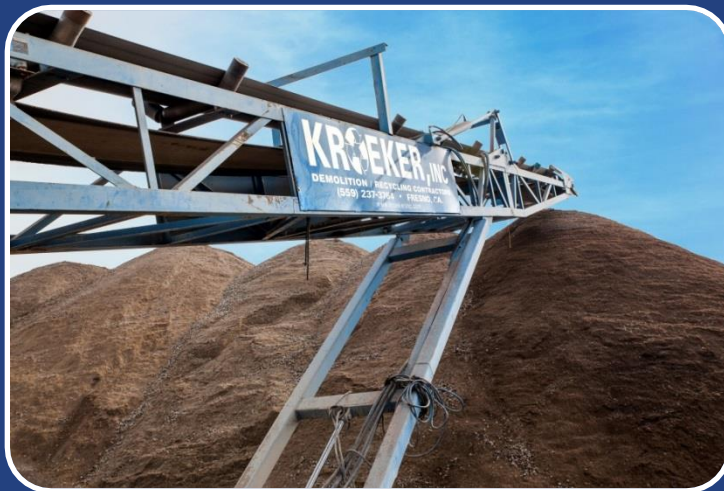
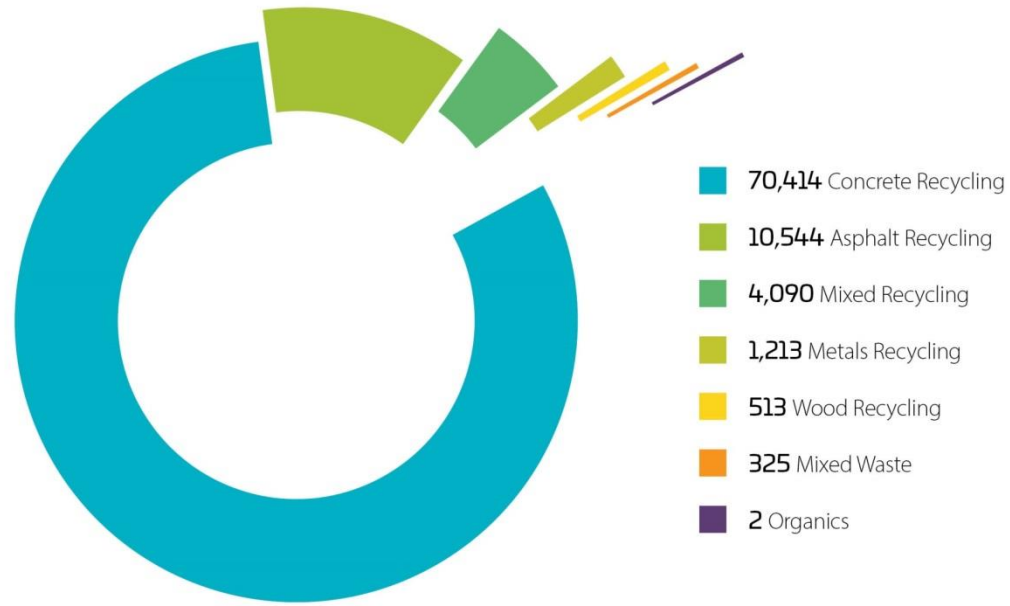
- **1,648 Dispatched Workers**
 - » 1,215 for Construction Package 1
 - » 305 for Construction Package 2-3
 - » 120 for Construction Package 4
- **Over 875,000 Hours Worked**



Information as of December 31, 2017

RESULTS: Recycling

2016 Materials Management (in tons)



ENERGY GOALS

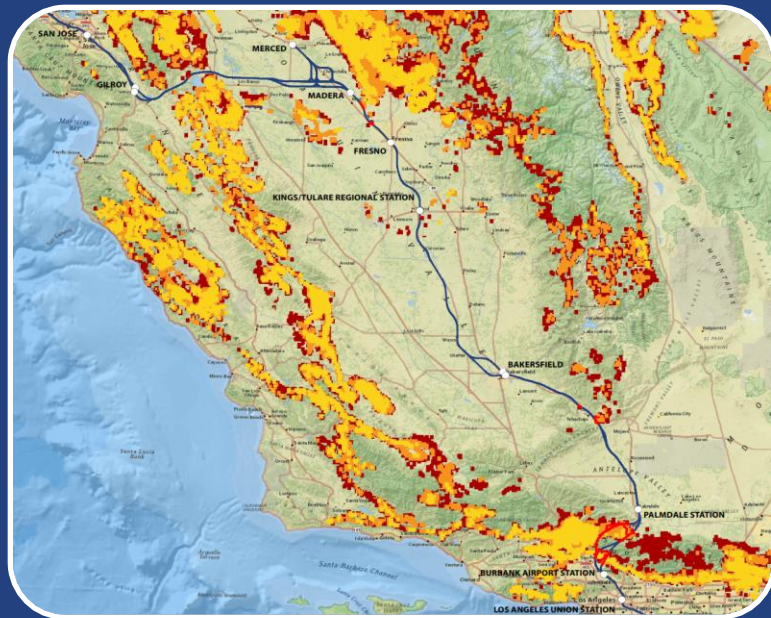
- **100% Renewable Energy**
 - » Exploring how emerging technology and new storage technology can benefit the system
- **Net Zero Energy Stations**
 - » Analyzing baseline designs and design criteria to confirm how they provide value to the operations of the facilities, and a net economic benefit to the system, riders, and community



CLIMATE CHANGE ADAPTATION WORK

- **Assessing Vulnerabilities**

- » Examining the Exposure Of The System To Potential Climate Threats



- **Participating in State Planning**

- » Aligning agency activities with state best practice



DRAFT REPORT
Safeguarding California Plan:
2017 Update

California's Climate Adaptation Strategy



FULL LIFECYCLE CONSIDERATIONS

Emissions Generated by Scope: 2015-2075*



	INDIRECT - Upstream		DIRECT - System	INDIRECT - Downstream and Avoided Emissions	
CONSTRUCTION	 SUPPLY CHAIN Sustainable procurement requirements and baseline setting	 CONTRACTOR FLEET Mobile equipment emissions during rail construction: .52 MMTCO ₂ e	 AUTHORITY RAIL DEVELOPMENT Zero direct emissions from rail construction	 DISPOSAL/RECYCLING ~ 13,000 MMTCO ₂ e avoided emissions through recycling and reuse to date	 TREE PLANTING OFFSETS Tree planting program, offsetting fuel-based emissions from construction: .52 MMTCO ₂ e (Cumulative)
OPERATIONS	 SUPPLY CHAIN Sustainable procurement of rolling stock and operations supply	 RENEWABLE POWER 100% renewable power for train operations	 AUTHORITY RAIL OPERATIONS Zero emissions generated from electric powered operations	 VMT + AIRTRIPS SAVED 58-71 MMTCO ₂ e was avoided because of vehicle and shorthaul airtrips	 ADDITIONAL SAVINGS Savings from Compact Land Use

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

UNDERSTANDING THE SUPPLY CHAIN

- **Consultation with Industry**

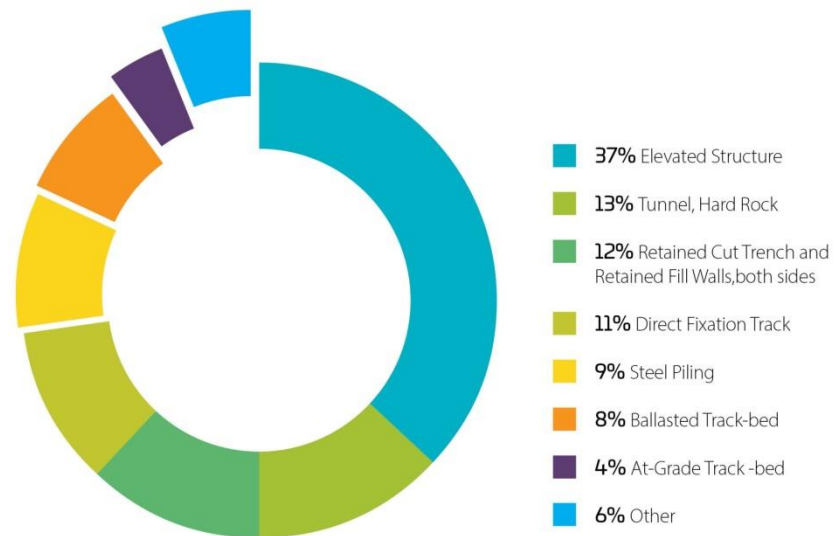
- » Explaining Authority Policy and Intent

- *“The Contractor shall provide Environmental Product Declarations (EPDs) from its suppliers and manufacturers for concrete mix designs used in elements of the project, including pre-cast and cast-in-place concrete, and all steel.”*

- **Analyzing Materials Installed**

- » Direction from Board in 2016 to Consider Attributes of Materials for the Infrastructure Across their Entire Life-Cycle

Contribution of System Elements to GHG Footprint



2017 GRESB INFRASTRUCTURE RESULTS

- Overall Score Improved from 71 to 75
- Remained #1 (out of 6) in North America for Transportation Systems
- #1 (out of 38) in North America for Infrastructure Assets
- #15 (out of 160) Overall

