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Comments on the Role of Hydrogen to Decarbonize California's economy

Submitted by Climate Action California and 350 Humboldt

Additional submitted attachment is included below.



September 21, 2023

Comments on the Energy Commission's September 8, 2023 IEPR Commissioner Workshop on the Potential Growth of Hydrogen

Climate Action California and 350 Humboldt, with more than 9,000 supporters around California, are pleased to submit these comments in response to the September 8 workshop.

The goal of this workshop was to assess the potential role of hydrogen in meeting California's decarbonization goals. As such, it was a good summary of mostly industry thinking on the subject. Only panel #1 included presentations by representatives of NGO's not directly associated with industrial interests. As such it was a biased representation, focused on Industry's short-term expectations—rather than on California's near-term and long-term need to electrify and minimize emissions.

Our thinking on this issue is guided by two principles:

- The State of California's highest mission is to protect the health and welfare of its citizens, not the profits of industry.
- To carry out this mission, the State of California must act with all haste to select the best solutions, which will slow the climate crisis fastest. We should not allow industry statements about what they consider "economically feasible" now to cloud our judgment. We must remember the wise maxim "There is no economy on a dead planet." We have less than seven years to avoid the scientifically predicted tipping point of 1.5C global warming. We must act as we would in an emergency and not expect to be able to carry out business as usual.

As was pointed out by Commissioner McAllister, solving the climate crisis will depend on mobilizing the proper combination of electrons and molecules, chosen to minimize climate impact. Hydrogen has an important *but limited* role in this arena. We must keep in mind that hydrogen is NOT a fuel, but an energy storage medium that requires energy to release it from its bound chemical forms. There are no economically recoverable deposits of molecular hydrogen to be mined on Earth.

INAPPROPRIATE uses of hydrogen

1. Hydrogen should not be mixed into existing or future pipelines intended for natural gas use. There are several reasons for this.
 - The first is that only small amounts of hydrogen, up to 10 percent of total gas, can be mixed with methane in existing natural gas infrastructure without endangering the reliability of the system to hydrogen embrittlement gas leakage, and possible catastrophic failure leading to combustion.

- Secondly, this small admixture will displace only 10 percent of the methane burned, yielding only a minimal climate benefit depending on the carbon intensity of the hydrogen used. Efforts will be better spent electrifying these uses and eliminating gas service, which would have the co-benefit of eliminating methane leakage from the distribution system.
 - Thirdly, no natural gas appliances have been certified to be used with any amount of hydrogen. The risks and many dangers to homes and commercial sites must be ruled out through rigorous testing before hydrogen can be used in furnaces, gas stoves, and ovens.
2. Fueling stations for light duty vehicles should not be given any state or federal support. The ship has sailed on this market. There are 1 million battery electric vehicles in our state¹, but only 15,000 hydrogen fuel cell (HFC) cars.² According to the Hydrogen Fuel Cell Partnership, which provides charging information to HFC drivers, there are only 55 public hydrogen filling stations in California at this writing.³ In 2021, the median cost of a new hydrogen fueling station was “approximately \$1.9 million in capital.”⁴ In contrast, the California Energy Commission reports that there are over 80,000 public and shared private EV charging stations in the state (not counting home chargers).⁵ Federal Inflation Reduction Act funding for chargers will further accelerate this growth. Efficiency is also an issue. A recent journal article showed that the round trip efficiency of renewable electricity powering a battery electric vehicle was 73 percent, vs. 22 percent for a hydrogen fuel cell vehicle.⁶ This clearly illustrates the reason why hydrogen should never replace direct use of electricity.

APPROPRIATE uses for hydrogen

Hydrogen should be used for those sectors which are hard to electrify directly. Opportunities include:

- Chemical processes currently using SMR-generated hydrogen
- Fuel for long-distance aviation and shipping
- Locomotives, if clean electrification is not feasible or available
- Heavy-duty, long-haul trucks and agricultural/industrial vehicles
- Industrial heating processes such as steelmaking
- Long-term energy storage

What definition should be used for green hydrogen?

We believe that *at a minimum* the definition used in Section 45V of the federal Inflation Reduction Act (IRA) for the lowest carbon intensity hydrogen be used as the benchmark. California should not spend public money to support development of hydrogen that is more carbon intensive than the IRA’s lowest carbon definition of “clean,” 0.45 kg CO_{2e}/kg H₂. For example, the federal Infrastructure Act refers to

¹ <https://www.gov.ca.gov/2022/02/25/california-leads-the-nations-zev-market-surpassing-1-million-electric-vehicles-sold/>

² <https://www.caranddriver.com/features/a41103863/hydrogen-cars-fcev/>

³ <https://m.h2fcp.org/>

⁴ <https://www.hydrogen.energy.gov/pdfs/21002-hydrogen-fueling-station-cost.pdf>

⁵ <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/electric-vehicle>

⁶ <https://insideevs.com/news/332584/efficiency-compared-battery-electric-73-hydrogen-22-ice-13/>

hydrogen that is 2.00 kg CO_{2e}/kg H₂ “clean” hydrogen. **When applied to other processes such standards may indicate good investments for industry, but California and any future Green Hydrogen Hub developed here should *only* support the build-out of increasingly inexpensive green hydrogen.** We fully support the three-pillars definition of green hydrogen as proposed by several environmental organizations. Together, the pillars ensure that production of green hydrogen will not cannibalize California’s march to a fully electrified economy. The pillars state that the green hydrogen should be:

- Produced by additional sources of green electricity, not existing sources,
- Produced at close to the same time as the electricity used to produce it, and
- Produced near the site of production of the green electricity used to make it. This is to avoid the necessity of constructing long transmission lines and pipelines. The latter have not yet been certified for high pressure hydrogen service and could be prone to leaks.

What can we do to reduce the cost of hydrogen for medium duty and heavy duty transport?

In the workshop, the high price of green hydrogen was heavily discussed in relation to the fuel cell truck market. One option that was not discussed is to gradually raise the tax on diesel fuel and use the money to subsidize the adoption of battery and fuel cell medium duty and heavy duty trucks as well as the installation of a suitable network of green hydrogen filling stations for these vehicles. This is not the same as providing filling stations for light duty fuel cell vehicles, which would require a much more extensive network. Such a policy would provide a strong price signal to the market as it would depress the sales of diesel and promote the development, and sales, of green hydrogen.

Thank you for considering these comments. If you have any questions or wish to discuss any of the ideas in this letter, please [contact Steve Rosenblum](#), who will be happy to meet with staff at any time.

Sincerely,



Stephen Rosenblum, Ph.D. chemistry
For Climate Action California



Daniel Chandler, Ph.D.
Steering Committee, 350 Humboldt