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## FCEVs require little behavior change and are thus most likely to convince people to drive a ZEV

Fuel Cell Electric Vehicles (FCEVs) are ZEVs and must be included in any Commission consideration of the ZEV market. At present, there are over 6000 FCEVs in California, and they are served by a network of 39 fueling stations. These numbers are steadily growing, thanks in part to ongoing Commission support.

I have driven my 2017 Honda Clarity FCEV over 24,000 miles since August, 2017, traveling extensively around the state from my home in Davis. In the San Francisco Bay area, and in Los Angeles and Orange counties, I have found that the network of fueling stations is approaching the point where a FCEV driver is rarely more than 20 miles from one. During a 5-minute fueling stop, my FCEV can gain over 300 miles of range. A single station can serve many FCEVs due to its ability to refuel up to 12 cars per hour. Even the fastest DC fast charge PEV chargers cannot approach 300 miles in 5 minutes. Thus, it takes many more DCFC stations to refuel the same number of cars.

It is estimated that 1000 hydrogen stations will be enough to serve 1,000,000 FCEVs (TN227444, 2019-2020 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program, p. 55). By contrast, the state has set a goal of 10,000 DCFC stations (not to mention 250,000 level 2 chargers) to serve 1.5 million electric vehicles, by 2025. (id.,p. 31).

A passionate advocate for adoption of ZEVs, I volunteer at ride-and-drive events where members of the public have the opportunity to try out an EV. Almost without exception, they love the driving experience and are excited at the prospect of owning one. But their enthusiasm starts to diminish quickly once they start asking questions about how to manage charging a PEV. They are put off at the notion of needing to install level 2 EVSE at homeâ€"level 1 being simply too slow to recharge todayâ€™s 60kw and larger batteries. Will my service panel and wiring need to be upgraded, and what will it cost, are typical concerns. They are also put off at the notion of needing to plan their activities around their carâ€™s state of charge. They donâ€™t want to have to worry about whether or not they can take off on a long drive without first undertaking a lengthy recharging session. And they donâ€™t want to spend 30 minutes or more at a DCFC station every 250 miles or so.

Many of the people I talk with also object to having to move to a smaller, less versatile vehicle than the pickup truck or SUV they are used to.

An additional obstacle arises among the millions who live in multi-unit dwellings or must park on the street. They do not have the option of at-home charging. This is an even greater concern globally, where multi-unit dwellings are prevalent. China, for example, is now moving swiftly toward adoption of FCEVS, because so much of that countryâ€™s population lives in high-rise

apartment complexes. Centralized, rapid fueling is the best, perhaps the only, viable option under those circumstances. https://qz.com/1597577/architect-of-chinas-ev-boom-now-backs-hydrogen-fuel-cells/

California and the rest of the world need to transition speedily into ZEVs. This means that drivers will need to change their behavior. The key to getting people to change their behavior is to minimize the amount of change necessary, and to retain what is familiar to them as much as possible.

This is where the FCEV has huge advantages over the PEV. People are used to going to the gas station about every 300 â€“ 400 miles where, in about 5 minutes, they can refuel their cars and go another 300 to 400 miles. It does not involve their needing to install or do anything at home, or look for charging stations to use while they shop or travel. Bottom line, people will be willing to move to an FCEV because it will not inconvenience them. It will require far less of a change in their behavior than moving to a PEV. Their transportation routine will not change.

FCEV architecture is far better suited to installation in the pickup trucks and SUVs that so many people now favor. Scalability is one of the reasons we are now seeing fuel cell technology in freight hauling, marine and rail applications. Auto manufacturers could install fuel cells and tanks in their current lines of large light-duty vehicles without the need to start from scratch. https://gearjunkie.com/chevrolet-silverado-zh2-hydrogen-fuel-cell-pickup

California Health & Safety Code sections 44270.3 and 44273 require the Energy Commission to quantify the benefits achieved through ARFVTP-funded projects, from both effectiveness and dollar-benefit perspectives. The National Renewable Energy Laboratory (NREL), working with CEC staff, conducted this assessment for the 2017 Integrated Energy Policy Report (IEPR) and for previous IEPRs and IEPR Updates. NREL has consistently reported that FCEVs have far greater potential to displace petroleum fuel, and to reduce GHGs and criteria pollutants, than PEVs. (TN227444, 2019-2020 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program, tables 6, 7, 8; TN223205, Final 2017 Integrated Energy Policy Report, tables 42, 43).

Ultimately, any transition to ZEVs will need to become self-sustainingâ€”the sooner the better. Clear and consistent policy signals from government are one of the best ways to encourage private investment and growth toward economic viability. The FCEV industry, in particular, having come this far, deserves reassurance that investments it makes in worthy projects to develop fueling infrastructure and vehicles will be met with ongoing and unwavering support. I urge the Commission to continue its essential work on FCEV fueling infrastructure. While we need all types of ZEVs, establishment of a robust hydrogen fueling network has the strongest likelihood of persuading motorists to switch to a ZEV. For them, their transportation lives will continue with almost no change of behavior. That is the key to rapid transition to zero-emission transportation.

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