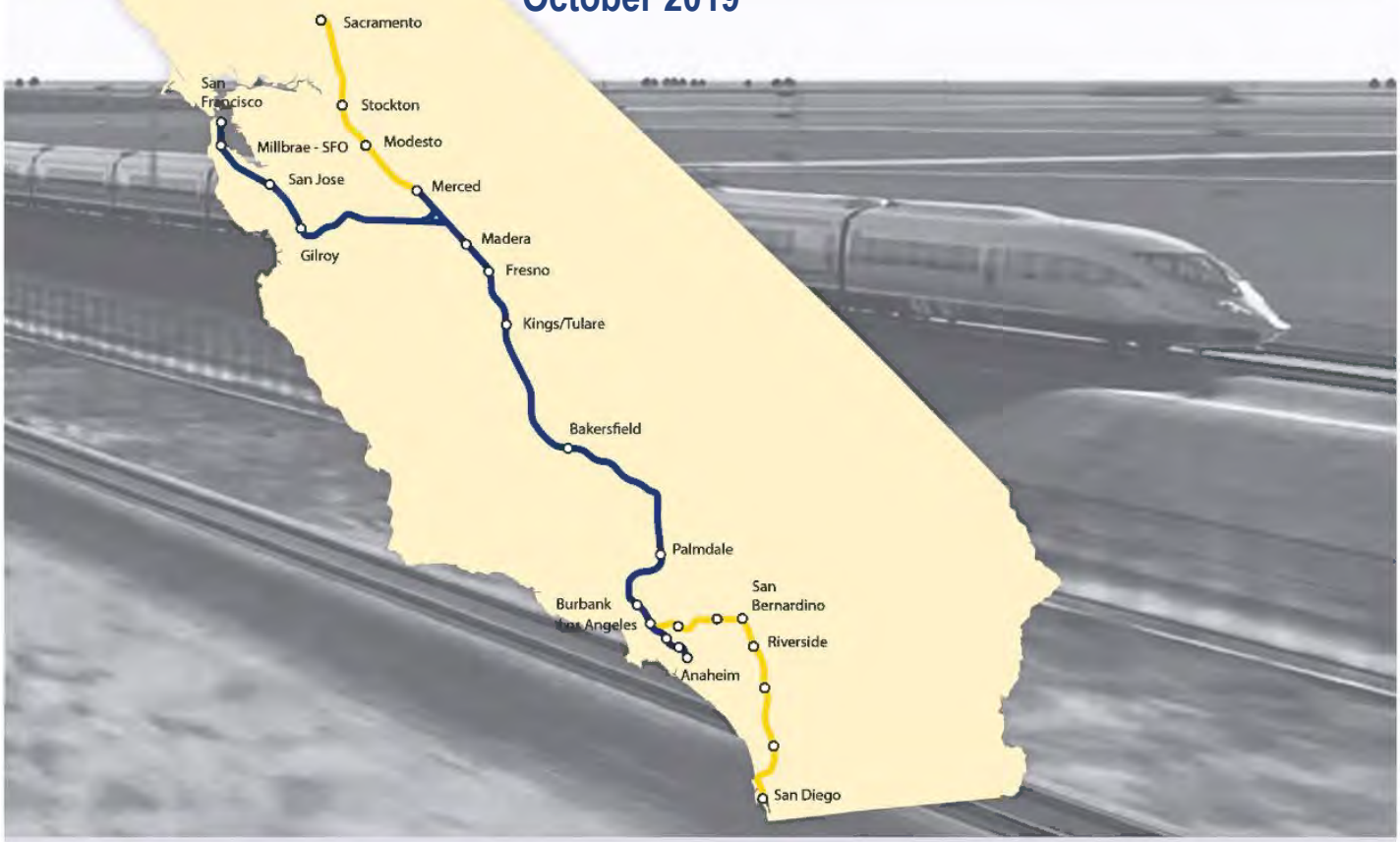
APPENDIX 3.3-C: CHANGES TO PROJECT BENEFITS BASED ON 2018 BUSINESS PLAN

California High-Speed Rail Authority

San Jose to Merced Project Section

Changes to Project Benefits Based on 2018 Business Plan

October 2019



CALIFORNIA High-Speed Rail Authority

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by the State of California pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated July 23, 2019, and executed by the Federal Railroad Administration and the State of California.

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1 INTRODUCTION

This document provides additional information regarding the benefits associated with the long-term operation of the high-speed rail (HSR) project. The document briefly summarizes assumptions about the HSR system and the corresponding key project benefit information that was presented in the San Jose to Merced Section Project Environmental Impact Report (EIR)/Environmental Impact Statement (EIS). The benefits described in the EIR/EIS are based on the scenarios and assumptions contained in the 2016 Business Plan, which was adopted by the California High-Speed Rail Authority (Authority) Board on May 1, 2016. This document provides information on how those benefits may change based on updated scenarios and assumptions contained in the 2018 Business Plan, which was adopted by the Authority Board on May 15, 2018. This information is intended to reflect the potential range of outcomes for HSR project benefits in the future and to inform the decision-making process.

The information contained in this appendix is part of the EIR/EIS. However, it does not constitute a change in the proposed HSR system and does not identify new or more severe adverse environmental impacts or changes to the discussion of adverse environmental impacts from the HSR system. The additional information does not change the feasibility of any alternatives or mitigation strategies that were considered infeasible or not reasonable for purposes of project-level analysis. This additional information is solely for the purpose of providing a comparison of the analysis provided in the EIR/EIS to the 2018 Business Plan.

2 OVERVIEW OF KEY ASSUMPTIONS IN THE 2016 AND 2018 BUSINESS PLANS

2.1.1 2016 Business Plan

The EIR/EIS includes information on project benefits, including reduced vehicles miles traveled (VMT), energy use, and air pollution. These benefits were derived based on the assumptions in the 2016 Business Plan for the opening year for passenger service of the Silicon Valley to Central Valley Line (Valley-to-Valley Line) and Phase 1 of the HSR System (Phase 1). The Valley to Valley Line would connect San Jose to north of Bakersfield. Phase 1 would connect San Francisco and the Bay Area to Los Angeles and Anaheim.

Two primary forecasting scenarios were created: one assumes that the Valley-to-Valley line would open in 2025 and the other assumes that Phase 1 would begin in 2029. Forecasts were also made for 2040, the planning horizon for the environmental analysis. A 5-year ramp-up assumption was made for growth in ridership after the opening of each section for revenue service. It was assumed that only 40 percent of the forecast ridership would materialize in the first year, 55 percent in the second, 70 percent in the third, 85 percent in the fourth, and 100 percent in the fifth.

Because the ultimate ridership of the HSR system would depend on many uncertain factors, such as the price of gasoline and population growth, the forecasts in the 2016 Business Plan and EIR/EIS consider medium and high ridership scenarios for each analysis year.

2.1.2 2018 Business Plan

The 2018 Business Plan builds on and updates the 2016 Business Plan. It summarizes the progress made since 2016, updates information and forecasts, and outlines a path for advancing the HSR project. The revised cost estimates and forecasts have been informed by and improved through rigorous scrutiny and review by a range of external experts and academics. The 2018 Business Plan also includes an updated analysis of the economic impacts of the system, which shows that the program is financially viable and a sound investment opportunity.

One of the key revisions to the 2018 Business Plan that could affect the benefits analysis presented in the EIR/EIS is opening year assumption for the Valley-to-Valley Line and Phase 1. In its 2016 Business Plan, the Authority adopted the goal of completing a connection between San Jose to north of Bakersfield as part of the initial Valley-to-Valley Line. The 2018 Business Plan extends the Valley-to-Valley Line with service between San Francisco and Bakersfield.

Extending the Silicon Valley to Central Valley Line to San Francisco and Bakersfield expands high-speed rail to major urban centers at both ends of the line, which results in different ridership forecasts than the Valley-to-Valley Line as defined in the 2016 Business Plan. The extended Valley-to-Valley Line would not be complete until 2029. Accordingly, the opening year for Phase 1, which includes the sections from Bakersfield to Anaheim, from Madera to Merced, and final improvements between San José to San Francisco (Salesforce Transit Center), was updated in the 2018 Business Plan to 2033. As discussed above, the EIR/EIS assumed that the Valley-to-Valley line would begin operating and generating benefits in 2025 and Phase 1 would begin in 2029.

In addition to different opening years, the 2018 Business Plan presents different ridership forecasts for 2029 and 2040 than were assumed in the EIR/EIS. All forecasts presented in the 2018 Business Plan used the same models as the 2016 Business Plan. However, since the 2016 Business Plan, the ridership model has gone through additional internal and external reviews. In addition, key model inputs for all forecasting have been updated to reflect the latest available data, such as population forecasts and auto operating costs. Specifically, input data were updated for the following:

- Socioeconomic forecasts
- Transit network plans
- Auto travel time
- Auto operating cost
- Parking costs
- Operations planning

Finally, the ridership forecast includes an enhanced risk analysis that considers new and additional risk variables. This enhanced risk analysis builds upon the risk analysis conducted in 2016 by including the following risk variables:

- **Reliability of high-speed rail**—Capturing uncertainty around on-time reliability
- **Travel time in autonomous vehicles**—Measuring the disutility of time spent in an automobile and considers how travel choices might change with autonomous vehicles
- **Visitor travel**—Including out-of-state trips from tourism, business, and other travel
- **Induced travel**—Including trips that would not have otherwise been made without the increased connections created by the HSR system
- An enhanced penalty applied to long-distance HSR trips that require long access/egress travel time

2.1.3 Ridership Comparison

Based on the assumptions of the 2016 Business Plan, the EIR/EIS presents ridership forecasts for the initial segment of the Valley-to-Valley line in 2025 under the medium and high ridership forecasts. The EIR/EIS also presents ridership forecasts for Phase 1 in 2029 and the 2040 planning horizon. Table 1 presents a comparison of the ridership forecasts from the 2016 and 2018 Business Plans.

Based on the assumptions of the 2018 Business Plan, the extended Valley-to-Valley line would open in 2029 and carry 71 percent fewer annual riders compared to the HSR system described in the 2016 Business Plan. The ridership comparison for 2029 is not exact given that the 2016 Business Plan assumes Phase 1 would be open by 2029 and the 2018 Business Plan assumes that only the extended Valley-to-Valley line would be open by 2029. The most direct and applicable comparison is under 2040 conditions where both the 2016 and 2018 Business Plans assumed full build of the HSR system. As shown in Table 1, the 2018 Business Plan forecasts 9 to 18 percent fewer annual riders in 2040 than the 2016 Business Plan.

Table 2 Comparison of High-Speed Rail System Ridership Forecasts Under the 2016 and 2018 Business Plans (millions of riders per year)

Forecasts	2025[1]	2029[2,3]	2033[4]	2040[5]
Medium Ridership				
2016 Business Plan	3.0	19.3	-	42.8
2018 Business Plan	-	5.7	23.6	40.1
Change	*N/A*	*-71%*	*N/A*	*-18%*
High Ridership				
2016 Business Plan	4.2	26.0	-	56.8
2018 Business Plan	-	7.6	30.8	51.6
Percent Change (%)	*N/A*	*-71%*	*N/A*	*-9%*

Sources: Authority 2016, 2018a
- = data not available
N/A = comparison not available
[1] 2016 Business Plan assumes Valley-to-Valley line will be open by 2025.
[2] 2016 Business Plan assumes Phase 1 will be open by 2029.
[3] 2018 Business Plan assumes extended Valley-to-Valley line will be open by 2029.
[4] 2018 Business Plan assumes Phase 1 will be open by 2033.
[5] Both the 2016 and 2018 Business Plans use 2040 as the environmental analysis planning horizon.

3 COMPARSION OF KEY PROJECT BENEFITS UNDER THE 2016 AND 2018 BUSINESS PLANS

Ridership estimates from the 2016 Business Plan (see Table 1) were used in the EIR/EIS to assess project benefits under the medium and high rider forecasts for 2029 and 2040 in terms of reduced VMT, air quality emissions, and energy consumption, as compared to the No Project Alternative (Authority 2018). Table 2 presents a summary of these key benefits. Note that criteria pollutant reductions are not shown as all pollutants would be reduced for all years and under all ridership forecasts. Refer to Table 3.3-22 and Table 3.3-23 in Section 3.3, Air Quality and Greenhouse Gases, for estimated criteria pollutant reductions.

Table 1 Summary of Key EIR/EIS Annual Statewide Benefits Compared to the No Project Alternative

Forecast	VMT (million miles)	Diverted Aircraft Flights	GHG Emissions (million metric tons CO_2e)	Energy Use (million BTUs)
2029				
Medium Ridership	2,300	52,000	0.5	11.7
High Ridership	3,100	58,000	0.3	9.5
2040				
Medium Ridership	4,800	111,000	1.0	19.3
High Ridership	6,600	107,000	1.5	28.1

VMT = vehicle miles traveled
CO_2e = carbon dioxide equivalent
BTU = British thermal unit

The HSR project would provide a new travel mode and divert automobile trips and aircraft flights to the HSR. The reduction in both automobile and air travel VMT would provide benefits in the form of reduced congestion on both the state's highway system as well as at airports. Shifting

passenger trips to HSR would also achieve substantial criteria pollutant and GHG emissions reductions, as well as energy savings. Under the 2018 Business Plan ridership forecasts, the HSR project would achieve these benefits, but they would occur at different times and may be less than described in the EIR/EIS under Phase 1 in 2040.

The EIR/EIS assumes that Phase 1 would open in 2029, whereas the 2018 Business Plan assumes that in 2029, only the Valley-to-Valley line would be open. This results in about 70 percent fewer riders in 2029 as compared to the EIR/EIS, which would likely lower estimated VMT and aircraft reductions in this year by a similar percentage. However, once Phase 1 is completed in 2033, the project would yield the same types of Phase 1 ridership benefits as presented in the EIR/EIS.

Under Phase 1 in 2040, the 2018 Business Plan estimates that the HSR project would achieve 9 to 18 percent fewer annual riders than expected under the 2016 Business Plan. Because project benefits in the form of reduced VMT, air pollution, GHG emissions, and energy use are based on the public's use of the HSR system, it is reasonable to expect that the lower ridership forecasts of the 2018 Business Plan scenarios (see Table 1) would lead to benefits in these areas accruing more slowly than anticipated in the EIR/EIS (see Table 2). Accordingly, benefits achieved under the 2018 Business Plan may be 9 to 18 percent less than those presented in the EIR/EIS, depending on the ridership scenario.

4 OTHER POTENTIAL BENEFITS

Additional benefits of the HSR project described in the EIR/EIS and 2018 Business Plan include:

- Travel time savings for HSR riders
- Travel time savings for highway users
- Travel time savings for airline passengers
- Reliability in travel times
- Reductions in vehicle operating costs
- Increased productivity for HSR riders
- Reduction in parking infrastructure needs
- Airline operator savings
- Improved transportation safety and reduced costs from accidents
- Jobs to operate and maintain the HSR system

In the 2014 Business Plan, a benefit-cost analysis concluded that the anticipated quantifiable benefits from the HSR system exceed anticipated costs, regardless of buildout phasing or scenarios (Authority 2014). This is true for assumptions in both the 2016 and 2018 Business Plans. However, the quantifiable benefits achieved under the 2018 Business Plan may follow the same trend of ridership and be 71 percent less in 2029 and 9 to 18 percent less in 2040 than the quantifiable benefits presented in the 2016 Business Plan.

5 CONCLUSION

Although the 2018 Business Plan assumes fewer annual riders in 2029 and 2040 and therefore reduced benefits when compared to the 2016 Business Plan, in both business plans the HSR ultimately affords a more energy-efficient choice for personal travel that will help alleviate highway congestion and provide greater capacity for goods movement. Benefits would be achieved in terms of reduced VMT, air quality emissions, and energy consumption. With the HSR as a backbone for the state's transportation infrastructure, there are also new opportunities for transit connectivity and refocusing land use patterns that can take advantage of mass transit investment and other alternatives to automobile travel, reducing GHG emissions and moving the state closer to the "sustainable community" goals laid out in Senate Bill 375 (see Chapter 1 of the EIR/EIS).

6 REFERENCES

California High Speed-Rail Authority (Authority). 2014. *2014 Business Plan.* April 30, 2014. www.hsr.ca.gov/docs/about/business_plans/BPlan_2014_Business_Plan_Final.pdf (accessed October 26, 2018).

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