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Comments of FuelCell Energy, Inc. on ARFVTP Investment Plan

Additional submitted attachment is included below.

FuelCell Energy
Ultra-Clean, Efficient, Reliable Power

In the Matter of: 2016-2017 Investment Plan Update	Docket No. 15-ALT-01 RE: Alternative and Renewable Fuel and Vehicle Technology Program

January 23, 2016

Commissioner Janea A. Scott
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Dear Commissioner Scott and California Energy Commission Staff,

FuelCell Energy, Inc. (FCE) is pleased to provide these comments to the California Energy Commission (CEC) in response to the 2016- 2017 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP).

I. Introduction

FCE is a global leader in the design, manufacture, operation and service of ultra-clean, efficient and reliable fuel cell power plants. We have pioneered a number of emerging fuel cell applications, including hydrogen co-production fuel cells that produce distributed hydrogen for use in mobile applications. In January 2016, FCE received contingent certification for a prospective pathway for its renewable hydrogen generation solution using fuel cells at wastewater treatment facilities under the Low Carbon Fuel Standard (LCFS), administered by the California Air Resources Board (CARB).

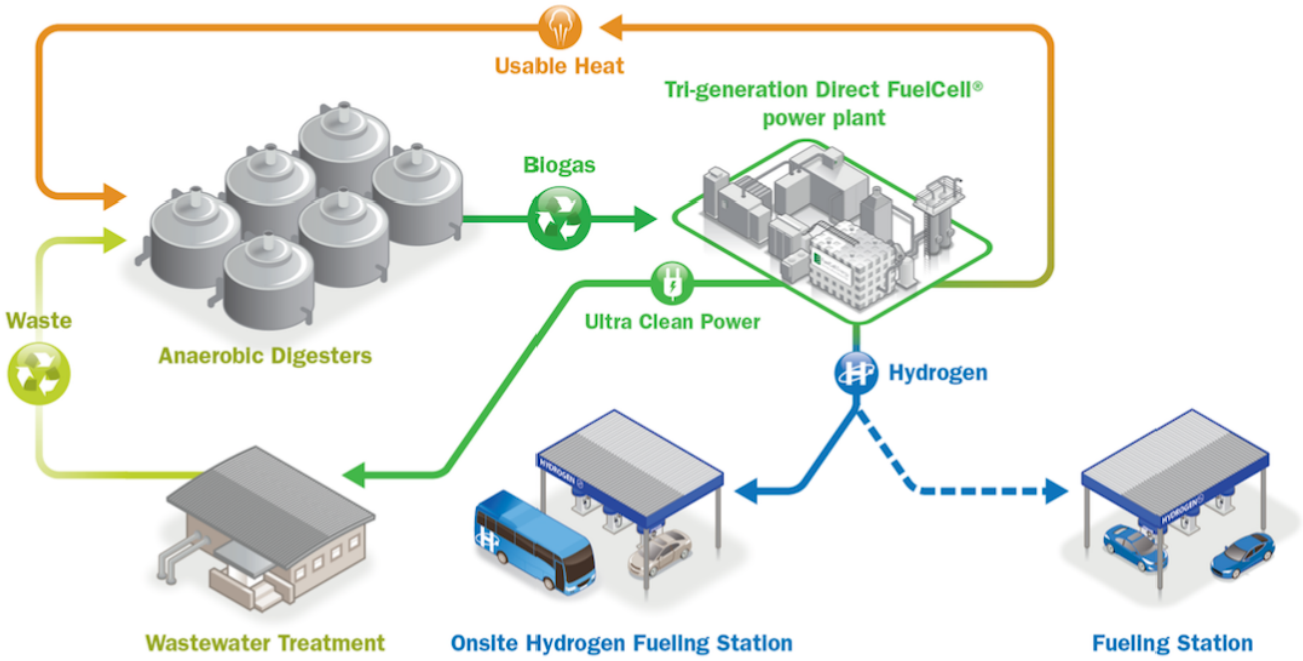
FCE is hopeful that the ARFVTP can be a catalyst for renewable hydrogen production. California Senate Bill 1505 requires that at least a third of all hydrogen for FCEVs dispensed in publicly funded stations come from eligible renewable resources.[1] In addition, CARB recently increased its projection of California fuel cell electric vehicles (FCEV) to 34,300 by 2021.[2] Accordingly, we request the ARFVTP 2016-2017 Investment Plan provide the flexibility for renewable hydrogen production to qualify under the general category of "Alternative Fuel Production and Supply" as well as under the "Emerging Opportunities" category.

II. Renewable Hydrogen Co-Production from Fuel Cells

[1] Senate Bill 1505 (Lowenthal, Chapter 877, Statutes of 2006).
[2] 2015 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development, available at http://www.arb.ca.gov/msprog/zevprog/ab8/ab8_report_2015.pdf, Page 6.

When fueled with methane-rich gas derived from an eligible renewable source, in Hydrogen Co-Production mode our fuel cells produce renewable: 1) electricity, 2) usable heat, and 3) purified hydrogen. Purified hydrogen is stored and can be used as transportation fuel for FCEVs. With a hydrogen co-production fuel cell system, purified hydrogen is only generated when it is needed. Otherwise, the hydrogen is used internally, and the system continuously produces heat and electricity, thereby leveraging all of the capital that is invested in the plant and helping to mitigate potential stranded capital issues.

FCE's hydrogen-co-production system generates approximately 1,200 kilogram per day of hydrogen, which is adequate to service approximately 300 cars/day or 50 buses/day. Simultaneous with the hydrogen production is the generation of 2 megawatts of electric power and 2 million Btu's of thermal energy. Hydrogen production results in a modest reduction of electrical output in the tri-generation configuration compared to the power/heat-only configuration. The below figure provides an overview of how the system operates.



Hydrogen co-production fuel cells can provide an infrastructure bridge for hydrogen FCEV rollout. The Governor's office, CEC, and CARB have all made hydrogen infrastructure a key priority for meeting the state's zero emission vehicle goals. Early deployment presents a challenge to the hydrogen FCEV industry because station investment often needs to come before vehicle demand. Auto manufacturers from around the world have announced plans to commercialize FCEVs and have called for increased investment in refueling infrastructure. As previously noted, Senate Bill 1505 requires that at least a third of all hydrogen for FCEVs come from eligible renewable resources.

Hydrogen co-production fuel cells can provide a local, renewable, cost-effective, and efficient solution for distributed hydrogen production for FCEVs. FCE launched the first hydrogen co-production fuel cell system in Fountain Valley, California, at an Orange County Sanitation District water resource recovery facility. This system used renewable biogas from an anaerobic digester to

produce electricity, heat, and purified hydrogen for a FCEV refueling station. We developed this three-year pilot project in partnership with the U.S. Department of Energy, CEC, CARB, South Coast Air Quality Management District, and a variety of others.

FCE is actively exploring commercial multi-megawatt hydrogen co-production fuel cell systems with a variety of California water resource recovery facilities and other biogas producers, such as dairies and organic waste facilities, with a goal of providing 5,000 kilograms of renewable distributed hydrogen for California's growing fleet of FCEVs by 2021. Dairies are a excellent target for hydrogen-co production CHP fuel cells, particularly given CARB's desire to capture and productively reuse more dairy methane that is currently being vented into the atmosphere. Such projects dramatically reduce GHG emissions.

Most recently, CARB's team performed a complete life cycle analysis on the hydrogen co-production fuel cell system and determined that it has a negative carbon footprint, as the power and hydrogen generation process is net carbon-neutral due to the use of renewable biogas, and is a cleaner use of the biogas compared to alternatives. Overall, the hydrogen co-production system has been determined to be a negative carbon emitter; this is a superior result in comparison to other hydrogen generation technologies such as electrolysis or traditional steam reforming.

While the LCFS program is focused on carbon emissions, it is also notable that our hydrogen co-production solution produces hydrogen without using water, which is consumed in both electrolysis and conventional steam methane reforming. Our system uses waste heat and water byproducts produced by the fuel cell during power generation to make hydrogen efficiently and without the need for external water consumption, which is increasingly a concern in certain regions, including California.

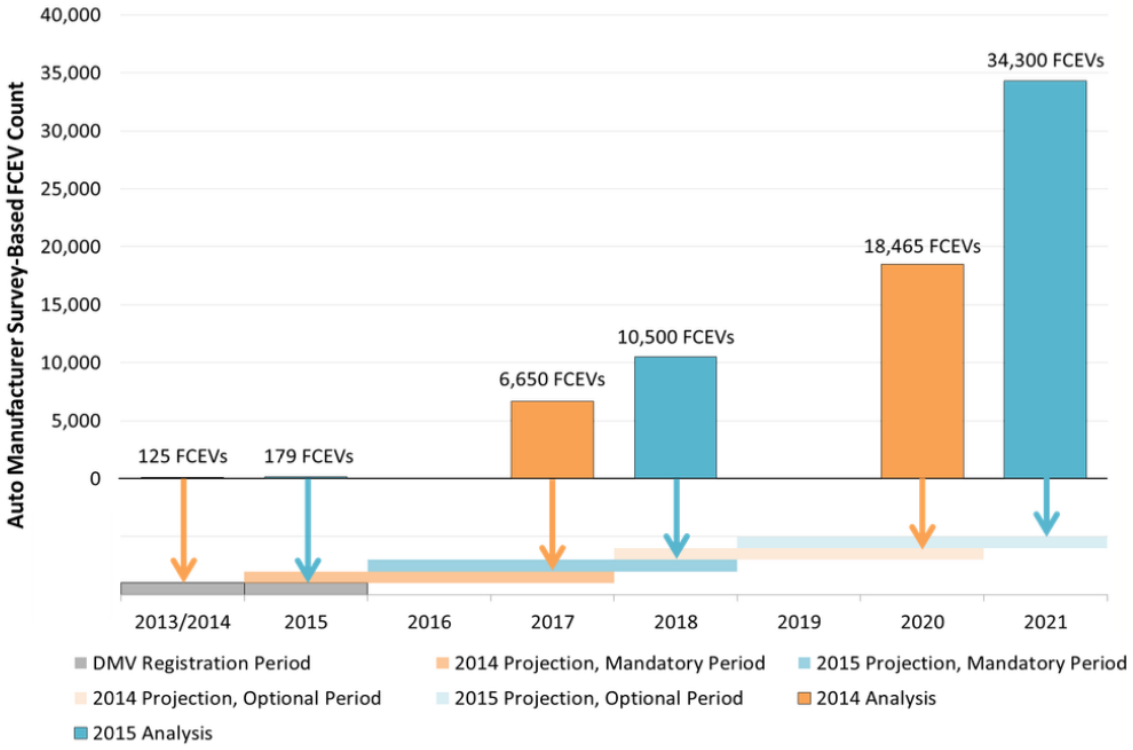
III. Growth of FCEV Market Justifies Hydrogen Inclusion in Alternative Fuel Production Category

The FCEV market is expected to grow rapidly. Both Hyundai and Toyota have FCEV's commercially available today. Many other automobile manufacturers have announced plans for commercially launching FCEV's including General Motors, BMW, Honda, Audi and Mercedes. Providing renewable hydrogen for fuel cell buses and material handling are also potential markets. According to CARB:[3]

- Auto manufacturer projections indicate that California's FCEV fleet will grow to 10,500 by the end of 2018 and 34,300 by the end of 2021, representing a near doubling from the previously reported projections of 18,465 FCEVs in 2020.
- A total of 51 currently funded and operational FCEV stations will be available by the end of 2016. These 51 stations will have a fueling capacity of 9,400 kilograms per day, equivalent to an expected demand of approximately 13,500 FCEVs.
- The 2015 auto manufacturer survey results suggest the FCEV market may grow faster than previously projected based on the 2014 survey. As a result, currently funded stations will support hydrogen demand of California's FCEV fleet out to 2018. After 2018, the number of vehicles expected to be on the road may need more fuel than can be provided by the number

[3] [3]2015 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development, available at http://www.arb.ca.gov/msprog/zevprog/ab8/ab8_report_2015.pdf, Page 4.

of hydrogen stations that can be built with currently available public funding, assuming funding levels and station capacity remain unchanged.



- CARB's analysis finds that the full $20 million annual allocation (for FY 2016/17) available from ARFVTP funding is necessary to support additional hydrogen stations. Innovative approaches to utilize this funding could help meet projected accelerating demand for hydrogen fuel from a growing FCEV fleet.

FCE believes that in addition to funding for hydrogen stations, ARFVTP should prioritize renewable hydrogen production as required by Senate Bill 1505. Accordingly, we recommend greater flexibility for renewable hydrogen production in the budget allocation for the "Alternative Fuel Production and Supply" category, in addition to the "Emerging Opportunities" category.

IV. Conclusion

FCE greatly appreciates the opportunity to make these comments and the thoughtful consideration of the CEC.

Respectfully submitted,

Mike Levin
FuelCell Energy, Inc.
Telephone: 949-231-0111
Email: mlevin@fce.com