



California High-Speed Rail Program Revised 2012 Business Plan

APRIL 2012

Building California's Future



Executive Summary

Better. Faster. Cheaper.

That has been the charge to the California High-Speed Rail Authority (CHSRA/Authority) in revising the Draft 2012 Business Plan (Draft Plan). Following release of the Draft Plan on November 1, 2011, Governor Jerry Brown affirmed the importance of moving forward with high-speed rail (HSR) as an important investment in California's future. But, he and others called for changes to the Draft Plan so that the utility of the system and its connectivity with regional/commuter rail systems will be improved; so that Californians will realize benefits sooner; and, so that the costs to taxpayers will be reduced.

The responsibility of the Authority, as established in Proposition 1A, is clear—to implement the program approved by the voters.

It is the intent of the Legislature by enacting this chapter and of the people of California by approving the bond measure pursuant to this chapter to initiate the construction of a high-speed train system that connects the San Francisco Transbay Terminal to Los Angeles Union Station and Anaheim, and links the state's major population centers, including Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego...

The Draft Plan laid out a roadmap for how such a high-speed program could be implemented. Following its release, the Authority solicited, reviewed, and considered comments from a broad range of interested parties. Public meetings to receive comments were held in Sacramento, Merced, and Los Angeles. The Draft Plan was the focus of several legislative hearings that included public participation. Numerous meetings and discussions were held around the state with a wide range of stakeholders. Input was received from the California High-Speed Rail Peer Review Group, the Legislative Analyst's Office, and the Bureau of State Audits. More than 250 comments were submitted to the Authority's website and through letters.

There was widespread acknowledgement that the Draft Plan was an improvement over previous versions; that it was realistic, transparent, and that it presented a logical and feasible means of delivering the program through phased implementation. That realism and transparency also meant that the public and decision-makers were confronted with higher cost estimates, longer time frames, and a frank assessment of the current funding outlook, which includes contentious issues at the federal level.

The critiques, commentaries, and suggestions yielded a number of consistent themes:

- Broad support was voiced for a phased implementation strategy to deliver the system
- The cost for the full-build system was too high
- A blended approach to both construction and operations, reducing costs and impacts, is the preferred path forward
- Near-term investment in the "bookends" (the Los Angeles and San Francisco Bay Area metropolitan regions) would produce immediate benefits and enhance the ultimate utility of high-speed rail

- Closing the intercity rail gap across the Tehachapi Mountains between Bakersfield and Palmdale should be a priority to connect the state via rail
- The benefits of the initial investment in the Central Valley were not clear enough and were seen by some as imposing a risk of stranded investment if the program did not continue
- Ridership estimates remain a question for some
- The opportunity to bring in private-sector investment earlier should be re-evaluated
- Some of the technical analyses, such as the presentation of the cost of alternative capacity on freeways and airports, were not clearly presented, leading to misunderstanding or skepticism
- The near-term federal budget scenario raises questions about when and how new federal funding will be provided to support the implementation of the next steps of the program

Key changes from the Draft 2012 Business Plan

The wide array of input, along with further analysis by the Authority, has resulted in significant changes to the Draft Plan. With these changes, the 2012 Revised Business Plan (Revised Plan) provides for an implementation strategy that delivers greater value, broader benefits, and earlier results by more quickly and effectively integrating HSR into an expanded, improved statewide rail network, as shown in Exhibit ES-1.

The overall passenger rail system will be significantly **better** because of two commitments in the plan. First is the commitment to build not just an initial construction segment but in fact an Initial Operating Section (IOS) of high-speed rail. This IOS, which can be completed within 10 years, will connect the Central Valley to the Los Angeles Basin. This segment will bring high-speed, electric passenger operations to California, tying together the Central Valley with the Los Angeles Basin as a first step toward a statewide high-speed rail system. Second, the Revised Plan provides for the integration, or blending, of high-speed rail improvements with existing and upgraded rail systems. Passengers will have more options, faster travel times, and greater reliability and safety. By leveraging new infrastructure and systems with existing and upgraded systems, taxpayers will benefit from greater cost efficiency and more effective use of state investments dollars.

Benefits will be delivered **faster** through the adoption of the blended approach and through investment in the bookends. Across the state, transportation systems will be improved and jobs will be created through the implementation of those improvements. The Central Valley will see the initial construction of the nation's first high-speed rail system and will benefit from an expanded and integrated passenger rail system that uses that infrastructure. 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, targeted by Caltrain for 2020. Southern California will see near-term improvements in the Metrolink system, better connectivity of transit and rail services in Los Angeles, San Diego, and the Inland Empire through cooperative early investments, using allocations from the \$950 million in Proposition 1A connectivity funds and other sources.

Exhibit ES-1. Summary of key changes in Revised 2012 Business Plan

Revision from Draft Plan	Description	Benefits
Commitment to blended system	Focuses new high-speed infrastructure development between the state's metropolitan regions while using, to the maximum extent possible, existing regional and commuter rail systems in urban areas.	Cost reduction, reduced community impacts, better leverage of resources/ investments
Commitment to blended operations	At all phases of development, seeks to use new and existing rail infrastructure more efficiently through coordinated delivery of services, including interlining of trains from one system to another, as well as integrated scheduling to create seamless connections.	Maximizes benefits of all investments, accelerates improvements, provides seamless travel for users, enhances connectivity to system
Investment in bookends	Makes improvements in existing rail systems in the metropolitan regions prior to or, in some cases, in lieu of, high-speed infrastructure. Connects high-speed rail to already existing modes of transportation.	Delivers improved service—reliability, safety, efficiency—to users of existing rail systems, providing tangible benefits in the near-term and building rail ridership for the long-term
Initial Operating Section (IOS)—South	<p>Based on factors including ridership and revenue forecasts, capital and operating costs, public input, and potential for private-sector investment, the Revised Plan identifies the IOS-South as the preferred implementation strategy. This will close the gap between Bakersfield and Palmdale and connect the Central Valley to the Los Angeles Basin at San Fernando Valley, creating the first fully operational high-speed rail system. This will be coupled with investments in Northern California to provide near-term benefits and lay the foundation for high-speed rail service to San Jose and San Francisco. Upgrades to the existing San Joaquins service will provide further time savings.</p> <p>Cap and trade funds are available, as needed, upon appropriation, as a backstop against federal and local support to complete the IOS.</p>	<p>Clarity of focus for development work, development of funding strategies, engagement with private sector interests, connecting the regions via a statewide rail network</p> <p>Close the rail gap between Northern and Southern California, the state's highest priority for intercity rail</p> <p>Connect the state's largest population (Los Angeles Basin) with the fastest growing part of the state (Central Valley)</p>
IOS First construction segment—put into service	Through collaborative planning and implementation with the California Department of Transportation (Caltrans), Amtrak, Altamont Commuter Express (ACE), BNSF Railway, and Union Pacific, the San Joaquin rail service (fifth busiest in the nation) will be shifted to the first construction segment upon its completion, resulting in a 45-minute time savings; through complementary improvements, this will tie with ACE to provide new, expanded, and improved rail service throughout northern California, connecting the Central Valley with the San Francisco Bay Area and Sacramento regions.	Enhanced utility of initial investment, providing improved service to the more than 1 million San Joaquin riders, and opening up regional rail service

The benefits of investing in high-speed rail will be delivered far *cheaper* than previously estimated. Through the adoption of a blended approach, the Authority has confidence that the cost of delivering the San Francisco-to-Los Angeles/Anaheim system, in accordance with Proposition 1A performance standards, is reduced by almost \$30 billion, now estimated at \$68.4 billion. Under the phased approach, and consistent with Proposition 1A, construction of any segment would only proceed when funding is identified and the Legislature has approved the use of additional state funding.

A blended system with broader, earlier benefits

The most consistent and widespread recommendation from those commenting on the Draft Plan was to fully adopt the “blended” approach in which existing metropolitan rail infrastructure would be used as much as possible and upgraded as needed to provide connections into the urban areas. For example, the legislatively mandated California High-Speed Rail Peer Review Group, in its January 3, 2012, letter to the Legislature (www.cahsrprg.com/index.html), stated the following,

We congratulate the CHSRA on its recognition of the viability of the blended option. Given the adamant environmental opposition to the full build-outs on either end of the system and the enormous added costs involved, we question the value of retaining the full Phase 1 build-out at all in any of the CHSRA’s more immediate plans.

The implementation strategy in the Revised Plan draws on international experience in building high speed rail systems and has been tailored to address the unique circumstances in California through collaboration with state, regional, local, and private transportation partners. It is a phased strategy with three key elements:

- **“Blending”** high speed with existing rail systems to accelerate and broaden benefits, improve efficiency, minimize community impacts, and reduce construction costs while enhancing rail service for travelers throughout the state
- Making **early investments** in the “bookends,” or San Francisco Bay Area and Los Angeles Basin regions, to upgrade existing services, build ridership, and lay the foundation for expansion of the high-speed system
- Delivering **early benefits** to Californians by using and leveraging investments as they are made

After issuing the Draft Plan which introduced the Phase 1 Blended option, the Authority prepared additional analysis on the capital costs, the operating and maintenance plan and costs, and ridership/revenue forecasts for this option. In addition, the Authority collaborated with other transportation providers, including Caltrans, Caltrain, ACE, and Metrolink, to further develop this option for implementation. This additional work and analysis has enabled the Authority to fully embrace the Phase 1 Blended option in this Revised Plan.

For Phase 1, as described in Proposition 1A, the blended system means building the “Bay-to-Basin” system, with new, dedicated HSR infrastructure connecting San Jose and the San Fernando Valley, and then to Los Angeles’ Union Station. Improvements will be made to the existing Amtrak/Metrolink rail corridor between Union Station and Anaheim to improve safety, reliability, capacity, and travel times in that corridor. In the San Francisco Bay Area, the existing Caltrain corridor will be upgraded through

grade separations, electrification, and passing tracks (to be studied) to provide the connection north from San Jose to the new Transbay Transit Center in Downtown San Francisco. This blended system will allow a one-seat ride (meaning passengers will not have to change trains) between San Francisco and Los Angeles and provide greater connectivity with existing regional and local transit systems. These benefits will be the foundation for implementation of a high-speed program in phases, as described in detail in Chapter 2, The Implementation Strategy: Blending, Phasing, Investing in Early Benefits, as follows:

- (1) **Early investments/statewide benefits**—First construction of the IOS, improvements to existing regional/commuter systems, new Northern California unified passenger service, and an accelerated closure of the rail service gap between Northern and Southern California
- (2) **Initial high-speed rail operations**—Completion of the IOS and operation of the first high-speed rail revenue service in the United States
- (3) **The Bay-to-Basin system**—Linking the state’s major metropolitan areas with high-speed rail service while incorporating improved regional service

What does “blended” mean?

The 2012 Business Plan refers to blended systems and blended operations, which describe the integration of high-speed trains with existing intercity and commuter/regional rail systems via coordinated infrastructure (the system) and scheduling, ticketing and other means (operations).

Blended systems—*integrated infrastructure investments*

Existing rail systems already serve intercity, commuter, and regional trips throughout California. A blended system would leverage these systems by tying them together with a HSR backbone through the Central Valley and connecting to major metropolitan areas. Although improvements to the regional and commuter rail systems are intended to improve or facilitate connections and integration with the high-speed rail system, they do not need to be implemented sequentially. Regional or local improvements to the existing systems, such as elimination of at-grade crossings and the addition of new passing tracks, have independent utility that will benefit regional and commuter passengers prior to connection to the high-speed rail system. Where possible, these improvements should move ahead independently and as quickly as feasible to accelerate benefits to California travelers.

Blended operations—*integrated service*

The blended system will allow rail operators to take advantage of new and improved infrastructure to enhance existing service, delivering benefits sooner. Blended operations will evolve over time, as infrastructure is developed. Utilization will progress from the operation of existing services over new high-speed rail infrastructure prior to the initiation of revenue service, to the coordination of high-speed and conventional rail services, to the interoperability of high-speed and conventional rail over shared infrastructure. In each phase, the goal will be to maximize and accelerate the benefits of investments in the most cost-effective manner.

- (4) **The Phase 1 system**—Connecting San Francisco, the Central Valley, and Los Angeles/Anaheim through a combination of dedicated high-speed rail infrastructure blended with existing urban systems
- (5) **Phase 2 expansion**—Bringing high-speed rail to Sacramento, San Diego, and the Inland Empire. Through the blended approach to Phase 1, these areas will see improvements in rail service and access to high-speed rail service far earlier than previously planned

Early investments, statewide benefits

Under the Draft Plan, the initial investments of Proposition 1A bond proceeds and matching federal funds were focused primarily in the Central Valley, with subsequent extensions reaching other areas of the state in phases. This Revised Plan retains the start of construction of new high-speed infrastructure in the Central Valley but introduces simultaneous investments to produce immediate benefits throughout the state (Exhibit ES-2). Working collaboratively with regional transportation partners, advanced investments will be made in the existing Los Angeles Basin and San Francisco Bay Area rail systems. These early improvements will accomplish two key goals:

- First, these improvements will lay the foundation for the high-speed rail system as it expands to reach those areas and connect the state.
- Second, because these improvements can proceed independently of the high-speed rail system, they will provide near-term benefits to travelers in metropolitan areas.

Benefits will be realized sooner and more efficiently, not only in metropolitan Los Angeles and the San Francisco Bay Area, but also in the Los Angeles–San Diego corridor, the Inland Empire, and the Sacramento region—all of which would see improvements much earlier than under any previous plan. This approach represents a significant evolution of thinking about how high-speed rail best fits into California’s transportation system and best serves the people of the state. More specifically, rather than being planned, designed, and implemented largely as a stand-alone system, high-speed rail in California will be integrated into a comprehensive and seamless statewide passenger rail network. Leveraging and partnering with intercity and regional systems results in a wide range of benefits, including the following:

- Accelerated delivery of advantageous investments
- Expanded early benefits for rail passengers
- Reduced costs
- Greater cost-effectiveness
- Fewer construction and operating impacts on communities
- Coordinated planning and investments among state, regional, and local agencies
- Improved transportation and reduced congestion in metropolitan areas
- Reduced air pollution, including greenhouse gas emissions

Exhibit ES-2. Early investments/statewide benefits



Early Investments/Statewide Benefits

- ◆ Begin construction of IOS HSR infrastructure
- ◆ Start Northern California unified service
- ◆ Invest in the “bookends”
- ◆ Advance early priority:
 - Close rail gap to LA Basin

New Northern California Unified Service

The first construction segment of the IOS will be put into use immediately upon completion for improved service on the San Joaquin intercity line. This service, the fifth busiest Amtrak line in the nation, already serves more than 1 million riders a year and will link with other systems, such as ACE and Caltrain, to create a new, improved network reaching from Bakersfield to the San Francisco Bay Area and Sacramento. Immediately, California’s rail network will be able to carry passengers faster and more reliably than ever before.

Begin building the Initial Operating Section

The IOS of the California high-speed rail system will connect Merced to the San Fernando Valley gateway to Los Angeles. This facility will be transformational in creating a passenger rail nexus between one of the fastest growing regions in the state with the state’s largest population center. Among its many benefits will be the realization of the state’s highest intercity passenger rail priority— closing the state’s single largest gap in intercity rail service—linking north and south at Bakersfield to Palmdale. Immediate steps toward this goal include the prioritization of environmental clearance and other preliminary work necessary for this gap closure.

Improve service in the “bookends”

This will be achieved by putting the \$950 million in Proposition 1A funding for connectivity to work. The Authority will work with the California Transportation Commission, Caltrans, and regional rail systems to gain approval this fiscal year for funds that can be used to make near-term improvements that will tie to eventual HSR service. Millions of travelers throughout the state will benefit from faster, more frequent, and more reliable services associated with the expansion of key transit investments throughout the state.

Additionally, the Authority is working with regional transportation agencies through memoranda of understanding and other mechanism to identify and implement additional improvements beyond the \$950 million in connectivity funds that can provide near-term benefits to commuters on Metrolink and Caltrain and pave the way for the future HSR system.

Electrify the Caltrain corridor

Electrifying Caltrain will result in a faster, more efficient, and more environmentally friendly rail system that will eventually allow for a one-seat ride between San Francisco and Los Angeles.

Electric trains can stop and start faster than diesel trains, which can reduce travel time and/or increase service to stations between San Francisco and San Jose. As Caltrain has already demonstrated, decreased travel time results in increased ridership. As more people ride Caltrain, congestion on freeways and surface streets in the San Francisco Bay Area will be reduced. In addition, the switch to electric power will lower air pollutant emissions from trains by up to 90 percent while significantly reducing power consumption. Electric-powered trains also are significantly quieter, which will benefit those living and working near the rail corridor.

Investing for California’s next generations

The need for a new generation of transportation improvements in California is clear. Today, the state’s transportation systems are straining to meet current demand. Congestion on roads results in \$18.7 billion annually in lost time and wasted fuel. Air flights between the Los Angeles and San Francisco metropolitan areas—the busiest short-haul market in the U.S.—are the most delayed in the country,

with approximately one of every four flights late by an hour or more.

Continued population and economic growth will place even more demands on California’s already overburdened mobility systems. Over the next 30 to 40 years, California is projected to add the equivalent of the current population of the state of New York. There is no question: meeting the demands of that growth will require *major* investments in transportation infrastructure over the next generation. Those investments will measure in the tens of billions of dollars. The question



will not be *if* those investments need to be made, but *how* those investments can provide the greatest benefits.

As has been proven around the world, high-speed rail, when integrated into a balanced transportation system, can meet a significant portion of increased demand in a manner that is sustainable and cost-effective.

As detailed in this Revised Plan, a statewide HSR system can be delivered to the citizens of California that will produce economic benefits, enhance and support environmental and energy goals, create near and long-term employment, improve mobility, and save money. Such a system also advances the state toward the attainment of goals established by landmark legislation such as California Senate Bill 375, the Sustainable Communities and Climate Protection Act of 2008, and Assembly Bill 32, the Global Warming Solutions Act of 2006. In its scoping plan for implementation of AB 32, the California Air Resources Board supports implementation of a high-speed rail system as “part of the statewide strategy to provide more mobility choice and reduce greenhouse gas emissions.”¹

Chapter 9 of this Revised Plan, Economic Analysis, shows that the benefits of high-speed rail far outweigh the costs of building, operating, and maintaining it. Californians will begin to see these benefits next year, when initial construction of the IOS will provide a much needed economic boost to the Central Valley, the fastest growing part of the state and the region hardest hit by unemployment. Almost 100,000 job-years of employment will be generated by the initial construction work. The \$2.7 billion initial investment will give the state a net economic impact of \$8.3 to \$8.8 billion—a 3:1 return on its initial investment—and state and local governments would earn more than \$600 million back in tax revenue, or nearly 25 percent of how much the state will spend.

It also has become clear that the key to a successful high-speed rail program is to focus on putting an operational, high-speed segment in place and then using that segment as a building block for the full system. The IOS can be built within 10 years, generating positive cash flows from operations, carrying millions of riders, and serving as a launch pad for private participation in the construction and operation of the system.



With 20 million more people expected to be in California within the next 40 years, we can't build enough highways and airport runways to accommodate the demand.

Joseph C. Szabo, Federal Railroad Administrator

The two keys to cost-effective and timely achievement of a statewide high-speed rail system are as follows:

- Dividing the program into a series of smaller, discrete projects that build upon each other but also provide viable high-speed rail service independently
- Making advance investments in regional and local rail systems to leverage existing infrastructure and benefit travelers by providing interconnecting blended services



Phasing the California State Water Project: “50 Years and Counting”

The California State Water Project is the largest state-built and state-operated multipurpose water and power system in the United States. It encompasses 701 miles of canals and pipelines that provide drinking water for 25 million people and irrigation for 750,000 acres of farmland. It began in 1960 and its expansion continues today, with the newest reservoir beginning construction in 2006.

Funding began with the approval of \$1.75 billion in bonds. Since that time, the 29 contracting agencies that deliver the water locally have made cumulative payments totaling more than \$9 billion.

By implementing the program in phases, work can be matched to available funding. Each segment can be delivered through a business model that transfers significant design, construction, cost, and schedule risks to the private sector and maximizes efficiency by capturing the advantages of private-sector innovation. Importantly, the phased approach means that decisions made today will not tie the state’s hands tomorrow. With the state’s success in securing over \$3 billion in federal funding, the first step can be taken now toward construction of the IOS. This money will be used to create jobs, obtain right-of-way, position the system for future expansion, and preserve options for future decision makers.

The decision to move ahead with the initial step does not commit the state to proceeding with the full program as outlined in this Revised Plan. By providing decision-makers with the flexibility to change course or timing, the plan preserves flexibility and can adapt to changing economic and budgetary realities or new opportunities. This approach is consistent with how other major infrastructure programs are implemented. The Interstate Highway System was designated in whole at the outset but constructed in phases over more than 50 years based on availability of funds, economic conditions, and other factors. The same has been true with the California freeway system and the state water project. HSR systems in other countries have been delivered this way as well. In Japan, for instance, initial plans provided an outline for full development, but implementation took place in segments, sometimes with years between the completion of one segment and the initiation of the next.

This Revised Plan has been developed by applying this and other successful implementation strategies that have evolved over the last half-century of experience throughout the world.

“Starting up a new high-speed service is challenging, as was the case in Japan in 1964; however, it is very rewarding for the country in the longer term Step-by-step extension of high-speed rail construction is common in Japan, too. For example our Tohoku-Shinkansen line, which runs through the northern part of Japan, has been constructed step-by-step. The initial section up to Morioka was completed in 1982, and the line was extended to Hachinohe in 2002 and to Aomori in 2011.

Masaki Ogata, Vice Chairman, East Japan Railway Company

How will California benefit from high-speed rail?

Economy

High-speed rail will bring significant benefits to California, both in the near term and in the long run. Benefits will be realized statewide and will encompass both economic and environmental concerns.

The Central Valley will experience the earliest positive impacts of this investment. Indeed, the economic growth associated with construction of the first segment of the IOS will create jobs in a region that is home to the highest unemployment rate in the state. As noted earlier, moving forward with initial construction will generate approximately 100,000 job-years of employment for people who need them most.

Along these lines, California’s construction industry, the sector hardest-hit by the economic recession, will see a boost in business associated with high-speed rail construction.

Connecting the Los Angeles and San Francisco metropolitan areas will generate approximately 800,000 to 900,000 job-years and will eventually result in more than 1 million job-years. High-speed rail is a major job generator, both in the short and long terms.

Transportation infrastructure

With the completion of high-speed rail, California’s drivers will see significant relief in traffic congestion. HSR will lead to a reduction of 320 billion vehicle miles traveled over the next 40 years. That will translate into 146 million hours saved for Californians each year—time spent doing better things than sitting in traffic. Similarly, airport congestion will be reduced. Ample precedent for this exists around the world.

“SFO is a strong supporter of High-Speed Rail. Connecting SFO to HSR will provide outstanding service to our passengers, providing quick and convenient connections to the rest of California. HSR will put SFO on [a] par with other world airports already benefiting from HSR, including Hong Kong, Shanghai, Tokyo, Frankfurt, and Zurich.

*John L. Martin, San Francisco
Airport Director*

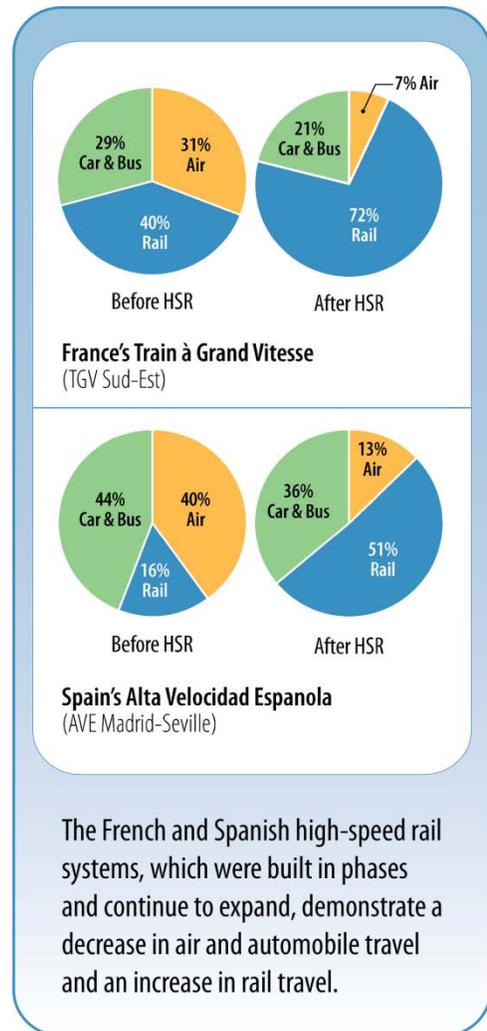


When high-speed rail service was introduced between Madrid and Seville, Spain, the share of trips taken by plane was reduced from 40 percent to 13 percent, and rail trips grew from 16 percent to 51 percent. This reduction in air travel means that limited airport capacity can be used more efficiently for longer-haul routes where aviation is more cost-effective and energy efficient. This type of shift from automobiles and airplanes to high-speed trains has been the consistent experience internationally, from Taiwan to Germany, France, and Spain.

Moreover, HSR also has generated an overall growth in travel, not just a reallocation between modes. The increased mobility from HSR prompts greater travel, generating more economic activity. On the high-speed route between Paris and Lyon, France, for example, half of the trips taken were new trips. The efficiency, reliability, and connectivity between economic centers provided by HSR contribute to long-term economic benefits. With implementation of the HSR system in California, as many as 400,000 long-term jobs could be created as the state’s economy becomes more efficient.

Funding and finance

Funding for the system will come from a mix of federal, state, and private sources and will benefit from innovative program delivery models that allow the private sector to design, build, and operate the system. Specific funding approaches are detailed in this Revised Plan; potential program delivery models are explained as well. Delivery approaches rely on the private sector to perform the final design and to provide operations, ultimately resulting in a concession to operate the full system and private capital to support construction of future phases. This private-sector involvement is feasible because each of the operating sections generates a positive cash flow from operations. Chapter 4, Business Model, includes a discussion of proven delivery and financing methods applicable to the high-speed rail program. Based on projected cash flows from operations, over \$10 billion in potential private-sector capital is anticipated once the IOS is in operation. These funds can provide a significant contribution toward completion of the Bay-to-Basin system.



Phased implementation provides two additional benefits with respect to project funding and finance:

- The funding required to advance any individual section is significantly less than if the system were to be constructed all at once.
- Risk is reduced for each subsequent section because of the successful performance of HSR operations on prior sections. In this way, success feeds on success and enhances the ability to attract private capital and operating expertise.

Exhibit ES-3. Summary of each phased implementation section

Section	Length (approx)	Endpoints	Service Description	Service Start	Cumulative Cost (YOES, billions)
Initial Operating Section	300 miles	Merced to San Fernando Valley	<ul style="list-style-type: none"> • One-seat ride from Merced to San Fernando Valley • Closes north-south intercity rail gap, connecting Bakersfield and Palmdale and then into Los Angeles Basin • Begins with construction of up to 130 miles of HSR track and structures in Central Valley • Private sector operator • Ridership and revenues sufficient to attract private capital for expansion • Connects with enhanced regional/local rail for blended operations, with common ticketing 	2022	\$31
Bay to Basin	410 miles	San Jose and Merced to San Fernando Valley	<ul style="list-style-type: none"> • One-seat ride between San Francisco and San Fernando Valley¹ • Shared use of electrified/upgraded Caltrain corridor between San Jose and San Francisco Transbay Transit Center • First HSR service to connect the San Francisco Bay Area with the Los Angeles Basin 	2026	\$51
Phase 1 Blended	520 miles	San Francisco to Los Angeles/ Anaheim	<ul style="list-style-type: none"> • One-seat ride between San Francisco and Los Angeles¹ • Dedicated HSR infrastructure between San Jose and Los Angeles Union Station • Shared use of electrified/upgraded Caltrain corridor between San Jose and San Francisco Transbay Transit Center • Upgraded Metrolink corridor from LA to Anaheim 	2029	\$68

¹ One-seat ride means that passengers do not need to switch trains, even if the train operates over two systems (e.g., moving north on dedicated high speed rail infrastructure and then moving onto Caltrain tracks at San Jose, assuming electrification of Caltrain corridor by 2020 as proposed by Caltrain)

Funding for the initial construction of the IOS will be a combination of federal funding and Proposition 1A funding. As the program proceeds, the state will continue to see significant federal support and private-sector capital investment once operations have commenced. Cap and trade funds are available, as needed, upon appropriation, as a backstop against federal and local support.

Planning scenario

This Revised Plan includes a planning scenario for use in projecting performance of the system. In order to generate key performance data, this planning scenario includes several basic assumptions regarding the Bay-to-Basin and Phase 1 Blended operating sections:

- The system will be completed by 2028.
- The average ticket fare between San Francisco and Los Angeles will be \$81 (83 percent of anticipated airline ticket prices) in 2010 dollars, with up to eight trains per hour during the peak period (four trains per hour from San Francisco, two trains per hour from San Jose, and two trains per hour from Merced).

For this Revised Plan, a planning schedule (Exhibit ES-4) was adopted that extended the date for completion of Phase 1 Blended from 2020 to 2028 to mitigate funding and other risks. Based on this schedule, costs have been inflated to assess the total costs in the year-of-expenditure.

Exhibit ES-4. Construction schedule

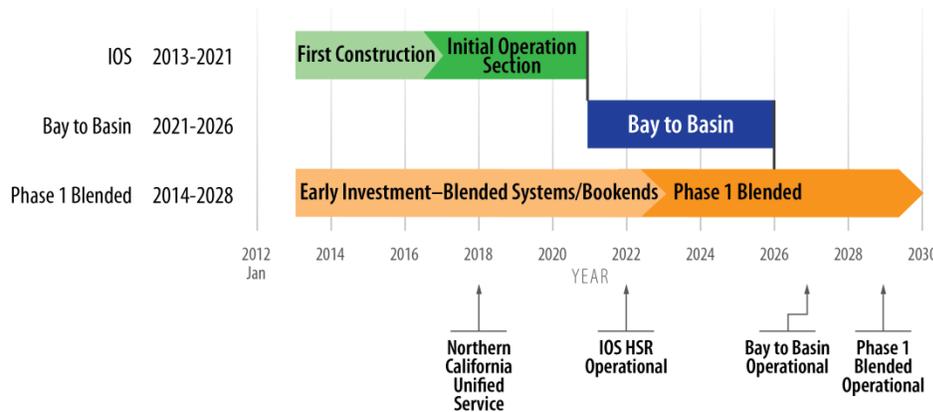


Exhibit ES-5 presents a planning case showing the impact of a 2028 schedule on year-of-expenditure cost.

If required, a Full Build option for Phase 1 could be completed by 2033 at an incremental cost of \$23 billion in year-of-expenditure dollars, for a cumulative cost of \$91.4 billion.

Exhibit ES-5. Planning case showing impact of planning schedule on year-of-expenditure cost

Section	Incremental Capital Cost (billions 2011\$)	Cumulative Capital Cost (billions 2011\$)	Completion of Section	Incremental Year-of-Expenditure Capital Cost	Cumulative Year-of-Expenditure Capital Cost
IOS	26.9	26.9	2021	31.3	31.3
Bay to Basin	14.4	41.3	2026	19.9	51.2
Phase 1 Blended	12.1	53.4	2028	17.2	68.4

Ridership and revenue

As is the case with any similar program, the forecasts of ridership and revenue continue to be the subject of extensive and intense review. Areas of focus include the model used to generate the forecasts, the assumptions and data used as inputs to the model, and the outcomes of the model. A number of steps have been taken to respond to comments and to continue to improve the reliability of the forecasts, and they are reflected in this Revised Plan. Those steps include the following:

- Inputs to the model have been updated and refined to use recent data reflect a broader range of scenarios.
- An independent panel of experts continues to review the model and its inputs.
- Post-model adjustments have been eliminated to reduce the potential for error, bias, or inconsistency.
- The model itself has been tested against actual conditions and external forecasts and demonstrated its reliability.
- Data and reports have been made available for public review.

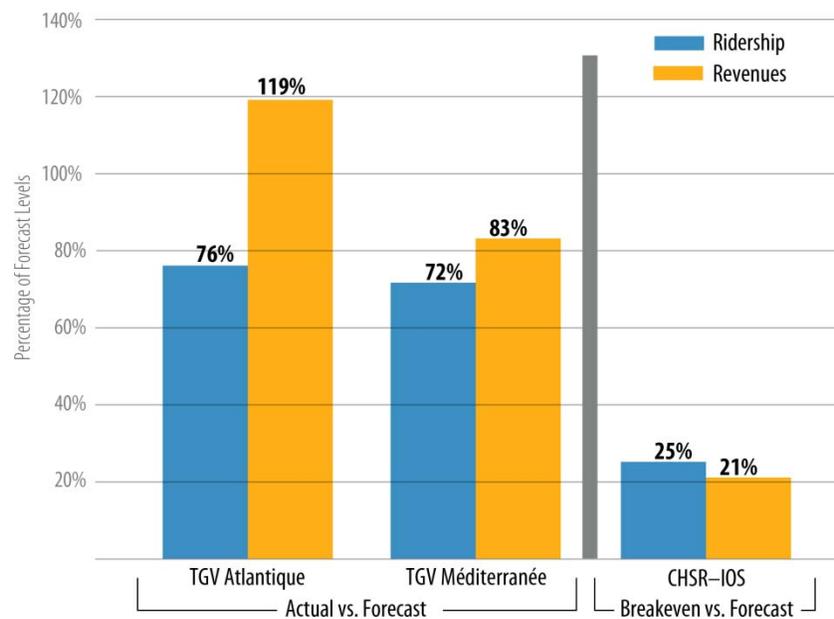
Details of these actions are provided in Chapter 5, Ridership and Revenue. An important step forward to demonstrate the viability of the model and the reliability of its outputs was the use of it to test actual conditions in the Northeast Corridor. This test demonstrated the sensitivity of the model to inputs and the reasonableness of the outcomes.

Another important aspect to consider is the performance of both domestic and international rail systems against their forecasts. Studies have been conducted on toll roads, high-speed rail systems, and quasi-high-speed rail systems. One of the most widely cited is a 2003 Cambridge University report titled *Megaprojects and Risk* by Flyvbjerg, et al. This report found that a common element in projects that failed to reach forecast results was an optimistic assumption of a particular event that would lead to higher ridership. For example, ridership forecasts for the French TGV system assumed significant spikes in motor fuel prices, which would cause more people to leave their cars and use high-speed rail. When the anticipated increase in prices did not occur, ridership did not materialize as projected.

This and other lessons were considered in developing the ridership and revenue modeling for the California high-speed rail program. Accordingly, there is no such reliance on singular and unsubstantiated factors such as an assumed spike in gasoline prices. Key inputs that are drivers of ridership, such as fuel prices, airline ticket prices, and population, are all conservative and based on external sources.

It is also important to understand what the performance of other HSR systems against forecasts might mean for the California system. In particular, international experience illustrates that disciplined management through a private-sector operator leads to stronger financial performance, even in the face of changing circumstances. For example, the French TGV Atlantique line initially was 24 percent below projected ridership, but exceeded revenue forecasts by 19 percent. Similarly, the TGV Méditerranée line ridership fell 28 percent below initial forecasts, but revenues were off by only 17 percent. As shown in Exhibit ES-6, the performance of California’s system against forecasts would have to be approximately three times worse than the French examples to fall below the breakeven point at which the system will function without an operating subsidy.

Exhibit ES-6. Percentage of forecast levels



Three ridership scenarios were modeled in this Revised Plan: Low, Medium, and High. As described in Chapter 5, Ridership and Revenue, conservative assumptions for key factors, such as population and the cost of driving, were used throughout the modeling. Operating and maintenance costs are highly correlated to the number of riders and use of the system; that is, the more riders, the more trains needed and the higher the cost of operating and maintaining them.

Analysis of the three scenarios shows that there is a net positive cash flow from operations (revenues minus operating and maintenance costs) from the first year of operation under each phasing scenario (Exhibit ES-7). This is a consistent finding across operating segments, phases, and development scenarios once an IOS is achieved.

Exhibit ES-7. Operating results for IOS, year 2025

Ridership Scenario	Ridership (millions)	Revenue (millions)	Operating and Maintenance Cost (millions)	Net Cash Flow from Operations (millions)	Operating Subsidy?
High	10.5	\$1,096	\$556	\$540	No
Medium	8.1	\$844	\$499	\$345	No
Low	5.8	\$591	\$376	\$215	No

Projections demonstrate that high-speed rail in California will be viable, even at the very conservative low scenarios. Under all forecasted scenarios, each operating section of the California high-speed rail system is projected to operate without a subsidy. This is not only important in terms of achieving the Proposition 1A criteria, but it supports investment of private capital for construction.

Cost control

Implementation of the program will be affected by a range of external factors over time. As such, this and future business plans should be seen as part of a dynamic process. One area where this will be especially pronounced is the continual process of managing the program to deliver benefits more cost-effectively.

The Authority will maintain and reinforce internal cost-control procedures and use external reviews to regularly evaluate options for reducing costs and accelerating improvements. Ongoing value engineering, collaborative planning, and focused use of procurement tools to incentivize efficiencies are among the tools that will be used.

The role of the private sector

The Authority's long-term business model is founded on a strong public-private partnership relying on the private sector to design, build, operate, and maintain a high-speed system that is funded by a combination of government investments and future revenues from riders that support the investments of capital from the private sector. Risk is transferred to the private sector immediately beginning with design and construction, and the transfer of risk increases as the system is developed and opened to incorporate operating performance and profit and loss.

The private sector will be brought on board through design-build contracts to finalize the design of the first segment of the IOS and then construct it. This will result in the transfer of key risks from the public to the private sector, where they can be better managed—an important part of the program's cost-containment strategy.

As explained in Chapter 7, Financial Analysis and Funding, this Revised Plan assumes capital investment when the IOS is in place and generating revenues. This is the point in the program at which risks have been reduced sufficiently to allow access to more private capital at lower costs. Following up on recent questions posed by stakeholders, the Authority reevaluated private-sector interest in early 2012 by interviewing a number of the respondents who indicated interest in investing in the project and through

one-on-one interviews with firms that responded to the Request for Qualifications for the first construction package. Responses from the Request for Expressions of Interest and recent discussions with interested companies confirmed the private sector's interest in the project and the conditions and timing required to attract the significant private-sector investment reflected in the Revised Plan.

Alternative financing and delivery processes, including early investment by the private sector, continue to be developed and adapted both domestically and in other countries. Although more prevalent outside the United States, innovative public-private partnerships are being introduced and used more frequently here. Adoption of a policy to encourage unsolicited proposals for private-sector involvement in the high-speed rail program will be an important tool to accelerate the development of the IOS and projects related to blended system improvements.

Summary

This Revised Plan considers the comments on the Draft Plan and reflects those calls for change. It presents a **better** way to build the system incrementally and in partnership with regional/commuter rail systems. Implementation of the plan will deliver benefits to Californians **faster**. By leveraging existing systems, it will be significantly **cheaper** to deliver the high-speed rail program. The revisions go beyond these important improvements. By investing in electrification of the San Francisco Peninsula rail system and paving the way for more efficient operations around the state, HSR will help contribute to a **cleaner** transportation system. In addition, focusing early investments on the elimination of high-priority at-grade crossings and other improvements will help make California's growing passenger rail network **safer**.

Contents of the Revised Plan

This Revised Plan addresses the requirements in Section 185033 of the Public Utilities Code and includes summaries of key changes in implementation strategy, ridership, and costs from the 2009 Business Plan. In addition to the major revisions discussed previously, throughout this Revised Plan there are modifications that respond to comments and address technical, editorial, and other issues. Supporting technical documents and appendices have been updated both to reflect and provide expanded explanation of these changes. Those documents will be posted on the Authority's website at www.cahighspeedrail.ca.gov/business_plan_reports.aspx.

As part of the Authority's commitment to transparency and accountability, a new supporting document, *Addressing Comments from Reviewing Entities*, summarizes the comments from the Legislative Analyst Office and the California High-Speed Peer Review Group on the Draft Plan and how the Revised Plan addresses those comments. The Draft Plan remains available as a reference document. Both of these and other supporting technical documents can be found at www.cahighspeedrail.ca.gov/business_plan_reports.aspx.

Central Tenets of the 2012 Business Plan

Analysis

- A thorough re-evaluation and review of ridership models, with international peer review of the model and methodology
- An update of project capital and operating costs, using conservative inflation assumptions and a large contingency budget
- A re-examination of whether a revenue guarantee would be required
- A re-thinking of the critical relationships between HSR and local/regional transit systems
- An analysis of whether the system could be built in segments, with each having independent utility
- A reassessment of the federal and state funding environment, particularly over the short term
- A realistic appraisal of when and how private capital will be available

Conclusions

- The ridership model is sound and can be used for business planning. Projections show that the Initial Operating Section will generate a net operating profit.
- The capital costs have grown, as more engineering and environmental analysis has been done. However, the new capital costs are an accurate, current reflection of the cost of building out the segments and the system, with sufficient contingency to address foreseeable changes.
- Under this plan an operating subsidy will not be required. California HSR will be able to sustain operations going forward, consistent with HSR systems around the world. Profits will be able to contribute to future construction costs.

- Criticism that HSR has failed to leverage existing regional rail systems has been justified. The 2012 Business Plan moves toward a much fuller integration with those systems toward realizing the benefit of advanced investment in upgrading those existing lines. The Authority plans to use those systems for strategic connections in the early years and to run “blended service” (i.e., HSR trains running at appropriate urban-area speeds on existing or improved tracks where possible).
- It is both desirable and necessary to construct HSR in phases—adding lateral segments and later service-level upgrades. This can be done so that each segment has independent value and so that funding confidence can be achieved before each segment is commenced.
- The Authority realizes that the current funding environment is challenging. However, there are sufficient funds to construct the foundation segment of HSR and secure important rights-of-way. Moreover, progress toward fully funding the all-important Initial Operating Section can be secured from a variety of potential sources.
- The private sector will play a major role in HSR. This project neither can nor should be built entirely with public funds. We expect private-sector operations and maintenance in the near term. Significant private capital is available upon completion of the IOS and demonstration of ridership, and the Authority actively working with the private sector to explore innovative, cost-effective ways to secure private participation for all elements of the program.

End notes

¹ *Climate Change Scoping Plan: A Framework for Change*. Prepared by the California Air Resources Board for the State of California Pursuant to AB 3, The California Global Warming Solutions Act of 2006. December 2008.