

Lesson Nine: Is the California High-Speed Rail A Viable Solution to Environmental Pollution?

Overview: This lesson is about making decisions in situations of uncertainty, looking at the California high speed rail project as a case study. The California project was proposed as part of a larger nationwide infrastructure plan for a high speed rail project similar to those in place in other countries. Construction on the California project has started although the final reach of the project is still being discussed. In this lesson, students will explore the economic concepts of externalities, future consequences, and costs and benefits to decide whether the California high speed rail project is a viable solution to environmental pollution in the state. The second lesson in this series will discuss the economic and political decision-making process in uncertainty. The lessons are each designed to take about 50-60 minutes, though each can be extended through in-class or at-home research, class discussion, presentations, or projects.

Objectives: Students should be able to do the following at the end of the lesson:

1. Discuss the costs and benefits of the California high speed rail project as a solution to environmental pollution.
2. Analyze bias of documents and consider bias in the analysis of documents.

Activities:

1. Introduction to the California high speed rail project
2. Read background materials about the California high speed rail project.
3. Read documents describing the environmental impact of the California high speed rail project.
4. Develop argument for/against California high speed rail project

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These instructions are meant to be a guide. You may use this guide directly or adapt as you see fit to your classroom.

Part 1: Introduction to the California High Speed Rail Project

The lesson begins with an introduction to the California high speed rail project. The most difficult aspect of this lesson for students to understand, and the most important, builds on one of the central ideas of economics: decision making.

Tell students: Today we will be looking at one of the central ideas of economics: decision making. But oftentimes, economists must make decisions without actually knowing all of the information they would like to have ahead of time or without knowing all of the consequences of the decision. They make decisions when the answers are uncertain. This process is what economists often face when making decisions about infrastructure.

To introduce this idea, pose several questions to the students for them to think about, write about, talk about with a partner, and then discuss as a class:

- Do you go to the store or mall if you do not know what the parking situation is?
- Do you buy an expensive ticket to a game or concert if you do not know if the game or concert will be good?
- How do you decide what college to go to without knowing exactly what the college will be like?
- Do you date someone, knowing that the odds are likely you will break up?

Most students have probably faced decisions such as these before.

Ask students: Let's think about these situations. In order to make these difficult decisions, what information do you need? What bias might you encounter? If you are deciding whether to date someone, you may want to know what they like to do for fun, so you could ask their ex, who may be biased in their opinion of the person. If you are deciding whether to go to a concert or not, you may ask a friend who says the concert was great, but the band is a metal band and your friend loves metal music but you do not. This bias will need to be taken into account when you make your decision.

An extension of this activity is to ask students what other questions they face that they must answer without having all the answers. They may begin to state other information they would need or types of bias they may encounter.

To put these questions in economic terms for students, tell students: An economist may ask this question as, “How do we complete a cost-benefit analysis to make a decision without really knowing the costs or the benefits?” To look at this issue in more depth, we are going to investigate the proposed California high speed rail project.

Tell students: Deciding whether to build the California high speed rail project is a decision that must be made without knowing the consequences, as is often the case when deciding whether to construct infrastructure projects. The high speed rail project will extend from San Francisco, CA to Los Angeles, CA, a distance of 383 miles (approximately the distance from Boston, MA to Philadelphia, PA or from Denver, CO to Santa Fe, NM or from New Orleans, LA to Birmingham, AL).

To put this high speed rail project into a context your students can understand, give students a relative distance for your geographic location. For example, what city is approximately 400 miles from where your school is?

Ask students: What options do you have for travel transportation if you want to go on a trip to a place approximately 400 miles from where you live?

Typical answers will include plane, car, bus, or train. Students can discuss the costs and benefits of each mode of transportation. In this situation, like the situations posed above, the answers are uncertain. Will there be traffic? Will a flight be delayed or canceled? In order to address these uncertainties, students would want to seek information, consider the bias of their sources, and ultimately make a decision, the same process economists use when making decisions, especially those related to infrastructure projects.

Tell students: For distances that are a bit long to drive but short to fly (approximately 400 miles, or five to six hours), there could be an option for a high speed train. The picture of a car from this rail project can be projected so students can see what the train looks like.

Tell students: This train has been proposed as a solution to environmental pollution caused by planes and cars. But deciding whether the train is a viable alternative is difficult, since there is only soft evidence about the potential consequences of such a large infrastructure project – there is no hard data to consider in the cost-benefit analysis since the values are all projected. There is some hard evidence about the pollution caused by driving and by flying, and the costs and benefits, externalities, and consequences of those two forms of travel can be discussed. But is a high speed train a solution to that environmental pollution?

The purpose of this introduction is to have students start thinking of the rail project as an alternative form of transportation and to put the proposal for the project in context. Students will now read some of this soft evidence to determine if the California high speed rail project is a viable solution to environmental pollution.

Part 2: Background Reading

Students read the background reading on the California high speed rail project to gain more context. The reading addresses the projected plan and cost of the rail project in addition to the funding solutions that have been developed. The background reading is designed to give students an understanding of the project, both what has already been decided and what could still be decided.

Ask students to read the background in pairs or small groups so that they can discuss as they read. In some classes, it will be more appropriate for students to read the documents individually and discuss them with other students or as a class afterwards or to read the document as a whole class.

Ask students: What is the proposal? What is your initial reaction to this project? What additional information would you like to have in order to make a decision about whether the rail project is a viable solution to environmental pollution?

Part 3: Document Analysis

Ask students to read the documents addressing the environmental impact of the California high speed rail project. Students should read the documents in small groups and go over the questions as a group after each document. In some classes, it will be more appropriate for students to read the documents individually and discuss the questions with other students afterwards. Students can also read the documents together as a class, discussing as you go. Students should answer the questions that follow each document to ensure their understanding.

Tell students: Think about the different ways that the high speed rail could impact the environment (e.g., air pollution, water pollution). How likely are these effects? Are they probable, possible, improbable, or impossible? By the end of the lesson, students should understand what each document contributes to the larger discussion of the California rail project as a viable solution to environmental pollution.

Part 4: Developing an Argument

Before students start discussing whether the rail project is a viable solution to environmental pollution, make sure that students understand the documents, what each of them contributes to this discussion, and what biases may appear in each document based on the source of the information. Then ask them to answer the questions on the final page of the student handout.

At the end of class, ask students: What are the possible environmental effects of the high speed rail? Are these effects positive or negative? How probable are these effects? Are they probable, possible, improbable, or impossible? How important are the effects?

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Document A: Introduction to the California High Speed Rail Project

Directions: Read the excerpt below, adapted from information published about the project, much of it from the California High Speed Rail Authority, to understand the context of the California high speed rail project.



The California High Speed Rail Project is a high-speed rail system currently under construction in the state of California. The project is managed by the California High Speed Rail Authority, a state agency run by a board of governors. It is responsible for planning, designing, building and operating the first high-speed rail system in the nation. By 2029, the system is intended to run from San Francisco to the Los Angeles basin and will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations. The California project is part of a proposed nationwide high speed rail system, which would be a huge infrastructure project, one of the largest in the history of the United States.



By the end of Phase 1, the route will connect Los Angeles with San Francisco at speeds up to 220 miles per hour (350 km/h), making the trip in 2 hours and 40 minutes (it takes approximately six hours to drive that distance in a car). The system is required by law to operate without a subsidy (a payment from the government), and to eventually connect the state's major cities in the San Francisco Bay Area, Central Valley, and Southern California.

Construction on the initial section from Merced to Bakersfield, in the Central Valley, began in 2015 and is expected to end in 2019. That track will be used for local service. High-speed rail service is expected to begin in 2022 after the rails are extended south to Burbank. Phase 1 is planned to be completed in 2029. In Phase 2 (no timetable yet), the system will be extended to the north (through the Central Valley to Sacramento) and to the south (to San Diego), reaching all the major population centers in the state.



Construction is only fully funded through 2019, although the project is now automatically getting cap-and-trade funding (payments to the government on the part of companies for the right to pollute) amounting to hundreds of millions of dollars annually. With an anticipated construction and planning cost of \$68.4 billion for Phase 1, the project is the most expensive public works project in United States history. The project has had to contend with a number of lawsuits seeking to stop it, but thus far they have only delayed it. A lawsuit that succeeds before 2019 is not likely to stop various projects already underway, but might delay or even halt a dedicated High Speed Rail service in the state.

One reason the California high speed rail project has been suggested is that it will reduce environmental pollution by reducing the volume of cars traveling through California. There are frequent travelers between the Bay Area and the Los Angeles area. The California High Speed Rail Association (CHSRA) projects that as many as 100 million people or more a year will ride the high speed trains, although other estimates cite ridership as low as 20 million people a year. These numbers are projected values only. There is not hard data to support either estimate. The construction of the project would create noise, air, and water pollution from associated work, and the final railroad would emit air pollution in addition to noise pollution.

Directions: Think about the questions below:

1. What are your initial reactions to the California high speed rail project?
2. What questions do you have about the California high speed rail project?

Directions: Read the documents below that describe the environmental impact of the California high speed rail system. Annotate the documents by highlighting, underlining, and taking notes about the environmental impact of the California high speed rail system. The impact could be positive or negative.

Document B

Source: From an article by Jacqueline Lee published in the *San Jose Mercury News*, a newspaper based in the San Francisco Bay Area serving cities through which the high speed rail would travel. Published 16 October 2015.

The California High Speed Rail Authority held four community meetings last month to initiate its environmental analysis of the 51-mile Peninsula portion of the line [from San Jose to San Francisco].

Councilman Pat Burt said the state agency’s goal to certify a final environmental report by summer 2017 is unrealistic.

“I think that what they are planning to do is a prescription for failure,” Burt said. “It is the sort of process that resulted in the horrendous backlash [for the project] previously.”

Burt, who previously served on the city’s Rail Committee, said Palo Alto should again rally other Bay Area cities to ask the rail authority and Caltrain [the local train service] to take a “context sensitive solutions” approach in evaluating high-speed rail on the Peninsula.

To do that, more time would be needed for a proper environmental review, the council agreed. Councilman Marc Berman said the state agency’s accelerated environmental review process is unreasonable and unnecessary.

“We should push back as forcefully as we can,” Berman said.

In a 7-0 vote, the council directed the mayor and city staff to convey its stance to the rail authority and Caltrain, asked the mayor to reappoint the Rail Committee and requested staff to plan a citywide context sensitive solutions approach to the future of rail in Palo Alto and the mid-Peninsula.

1. Does the author of this article seem to argue that the rail project is a viable solution to environmental pollution?
2. What evidence supports her argument?
3. What bias may impact the author’s opinion?
4. How does that bias impact your interpretation of her opinion?

Document C

Source: The projected benefits of the California high speed rail project identified by the California High Speed Rail Authority, the organization responsible for building the infrastructure project. Published 2010.

Transportation	Employment	Environmental Quality	Urban Vitality
Congestion relief on freeways and at airports	Up to 100,000 construction-related jobs	Improved air quality; Reduced greenhouse gas emissions by 12 billion pounds per year	Revitalized communities, economic development around stations
Faster travel between major metropolitan areas	Up to 450,000 permanent new jobs over 25 years created by HSR economic growth	Improved energy efficiency: 1/3 energy use of planes, 1/5 that of cars	Transit- and pedestrian-oriented infill development
Improved movement of people, goods and services		Reduced dependence on foreign oil: 12.7 million barrels less per year	Enhanced public safety due to separation of tracks and highways

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3. What bias may impact the author's opinion?
4. How does that bias impact your interpretation of their opinion?

Document D

Source: A letter from Enrique Manzanilla, Director of the Communities and Ecosystems Division of the Environmental Protection Agency, a federal organization responsible for environmental policy, to Mark Yachmetz, Associate Administrator of Railroad Development at the Federal Railroad Administration, summarizing the Environmental Protection Agency's review of the plan for the California high speed rail project. Published 24 October 2005.

EPA supports the concept of a high speed train system in California that can facilitate the movement of people, while minimizing environmental impacts.

While EPA has continuing concerns regarding the Final PEIS, our primary focus is to provide CHSRA with solid guidance in the development of future environmental analyses. We have included several recommendations to make the rail project more environmentally friendly.

Recommendation #1:

There are certainly impacts on the immediate landscape where the railroad is proposed that will have regional impacts. The final PEIS does not provide an explanation of the cumulative impact of the railroad on the resources across the state. EPA encourages CHSRA to improve the methodology used so that a more thorough cumulative impact assessment can contribute to project design.

Recommendation #2:

There are several proposed routes for this project. A coalition of the EPA and CHSRA will ensure that the final plan contains the least environmentally damaging route. EPA has identified potential impacts to aquatic resources of national importance, wetlands and water quality, wildlife habitats, and endangered species that would result from some proposed routes, through the construction of the project or the final route and implied pollution from the trains.

Recommendation #3:

EPA recommends that CHSRA follow through with commitments for analysis to avoid minimizing aquatic resources, negatively impacting Soledad Canyon and the Santa Clara River, and disrupting wildlife movement corridors with measures to maintain wildlife movement.

EPA continues to be supportive of the proposed project, and we look forward to maintaining our working relationship with CHSRA in the development of an environmentally protective high speed train system.

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4. How does that bias impact your interpretation of his opinion?

Document E

Source: The environmental benefits of the California high speed rail project, as outlined by the California High Speed Rail Authority. Published 2015.

The California High Speed Rail Authority is developing a high speed rail system that will deliver fast, direct travel between the state's major regions while providing environmental benefits. Simply expanding the state's existing transportation corridors could not deliver the same quality and level of benefits.

The high speed rail system will take cars off the road and reduce daily flights between major urban regions in California, thus boosting the state's economic productivity as more travelers and commuters take the train to get around the state, resulting in less congestion for drivers, less delay for air passengers, and reduced air pollution.

By 2040, the system will reduce vehicle miles of travel in the state by almost 10 million miles of travel every day. From the start of operations in 2022 through 2080, the system will reduce auto travel on the state's highways by over 400 billion miles of travel. Starting in 2030, the state will see a reduction of 93 to 171 flights daily. By 2040, the state will see a reduction of 97 to 180 flights daily. Air travel contributes significantly to carbon dioxide emissions.

Fewer cars on the road means improved air quality in the State. California has some of the most congested urban areas with the poorest air quality in the nation. Particularly in the summer months, residents of the Central Valley endure air quality linked to increased rates of asthma and other respiratory ailments. Fewer cars and a train that uses clean energy means cleaner air.

In 2010 alone, United States greenhouse gas (GHG) emissions totaled 6,821.8 million metric tons of carbon dioxide. California leads the nation in working to reduce the level of GHG emissions. In 2022, when the initial operating section of the rail system from Merced to the San Fernando Valley is running, the resulting GHG reductions will be between 100,000 to 300,000 metric tons of carbon dioxide in the first year. That is the equivalent of taking 17,700 to 53,000 personal vehicles off the road. Between 2022 and 2040, the cumulative reduction of carbon dioxide is estimated to be between 5 and 10 million metric tons.

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Document F

Source: An article in the *San Jose Mercury News* by Juliet Williams, summarizing a lawsuit contesting the CHSRA's environmental claims about the California high speed rail project. Published 24 June 2014.

A San Rafael-based group filed a lawsuit against the California High Speed Rail Authority, arguing that the building the \$68 billion bullet train would create more pollution than it would reduce for at least a decade. The suit alleges that the board downplayed the harmful effects on the environment caused by the construction and existence of the train and exaggerated the potential environmental benefits of high-speed rail in its scoping plan, allowing the state to claim the bullet train will reduce greenhouse gas emissions.

The lawsuit says the California High Speed Rail Authority conducted an “inadequate” environmental analysis “without doing its own independent analysis and evaluation of those impacts and their significance.” It says the board also failed to consider the pollution associated with “manufacturing the many thousands of tons of cement that would be needed for the project’s construction.”

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2. What evidence supports her argument?
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4. How does that bias impact your interpretation of her opinion?

Developing an Argument

Directions: Answer the following questions. Use data from the documents to support your answers.

1. What are the possible environmental impacts of the high speed rail project? Are these impacts positive or negative? Think about the many subtopics of environmental impacts, such as the possible disruption of animal migration patterns, air pollution, runoff causing water pollution, and many more.
2. Do you think the projected values for ridership are accurate? Why or why not? What may impact ridership?
3. Do you think the projected values for costs are accurate? Why or why not? What could impact costs?
4. Do you think the projected values for the environmental benefits are accurate? Why or why not? What unintended consequences or externalities may occur?
5. Do you think a significant number of patrons will ride the high speed rail? Or will people continue to drive?
6. Will pollution occur during the production of the rail and during its existence?
7. Will the existence of the rail line counteract any pollution created during the production and existence of the rail line?
8. Is the high speed rail project a viable solution to environmental pollution in California? Why or why not?