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FuelCell Energy Inc Comments on 20-IEPR-04 Related to Microgrids

Additional submitted attachment is included below.

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July 30, 2020

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 20-IEPR-04
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: IEPR Commissioner Workshop on Assessing the Future Role of Microgrids in California: Docket Number 20-IEPR-04

In response to the July 7 and July 9, 2020 California Energy Commission (CEC), California Independent System Operator (CAISO) and California Public Utilities Commission (CPUC) Commissioner Workshops on Assessing the Future Role of Microgrids in California, FuelCell Energy, Inc. (FCE) respectfully submits these comments for consideration.

I. Value Statement

Because FCE fuel cell systems generate continuous power without combustion and without criteria pollutants and air toxics emissions while maintaining the resiliency and reliability of local grid operation, these fuel cells should be a critical and preferred resource for California to address power shutoffs and grid unreliability both in front of and behind the meter. Additionally, given the disproportionate negative impact that criteria air pollution and power shutoffs have on disadvantaged communities in this state, we urge the Commission to consider our fuel cells as a technology that directly mitigates those significant harms.

II. Introduction

FCE is a global leader in the stationary fuel cell market, providing affordable and clean onsite energy, 24/7 at sites including wastewater treatment plants, hospitals, universities, industrial facilities and serving utilities including at substations. FCE has been a participant for many years in California's clean energy programs and has made meaningful contributions to meeting California's emissions reduction, microgrid and biofuel goals. FCE fuel cells are a clean, reliable "energy platform" that produce power and can deliver solutions with additional features such as biogas clean-up, heat recovery for combined heat and power (CHP) and vehicle quality hydrogen for zero-emissions fuel. FCE fuel cell platforms are currently deployed throughout the state of California, including at sites located within disadvantaged communities.

With more than 10 million megawatt hours of clean electricity produced, FuelCell Energy is a leader in delivering environmentally-responsible distributed power solutions through our proprietary, carbonate fuel cell platforms. Today, we develop turn-key distributed power generation solutions and operate and provide comprehensive service for the life of the power plant. Our fuel cell platform is a clean, efficient alternative to traditional combustion-based power generation and is complementary to an energy mix like California's consisting of intermittent sources of energy, such as solar and wind.

III. Advantages of Microgrids with Fuel Cells

For decades, the United States flirted with the idea of microgrids, but largely confined them to college campuses. After September 11th, the heightened need for energy security and resiliency at military and governmental facilities stimulated advancements in microgrid planning.

In 2012, Superstorm Sandy jolted the nation into understanding the fragility of its centralized power grid and the value of distributed energy, accelerating implementation and development. The rapid emergence of microgrids parallels federal, state and societal goals to replace traditional generation with cleaner resources, without diminishing reliability. Long distance transmission of power is especially susceptible to interruption and extreme weather events. Power interruptions in California over the last few years have wreaked havoc on businesses and residents, costing millions of dollars and in some cases the lives of Californians. Finding viable, reliable, and cost-effective strategies to mitigate these shut offs is rightfully a top priority for the state.

A microgrid may have several sources of generation, some of them intermittent or short-lived, such as solar energy or battery storage. The fuel cell, on the other hand, can run continuously 24 hours a day, seven days a week, 365 days a year. Logically, diversified and well organized microgrids have emerged as potential short-term and long-term solutions to resolving a lack of reliability in the electric grid.

One of the critical ways in which fuel cells are important to the success of microgrids is the ability to create continuous and reliable power for customers behind the meter and for utilities at the substation level, easily sited right where the power is needed most. A microgrid featuring a fuel cell can immediately disconnect itself from the broader macrogrid and operate completely islanded without interruption. When connected to California's robust gas delivery system or in some cases a significant local resource such as biogas from a wastewater treatment plant, a fuel cell installation can seamlessly deliver power to the end user without interruption and maintain that delivery until broader grid power is returned. The inherent ability of FCE platforms to switch from grid connected to grid independent and back to grid connected mode enhances the operational reliability of critical facilities and businesses. This standard capability

allows FCE sites to be configured as a continuous power supply for any facility.

Additionally, fuel cells provide valuable grid stabilizing services that help manage energy systems, including ones that might have multiple distributed resources or fluctuations in supply. Fuel cells act as a kind of backbone that the microgrid can rely on as it configures its various energy resources, including power from the central grid. With this backbone intact, the advanced microgrid controller multi-tasks, figuring out which resources to use at any given moment. It makes these decisions based on the goals set by the microgrid controller. The goal may be cost-effectiveness, reliability, environmental performance or another parameter the operator prioritizes.

Some fuel cells systems are grid connected and can be dispatched to assume backup power load requirements instead of or in addition to the on-site load requirements where they are connected behind-the-meter. Furthermore, the nature of fuel cell continuous power also confers benefits to the grid, and certainly to a microgrid, in the form of grid services like frequency support, voltage support, and reactive power and are certified to do so. Fuel cells also reduce greenhouse gas emissions and can achieve zero-carbon emissions when fueled by biogas or renewable hydrogen.

FCE fuel cell platforms are easily sited and installed in urban environments where space is limited and are generally exempt from emissions permitting. Fuel cells efficiently occupy small footprints to produce power onsite, reducing

Figure 1: FuelCell Energy Inc 1.4MW system provides on-site power within a confined urban configuration

transmission loss and costs and easing access for inspection, monitoring, and maintenance. FCE's systems also operate quietly without disturbing the communities, businesses, or facilities around them.

As a non-combustion generation technology, fuel cells can be paired with storage, wind, solar, demand response, battery storage or other technologies, in order to integrate numerous distributed energy resources and controls to create a diverse, clean, and reliable microgrid. In this way, fuel cells have played and can continue to play an important role in helping California keep reliable continuous power connected to the California electric grid while achieving the state's ambitious GHG and criteria pollutant reduction goals.

IV. Fuel Cells Should be California's Preferred Energy Resource to mitigate the impacts of Public Safety Power Shutoffs

With the current focus on public safety power shutoffs ("PSPS") and challenges with power reliability during times of grid shutdown, FCE can offer a clean alternative to traditional backup power provided by diesel generators and gas turbines that also results in energy savings, emissions reductions, and continuous power. Furthermore, onsite generation and microgrid applications significantly reduce the risk and devastation associated with high voltage power lines across California.

Multiple articles and news reports during the 2019 fire season focused on microgrids that kept the power on when the grid was shut down. In one article showcasing the CEC's significant investment in microgrids, two of four microgrid installations highlighted in the article are

powered by FuelCell Energy fuel cells.[1]

The use of diesel backup generators is rightfully problematic for many stakeholders. These diesel generators are dirty, less efficient, and should be nobody's first choice for electricity. Diesel generators are often placed in areas already suffering from high pollution burdens where they then pump more particulate air pollution into the air. These communities are hit with a double jeopardy of unreliable electricity and further increased localized pollution. The multilayered inequity in the deployment of these diesel generators is significant and cannot be disregarded.

As California looks for options to provide resilient local power sources that can ride through grid outages without adding to the local air pollution burden, fuel cells are plainly superior options to conventional diesel generators.

Not only can FCE fuel cells provide power in place of those diesel generators, but FCE fuel cells do not create the pollution, noise, and intermittence that diesel does. The California Air Resources Board (CARB) estimated the NOx and PM increases due to the additional generators operating during the month of October 2019 during PSPS.[2] The CARB staff assessment assumed only 50 hours of operation per generator during month of October 2019, with the resulting estimated excess emissions from the use of generators summarized in the table below.

[1] See It's Dark in California but the Message is Clear: More Microgrids Needed https://microgridknowledge.com/microgrids-california-power-outages/, which spotlights FCE's installations at The University of California San Diego and the Santa Rita Jail.
[2] https://ww2.arb.ca.gov/resources/documents/emissions-impact-generator-usage-during-psps

Table 1

		NOx (tons)	PM (tons)	Diesel PM (tons)	Additional Generators Running in PSPS
Portable	Gasoline Less than 25 hp	24.3	10.6		122,000
	Diesel Above 25 hp Non-Rental	7.3	0.3	0.3	381
	Diesel Above 25 hp Rental	9.1	0.3	0.3	582
Permitted Stationary Back-Up Generators (Assuming 30% Load Factor)		125.7	8.3	8.3	1,810
Non-Permitted Generators		N/A	N/A	N/A	N/A
Total		166.4	19.4	8.9	124,774

These excess emissions can be avoided and prevented by including fuel cells as the backbone generation technology for microgrids carrying substation loads and local distributed loads. For comparison purposes, the table below shows the percent reduction and the calculated resulting NOx and PM emissions if fuel cells were assumed to carry the same load during the October 2019 PSPS as the additional generators estimated by the CARB staff. Fuel cells also emit negligible and near-zero SOx.[3]

Table 2

	NOx (tons)	PM (tons)	Diesel PM
FuelCell Energy Power Platform Percentage Reduction over Gasoline and Diesel Generators	99.9%	99.9%	99.9%
FuelCell Energy Power Platform Equivalent Emissions for Assumed Load Same as ARB Staff Estimates	0.200	0.0008	0.0006

FCE fuel cell platforms deliver air quality benefits now, which means fewer Californians

[3] Figure assumes diesel generator emissions are an average of Tier 2 and Tier 3 emissions from SCAQMD certified ICE list (http://www.aqmd.gov/home/programs/business/business-detail?title=certified-equipment&parent=certified-products)

breathing NOx, SOx, and PM 2.5 this year, next year, and not just in 10 or 15 years when we must meet our environmental targets. Wide deployment only expands the level of benefit.

Lastly, in a time when PSPS events are happening every year, the need to quickly deploy reliable and permanent distributed generation technology to communities across California to prevent outages and air pollution is exceedingly important. FCE's ability to easily structure project financing significantly simplifies the microgrid deployment conversation. FCE's capacity to bring financing solutions offers public entities and utilities the up-front capital to assure installations are operational as quickly as possible, creating reliability and environmental benefits as immediately as possible. As this state and its local public agencies enter a prolonged period of economic uncertainty brought on by the COVID-19 pandemic, the ability for FCE to provide project financing and expedient project delivery should not be discounted as policymakers consider clean energy projects that create tangible near-term air quality benefits. Unlike some intermittent renewable resources, fuel cells are very easy to site in dense urban areas, connecting directly to the local distribution system and providing clean power right in the heart of the community where it is needed most.

V. Current Examples of Microgrids with Fuel Cells

FCE has facilities serving or owned by some of the largest utilities and independent power producers in the world, including, Avangrid, Eversource, Clearway Energy, AEP OnSite Partners, Southern California Edison, and PG&E in North America, EON Connecting Energies in Europe. Utility installations include power purchase agreement (PPA) structures supplying the grid, as well as utility-owned fuel cell plants located near existing substations. These include a

20 megawatt fuel cell park in South Korea owned by Korea Southern Power Company and a 15 megawatt (MW) fuel cell park in the northeastern U.S.

In California, FCE installed a 2.8MW fuel cell platform at the University of California, San Diego campus in La Jolla that has been operating since 2011 on the microgrid there. The system uses biomethane by pipeline from the Point Loma Wastewater Treatment Plant. A combined heat and power system, the fuel cell provides chilling to campus buildings and supplies the campus with continuous power during grid outages and is synchronized with gas turbines, solar arrays and battery-based energy storage onsite.

Figure 2: FCE SureSource 3000 system at UCSD campus in La Jolla

In Woodbridge, Connecticut, a 2.2MW SureSource 3000 serves both the Town of Woodbridge and Amity Regional High School through a microgrid. During power outages, the fuel cell microgrid is designed to island itself and serve seven critical buildings spread out over a half mile expanse. These buildings comprise a town hall, library, fire station, public works facility, senior center, and emergency facility. When not islanded, the fuel cell supplies the regional grid. In addition to supplying power, the fuel cell microgrid also acts as a heat source for the high school.

Currently under construction at the Naval Submarine base in Groton, Connecticut is a 7.4MW fuel cell power plant that will serve as the backbone of a microgrid designed to provide the base with an uninterrupted power supply during times of grid outage.

While not operating on a microgrid, Riverside Regional Water Quality Control Plant uses

an FCE fuel cell to generate renewable electricity directly from the biomethane created onsite at the treatment plant. In the past, when this biomethane has had no useful outlet, it has been flared or vented directly into the air, right in the heart of the disadvantaged communities surrounding the facility. In Riverside, our fuel cell is actively reducing emissions and, importantly, preventing criteria emissions and smog from ever being emitted into those communities. Later this year, we expect to be fully operational at a similar facility in San Bernardino where an FCE fuel cell will be capturing biomethane, producing clean energy, and preventing enormous amounts of criteria pollution, greenhouse gases, and short-lived climate pollutants from ever being emitted.

VI. Policy Considerations for Reducing Regulatory Barriers that Inhibit the Successful Deployment of Fuel Cells for Microgrids in California

California policymakers have a strong record of recognizing market and societal change and adapting policy to incentivize new technology. Many of the policies that advanced the deployment of fuel cells remain critical to enabling advancement of microgrids. These policies should be revisited not just in the context of fuel cells, but in the broader context of how they enable the combined benefit of clean fuel cell resources and microgrids. The IEPR should recommend addressing and re-evaluating non-bypassable charges for departing load customers, reducing standby charges, and making the interconnection of multiple technologies to a microgrid feasible through a simplified process.

Even when electric service is partially or totally discontinued, customer generation departing loads are hit with utility non-bypassable charges. However, under the existing net energy metering tariff, customers using qualifying fuel cell systems for electric generation are exempt from non-bypassable charges. However, the net energy metering standard established by

CARB for adoption is overly restrictive and will inhibit the proliferation of fuel cell microgrid installations, paradoxically incentivizing the use of dirtier back up diesel generators. FCE thinks that any utility microgrid tariffs should exempt customers using CARB DG-certified generation from non-bypassable charges. Californians are paying a high social and environmental price for PSPS events and their reliance on a macrogrid that faces significant annual threats. We should be lowering the financial cost of implementing solutions that alleviate this price to Californians.

Additionally, a streamlined interconnection process for microgrid services is essential to address PSPS events. We have the technology to make meaningful improvements to our grid to avoid much of the pain and pollution that PSPS events inflict. We just need to implement a faster process to get those generation technologies up and running.

We want to reiterate that fuel cells can be an important part of the solution to provide grid reliability and services, to improve local air quality, and to reduce greenhouse gas emissions in California and particularly in disadvantaged communities.

VII. Conclusion

FCE appreciates the opportunity to comment on the 2020 IEPR Commissioner Workshop on Assessing the Future Role of Microgrids in California. We recommend that the CEC consider the operational advantages that fuel cells bring to microgrids and the environmental benefits that non-combustion technology affords. The CEC should highlight the use of fuel cell systems as part of the recommended strategy for making microgrids ubiquitous in California. FCE also respectfully recommends the CEC address regulatory and financial barriers that inhibit the use of these systems in California. The IEPR should prioritize technologies like fuel cells that reduce

air pollutants and increase resiliency, both of which directly and positively impact all Californians, and particularly those in disadvantaged communities.

Sincerely,

/s/

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