California Energy Commission  
Dockets Office, MS-4  
1516 Ninth Street  
Sacramento, CA 95814-5512

March 24, 2017

Re: Comments on EPIC Investment Plan by CHBC

Dear Chairman Weisenmiller and fellow CEC Commissioners,

The California Hydrogen Business Council (CHBC) appreciates the opportunity to submit comments on the California Energy Commission's 2018 - 2020 EPIC Investment Plan Draft Funding Initiatives. For your consideration, we offer the following recommendations for inclusion into the EPIC Triennial Investment Plan.

**Theme 2, S2.2: Push Low-Carbon Microgrids Closer to Commercial Viability**

The CHBC would encourage the CEC to include Power-to-Gas demonstration projects for funding consideration under Theme 2 - S2.2 “Push Low-Carbon Microgrids Closer to Commercial Viability” of the Investment Plan. The CEC’s goal to establish commercial opportunities for microgrids would very much be in line with investment in demonstration projects for renewable gas from electrolysis, known as Power-to-Gas (P2G).

The CHBC’s White Paper “Power-To-Gas: The Case For Hydrogen” explains how P2G technology has the potential to provide a large-scale, cost-effective solution for storing excess energy produced from renewable sources. In summary, Power-to-Gas (P2G) uses excess renewable energy via electrolysis of water to produce hydrogen gas, serving as a “gas battery.” Like regular batteries, P2G technologies have excellent load-following capabilities, which are necessary to manage the intermittency of solar and wind resources. Unlike battery storage, however, P2G can store utility-scale quantities of energy indefinitely, without self-discharge, either in tanks, the natural gas grid, or directly in hydrogen caverns. This seasonal storage capability can play a role when wind power generated in March can be delivered into the high-value energy markets of August and September. These unique attributes have the potential to enable very high levels of renewable energy production while maximizing economic value.

This ability of P2G to allow energy from renewable sources, such as solar photovoltaic and wind, to be generated during periods of low demand for use later in high demand periods reduces the need for renewable curtailment. This can be effective in alleviating the "ramping" problem experienced by electric utilities in the afternoon and evening periods and smoothing the “duck curve”.
Thus, P2G RD&D, including pre-commercial pilots and system modeling, would represent an important, high-value addition to the EPIC portfolio.

There are several P2G facilities in Europe in various phases of development, with over 28 P2G facilities operational in Germany alone, and three more are operational in North America. Two P2G projects are active in the US, one at the National Renewable Energy Laboratory in Golden, Colorado, and the other at the University of California, Irvine. These demonstrations will assess the feasibility and potential benefits of using the natural gas pipeline system to store photovoltaic and wind-produced energy. These are referred to collectively as a “system solution” because of the added benefits of helping balance the grid and providing substantial energy storage capacity.

Conclusion
California is faced with an increasingly urgent need to deploy utility-scale energy storage solutions to support intermittent renewable power generation. CAISO reports that over 300 GWh of solar and wind electricity were curtailed in 2016, and that number is likely to increase. Battery storage technology cannot provide all the energy storage California needs to meet its climate goals. Bulk storage options like pumped hydro and compressed air carry geographic restrictions that also limit the contribution they will be able to make to California’s energy system. P2G enables long-term storage of large amounts of emission-free energy, and is geographically flexible, especially when connected to the vast gas network. P2G is thus critical to California to meet its ambitious climate goals cost-effectively and needs to be part of the state energy portfolio. Investing in advancing the commercialization of P2G now will help accelerate its adoption and move this technology to market. Therefore, the CHBC believes P2G should receive an in-depth evaluation by the CEC for its potential as a large-scale storage option, as well as its potential applications to microgrids.

Thank you for your consideration!

Sincerely,

Emanuel Wagner
Assistant Director | California Hydrogen Business Council

---

- CHBC White Paper “Power-To-Gas: The Case For Hydrogen”
- Pilot Projects in Germany: http://www.powertogas.info/power-to-gas/pilotprojekte-im-ueberblick/