California High-Speed Rail Authority

2023 Economic Impact Analysis

Technical Supporting Document

February 6, 2024

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1. Executive Summary

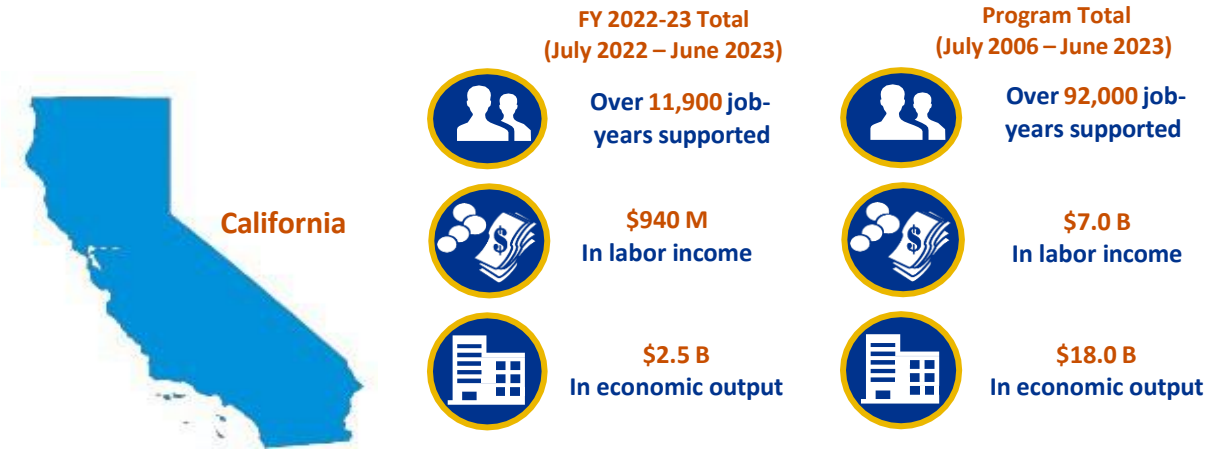
The California High-Speed Rail Authority (the Authority) is delivering the nation's first high-speed train project (the Program) and is generating economic impacts in California through the Program's substantial investments in planning and constructing the project. The economic activity associated with the expenditures attributable to the Program supports thousands of jobs across all functions, from planning and environmental clearance to engineering and construction. This significant employment, along with substantial expenditures for goods and services across industries, generates considerable economic impacts throughout California and beyond. Importantly, the impacts are felt throughout many Disadvantaged Communities (DACs) in California including the Central Valley.

Measures of the economic impacts associated with the Authority's investments have been measured and documented since 2017, with the first report detailing the economic impacts that resulted from the historical investment in high-speed rail from July 2006 through June 2016 (Historical Analysis). Updated reports have been produced annually since 2017.

This report, the 2023 Economic Impact Analysis Technical Supporting Document, provides an updated snapshot of the economic impacts resulting from Authority spending that took place over the time period of July 2022 through June 2023. The magnitude of these economic impacts is estimated using the Impact Analysis for Planning (IMPLAN) input-output model, which quantifies impacts on supporting industries, generated wages and salaries, and overall employment.[1] Starting with a detailed analysis of Program direct spending, these costs are aggregated and assigned to appropriate industry sectors to calculate the associated economic impacts at the statewide level. Then, utilizing contract-level historical invoice cost data from the past three (3) fiscal years, geographic spending profiles that allocate share of spend by zip code and professional service contract are created and applied to the full contract spend amounts in Fiscal Year (FY) 2022-23. This approach relies on previous detailed invoice reviews that comprise the total contract spending.[2]

Estimated Economic Impacts

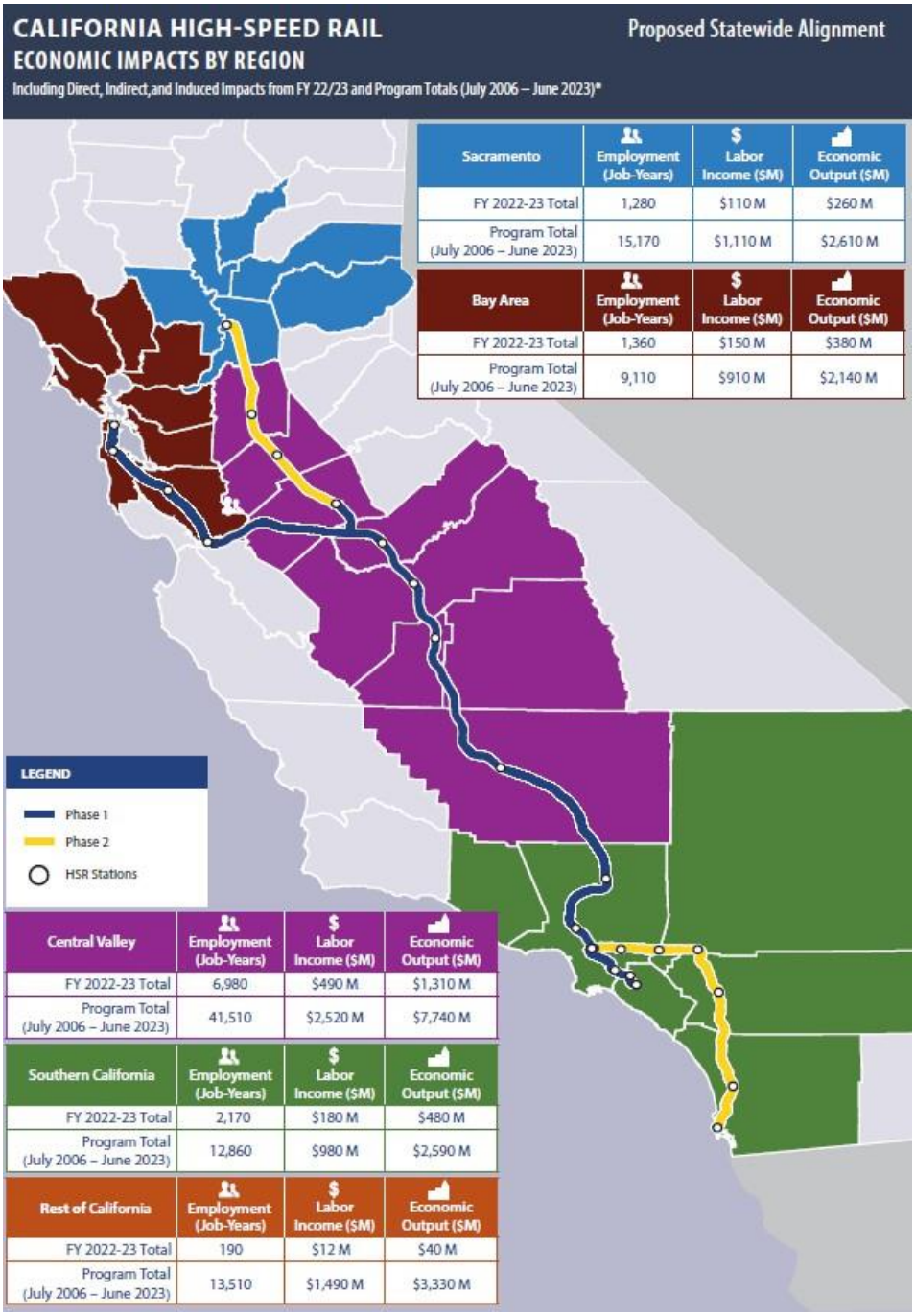
Figure 1: Total Potential California Economic Impact – FY 2022-23 & Program Total



[1] IMPLAN Group, LLC. IMPLAN Application. Huntersville, NC. IMPLAN.com

[2] A detailed description of the economic impact data, methodology, and important definitions are discussed throughout sections 3 and 5 of this report.

Figure 2: Economic Impacts by Region – FY 2022-23 & Program



Sacramento	Employment (Job-Years)	Labor Income ($M)	Economic Output ($M)
FY 2022-23 Total	1,280	$110 M	$260 M
Program Total (July 2006 – June 2023)	15,170	$1,110 M	$2,610 M

Bay Area	Employment (Job-Years)	Labor Income ($M)	Economic Output ($M)
FY 2022-23 Total	1,360	$150 M	$380 M
Program Total (July 2006 – June 2023)	9,110	$910 M	$2,140 M

Central Valley	Employment (Job-Years)	Labor Income ($M)	Economic Output ($M)
FY 2022-23 Total	6,980	$490 M	$1,310 M
Program Total (July 2006 – June 2023)	41,510	$2,520 M	$7,740 M

Southern California	Employment (Job-Years)	Labor Income ($M)	Economic Output ($M)
FY 2022-23 Total	2,170	$180 M	$480 M
Program Total (July 2006 – June 2023)	12,860	$980 M	$2,590 M

Rest of California	Employment (Job-Years)	Labor Income ($M)	Economic Output ($M)
FY 2022-23 Total	190	$12 M	$40 M
Program Total (July 2006 – June 2023)	13,510	$1,490 M	$3,330 M

During FY 2022-23, the Authority expended approximately $1.42 billion in funds[3], comprising economic activities primarily related to construction, planning and engineering, and other professional services including the Authority's operations. As shown in **Figure 1**, these expenditures supported approximately 11,980 job-years within the State of California; approximately $940 million in labor income; and about $2.5 billion in total economic output. Combined with the results from the previous analyses described earlier, the Authority's expenditures have, since 2006, supported up to 92,000 job-years, $7.0 billion in labor income, and $18.0 billion in total economic output across the state.[4]

[3] Total FY 2022-23 expenditure from the August F&A Committee report: https://hsr.ca.gov/wp-content/uploads/2023/08/Total-Project-Expenditures-with-Forecast-August-2023-A11Y.pdf

[4] Technical definitions of these economic impact metrics are provided in Section 3.3 of this report

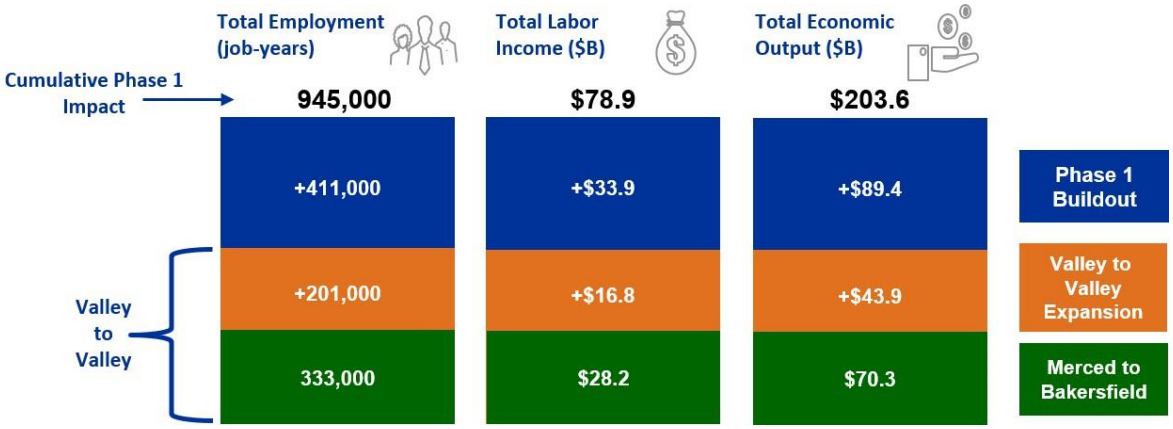
As demonstrated in **Figure 2**, these economic impacts have been felt across the state, with the most sizable effects taking place in the Central Valley, where substantial construction activities are ongoing along this first 119-mile segment. These construction activities supported over 6,900 job-years in the Central Valley region in FY 2022-23 alone.

The total economic impacts in the State of California are higher than the total economic impacts across the four analysis regions; these remaining impacts, depicted in **Figure 2** as "Rest of California," capture expenditures incurred in the rest of the state other than the four analysis regions as well as leakage from the four analysis regions to the rest of the state. The remaining impacts account for additional 190 job-years supported and $40 million in total economic output in FY 2022-23 alone.

Furthermore, the economic impacts of Authority expenditures have been felt beyond the State of California. In FY 2022-23, approximately $11.1 million (1%) of the Authority's expenditures went to contractors outside the state, with approximately 94% of that out-of-state spending retained within the United States.

Figure 3 below illustrates the cumulative economic impact of each stage of Phase 1 from FY 2006-07 over the construction period through completion, combining past spending and planned future expenditures. The Authority's expenditures through completion of Phase 1 are expected to support 945,000 job-years, nearly $78.9 billion in labor income, and $203.6 billion in total economic output across the state.

Figure 3: Phase 1 System Cumulative Economic Impact by Project Stage, 2006-07 through Completion



Key Modeling Updates

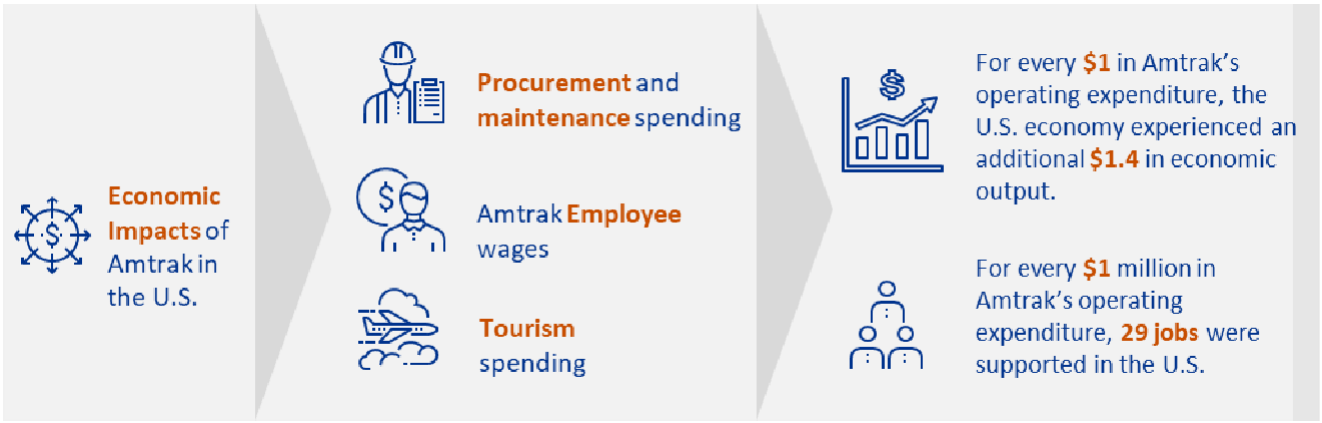
This year's economic modeling approach included two significant updates over previous years:

- ***Change of IMPLAN model data year*** – The new economic analysis is based on an IMPLAN model which represents 2022, the most current model year available at the time of the analysis. Each year, the model is adjusted to reflect the latest economic data including information on interdependencies between industries, employment trends, taxes, subsidies, profits, and many other factors. Notably, the new model was found to estimate higher levels of employment for a given economic output for the construction industry than the previous model.

- ***Multi Regional Input Output (MRIO) modeling approach*** – The new IMPLAN model includes multi-regional input-output functionality, which allows economic activity in one region that has indirect impacts in other regions to be fully tracked. While the effect of the new approach is mild for the state-level results, there is a notable effect on the regional results for the Bay Area and Southern California, which now capture significant economic activity associated with the production of intermediate inputs to the construction occurring in the Central Valley.

Impacts of Future High-Speed Rail (HSR) Operations

The scope of this study is to measure the economic impacts from the historical and projected expenditures for the planning and construction of Phase 1 of the Program. It does not attempt to quantify the economic impacts or other long-term benefits associated with future operation and maintenance of the Program. As illustrated below, studies of existing passenger rail systems have shown that ongoing rail operations generate significant economic impacts through supporting job creation and encouraging tourism, as well as creating other economic benefits such as travel time savings, reduction in greenhouse gas emission, and productivity improvements.[5, 6, 7] While these existing HSR systems are not perfectly comparable to the California High-Speed Rail system, it reinforces the notion that major infrastructure such as HSR generate significant impacts tied to the construction and operation separate from the benefits tied to the impacts on accessibility, the environment, safety, and other social benefits. [8] To provide an estimate of future impacts, the graphics below depict the economic impacts of ongoing rail operations and societal benefits from rail service in the U.S. and abroad.



[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/466084/first_interim_evaluation_hs1_main-report.pdf

[6] https://highspeed1.co.uk/media/vemkxmot/delivering-for-britain-and-beyond-the-economic-impact-of-hs1-march-2020.pdf

[7] https://www.amtrak.com/content/dam/projects/dotcom/english/public/documents/corporate/nationalfactsheets/Amtrak-Economic-Contribution-Brochure-083016.pdf

[8] The Authority has produced a benefit-cost analysis (BCA) that estimates the societal benefits and costs of the Phase I high-speed rail system through 30 years of operations. These benefits are described in the May 2023 California High-Speed Rail Benefit-Cost Analysis: https://hsr.ca.gov/wp-content/uploads/2023/05/2023-Benefit-Cost-Analysis-Report-Presentation-v1-A11Y.pdf

2. Introduction

The Authority is responsible for planning, designing, building, and operating the first high-speed rail system in the nation. California's high-speed rail system will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs, and preserve agricultural and protected lands. In what is known as Phase 1 of the program, the system is designed to run from San Francisco to the Los Angeles basin in under three hours at speeds capable of greater than 200 miles per hour. In addition, the Authority is working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs.

Construction is under way and the Authority is a project delivery organization. With large scale construction occurring, the economic impact of the activities continues to be substantial. Starting with just a few employees over a decade ago, the project has now supported thousands of jobs across all functions from planning and environmental clearance to engineering and construction. The investment has generated substantial economic impacts to California as well as local counties and cities. To understand these impacts, the Authority developed an annual report "Economic Impact Analysis – Technical Supporting Document" which was first started in September 2017. This report details economic impacts that result from the expenditures attributable to the investment in high-speed rail.

This FY 2022-23 Economic Impact Study covers the economic impacts of the investment in high-speed rail for the period of July 2022 to June 2023 and adds the impacts to the cumulative totals since 2006. This document serves as the methodological overview and provides the detailed data and assumptions supporting the results from the analysis and other documents that may reference the results. The previous analyses that focused on July 2006 through June 2022 will be referenced as the Historical Analysis with subsequent analyses focusing on future spending.

2.1 Purpose of this Document

The primary purpose of this document is to present the economic impacts of the Authority's expenditure from July 2022 through June 2023. The FY 2022-23 Economic Impact Study estimates the economic impact of the Authority's expenditure during this period in terms of employment (measured as job-years), labor income, and economic output.[9] This study reports the economic impacts of the project on the State of California, as well as at regional, sub-regional, and national levels. A summary of the geographic breakdown of impacts can be found in Section 4.3: Breakdown by Region.

The scope of this study is to measure the economic impacts from expenditures attributable to the Program. Projected impacts by Project Segment are also included to estimate the anticipated job-years, labor income, and economic output of project expenditures upon completion of Phase 1. This study does not attempt to quantify the many long-term benefits and impacts associated with future rail operations, such as increased accessibility, reduced vehicle miles traveled and vehicular congestion, increased safety, greenhouse gas emission reductions, increased economies of agglomeration and other benefits. These benefits are described in multiple 2023 California High-Speed Rail benefit-cost analyses performed for Federal grant applications and the 2019 Equivalent Capacity Analysis Report or will be covered in separate analyses in future reporting.[10, 11] The results of this study reflect the gross economic impacts of the project attributable to expenditures and do not consider the potential impacts of alternative uses of the state and federal funding sources used to pay for the project, including the potential impact to other programs, services, or to the State of California had funds not been allocated to the Program. Additionally, this study does not consider the economic effects resulting from changes in consumption due to the collection of revenues from operations.

[9] Technical definitions of these economic impact metrics are provided in Section 3.3 of this report

[10] https://hsr.ca.gov/wp-content/uploads/2023/05/2023-Benefit-Cost-Analysis-Report-Presentation-v1-A11Y.pdf

[11] https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_2019_Equivalent_Capacity_Analysis_Report.pdf

2.2 Outline of the Report

The report is organized as follows: Section 3 Data and Methodology discusses the data sources, model assumptions, and methodology for this study. Section 4 presents the economic impact assessment from the Authority's Program expenditure; it then qualitatively discusses investments the Authority has made to support local community programs. Section 5 Methodological Appendices provides additional technical details on calculation steps and methodology applied.

3. Data and Methodology

3.1 Model Data

This section presents details on input data for the economic impact study and an overview of the data collection and data quality check process.

3.1.1 Program Expenditure

The economic impacts are directly tied to expenditures reported in the FY 2022-23 Program data. In FY 2022-23, approximately $1.42 billion of expenditures took place, for a total program investment of just under $11.2 billion from July 2006 to June 2023. Funding for these contracts and expenditures has been provided by a mix of federal and state sources. The project has been divided into ten separate sections along the alignment. Each of the sections will go or has already gone through the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) process before permitting, Right-Of-Way (ROW) acquisition, then construction. The project sections are listed below.[12]

Table 1: California High Speed Rail Project Sections

Phase 1

- San Francisco to San Jose
- San Jose to Merced
- Merced to Fresno (including the interchange known as the Central Valley Wye)
- Fresno to Bakersfield (including evaluation of and planning for a Locally Generated Alternative section)
- Bakersfield to Palmdale
- Palmdale to Burbank
- Burbank to Los Angeles
- Los Angeles to Anaheim

Phase 2

- Los Angeles to San Diego
- Merced to Sacramento

Almost all program expenditures are attributable to the creation of California High Speed Rail Phase 1, while a small amount of expenditure has occurred for Phase 2 planning.

Program expenditures can be broken down into six general categories:

- ***Planning/Environmental*** – expenditure in this category includes Regional Consultant (RC) and Environmental and Engineering (E&E) costs. Tasks under the planning/environmental category cover the preparation of project site-specific EIR/EIS documents and preliminary engineering for all the project sections.[13] Although other parts of the organization also perform duties related to the planning and environmental clearance processes, simplifying the variety of services provided is appropriate for the purposes of this economic analysis.

- ***Real Property Acquisition*** – expenditure in this category includes ROW support services (mapping, surveying, appraisal, negotiation, and acquisition) contracts costs, relocation expenses, and land acquisition purchase payments.

[12] Project Sections are shown on the Authority's webpage: https://hsr.ca.gov/high-speed-rail-in-california/project-sections/

[13] The environmental review process must comply with the standards set forth in both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) review process. As such, both EIR and EIS documents are required.

— ***Construction*** – expenditure in this category includes the Design-Build (DB) contractors, California State Route 99 Relocation project being undertaken by Caltrans (through a contractor), portions of Project and Construction Management (PCM) contracts costs, Los Angeles Union Station funding, and Caltrain's electrification of the Peninsula Corridor. Tasks under the construction category include final design, construction administration, utility relocation, site clearing and civil works construction.[14]

— ***Program Administration*** – expenditure in this category includes Authority expenses and the Rail Delivery Partner (RDP)/Program Delivery Service (PDS)/Program Management Team (PMT) contracts costs. Tasks under the Program Administration (PA) category cover Program Management (PM), program integration and coordination, and overall program delivery tasks. Although the Authority and RDP and now PDS work across the other categories, they are separately included in the summary category for this analysis.

— ***Other*** – expenditure in this category includes Resource Agencies (RA), Third-Party Agreements (TPA), legal, financial services, and other miscellaneous contracts.

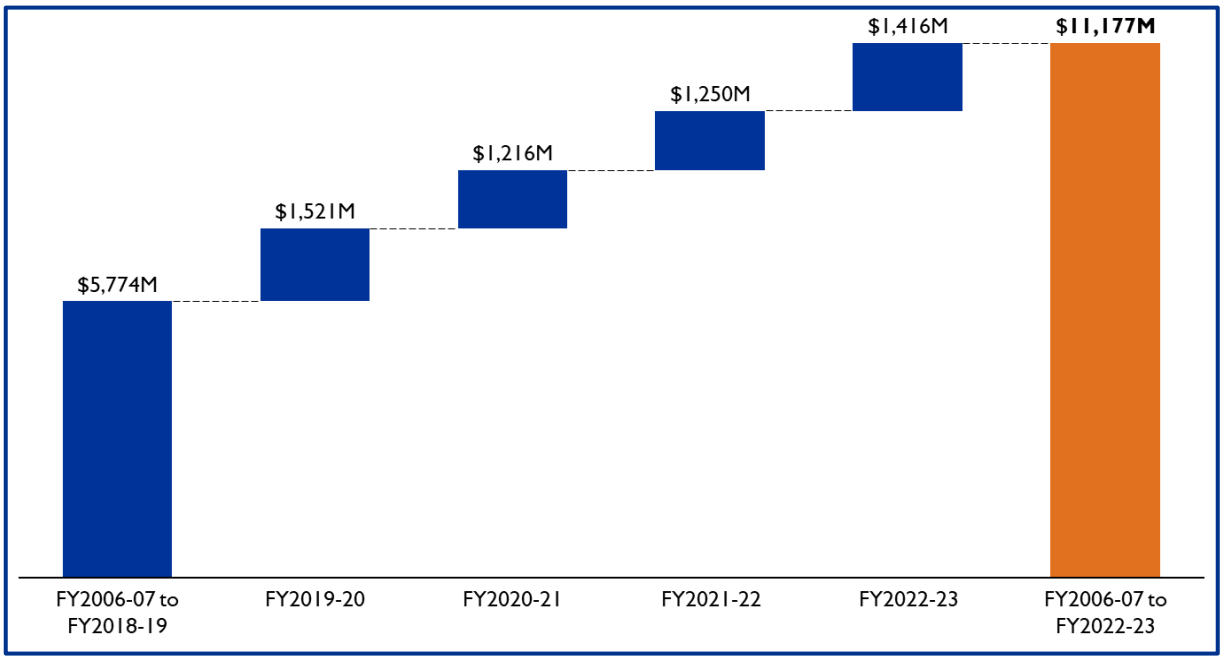
- RA contracts are agreements with local, state, and federal government agencies for station design, permits, review fees, etc.
- TPA contracts are agreements with utilities, railroads, and other stakeholders for utility relocation work along the alignment.
- Legal contracts are for various legal advisory services for the Program.
- Financial services contracts are for financial advisory services for the Program.

— ***Bookend Projects*** – expenditure in this category primarily reflects projects that are defined under SB 1029 (Item 2665-104-6043 as added to Section 2.00 of the Budget Act of 2012) to receive specific project investments from Prop 1A and other commitments that the Authority made through agreements with local agencies. Authority expenditures for these projects includes Peninsula Corridor Electrification Project (Caltrain Electrification) and the San Mateo Grade Separation in the North as well as Rosecrans/Marquardt Grade Separation and Los Angeles Union Station in the South. This analysis also includes funding for the Caltrain Electrification and Los Angeles Union Station planning funds in FY 2021-22. Moving forward, additional funds may be allocated to additional bookend projects.

The total expenditure by economic analysis timeframe is shown in **Figure 4** which includes ROW acquisition costs. Prior fiscal year historical expenditure data reflect slight changes from previous economic impact analyses due to data reconciliations and accrual adjustments reflected in the Authority's monthly financial reports.

[14] The categories used in this analysis and described in this section are meant to be a summary for purposes of this analysis. The Authority's financial reporting may provide different breakdowns to manage and report on the program.

Figure 4: Total Program Expenditure ($ millions) by Fiscal Year, July 2006 – June 2023



[1] Totals may not sum due to rounding.
[2] Total Project Expenditure from the August 2023 F&A Committee report.
[3] Prior Fiscal Year Project Expenditure totals may not match to earlier F&A Committee reports.

Out of the approximately $1.42 billion of total program investments in FY 2022-23, $1.34 billion was used as an input to the economic impact input-output modeling described in this report, with $1.32 billion of that spending taking place in California. The economic impact calculations in this study exclude expenditures spent on ROW land acquisition payments. Payment to property owners for land acquisition is considered an economic transfer and is therefore excluded from the economic impact analysis. However, support activities for land acquisition, such as appraisal, surveying, and geotechnical services, do generate economic impacts and are included in the analysis.

3.1.2 Data Collection

The calculations of expenditure impacts conducted by the Business and Economic Branch (the Study Team) involves using the IMPLAN modeling software. IMPLAN is an input-output model that calculates the total economic impact of a direct expenditure and is described in detail below. The direct expenditures are in the form of contract-level Program spend on an annual basis, which the Study Team categorizes by industry sector and location at the zip code level to create a spending profile.

Precisely measuring economic impacts requires accurately identifying the location of the direct expenditures to best capture the indirect effects. To ensure that the geographic breakdowns remain relevant with changing geographies for the large professional services contracts over time, detailed review of geographies at the invoice level will take place every three years, a requirement that will coincide with the 2023-24 Economic Impact Analysis. The construction contracts are analyzed for geographic spending every fiscal year.

Enhancements to this methodology:

- Expenditure data for RDP and KPMG LLP have been analyzed annually since the data available can be efficiently analyzed at a more frequent cadence.
- Any new contract in a current FY that has spending above a certain amount (i.e., $2.5 million in FY 2022-23) on an annual basis will still go through contract review to develop the baseline for geographic spending.

3.1.3 Data Quality Assurance / Quality Control

To ensure data reliability, the Authority team consisting of the Business and Economic Branch (Study Team) conducted thorough quality assurance / quality control procedures in every step of the data collection process including invoice review, contractor outreach, and data gap interpolation. Consultant costs submitted by prime contractors or tabulated from submitted invoices were validated against the payment logs of the Authority's Financial Office. This was especially important, considering the numerous ways in which data was formatted. Employee office locations submitted by contractors were validated through web searches to confirm that companies have offices in the locations that they provided.

3.2 Key Model Assumptions

This section provides key model assumptions that are used in developing the economic impact analysis.

3.2.1 Geographic Assumptions

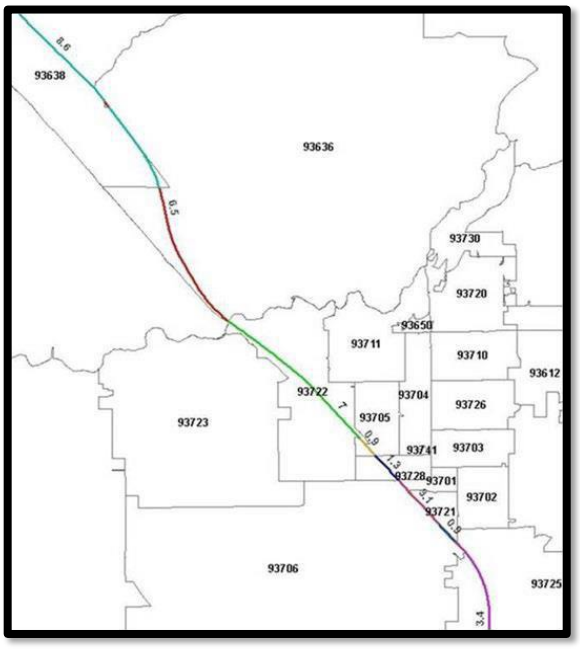
As discussed in the data collection process above, the Authority has gathered specific geographic detail on where work was completed for a number of large contracts in the past. This geographic information allows the Authority to develop geographic spending profiles by contract for the FY 2022-23 Economic Impact Analysis and describe exactly where the economic impacts of its spending are felt, particularly within the State of California. The contractor outreach process varied slightly depending on the contract category.

For professional service contracts, the goal was to match staff members with an office location where the work was performed. Many prime contractors provided a list of employee names and office locations for their direct employees. As described in the previous section, when this was not available, prime contractor's employees were assumed to have completed their work in the same office where they were employed in the previous geographic spending profile, or from a web search of employee or firm office addresses. For staff whose office addresses were not available, hours and expenditures were assigned to the most logical office location.[15] Subcontractors were assumed to have completed all their work within the same office, the location of which was assigned per the same criteria.

For design-build contracts, subcontractor payments were allocated to the main regional office of that subcontractor. First, prime contractor costs were categorized as either professional services costs or construction costs. Next, professional services costs were assigned to the project office of each Construction Package (CP): CP 1's project office is in Fresno, CP 2-3's project office is in Selma and CP 4's project office is in Wasco. Construction costs were allocated by linear miles per zip code along the alignment for each CP. This was done by plotting each of the CP alignments over a shapefile of zip codes, and then calculating the percentage of the total alignment length that falls within each zip code.

Figure 5 shows an example of the CP 1 alignment-zip code map overlay. This same process was undertaken for Caltrans' work on SR-99 realignment.

Figure 5: CP 1 Alignment Zip Code Map Overlay



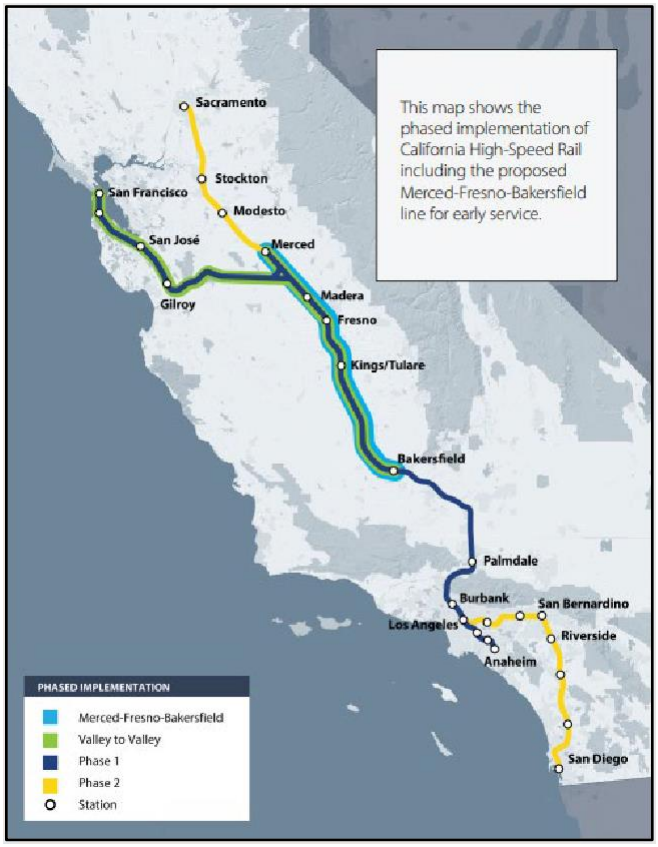
[15] Expenditures were assigned to the California office where available. For contractors with more than one office in California, expenditures were assigned to either the largest office in the state, or the office located closest to where the work was being performed. Expenditures by out-of-state subcontractors were assigned to the head office.

The location of work for costs not included in the major contracts (such as Authority costs, ROW services, ROW relocation, RAs, or Third-party Agreements) have been obtained through a variety of outreach and data gathering methods. Location of Authority costs were allocated based on the number of staff and their authorized salaries for each of the Authority's offices. ROW relocation costs were allocated to the recipient of the compensation. For other contracts such as ROW services firms, RAs, and Third-party Agreements, the Study Team determined the location of prime contractor offices based on one of the following sources: internal Authority tracking sheets, the most recent in-depth spending profile analysis (the FY 2019-20 geographic spending profile), or a web search.

3.2.2 Project Segment Impact Forecast Assumptions

In addition to measuring the economic impact of the annual expenditures for FY 2022-23, this report also includes an evaluation of the economic impact of the total program historical and projected expenditures for each project segment through Phase 1 from FY 2006-07 to completion. The Authority plans to deliver the Phase 1 system incrementally into three distinctive project stages: Merced to Bakersfield, Valley-to-Valley Expansion, Phase 1 buildout. Merced to Bakersfield stage and Silicon Valley-to-Central Valley Line Expansion are combined as the "Valley-to-Valley" (V2V) portion (see **Figure 6**).

Figure 6: California High-Speed Rail Phased Implementation Map



The analysis in this report captures the Draft 2024 Business Plan capital cost estimate of $106,163 million for the full Phase I system cost.

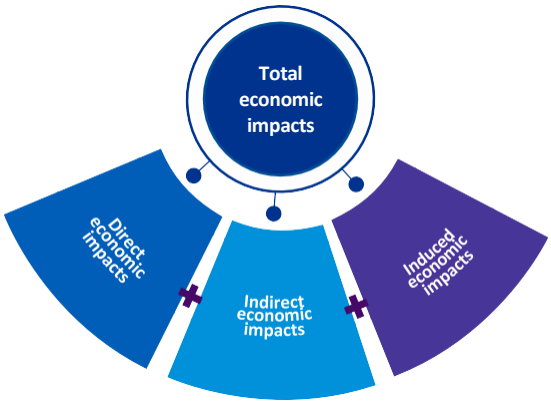
3.3 Economic Impact Assessment Methodology

The economic impacts presented in this report are estimated using the input-output modeling software IMPLAN, an industry-standard approach. The analyses used pre-defined regional economies for states and counties embedded within IMPLAN. The expenditure data used for inputs were expressed in nominal dollars; IMPLAN is capable of interpreting inputs from different dollar-years and performing the conversion to constant dollar-years.[16] Similarly, IMPLAN can generate outputs in any desired dollar-year. For this analysis, all inputs and outputs are expressed in 2023 dollars.[17] This analysis uses IMPLAN's Multi-Regional Input-Output (MRIO) model to estimate the economic impacts due to economic linkages between sub-State regions.

3.3.1 Economic Impact Model Overview

Input-output models recognize the interdependence among different industries and quantify the total economic activity across industries generated by a particular type of spending. For example, new expenditures in the construction sector will cycle through the intermediate steps in the supply chain and generate increased demand for intermediate goods and services ranging from concrete to carpenters. In addition, input-output modeling considers how the additional labor income generated by spending in a particular industry—e.g., the salaries earned by carpenters employed by the Program's contractors—will translate into increased consumer spending in the form of household expenditures.

The input-output model accounts for three types of economic impacts: direct, indirect, and induced effects.



Direct impacts are the economic effects generated by direct spending on a project. In the case of California high-speed rail, these impacts result from the Authority's spending on Authority employees as well as its contractors (including both construction contractors and professional services).

Indirect impacts the economic effects that occur in the next step in the supply chain. These impacts are dispersed among the industries that supply intermediate goods and services to firms with direct impacts. For California high-speed rail, these impacts can be observed in a diverse range of industries across the state. For example, this may include the materials producers who supply the construction firms, as well as the technology vendors who service the professional service firms.

Induced impacts are the economic effects that result when income earned by direct and indirect employees gets spent elsewhere in the economy. For example, both the civil engineer working full-time on California High-Speed Rail and the software engineer who codes a new version of AutoCAD spend their household income on housing, groceries, and other expenses in California.

The direct, indirect, and induced impacts together create the total economic impacts.

A Multi Regional Input-Output (MRIO) model has been used. MRIO analysis extends traditional input-output modeling by capturing interregional economic interactions. It tracks how an industry's activities in one region affect production and household spending in other regions, providing a comprehensive view of economic interdependence. MRIO is particularly effective in analyzing complex projects like California High-Speed Rail, where impacts transcend regional boundaries, in two ways: First, the approach identifies direct, indirect, and induced effects across multiple regions, highlighting the broader economic ripple effects of the project. In so doing the model does not sacrifice quantifying the connectivity between sub-state regions modeling impacts of expenditures locally. Secondly, allowing modeling expenditures locally

[16] The base year for IMPLAN's multipliers is 2022, meaning that the multipliers reflect industry relationships as observed in 2022. This is industry standard and has negligible effect on the results.
[17] Source: IMPLAN 2022 data for model region including the State of California, Bay Area, Sacramento region, Southern California region, Central Valley region and counties. For more information on the IMPLAN modeling process, visit IMPLAN.com

allows capturing the economic specificity of the region where spending occurs while still capturing the economic connectivity between regions.

The IMPLAN model uses the following metrics to measure economic impact of the Authority's investments (or direct expenditures):

Economic output represents the total value of industry production associated with the Authority's expenditures. For service-industry sectors, this value is equal to total sales, while for retail sectors, output is equal to businesses' gross margin. For manufacturing sectors, output is equal to sales, less any change in inventory.

Employment is measured in job-years, or the amount of labor equal to a year of full-time or part-time work. Note that a job-year can be completed by employees working full-time of part-time, and data in the IMPLAN software reflects the observed breakdown between full and part-time employees in each industry. In the context of the Program's economic impacts, job-years are defined as the equivalent number of one-year-long jobs supported by the project. For example, if one job is supported for two years, it therefore represents two job-years. In 2009, the White House Council of Economic Advisers (CEA) produced estimates of job creation that would result from the American Recovery and Reinvestment Act (ARRA); those estimates were expressed in job-years because, as the report describes, "for some purposes, looking at the effects at a single point in time is not the most useful approach."[18] The 2023 analysis and prior analyses considered historical project-related spending. Because the volume of spending was highly variable from year to year, throughout the analysis period, especially in the early years, and because the types of services procured with that spending changed substantially over the life of the project, reporting the results of this analysis as job-years is most appropriate.

Labor income refers to all forms of employment income, including compensation firms paid to employees (i.e., wages, benefits, and payroll taxes), and income earned by self-employed workers or unincorporated sole proprietorships.

See Section 5.2 IMPLAN Software and Methodologies for a more in-depth discussion of IMPLAN models.

3.3.2 Economic Impact Modeling Approach

Project costs are aggregated and assigned to appropriate industry sectors to calculate the associated economic impacts at the statewide level by applying IMPLAN model multipliers.[19] Then, spending profiles allocating share of spend by zip code and contract are created and applied to the full contract spend amounts in FY 2022-23. This approach relies on detailed reviews of contract invoices and produce estimates for economic impacts at the county, regional, and statewide levels. This approach provides a reasonable range of outputs that can be used as a benchmark against other economic impact studies, and as estimates for the spatial distribution of economic impacts resulting from project investments.

3.3.3 Literature Review and Validation

Several studies have estimated the economic impacts and overall benefits of investment in transportation infrastructure in general, and of the Program specifically. A review of studies was conducted for the previous Historical Analysis Technical Supporting Document (Historical Analysis) to provide analytical context, ensure a methodology consistent with industry standards, and benchmark results when applicable.

For the Historical Analysis, the Authority requested review and validation from several industry experts both within and outside of government who reviewed inputs, assumptions, methodology, and outputs. Reviewers included the University of the Pacific, the California High-Speed Rail Peer Review Group, the State of California Department of Finance, and the California Department of Labor. All reviewers were positive in their review that the methodology used met industry standards. The FY 2022-23 Economic Impact Analysis followed the same methods and approaches as the Historical Analysis. Thus, the review and validation conducted at that time remains relevant.

[18] https://obamawhitehouse.archives.gov/administration/eop/cea/Estimate-of-Job-Creation/

[19] For a defined geography, a multiplier is a quantitative technique that captures the ratio between a direct impact and wider economic impacts for the relevant geographies.

4. Economic Impact Assessment

This section details the results of the FY 2022-23 Economic Impact Analysis as well as total impacts to date from prior expenditures reported in prior analyses. For details regarding prior year of Program impacts, see the prior reporting in Historical Analysis.

Impacts are shown over a variety of geographies and results detail specific impacts in greater depth. As discussed in Section 3.3, this analysis shows geographic outputs based on location of the work being performed or where companies are located, rather than where those doing the work live. All inputs and results are expressed in constant 2023 dollars unless otherwise specified.

4.1 California Economic Impacts

In FY 2022-23, the Authority invested $1.42 billion in planning and construction of the high-speed rail system, of which approximately $1.34 billion was included in this fiscal year analysis and $1.32 billion was retained in the State of California.[20] In FY 2022-23, Authority investments supported 11,980 job-years of in-state employment (including direct, indirect, and induced impacts) and generated $2.5 billion in total in-state economic output. Over the life of the project, Authority investments supported over 92,000 job-years of employment and generated up to $18.4 billion in total economic output in California.

As mentioned above, most of this economic activity has taken place in the State of California, with 99% of FY 2022-23 investment expended on companies and workers in the state. This estimate was developed using the spending profile data, with spending in non-California zip codes removed.

Table 2: Total Potential California Economic Impact – FY 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	6,940	$590	$1,320
Indirect Effects	2,190	$180	$600
Induced Effects	2,850	$180	$540
FY 2022-23 Total	**11,980**	**$940**	**$2,460**
Multiplier	*1.73*	*1.60*	*1.86*
Program Total (July 2006 – June 2023)	**92,150**	**$7,000**	**$18,400**

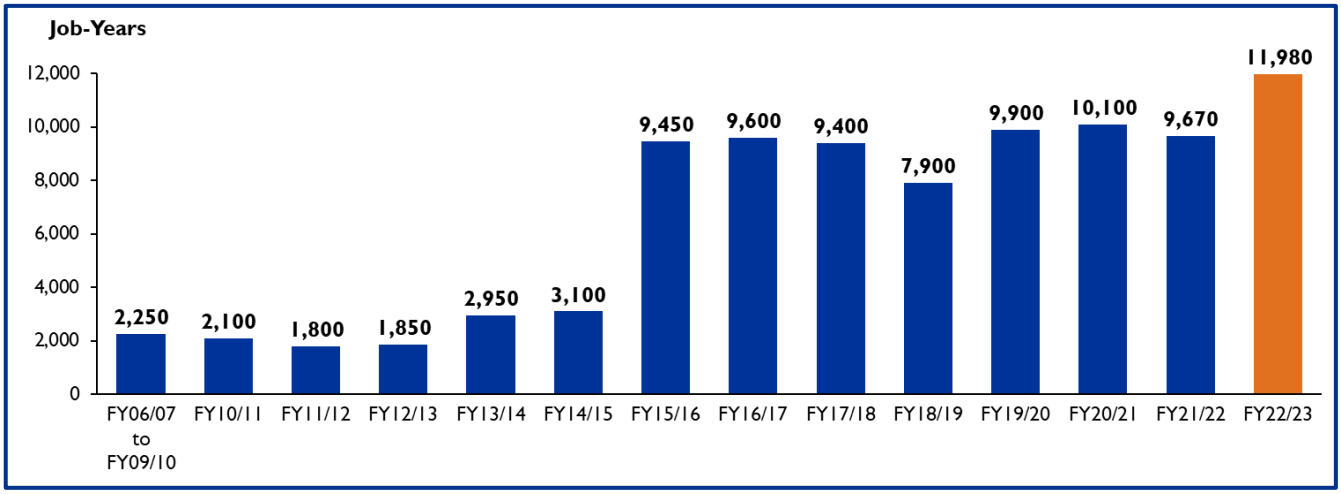
[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] Multiplier captures the ratio between total economic impact and the direct impact. For example, an employment multiplier of 1.73 means that a total of 1.73 job-years were supported in California as a result of one direct job-year employed for the project.

[20] $1.32 billion does not include ROW acquisition cost and other expenditure not captured in the economic impact analysis.

4.2 Total Employment Impact Overview

Job-years supported by the Authority's expenditures have grown significantly since construction commenced and ramped up in the Central Valley. **Figure 7** shows this growth in job-years from 2006-07 to the current analysis, with a noticeable rise starting in 2015-16, when construction activity in the Central Valley increased.

Figure 7: Statewide Total Supported Job-Years of Employment by Fiscal Year, July 2006 – June 2023



[1] Includes direct, indirect, and induced impacts

[2] The historical jobs analysis from FY 2006-16 took the results of the top-down statewide approach for the total impact shown in the Historical Analysis for statewide impacts and allocated them to each fiscal year based on the share of total expenditures that took place in that fiscal year.

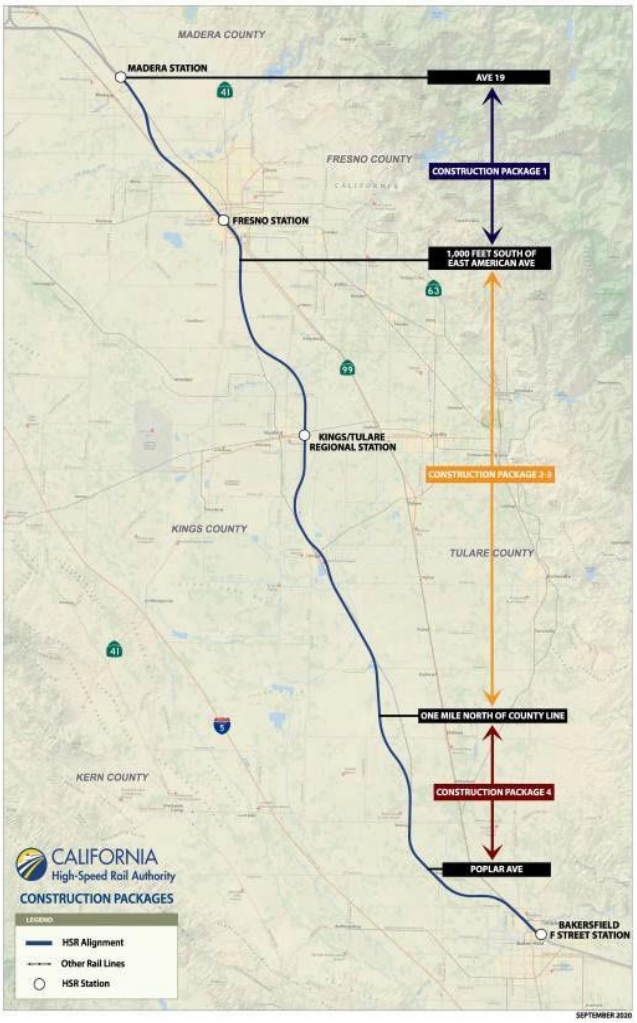
4.3 Breakdown by Region

This section presents the detailed impact by region throughout California. These regions include the Central Valley, Sacramento, Bay Area, and Southern California. The Central Valley has seen the largest overall impact in job-years of employment, labor income and economic output because of increased construction investment over the past three years. However, as construction spending continues to accumulate, its effects are seen in the Sacramento, Bay Area, and Southern California regions as local firms from those areas join construction teams in the Central Valley.

4.3.1 Central Valley Region

For this analysis (and as commonly defined), the Central Valley region includes the following counties: San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern. The Central Valley section of the system is considered the "backbone" of the project with its connections to the Bay Area and the Los Angeles Basin being critical to improving accessibility and the mobility options of the region's population.

Figure 8: Central Valley Segment (CVS) Construction Packages



Many communities in the Central Valley have been designated as disadvantaged based on a combination of economic and environmental conditions analyzed by the California Environmental Protection Agency.

Civil works construction for the first 119 miles of the system is ongoing through the CP 1, CP 2-3 and CP 4 design-build contracts. **Figure 8** shows each of the construction package segments along the project alignment. Each team has set up a local project and construction management office in the Central Valley and is doing the majority of their work locally and on the construction sites.[21]

Program investments had significant impact on the Central Valley economy, generating nearly 6,980 job-years of employment and over $1.3 billion in total economic output from July 2022 to June 2023.

Table 3 shows direct, indirect, and induced economic impacts of program investments in the Central Valley in terms of job-years of employment, labor income, and economic output generated during the analysis period for both FY 2022-23 and since 2006.

[21] The CP 1 project office is in Fresno, the CP 2-3 project office is in Selma and the CP 4 project office is in Shafter.

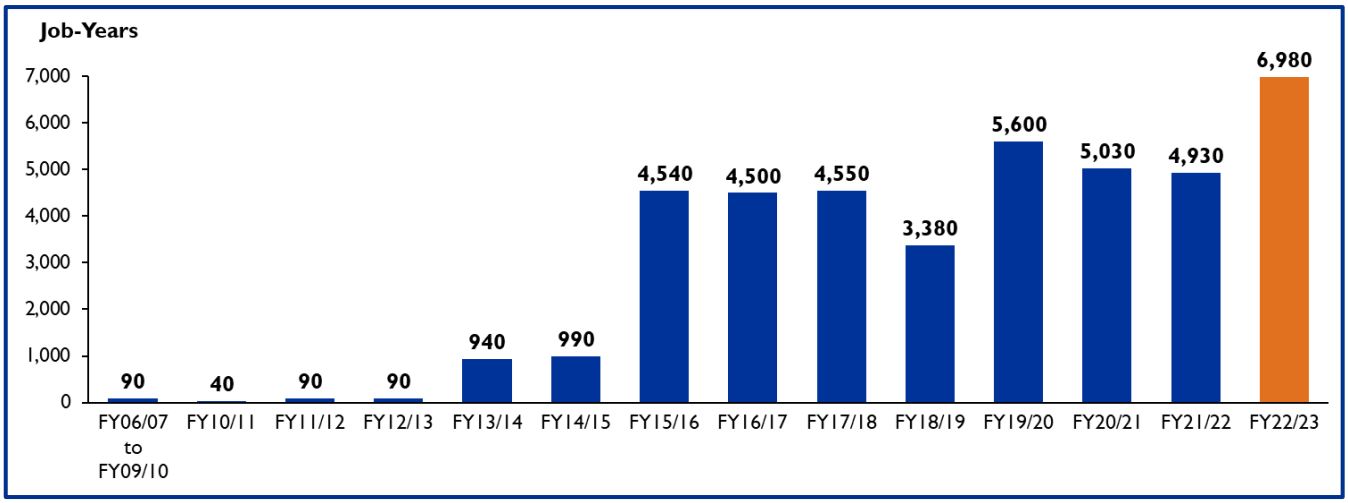
Table 3: Central Valley Economic Impacts, FY 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	4,550	$350	$820
Indirect Effects	970	$60	$240
Induced Effects	1,460	$80	$250
FY 2022-23 Total	**6,980**	**$490**	**$1,310**
Multiplier	*1.53*	*1.41*	*1.60*
Program Total (July 2006 – June 2023)	**41,510**	**$2,520**	**$7,740**

[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] Multiplier captures the ratio between total economic impact and the direct impact. For example, an employment multiplier of 1.53 means that a total of 1.53 job-years were supported in Central Valley as a result of one direct job-year employed for the project.

Figure 9 shows the approximate job-years of employment supported in the Central Valley by fiscal year. The increase in employment in FY22-23 over the previous year primarily reflects a significant uptick in construction expenditure over the last year.

Figure 9: Central Valley Region Total Supported Job-Years of Employment by Fiscal Year, July 2006 – June 2023



Note: Includes direct, indirect, and induced impacts

4.3.2 Sacramento Region

For purposes of this analysis, the Sacramento region includes Sacramento, Yolo, Placer, El Dorado, Sutter, and Yuba counties all located north of the Central Valley. The Authority's headquarters are located in downtown Sacramento. Most of the staff are in the government and professional services fields and provide overall guidance and oversight for the program.

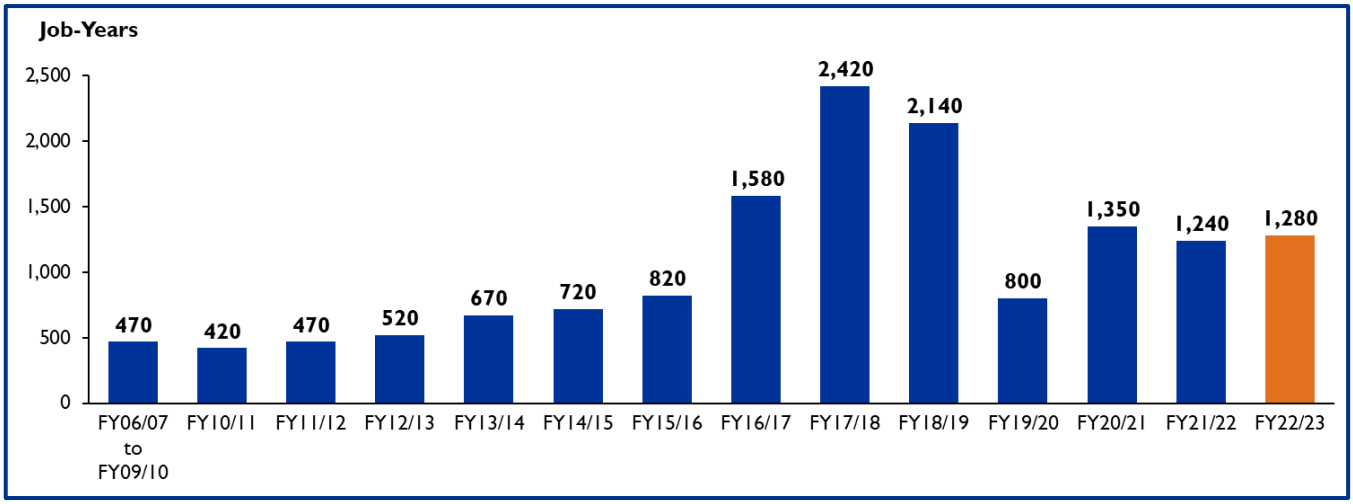
Table 4: Sacramento Region Economic Impacts, 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	640	$60	$130
Indirect Effects	300	$20	$60
Induced Effects	340	$20	$60
FY 2022-23 Total	**1,280**	**$110**	**$260**
Multiplier	*2.01*	*1.67*	*1.95*
Program Total (July 2006 – June 2023)	**15,170**	**$1,110**	**$2,610**

[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] Multiplier captures the ratio between total economic impact and the direct impact. For example, an employment multiplier of 2.01 means that a total of 2.01 job-years were supported in Sacramento Region as a result of one direct job-year employed for the project.

Figure 10 shows the approximate job-years of employment supported in the Sacramento region by fiscal year.

Figure 10: Sacramento Region Total Supported Job-Years of Employment by Fiscal Year, July 2006 – June 2023



Note: Includes direct, indirect, and induced impacts

4.3.3 Bay Area Region

The Bay Area region includes the following counties: Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Sonoma, Napa, and Solano. These nine counties are part of the Metropolitan Transportation Commission region. The Bay Area has mostly seen planning, engineering, and environmental work with only a limited number of Bay Area firms working on the construction in the Central Valley.

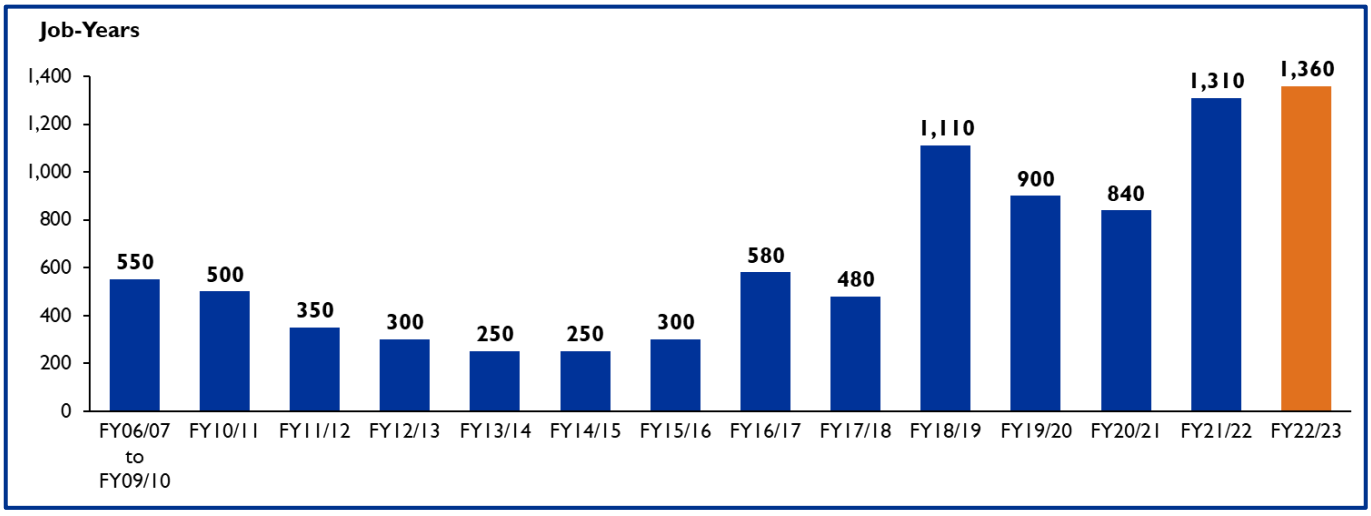
Table 5: Bay Area Region Economic Impacts, FY 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	750	$80	$170
Indirect Effects	280	$40	$120
Induced Effects	330	$30	$80
FY 2022-23 Total	**1,360**	**$150**	**$380**
Multiplier	*1.82*	*1.82*	*2.19*
Program Total (July 2006 – June 2023)	**9,110**	**$910**	**$2,140**

[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] Multiplier captures the ratio between total economic impact and the direct impact. For example, an employment multiplier of 1.82 means that a total of 1.82 job-years were supported in Bay Area Region as a result of one direct job-year employed for the project.

Job-years estimates since FY 2018-19 have increased in the Bay Area Region, as can be seen in **Figure 11**. From FY 2018-19, this is due to Caltrain spending, which is discussed more on the next page.

Figure 11: Bay Area Region Total Supported Job-Years of Employment by Fiscal Year, July 2006 – June 2023



Note: Includes direct, indirect, and induced impacts

Caltrain Electrification

The Authority is working in partnership with the Peninsula Corridor Joint Powers Board (Caltrain) and regional stakeholders to modernize the Caltrain corridor to keep pace with increasing ridership demands while also preparing its line for high-speed service. The San Francisco Bay Area will see the benefits of improved safety, reliability, efficiency, and air quality through the long-awaited electrification of the Caltrain corridor.

Caltrain Electrification will electrify the line between the 4th and King station in San Francisco and the Tamien Station in San Jose and provide signal and safety improvements that will allow Caltrain to operate clean, electrified service by 2024. This electrification project is a key component of the blended system that will accommodate high-speed rail service on the corridor.

Once the electrification project is completed, it will result in faster commute service for the region while also preparing for the integration of high-speed rail service. The state's commitment to this project will leverage funding to bring the total investment in the corridor to $2 billion.

Figure 12: Caltrain System Map

Through June 30, 2023, the Authority has contributed $623 million towards the Caltrain Electrification project, of which $127 million were made on FY 2022-23. This $127 million is included as a construction cost in the primary economic impact analysis and is reflected in this analysis.

4.3.4 Southern California Region

For purposes of this analysis, Southern California includes Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. These six counties are either in the Southern California Area Governments or San Diego Area Governments regions.

The Southern California region has seen mostly planning, engineering, and environmental work with a growing number of Southern California firms working on the construction in the Central Valley. Additionally, economic benefits have accrued before high-speed rail construction starts in the region as connectivity and bookend projects undergo construction.

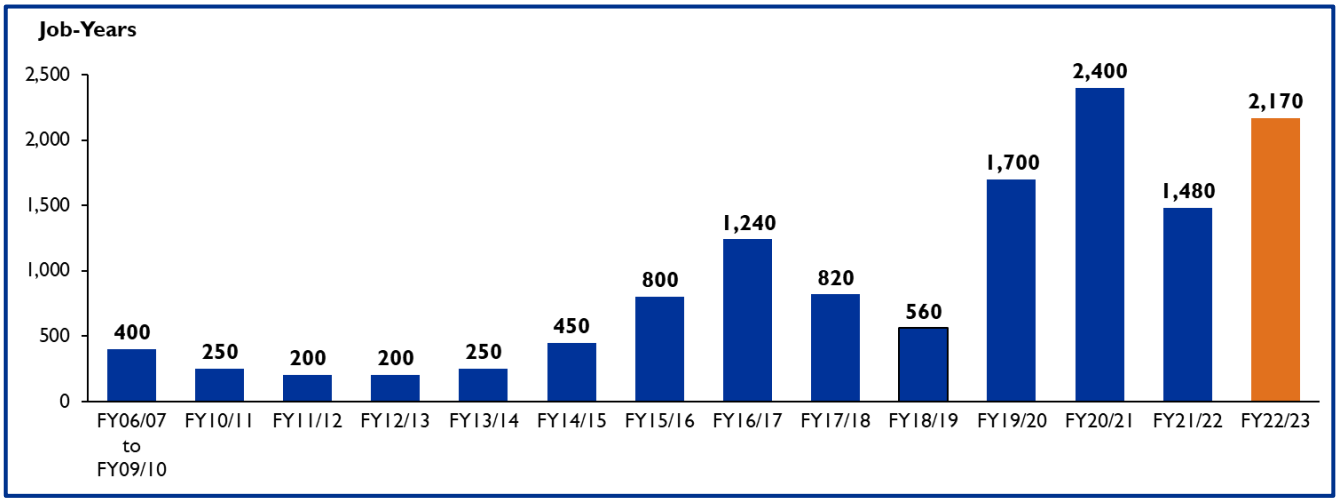
Table 6: Southern California Region Economic Impacts, FY 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	930	$80	$190
Indirect Effects	580	$50	$160
Induced Effects	670	$40	$130
FY 2022-23 Total	**2,170**	**$180**	**$480**
Multiplier	*2.34*	*2.10*	*2.52*
Program Total (July 2006 – June 2023)	**12,860**	**$980**	**$2,590**

[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] Multiplier captures the ratio between total economic impact and the direct impact. For example, an employment multiplier of 2.34 means that a total of 2.34 job-years were supported in Southern California Region as a result of one direct job-year employed for the project.

Figure 13 shows the approximate job-years of employment supported in the Southern California region per fiscal year.

Figure 13: Southern California Region Total Supported Job-Years of Employment by Fiscal Year, July 2006 – June 2023



Note: Includes direct, indirect, and induced impacts

Additional Southern California Investment

The Authority is also investing in two projects in Southern California that will support future segments of the high-speed rail project: grade separation at Rosecrans/Marquardt and upgrades at Los Angeles Union Station (LAUS) in downtown Los Angeles. As of June 2023, the Authority has supported $54.3 million[22] in investment in these projects.

Proposition 1A funds of $76.7 million were approved for the Rosecrans/Marquardt Grade Separation Project. The Rosecrans Avenue and Marquardt Avenue intersection is considered one of the most hazardous grade crossings in the state, according to the California Public Utilities Commission. Los Angeles County Metropolitan Transportation Authority (Metro), the lead agency on the project, estimates that more than 112 trains and more than 45,000 vehicles use the crossing daily. As of FY 2022-23, the environmental clearance process is complete for the Rosecrans/Marquardt Grade Separation Project.

Figure 14: Rosecrans/Marquardt Grade Separation Project Rendering

Furthermore, the Authority's partnership with Metro is key to implementing high-speed rail improvements in Southern California. The upgrade project at LAUS, called Link US Project, involves extensive track and station upgrades. The upgrades will transform access for regional services as well as modernize the station into a world-class facility. For the portion of the project that includes Union Station upgrades, Metro has closed escrows for the required right-of-way acquisitions and is coordinating with Southern California (SoCal) Edison on upfront utility work. Metro awarded the construction contract for this project in Spring 2022 and the new grade separation is expected to open in 2025. For the Link US run-through tracks project, the Final Environmental Impact Report (EIR) was certified by the LA Metro Board of Directors in June 2019. The Authority serves as the federal lead agency for the Link US Environmental Impact Statement (EIS) based on an agreement between the Federal Railroad Administration (FRA) and the State of California. Metro staff are currently preparing this EIS.

The calculated economic impacts of these Southern California investments have been included with the annual analysis for the applicable geographic locations.

[22] $54.3 million includes the California High Speed Rail Authority's expenditure contribution to Rosecrans/Marquardt and upgrades at Los Angeles Union Station (LAUS) as well as the expenditure for the Los Angeles County Metropolitan Transportation Authority (HSR15-170)

4.3.5 Rest of California Impacts

The analysis for this year employs IMPLAN's MRIO modeling methodology to calculate the economic impacts by categorizing the state into four primary regions (Central Valley, Sacramento, Bay Area, and Southern California) and one other region that serves as a catch-all for the remainder of the state ("Rest of California"). The MRIO model, unlike the single-region analysis used in previous years, incorporates and measures impacts from one region to another within the regional models. The "Rest of California" Impacts generated by program expenditures that took place outside of the four primary regions—but within California— represent approximately 1.8% of total program expenditures.

In FY 2022-23, the Rest of California Impacts account for an additional 190 job-years supported and about $40 million in total economic output. Since 2006, the remaining California Impacts account for an additional 13,000 job-years supported, approximately $1.5 billion in labor income, and $3.3 billion in economic output.

Table 7: Rest of California Impacts, FY 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	80	$6	$14
Indirect Effects	50	$4	$17
Induced Effects	50	$3	$10
FY 2022-23 Total	**190**	**$12**	**$40**
Program Total (July 2006 – June 2023)	**13,510**	**$1,490**	**$3,330**

[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.

4.4 California County Impacts

The California counties that show the largest impacts in FY 2022-23 include Kings County, Fresno County, Madera County, Kern County, Sacramento County, Los Angeles County, and San Francisco County.

In FY 2022-23, Kings County represents the biggest impact with about 29% of total direct job-years supported as a proportion of the statewide analysis.[23] Fresno County accounts for 19% of total program direct job-years, with Madera County accounting for 9%, Kern County accounting for 9%, Sacramento County accounting for 8%, Los Angeles County accounting for 7% and San Francisco County accounting for 1%.

Table 8 below shows the direct job-years (rounded to tens) attributed to select California counties, with cumulative Program Totals from 2006 to current report.

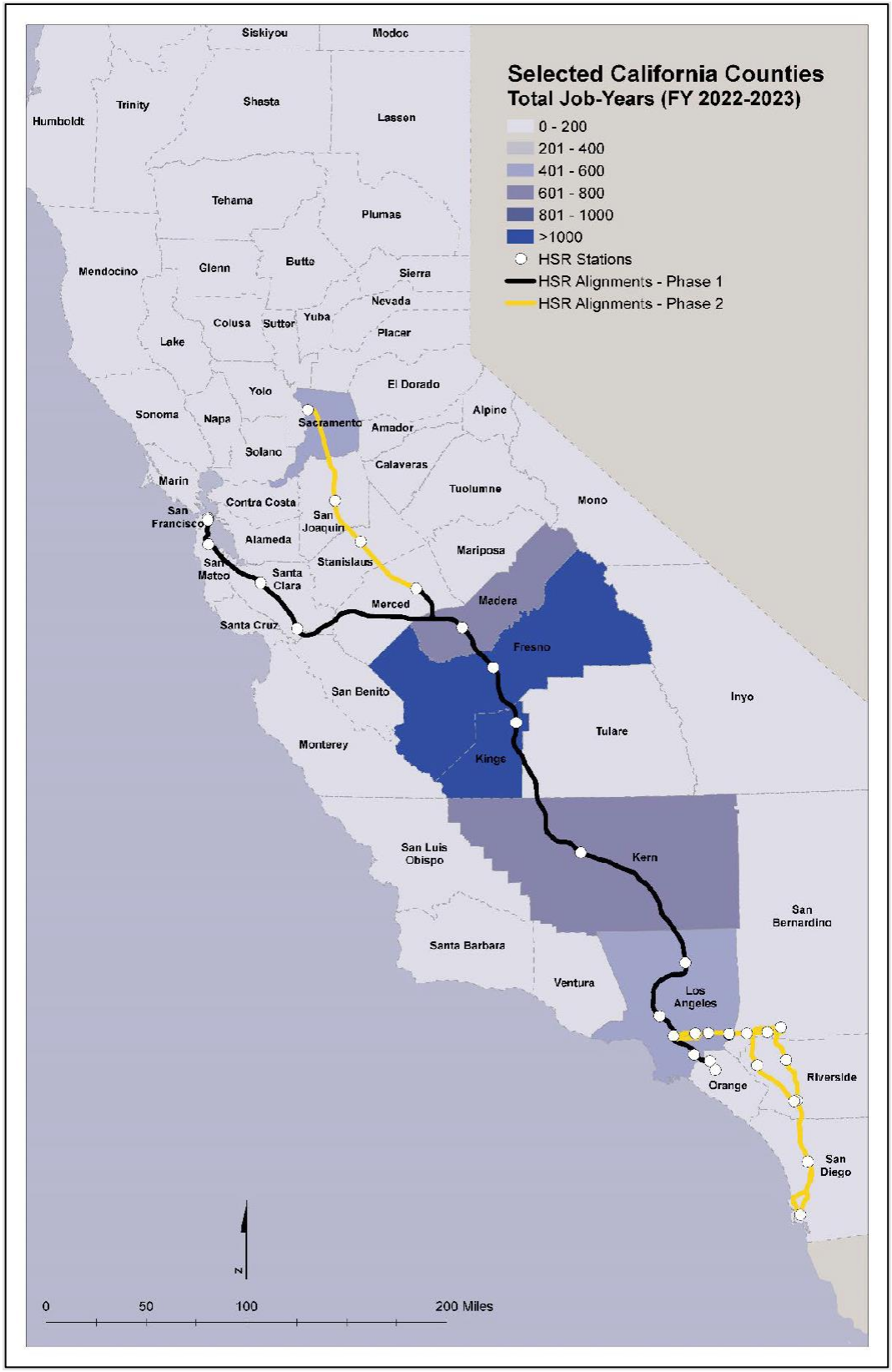
[23] In FY 2022-23, there is a total impact of 6,940 direct job-years statewide.

Table 8: Direct Jobs for Selected California Counties

County	FY 2022-23 Direct Job-Years	Program Totals Direct Job Years
Kings	2,050	5,420
Fresno	1,290	11,860
Madera	630	3,250
Kern	630	3,170
Sacramento	570	6,080
Los Angeles	500	3,150
San Francisco	80	1,270

Figure 15 below shows the FY 2022-23 direct job-years by county in map format.

Figure 15: California Counties, Total Supported Job-Years of Employment, FY 2022-23



4.4.1 Key County – Fresno County

Fresno was the site of the system's groundbreaking in 2015 and has seen significant construction and economic benefits from the project thus far. About one-half of CP 1 and one-fourth of CP 2-3 is in the County. Further, the Authority's Central Valley regional office is in the City of Fresno.

Work in the Central Valley and Fresno has included planning, engineering, and site-work preparation, including right-of-way acquisition, in preparation for construction as well as major construction itself. In FY 2022-23, Fresno County accounted for an estimated 1,290 direct-job years or 28% of total direct job-years supported in the Central Valley region.

Table 9: Fresno County Economic Impacts, FY 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	1,290	$100	$230
Indirect Effects	420	$30	$90
Induced Effects	580	$30	$100
FY 2022-23 Total	**2,290**	**$160**	**$420**
Multiplier	*1.78*	*1.56*	*1.80*
Program Total (July 2006 – June 2023)	**21,220**	**$1,210**	**$3,750**

[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] Multiplier captures the ratio between total economic impact and the direct impact. For example, an employment multiplier of 1.78 means that a total of 1.78 job-years is supported in Fresno County as a result of one direct job-year employed for the project.

4.4.2 Key County – Kings County

Kings was the county with the largest direct job-years impact in FY 2022-23. It is the third highest county in program total direct job-years, but this year's growth was significant to bring its total only slightly below Sacramento compared to the previous year. Over 80% of CP2-3 is in Kings County, accounting for an estimated 2,050 direct job-years or 45% of the total direct job-years supported in the Central Valley region.

Table 10: Kings County Economic Impacts, FY 2022-23 & Program Total, July 2006 – June 2023

	Employment (job-years)	Labor income ($M)	Economic output ($M)
Direct Effects	2,050	$140	$350
Indirect Effects	150	$10	$40
Induced Effects	270	$10	$50
FY 2022-23 Total	**2,460**	**$160**	**$440**
Multiplier	*1.21*	*1.15*	*1.23*
Program Total (July 2006 – June 2023)	**7,090**	**$470**	**$1,350**

[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] Multiplier captures the ratio between total economic impact and the direct impact. For example, an employment multiplier of 1.21 means that a total of 1.21 job-years is supported in Kings County as a result of one direct job-year employed for the project.

4.5 HSR Project Segment Impact Forecast

In addition to measuring the economic impact of the annual expenditures related to Authority activities for FY 2022-23, the analysis includes an evaluation of the economic impact of the total projected program expenditures for each component section within the total Phase 1 planned expenditure to completion. Phase 1 is broken into the following project sections: San Francisco to San Jose, San Jose to Merced, Merced to Fresno, Fresno to Bakersfield, Bakersfield to Palmdale, Palmdale to Burbank, Burbank to LA Union Station, and LA Union Station to Anaheim. The projected program expenditures by project section include track, systems and structure construction, professional services, real estate transaction costs, rolling stock procurement and legal services. In alignment with the methodology outlined in Section 3.3, the purchase of right-of-way and other real estate is regarded as a transfer payment and is excluded from the economic impact analysis. System-wide projected program expenditures were allocated by segment via the percentage of capital expenditure for each segment to ensure all Project costs were captured.

Using the methodology described in Section 3.3, the projected program expenditures from FY 2006-07 over the construction period through completion for each project section are organized by major asset category and attributed to their related industry sector based on the IMPLAN industrial detail. As the analysis includes evaluating expenditures in future years, a deflation factor is applied to produce outputs in constant 2023 dollars. The projected program expenditures and their resultant employment, labor income, and economic output are depicted in the table below.

Table 11: Phase 1 Economic Impact by Project Section, 2006-07 through Completion

Project Section	Total Programmed Expenditures ($B in 2023 Dollars)	Total Employment (Job-Year)	Total Labor Income ($B)	Total Economic Output ($B)
San Francisco to San Jose	$6.3	59,000	$4.9	$12.8
San Jose to Merced	$20.7	188,000	$15.5	$40.6
Merced to Fresno	$16.4	155,000	$13.2	$32.9
Fresno to Bakersfield	$18.4	175,000	$14.8	$37.0
Bakersfield to Palmdale	$18.3	164,000	$13.5	$35.8
Palmdale to Burbank	$17.9	159,000	$13.2	$34.9
Burbank to LA Union Station	$1.9	18,000	$1.5	$3.8
LA Union Station to Anaheim	$2.9	27,000	$2.3	$5.8
Total Phase 1	**$102.7**	**945,000**	**$78.9**	**$203.6**

[1] A job-year represents one year of employment for one person.
[2] Merced to Fresno Project Section includes the interchange known as the Central Valley Wye, including the segment traveling west to Carlucci Road.

Table 12 presents the projected program expenditures over the construction period through completion for Phase I by project stage. [24] **Figure 16** below shows that the total Phase 1 plan is broken into three distinctive project stages: Merced to Bakersfield, Valley-to-Valley Expansion, and Phase 1 buildout. The Merced to Bakersfield stage and Valley-to-Valley Expansion are combined as the "Valley-to-Valley" (V2V) portion. The Valley-to-Valley portion is combined with the Phase 1 Buildout portion as the total Phase 1 plan.

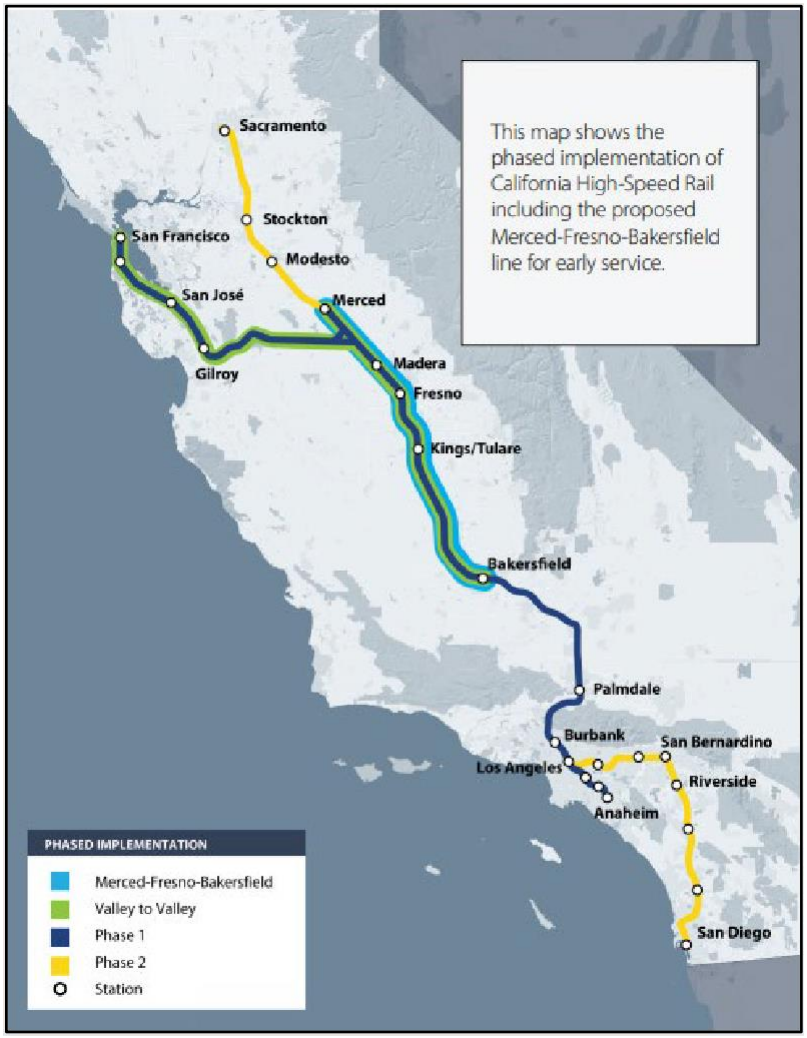
[24] For the purpose of this analysis, the estimated completion date is assumed to be 2033.

Table 12: Total Projected Program Expenditures by Project Stage, 2006-07 through full Phase I Completion

Project Stage	Total Programmed Expenditures (in $B in 2023 Dollars)	Total Employment (Job-Year)	Total Labor Income ($B)	Total Economic Output ($B)
Merced to Bakersfield	$35.0	333,000	$28.2	$70.3
Valley to Valley Expansion	$22.3	201,000	$16.8	$43.9
Valley to Valley Subtotal	**$57.3**	**534,000**	**$45.0**	**$114.1**
Phase 1 Buildout	$45.4	411,000	$33.9	$89.4
Total Phase 1	**$102.7**	**945,000**	**$78.9**	**$203.6**

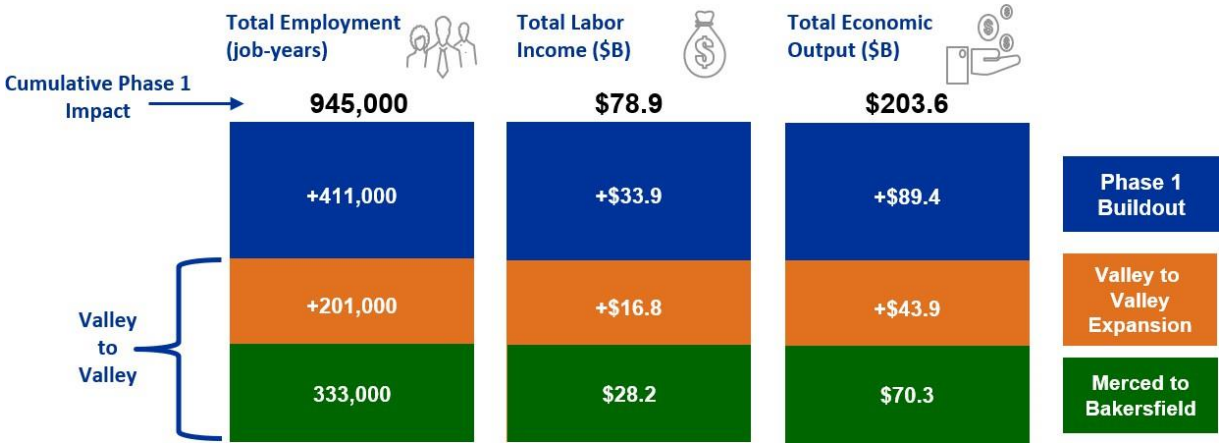
[1] Totals may not sum due to rounding.
[2] A job-year represents one year of employment for one person.
[3] The difference between the $102.7B listed here and the project stage program total of $106.2B is due to base year differences and the exclusion of ROW acquisition costs.
[4] Merced to Bakersfield includes Phase 1 Environmental Clearance and Bookends costs.

Figure 16: California High-Speed Rail Phased Implementation Map



Using the methodology described above, the projected program expenditures included in each stage of Phase 1 are attributed to the corresponding industry sector and evaluated in the IMPLAN input-output model. The figure below illustrates the cumulative economic impact of each stage of Phase 1 as their total value following their completion. The analysis measures the following metrics: total employment (in job-years), total labor income (in 2023 dollars) and total economic output (in 2023 dollars).

Figure 17: Phase 1 Cumulative Economic Impact by Project Stage, 2006-07 through full Phase I Completion



4.6 Disadvantaged Communities and Small Business Enterprises

The Authority is committed to ensuring small businesses and disadvantaged communities throughout California benefit and play an active role in building the Program. Investments made by the Program have promoted employment and business opportunities for small and disadvantaged businesses and workers.

California recognizes specific areas as disadvantaged communities based on a combination of environmental and socioeconomic factors. This analysis is conducted by the California Environmental Protection Agency (CalEPA) using a tool called CalEnviroScreen. Disadvantaged communities are defined as those that score in the top 25% of the most impacted communities based on an index made up of four components in two broad groups as shown in **Table 13**. Exposure and Environmental Effects components comprise a Pollution Burden group, and the Sensitive Populations and Socioeconomic Factors components comprise a Population Characteristics group.

Table 13: CalEnviroScreen 4.0 Indicator and Component Scoring

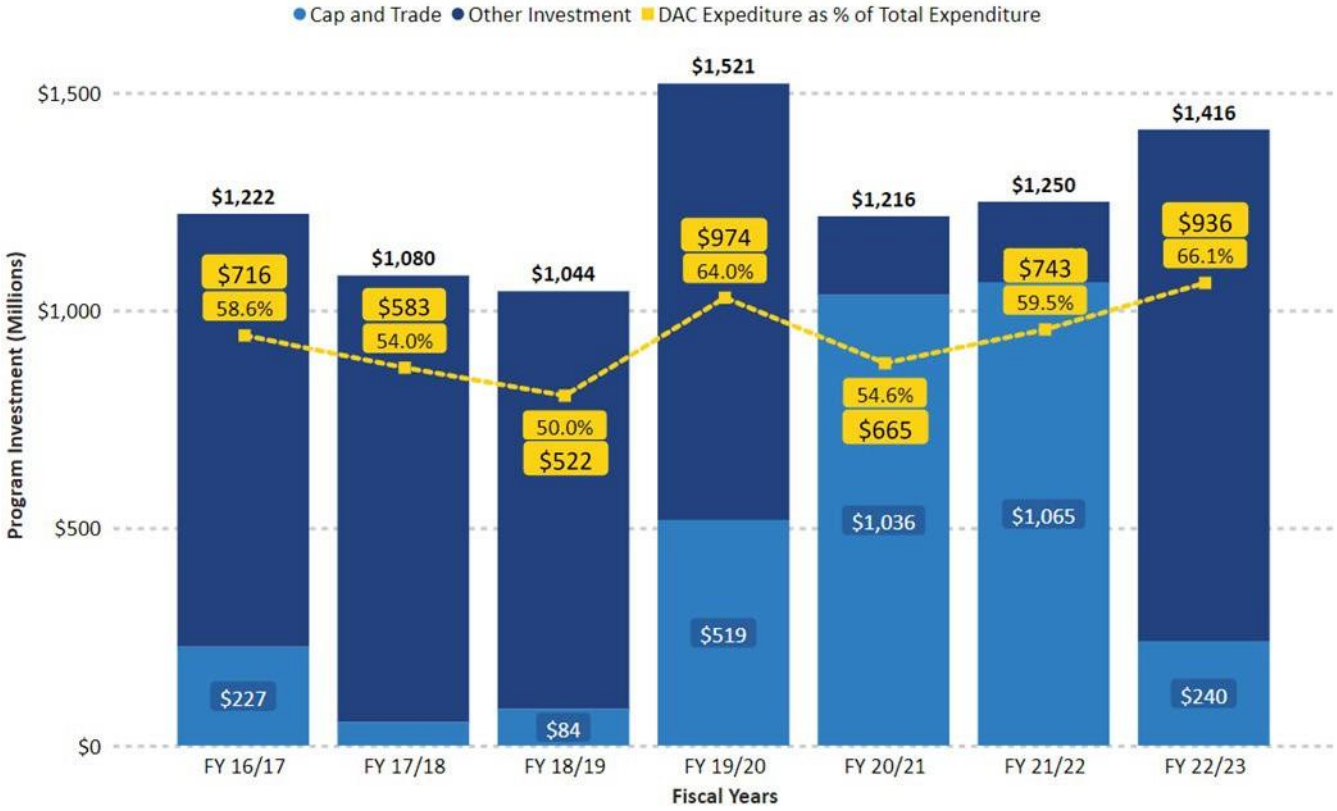
Pollution Burden x Population Characteristics = CalEnviroScreen Score	
Pollution Burden	**Population Characteristics**
Exposures • Ozone Concentrations • PM2 5 concentrations • Diesel PM Emissions • Drinking Water Contaminants • Children's Lead Risk from Housing • Pesticide Use • Toxic Releasers from Facilities • Traffic Impacts	**Sensitive Populations** • Asthma Emergency Department Visits • Cardiovascular Disease (Emergency Department visits for Heart Attacks) • Low Birth-Weight Infants
Environmental Effects • Cleanup Sites • Groundwater Threats • Hazardous Waster • Impaired Water Bodies • Solid Waste Sites and Facilities	**Socioeconomic Factors** • Educational Attainment • Housing-Burdened Low-Income Households • Linguistic Isolation • Poverty • Unemployment

An advantage to starting construction on the high-speed rail system in the Central Valley is the opportunity that construction generates for residents of disadvantaged communities that are disproportionally (though not exclusively) located in the Central Valley. Under the guidelines of the ARRA grant and Cooperative Agreement FR-HSR-0118-12-01-01 (FY10 grant), one of the priorities to be considered for project selection was whether the project was in an Economically Distressed Area. Project investments in the Central Valley are positively affecting the local economy, stimulating economic activity, and generating employment.

Around 66% of the investment in the system in FY 2022-23 occurred in designated disadvantaged communities throughout California, spurring economic activity in these areas. Additionally, about 57% of the total program investment from July 2006 through June 2023 occurred in designated DACs.

Figure 18 shows the program expenditures funded by cap and trade investment and other funding sources as well as DAC investment amount by fiscal year.

Figure 18: Program Expenditures by Funding Source and DAC Investment Amount by Fiscal Year



[1] Other investment sources include Proposition 1A funds and federal trust funds.
[2] FY2017-2018 Cap and Trade funding was approximately $54M.
[3] Program expenditures are slightly different from the amount captured in the analysis because they include ROW acquisition costs. For FY 2018-23, program expenditures by funding source are obtained from the F&A Committee annual Capital Outlay and Expenditure Reports. Since Capital Outlay and Expenditure report did not exist prior to FY 2018-19, program expenditures by funding source are obtained from the Authority's EcoSys reports.
[4] Prior Fiscal Year Project Expenditure totals may not match to earlier F&A Committee reports; as a result, DAC expenditure as a percentage of total expenditure may not match earlier economic impact reports.

Figure 19: Disadvantaged Communities in California and Project Alignment

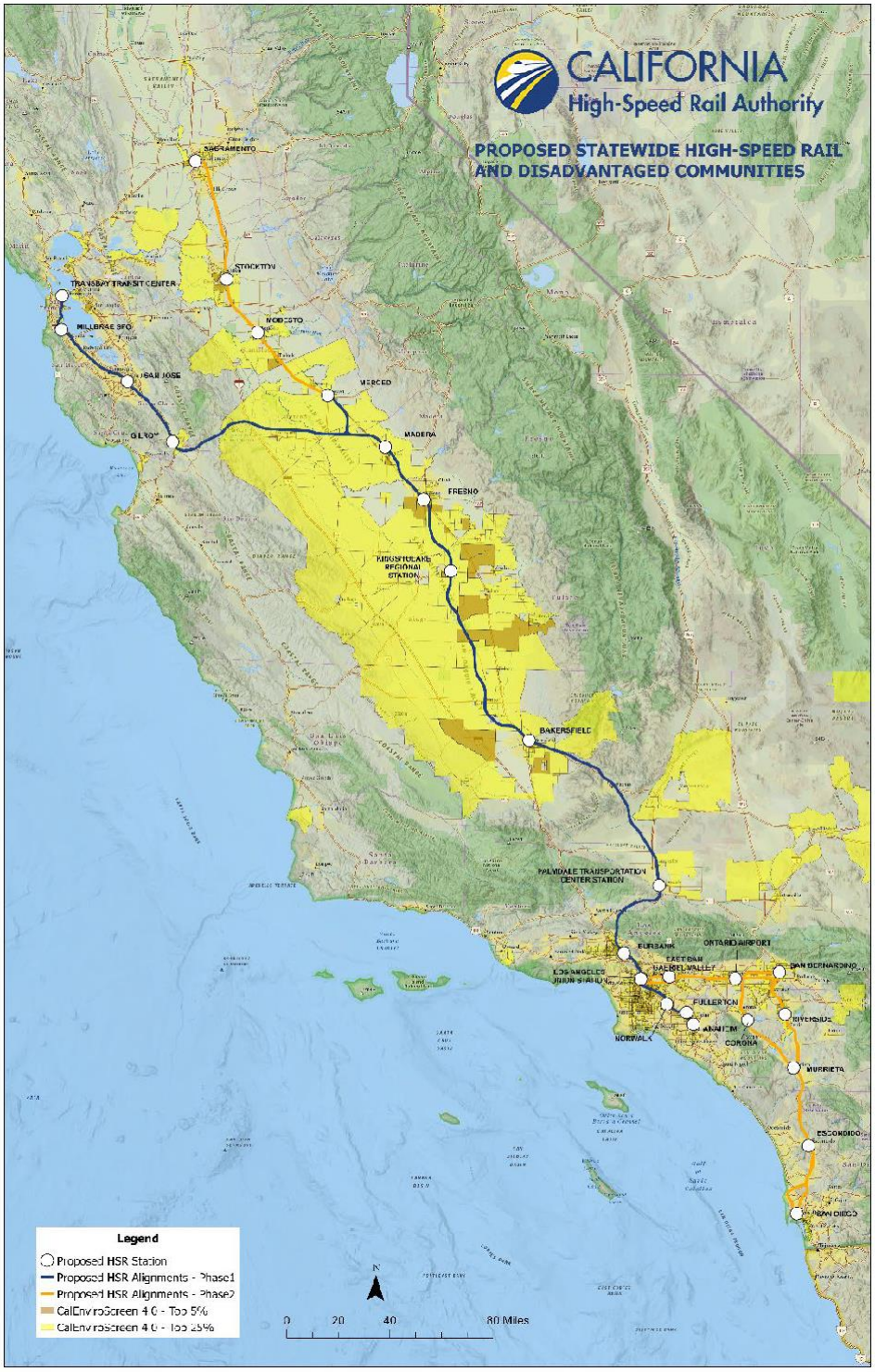
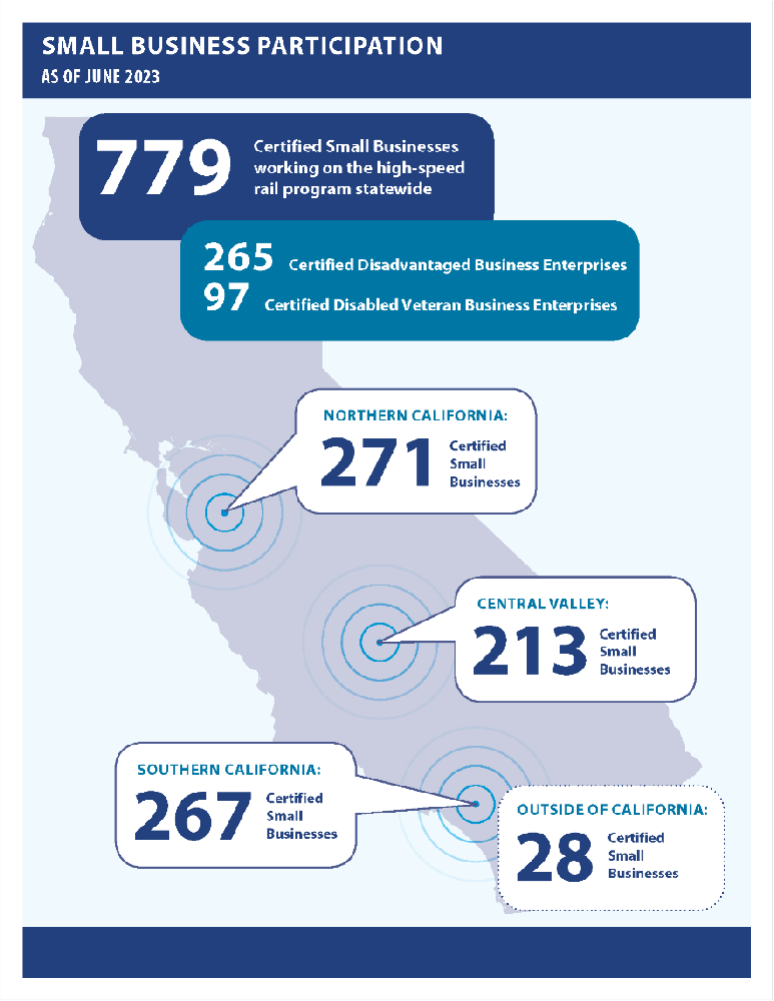


Figure 19 visually depicts an overlay of the Project across designated disadvantaged communities in California. From the implementation of the Authority's Small and Disadvantaged Business Enterprise Program in 2012 through June 30, 2023, professional services contractors and design-build contractors collectively have a 24.28% small business utilization levels (both lower than the 30% target). As of June 30, 2023, 779 small businesses were either committed, utilized, or actively working on the project. **Figure 20** summarizes small business participation across the state of California.

Figure 20: Small Business Participation in the California High-Speed Rail Program as of June 30, 2023



Furthermore, the Authority Board of Directors approved a Community Benefits Policy in 2012 to ensure that jobs created through program investments benefit disadvantaged communities The Authority's Community Benefits Agreement contains a Targeted Worker Program which ensures that 30% of all project work hours are performed by National Targeted Workers, and at least 10% of those work hours shall be performed by Disadvantaged Workers, including veterans.[25,26]

From the Project inception through June 30, 2023, over $1.47 billion has been paid to certified small businesses, Disadvantaged Business Enterprises (DBE), and Disabled Veteran Business Enterprises (DVBE). Of that amount, $596 million was earned by small businesses, $622 million was paid to DBE, and $248 million received by DVBE.

As of June 2023, more than 11,000 construction labor workers have been dispatched to the three high-speed rail construction packages in the Central Valley. Each of the project's design-builders is implementing the Targeted Worker Program, where 30% of all project work hours are performed by workers from disadvantaged communities where annual household incomes normally range from $32,000 to $40,000. Out of the 11,281 jobs supported, 3,741 went to residents from Fresno County, 2,116 from Kern County, 395 from Kings County, 485 from Madera County, and 1,127 from Tulare County.

[25] Targeted Worker is an individual whose primary place of residence is within an Economically Disadvantaged Area or an Extremely Economically Disadvantaged Area in the United States.
[26] A Disadvantaged Worker is an individual who meets the income requirements of a Targeted Worker, and faces other barriers to employment (e.g., being a veteran, lacking a GED or high school diploma, being unhoused, etc.)

4.7 National Impacts

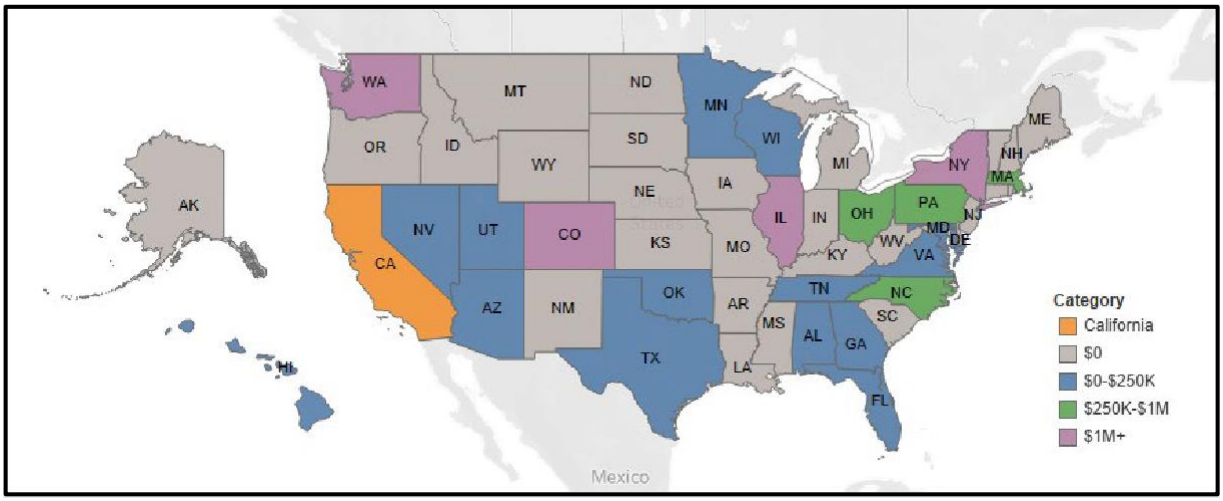
While Program expenditures primarily take place in California, expenditures have also impacted the economies of other US states through material purchases, companies based in other states working on the program, and other spillover effects. Over the lifetime of the program, companies from at least 41 different states have worked directly on the program, contributing to activities from planning and engineering to construction.

Table 14: Top 10 US States with Highest FY 2022-23 Expenditure Outside California

State	FY 2022-23 Expenditures	FY 2022-23 Percent of Non-California Expenditure within US (excludes international)
Illinois	$3,234,000	31.0%
New York	$1,828,000	17.5%
Washington	$1,285,000	12.3%
Colorado	$1,052,000	10.1%
Washington DC	$867,000	8.3%
North Carolina	$541,000	5.2%
Ohio	$527,000	5.0%
Massachusetts	$309,000	3.0%
Pennsylvania	$296,000	2.8%
Minnesota	$148,000	1.4%
All Other States	$363,000	3.5%
Total	$10,449,000	100.0%

[1] Totals may not sum due to rounding.

Figure 21: All US States Categorized by FY 2022-23 Expenditure



In FY 2022-23, out-of-state spending accounted for about 1% (about $11.1 million) of total fiscal year expenditures and includes spending across the United States as well as some expenditures for specialized services that were sourced from experts overseas due to the lack of specific high-speed rail expertise within the United States. Of the expenditures that occurred outside of California, nearly 94% ($10.4 million) remained within the US, while about 6% ($631 thousand) was allocated to international spending.

5. Methodological Appendix

5.1 Glossary

Acronym/Term	Description
Analysis	Fiscal Year 2022-2023 Economic Impact Analysis
ARRA	American Recovery and Reinvestment Act
Authority	California High-Speed Rail Authority
CalEPA	California Environmental Protection Agency
Caltrain Electrification	Peninsula Corridor Electrification Project
CEA	White House Council of Economic Advisers
CP	Construction Package
CVS	Central Valley Segment
DAC	Disadvantaged Communities
DB	Design-Build
DBE	Disadvantaged Business Enterprises
DVBE	Disabled Veteran Business Enterprises
E&E	Environment and Engineering
EIR/EIS	Environemental Impact Report/Environemental Impact Statement
FRA	Federal Railroad Administration
FY	Fiscal Year
HSR	High-Speed Rail
Historical Analysis	July 2006 – June 2017 Economic Impact Analysis
IMPLAN	Impact Analysis for Planning
LAUS	Los Angeles Union Station
Metro	Los Angeles County Metropolitan Transportation Authority
MRIO	Multi-Regional Input-Output
PA	Program Administration
PCM	Project and Construction Management
PDS	Program Delivery Service
PM	Program Management
PMT	Program Management Team
Program	California High-Speed Rail Program
RA	Resource Agency
RC	Regional Consultant
RDP	Rail Delivery Partner
ROW	Right of Way
Study Team	Authority Team consisting of the Business and Economic Branch
SoCal	Southern California
TPA	Third Party Agreements
V2V	Valley-to-Valley

5.2 IMPLAN Software and Methodologies

5.2.1 IMPLAN Methodology

The IMPLAN model provides information on industrial structure of a particular region, essential to estimate economic impacts at a regional level. The regional economic accounts are then converted to industry-level data by using linear algebra in the form of input-output accounts and a set of multipliers. The initial data set includes commodities used and created by industry and

these commodity flows across industries are derived for the local area using national Input-Output accounts. The IMPLAN model then derives final demand, value added, economic activity, and employment for each data set. More detailed information regarding employment figures is calculated for each industry in the local area.

5.2.2 IMPLAN Data

The components of the IMPLAN database form the economic accounts of an individual county, several counties, region, or an entire state. These accounts show the flow of commodities to industries and institutional consumers in separate industry sectors in agriculture, mining, construction, manufacturing, wholesale and retail trade, utilities, finance, insurance and real estate, and consumer and business services.

Each industry is described in terms of its purchases from and sales to all other industries in the local economy. Values for all activities are in producers' prices and do not include transportation costs or other additional transaction costs associated with delivering economic output from each industry to other intermediate users. The accounts also provide information on value added by each industry and sales by each industry to final demand. Value added has the following four main components:

- Employee compensation (wages, salaries, benefits, life insurance, retirement, etc.)
- Proprietary income (payments received by self-employed individual as income)
- Other property-type income (payments received from royalties and dividends)
- Indirect business taxes (primarily excise and sales taxes individuals pay to businesses)

Final demands are goods and services purchased for their ultimate use by an end user. They are allocated to producing industries and margins are allocated to the service sectors, such as transportation, wholesale and retail trade, and insurance associated with providing that good to the final user. Final demands include the following:

- Personal consumption expenditures (payments by individuals or households to industries for goods and services for personal consumption)
- Federal government purchases (military and non-military) and sales
- State and local government purchases (public education and non-education) and sales
- Inventory purchases (unsold annual output) and sales (where inventory reduction exceeds additions from production)
- Capital formation (expenditures to obtain capital equipment)
- Foreign exports

5.2.3 Multipliers

In an Input-Output model, the increase in demand for a product or a service causes a multiplier effect. For instance, an increase in demand for a product not only affects its producer, but also affects employees of the producer, suppliers of the producer, his employees and so on. This leads to the creation of a total effect that is greater than the initial change in demand. The ratio of total effect to initial effect is called the multiplier.

Multiplier = (Direct Effect + Indirect Effect + Induced Effect)/Direct Effect

Multipliers can express the ratio of total effects to initial effects for economic activity, income employment, local and state taxes. These multipliers vary by industry and region.