



March 22, 2013

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Honorable Amy C. Yip-Kikugawa
State of California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

RE: Rulemaking R.10-12-007 and Hydrogen Energy Storage Option

Dear Judge Yip-Kikugawa,

The California Hydrogen Business Council (CHBC) is writing to bring to your attention the capability of hydrogen and fuel cell technologies to meet the requirements for energy storage in California.

The CHBC is an industry trade organization whose membership includes:

- Fuel cell and electrolyzer companies including ITM-Power, Hydrogenics, Ballard Power Systems, NEL Hydrogen;
- Auto manufacturers including General Motors, Toyota, Honda, and Hyundai;
- Industrial gas companies Linde and Air Liquide; and
- Natural gas companies including Southern California Gas Company and Clean Energy.

The use of hydrogen as a deferrable load and a grid energy storage option is being demonstrated at the megawatt scale in Europe, Africa and Canada; hydrogen also is integrated with renewable electricity in a variety of installations in smaller scale.¹ Hydrogen storage is particularly well suited in cases when storage of days or even months is desired. In addition, the hydrogen produced for energy storage can be converted back into electricity when needed, injected into natural gas pipelines, used to improve biogas, and used as a transportation fuel.²

The International Partnership for Hydrogen and Fuel Cells in the Economy concluded in 2012 “hydrogen could be an ideal electricity storage medium, particularly when intermittent generation exceeds demand and large amounts of energy need to be stored.”³

Hydrogen energy storage is drawing increasing attention in the U.S. Sandia National Laboratory concluded in 2011 that “Hydrogen energy storage is an ideal match for renewables of all scales, especially large-scale wind.”⁴

¹ <http://www.itm-power.com/news-item/first-sale-of-power-to-gas-plant-in-germany/>

² <http://www.itm-power.com/project/ecoisland/>

³ http://www.iphe.net/events/workshops/workshop_2012-11.html

⁴ Schoenung, *Economic Analysis of Large-Scale Hydrogen Storage for Renewable Utility Applications*. Sandia National Laboratory, 2011

The National Renewable Energy Laboratory has examined the potential of storing large amounts of hydrogen in the natural gas pipeline system,⁵ and developed a lifecycle cost analysis of hydrogen versus other technologies for electrical energy storage.⁶

Companies in California are already putting hydrogen fuel-cell systems in place. In 2012, Toyota's U.S. headquarters in Torrance commissioned a 1.1MW hydrogen fuel-cell system for peak shaving during the summer months.⁷ Another key component of hydrogen-energy storage systems, the electrolyzer, is also being used in California at fueling stations in Arcata, Santa Monica, Riverside, Torrance, and in combination with solar electricity powers fuel cell buses at AC Transit's Emeryville station.

While PUC rulemaking R.10-12-007 is technology neutral, none of the scenarios or use cases developed in support of the rule making to date considers hydrogen energy storage. As the rulemaking will become the guideline for all California utilities, the CHBC encourages the PUC to adopt an all-inclusive approach.

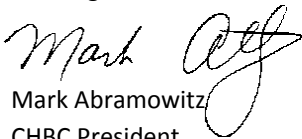
Hydrogen energy storage has many benefits, such as:

- Renewable energy integration – hydrogen can be produced via electrolysis from excess renewable energy sources such as wind during times of low electricity demand, thus:
 - Avoiding curtailing and intermittency issues
 - Offering service into the “dynamic frequency response” markets via dynamic electrolyzer load capabilities
 - Allowing for a higher penetration of renewable energy in California in support of its 33% renewable energy goal by 2020
 - Reducing the need to build high-voltage transmission lines
- Hydrogen can be stored in bulk quantities for comparatively low cost to battery technology and is not limited by the geographic considerations that limit pumped storage and compressed air as an energy carrier, hydrogen provides multiple uses , serving different needs:
 - Hydrogen can be converted to electricity via fuel cells within seconds or be stored for long periods of time without significant losses, and remain unaffected by external environmental conditions
 - Hydrogen can be used as a fuel for zero-emission fuel-cell electric vehicles, which are being rolled out in 2013-2017 time frame by most auto manufacturers

We urge the PUC to consider this promising technology among its scenarios and use cases, and we at the CHBC would be happy to assist in this effort.

We look forward to working with you and your staff to ensure the best possible energy solutions for California.

Best regards,


Mark Abramowitz
CHBC President

⁵ http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/blending_h2_nat_gas_pipeline.pdf

⁶ http://www.iphe.net/docs/Events/Seville_11-12/Workshop/Presentations/Session%203/3.1_IPHE%20workshop_Harrison.pdf

⁷ <http://www.ballard.com/about-ballard/newsroom/news-releases/news10171201.aspx>