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# VISUALIZING CALIFORNIA TRANSPORTATION IN 2030 USING SCENARIO PLANNING

ON THE WEB AT [HTTP://WWW.BREN.UCSB.EDU](http://www.bren.ucsb.edu)

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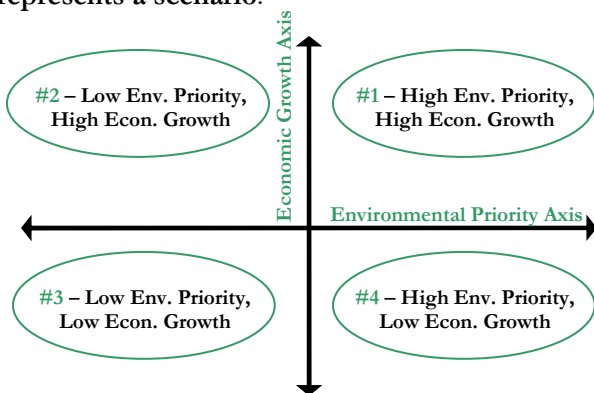
## Introduction

The future of transportation in California is uncertain, and the state faces a number of increasing transportation problems including congestion, population growth, and environmental impact. This project provides a framework for addressing these problems in a long-term, strategic manner.

Other methods of predicting the future often fall short because they are narrowly focused and rely only on mean historical trends. This project uses **future scenario planning** as a method for government and business to prepare for uncertainty by considering a wide range of future possibilities.

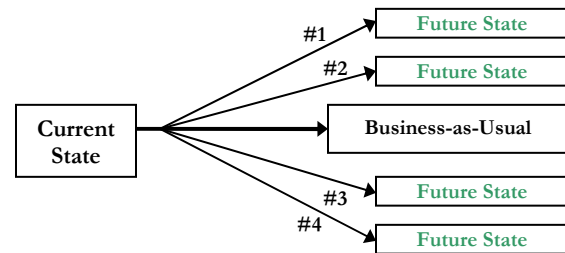
## Methodology

The primary goal of the scenario planning method is to identify and organize future uncertainties, and in doing so, to create a framework for understanding the implications of those uncertainties. Scenario planning typically uses two **drivers** to address uncertainties. Drivers are defined as the main forces that effect change within the studied system. This project uses **economic growth** and **environmental priority** as its two drivers. Drivers can be visualized as a set of axes, as seen in the figure below, where **each quadrant represents a scenario**.



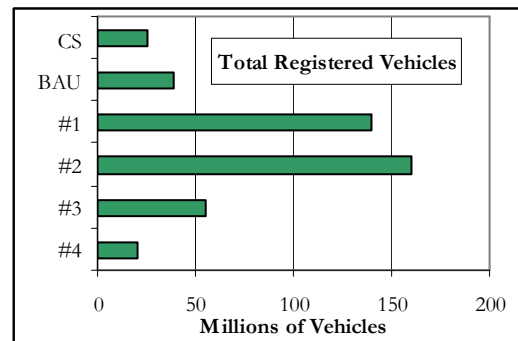
The California transportation system is described through a set of **system variables**. From the **current states** (CS) of these variables and their historic trends, a business-as-usual (BAU) projection is made for the

year 2030. For each variable, four **possible future states** are obtained by using the drivers to deviate from the BAU projection, as shown in the figure below. This creates the quantitative skeleton for our four scenarios, which are then fleshed out with narrative descriptions.

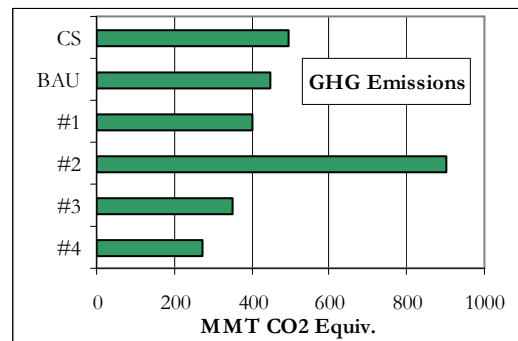


## Results

For each of the 74 system variables, we determined the current state and calculated values for the BAU projection and the four possible future states (one for each scenario). Here are two examples of the results:



By analyzing and comparing the results, we can begin to uncover the story of each scenario, which is then expanded upon in the qualitative descriptions.





## Scenario 1: Green is Golden



- Highly mobile, highly automated society.
- Citizens strive for “green” status.
- Transport activity is subject to a carbon tax.

### Joe's commute

Joe wakes up in his suburban condo to the smell of coffee from the café downstairs. He is up just in time to make the 8a.m. commute shift. It is his turn to drive the carpool. He inserts his transport card into the dash console and drives to the usual meeting spot.

On the way to work, they have to pass by old neighborhoods that have not made the change to new efficient technology. He looks at the new light rail system with pride, as his firm has helped build it.

It doesn't take a lot of effort to drive with all the sensors on the road. The office is getting quiet these days because so many people are telecommuting. He misses the old days, when you could chat at the water cooler with co-workers.

Almost every part of life in California is now regulated for eco-efficiency. California's transportation system has been re-structured to meet the high consumption demands of economic success and stringent environmental protection laws. Business in California has flourished by meeting the demand for low emission vehicles and other green technology.

Californians still have a high level of mobility, as long as they travel according to optimized travel times and modes. The distribution of “transport cards” has replaced drivers' licenses as standard issue identification. The transport cards maintain a digital record of each citizen's carbon footprint, for which they are taxed at the end of the year.

Fuel demand has been met by the introduction of an array of energy sources that are domestic, clean, and renewable, while emitting almost zero greenhouse gases. The replacement of old vehicles has become requisite by government mandate.

Cars are still the most popular mode of transportation—for the middle and upper class who can afford the low carbon technology and taxes. Public transit plays a major role in moving people around, but to the chagrin of the state government, is under-utilized.

## Scenario 2: Convenience Trumps



- Transportation channels near maximum capacity
- Commute is part of work day; extreme multitasking.
- Luxurious lifestyles, several single purpose vehicles

### Joe's commute

Joe grabs his morning coffee at 5:30a.m. He is waiting for the corporate shuttle to pick him up for the nearly 60 mile commute. In order to optimize their time while waiting in traffic, Joe and his colleagues have a meeting every morning en route at 6:30a.m. on the dot.

Each person has a work station on the shuttle which is as fully equipped as their office. Most of the participants for the morning meeting are on the bus, and they videoconference with the rest using state of the art audiovisual equipment. There are personal screens for high definition projection, along with surround sound for each workspace.

As soon as they reach the office, they begin acting on the decisions made en route. The shuttle home leaves the office at 3:30p.m. and they may use this time for small group meetings as needed.

California is very isolated as societal trends focus on personal freedom and prosperity, at the expense of community and environmental concerns. People and businesses continue to migrate to the state thanks to government deregulation and financial security, resulting in high levels of technological advances and reduced unemployment.

The transportation system is stressed and people opt to respond instead of waiting for the ineffectual and inefficient government to intervene. In order to be time-efficient, commuters purchase vehicles with built-in workspaces and hire drivers to enable themselves to multi-task. Businesses also organize shuttle pools to offer alternatives to the crowded and degraded public transportation means. Often, the wealthy hire helicopter taxis to bypass road and rail traffic altogether.

Homes, workplaces and shopping areas are spread out and continue to expand. This trend has opened up a market for travel easements; technologies that address traffic avoidance, telecommuting, audiovisual, comfort, and air filtration needs are of particular importance. Environmental quality has become a low priority due to a lack of immediate urgency.



### Scenario 3: Holding Our Own - A Modest Energy Society



- All energy sources are domestic
- High-density urban development emerges
- Limited mobility: work/shop from home
- Widespread use of public transportation

**Joe's commute**

Joe awakes to the sound of rain. Since he started working from home over ten years ago, Joe is no longer bothered by the weather. Joe and his family do many things in his apartment complex: shop, go to the movies, work out, and dine.

Last week Joe took the bus to his company's main office for an "in-person" meeting. These meetings allow Joe and his coworkers the chance to work with his company's clients directly. Joe's transportation engineering firm is one of the few remaining that still offers personal meetings.

During lunch Joe has to fill out a consent form for his son's upcoming "field trip." As part of the 3<sup>rd</sup> grade curriculum, each student is required to take a field trip to at least three foreign countries and to write a report on cultural differences. Naturally, each trip only lasts half an hour each so that the rest of the teaching day is not wasted. But each trip is full of highlights necessary for the students to learn about different cultures. This Friday, Joe's son will travel to Japan and learn about the past fifty years of urban planning and transportation evolution. Joe opts to pay a little extra to download an extended trip for himself later.

Californians are now among the most "virtually-mobile" people in the world. The transportation system in California has changed dramatically over the past couple decades. Fewer and fewer cars occupy the roads while buses and hyper-efficient trucks travel freely on the open spaces. It has become too expensive, and is often seen as unnecessary, for many people to purchase their own car. Any individual who needs to travel can take a bus almost anywhere without problems.

Many people have long since moved to high density apartments to be able to afford living in California. New apartment complexes incorporate businesses in the lower floors along with recreational and entertainment facilities. Small businesses have flourished near their close customer base while others have had to rely on virtual shopping and hyper-efficient shipping to transport goods.

### Scenario 4: Grown from Grassroots



- Main impetus for change brought on by local, grassroots activism
- Mobility and the transport of goods localized, as the costs of transportation soar
- Lack of funds encourages cooperation between government and businesses

**Joe's commute**

Joe gets up for work early on Monday morning. Along with several of his neighbors, Joe walks through his backyard to a dirt path that connects Joe's neighborhood with the nearby business and commercial district where most local residents work. The path was created through a governmentally-organized Community Pathways Program, funded by donations from area stores, and is maintained through community and employee volunteers.

Joe's job is located in a small mixed use area, with restaurants and shops so he can run errands easily. His building is LEED Platinum certified, and the entire complex is LEED MU certified (mixed use). A quick glance at the small parking lot reveals a handful of small alternative fuel cars, a large bike rack taking up over one third of the lot, and a corporate carpool bus, fueled by waste oils from local businesses and restaurants.

At the end of the day, Joe walks home knowing that because his day was almost carbon neutral, he can apply to be named Carbon Neutral Person of the Week.

Scenario 4 illustrates the potential impact of individuals working together to demand changes from the government, businesses, and each other. Mobility is severely limited, both due to choice and economic necessity. Major shifts in public demand for local, organic, and environmentally-friendly goods have led to a significant decline in the need for shipping.

Through the help of urban redevelopment and mixed-use, high density neighborhoods, the need for individuals to drive during a typical day has almost vanished in some parts of California. Many people choose to walk or bike to work and to run errands, and many more cannot afford the high costs of gas. Inexpensive alternative energy sources, particularly ones derived from California sources (such as waste-to-energy and biofuels from agricultural waste), have made significant in-roads with people and businesses who still must drive.



## Recommendations and Conclusions

In going through the steps of using the scenario planning method, we have learned a great deal about the process of building scenarios. Accordingly, we make a few recommendations to those who wish to duplicate our methodology in the future.

- The first step should be to pick a few drivers and perform quick, non-extensive ‘test’ scenarios.
- Second, scenario planners should discuss their scenarios and write up what the scenarios will look like in qualitative, narrative form, then use supporting data for scientific rigor.
- Lastly, the scenario planning team should be as multidisciplinary and diverse as possible. This will help to avoid bias and to ensure that the scenario narratives are diverse and comprehensive.

### Identifying Commonalities

The following elements were determined to be similar across two or more of the scenarios envisioned in this project:

- 1.) *Increasing congestion*
- 2.) *Increasing use of public transportation*
- 3.) *Corporate carpooling*
- 4.) *No clear technology winner*

In addition to these specific commonalities, we observed a number of themes that appeared in multiple scenarios, but arose through very different circumstances. These themes are particularly notable, as they show how positive outcomes can arise through a variety of pathways. The following are the most important themes we have observed:

#### **Common Themes:**

- 1.) *Energy Efficiency, arising from either economic or environmental efficiency – Scenarios 1, 3, & 4*
- 2.) *Higher environmental impacts result from high economic growth than from low environmental priority.*

### How Others Can Use This Project

The ultimate goal of this project is to facilitate discussion and consensus-building about the future direction of transportation within the state of California, in hopes of promoting sustainability. It is our desire that this project can be used by diverse parties in business, government, and academia to actively plan for their future transportation-related decisions.

### Signposts & Affecting the Future

In addition to making decisions based on a scenario analysis, planners often want to know which scenario is ‘coming true’ as time passes and the future becomes the present. Since each scenario is designed to be an extreme case, the future is unlikely to look exactly like any specific scenario and will likely contain elements of all four. However, the stakeholders can still have a substantial influence in shaping the future, based on their knowledge of the possibilities. These facts lead to two additional uses for scenario planning: Scanning for “Signposts” (defined as ‘indicators of which scenario is coming true’) and Affecting the Future.

#### **Examples of Signposts:**

- Changing environmental priority: Green party candidate elected governor; Inconvenient Truth wins an Oscar
- Changing economic growth: Shortage of Middle Eastern oil
- Hybrid car sales trends.

In order to affect the future, business, policymakers, academia, and households can look at the scenarios and decide which is best for them and for society as a whole. Making stakeholders aware of the drivers of change and of the possible outcomes of their actions can lead them to make choices with this long-term future in mind.

### Conclusion

Future scenario planning provides a useful tool for governments, businesses, non-profit groups, and research institutions facing an ever-changing world. Only time will tell if scenario planning helps inform successful decision making in California’s transportation future. Ultimately, the measure of good scenarios is not whether they get the future right, but whether they lead to better decisions in the present.

In scenario planning, it is important to keep in mind that the greatest insights are gained from the scenario planning process, rather than simply reading scenarios. Thus, we encourage organizations to practice scenario planning in their long-term strategies.

**"The only certain thing about the future is that it will surprise even those who have seen the furthest into it." - E J Hobsbaum, historian.**