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Additional submitted attachment is included below.

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California Hydrogen Business Council Comments on IEPR Update Workshops on Accessing the Future Role of Microgrids

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I. Introduction

The California Hydrogen Business Council (CHBC)[1] welcomes the opportunity to comment on the July 7 and 9 IEPR Update workshops focused on accessing the future role of microgrids. Our main points that we encourage the Energy Commission to include in the 2020 IEPR Update section and recommendations on microgrids are summarized below and elaborated on in the Comments section that follows.

A. Hydrogen fuel cells and electrolyzers have important roles to play in microgrid systems in California, as essential providers of long duration, flexible storage, generation, and grid support services.

B. Discussions and decisions pertaining to microgrids ought to include a diverse range of technologies and adhere to the principle of technology neutrality.

C. The focus of microgrid development in California ought to go beyond supporting the electricity system and also integrate the gas system as a resource to support resilience and reliability.

D. Interoperability standards across multiple sectors should be developed to fully support the cross sectoral benefits of solutions like hydrogen and fuel cell technology.

[1] The CHBC is comprised of over 100 companies and agencies involved in the business of hydrogen. Our mission is to advance the commercialization of hydrogen in the energy sector, including transportation, goods movement, and stationary power systems to reduce emissions and dependence on oil. The views expressed in these comments are those of the CHBC, and do not necessarily reflect the views of all of the individual CHBC member companies. Members are listed here: www.californiahydrogen.org/aboutus/chbc-members/

E. Microgrids ought to have access to the wholesale market to make good use of excess electricity (either consumed or delivered) to and from the microgrids that would otherwise be curtailed.

F. Relief from departing load and standby charges ought to be granted to encourage adoption of microgrids.

G. Microgrid system design should have some flexibility to be customized to suit the needs of the end user.

II. COMMENTS

A. Hydrogen fuel cells and electrolyzers have important roles to play in microgrid systems in California, as essential providers of long duration, flexible storage, generation, and grid support services.

Fuel cells emit zero criteria pollutants, and electrolyzers can produce hydrogen from renewable electricity that make it greenhouse-gas free over its lifecycle. Many microgrids that use hydrogen technology are in operation today, such as the Stone Edge Farm in Sonoma, as was discussed in Session 2. Other examples are the Massachusetts Clean Energy project that integrates renewable power-based hydrogen storage into its microgrid system,[2] and the Dunsfold Park microgrid project in the UK, which includes a 1.5 MW hydrogen fuel cell microgrid, using renewable hydrogen sourced from bioenergy, that is capable of powering 2500 homes.[3]

B. Discussions and decisions pertaining to microgrids ought to include a diverse range of technologies and adhere to the principle of technology neutrality.

[2] http://verdellc.com/Main_Press/press_solar40.html
[3] https://www.dunsfoldpark.com/news/afc-energy-commences-feed-on-landmark-hydrogen-fuel-cell-micro-grid-in-surrey-at-dunsfold-park.html

There are many microgrid technologies on the market, and they should all be treated with parity with regard to regulatory frameworks. A core purpose of microgrids is enhancing resiliency, and to fulfill this purpose, they should be encouraged to deploy a diverse range of technologies. The Stone Edge Farm is a prime example. Another example that demonstrates the principle of technology neutrality is the microgrid at Gordon Bulboz Nature Preserve in Wisconsin, which uses 200 kW of solar panels, an electrloyzer that supplies hydrogen for a 25 kW hydrogen fuel cell, a 100 kW lithium-ion battery storage system, a 65 kW micro-turbine that can run on gas or biogas, and a 60 kW Kohler natural gas generator to power the 18,000-square-foot nature center building and supply power for EV charging stations.[4] No microgrid technologies, including electrolyzer and or fuel cell technologies, should be excluded or disadvantaged by policy or regulatory decisions.

C. The focus of microgrid development in California ought to go beyond supporting the electricity system and also integrate the gas system as a resource to support resilience and reliability.

Microgrids can connect to the electricity system, and also to the gas system. Dr. Jack Brouwer and his team's research at UC Irvine shows how storing renewable energy in the gas grid in the form of hydrogen can allow for expansion of renewables on a microgrid. The campus has a microgrid[5] made up of combined-cycle turbines, chillers, thermal energy storage, EV chargers, hydrogen fueling stations, 4 kW of solar PV and 113 kW of concentrated solar PV**.** The campus also has a 60 kW electrolyzer that produces hydrogen, which is used to fuel vehicles and also injected into the gas grid and blended with the natural gas that fuels the combined cycle generation plant. Simulations conducted by UC Irvine showed that by using excess solar power on sunny days to power their electrolyzer to produce renewable hydrogen, the microgrid could support an additional 30 MW of solar panels. This represents an increase in the solar deployed on campus from 3.5 percent of the total to 35 percent.[6]

[4] http://www.bubolzpreserve.org/education/micro-grid/
[5] http://www.apep.uci.edu/Research/PDF/Microgrid/UCI_Microgrid_APEP_100518_1012am.pdf
[6] https://www.prnewswire.com/news-releases/socalgas-and-university-of-california-irvine-demonstrate-power-to-gas-technology-can-dramatically-increase-the-use-of-renewable-energy-300432101.html

D. Interoperability standards across multiple sectors should be developed to fully support the cross sectoral benefits of solutions like hydrogen and fuel cell technology.

Such solutions can carry electricity related benefits (as solutions for flexible, long duration storage, electricity generation, and grid services), heating related benefits (as a CHP or natural gas grid decarbonization solution), and transportation and equipment related benefits (in hydrogen fuel cell vehicles of all classes, as well as off-road equipment).

E. Microgrids ought to have access to the wholesale market to make good use of excess electricity (either consumed or delivered) to and from the microgrids that would otherwise be curtailed.

Microgrids have the capability to provide services to the larger electric grid through participation in wholesale energy and ancillary service markets. Present regulations do not allow behind-the-meter resources direct wholesale access, thus depriving microgrids of a value stream the technology is capable of accessing. Electrolyzers or tri-generation hydrogen systems can provide behind-the-meter microgrid solutions, for example, at university campuses and hospitals. Electrolyzers can produce hydrogen either from on-site solar as part of the microgrid, and/or they could be given access to curtailed electricity from wholesale access. This hydrogen can supply fuel cells to produce electricity onsite to support the microgrids and also support the larger grid with ancillary services.

F. The CPUC should provide relief from standby or non-bypassable charges to encourage adoption of microgrids.

Currently, demand charges and non-bypassable charges, such as Public Purpose Programs (PPP) charges, Nuclear Decommissioning (ND) charges, Competition Transition Charge (CTC), Department of Water Resources Bond Charge (DWR-BC), risk hampering the economics of microgrid deployment. While we understand the need to avoid long term subsidizing of technologies via special rates, we also think it important to recognize the enormous economic benefits that microgrids stand to offer and for this to be reflected in the kinds of support the state is willing to offer to enable their adoption. Microgrids can, for example, help mitigate the staggering toll of grid

outages, which climb in to the billions of dollars.[7] With this in view, we urge the Energy Commission to recommend exploration of relief from some or all demand and non-bypassable charges to support accelerated adoption of microgrids.

G. Microgrid system design should have some flexibility to be customized to suit the needs of the end user.

As concluded in a 2015 study for the Energy Commission, lack of flexibility has resulted in numerous conflicting management and controls infrastructure and vendor specific platforms, resulting in high cost of deployment.[8] For example, microgrids should be given the cross-sectoral flexibility to use both the electric and natural gas grid. Hydrogen produced in a microgrid setting can support both use and support the electricity grid, while also using the gas grid for storage, along with decarbonizing gas end uses. The Energy Commission ought to support developing tariff structures that are flexible to suit the needs of the end user.

III. Conclusion

The CHBC appreciates your consideration of these comments and looks forward to working with you further to better understand how hydrogen fuel cells and electrolyzers can play vital roles in future microgrid development in California.

Regards,

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[7] https://www.cnbc.com/2019/10/10/pge-power-outage-could-cost-the-california-economy-more-than-2-billion.html
[8] See pp. 13, 16, *Microgrid Assessment and Recommendation(s) to Guide Future Investments*, Prepared by DNV GL for CEC Energy Research Division, July 2015 https://ww2.energy.ca.gov/2015publications/CEC-500-2015-071/CEC-500-2015-071.pdf