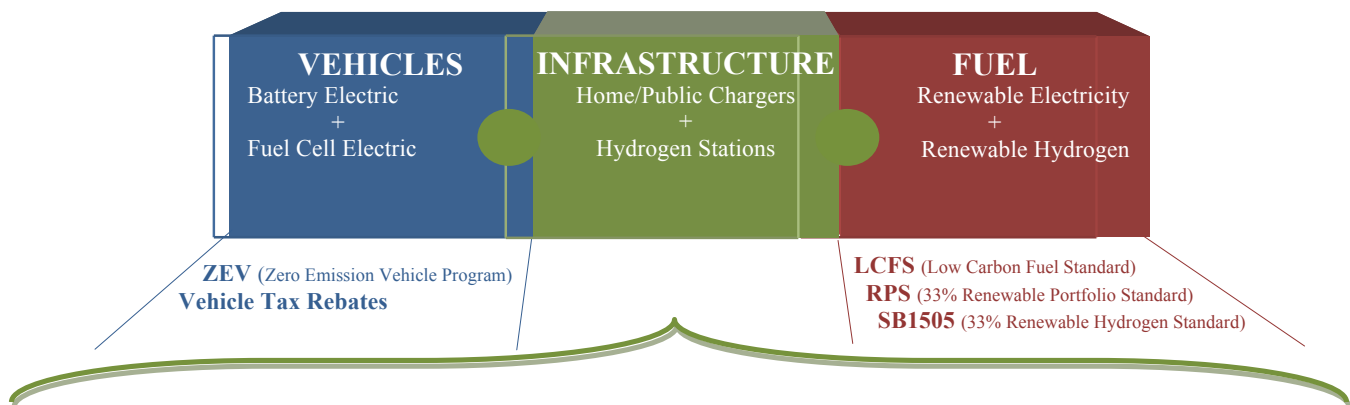


Infrastructure for Clean Transportation in California

It is now widely recognized that California will need a portfolio of advanced electric vehicles to reduce our dependence on oil, preserve clean air, and stabilize the global climate. This includes both Battery Electric Vehicles (BEVs), as well as hydrogen-based Fuel Cell Electric Vehicles (FCEVs), which together can replace the wide range of driving needs and ranges provided by today's gasoline cars and trucks.

The good news is that auto manufacturers are ready for large-scale commercialization of both technologies, with BEVs already on the market, and the large-scale deployment of FCEV planned in the next three years. California is strengthening the incentives and requirements to assure these Zero Emission Vehicles will be sold. Furthermore, there are incentives and requirements being put in place to ensure that electricity and hydrogen will be increasingly made from renewable sources.

The bigger challenge that remains is the question of infrastructure to support the fueling of these new vehicles, and who will install the charging stations and pumps, and who will pay for them. The diagram below highlights the current lack of a policy tools focused on ZEV infrastructure needs compared to the other dimensions of the sector:



Electric Charging Infrastructure

- For home charging, the Public Utilities Commission (PUC) directs utilities to install new meters in people's homes, and upgrade the grid to meet the power need. Individuals must pay for their home charging equipment, but the cost of grid upgrades is spread among ratepayers.
- No regulation requires public charging to be installed, but cities and businesses can apply for State co-funding (AB118) if they choose to install such infrastructure.
- Public chargers may be needed to make BEV available to people without private garages, as well as extend BEV range, but there is no framework yet in place to ensure this.

Hydrogen Fueling Infrastructure

- Since hydrogen is not regulated like electricity, there is no equivalent to the utility, or its obligation to serve - it is up to the free market.
- Until now, hydrogen stations have been built with state co-funding, in "clusters" where automakers are placing vehicles.
- With large-scale commercialization, a rapid ramp up will be necessary, requiring significant private sector investment.
- Although oil companies, industrial gas companies and fuel retailers will all ultimately profit from this sector, not all are willing to invest in the unprofitable early years.
- There is currently no policy framework in place that will ensure that hydrogen infrastructure is built to meet the needs of new vehicles.

Infrastructure Certainty and The Need For a Backstop

Market certainty is needed for alternative vehicles and infrastructure to overcome a classic chicken-and-egg paralysis: automakers need certainty that fuel will be available to consumers in order to invest in mass production facilities for the alternative vehicles; energy companies need certainty that mass commercialization vehicles will occur to be sure their infrastructure investments will not become stranded.

For electric charging of BEVs, the regulated utilities provide the certainty that electricity will be available as fuel, so automakers have begun commercializing vehicles knowing that single family home owners can be supplied with home chargers connected to the grid. In the future, it will likely be necessary to complement single family home charging with public, workplace, and multi-unit housing charging stations to continue to grow the BEV market. These stations will all be able to tie into regulated electric infrastructure.

The hydrogen infrastructure market is not regulated like the electricity market is, and therefore calls for a different approach to provide the necessary certainty that hydrogen fuel will be available for FCEVs. California has already set up grants and other incentives to the pioneers of this market to encourage them to build hydrogen-fueling stations during this early, pre-commercial phase, which they have done. But during the commercial ramp up, what is also needed is a clear, regulatory "backstop" in case incentives are not enough, and there is a shortfall in hydrogen stations. The pioneer automakers and energy companies need this backstop to provide certainty that the market will grow quickly to the scale needed to make their investments viable.

The California Clean Fuels Outlet

The California Air Resources Board is currently revising the Clean Fuels Outlet (CFO), an existing regulation that was designed to provide exactly this type of backstop needed by new alternative fuels markets. Although it was designed in the 1990s for different type of fuels, it is being revised to serve as the infrastructure complement to the Zero Emission Vehicles (ZEV) regulation that is placed on vehicle manufacturers. The CFO may apply to all ZEVs, but given that the immediate need for it is to provide the certainty for fuel cell vehicle deployment, the following focuses on hydrogen infrastructure.

What the CFO will do:

- The CFO will ensure that if there are not enough public hydrogen stations in place or planned to meet the needs of fuel cell vehicles, then the major energy companies of California will be required to build these additional stations.
- The stations that the CFO requires will only need to be located in the "clusters" where automakers have agreed to roll out their fuel cell vehicles, in a well coordinated plan facilitated by the California Fuel Cell Partnership. This ensures each station will get the maximum use possible, and provide the energy companies with the quickest path to profitability.
- Each energy company will be required to meet its fair share, based on its proportion of sales of petroleum fuels in California. Each company will be given maximum flexibility on how or with whom to make this happen, as long as it ensures that stations are in operation at the right place, in time, and meet the needs of fuel cell vehicle customers.

The diagram on the next page illustrates how a successful CFO regulation will provide the market certainty necessary to successfully deploy hydrogen FCEVs.

The CFO: A Complementary Backstop to Market-driven Infrastructure

