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California Public Utilities Commission
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Submitted electronically to: customerchoice@cpuc.ca.gov

**RE: National Fuel Cell Research Center Comments on the California Customer Choice Draft Green Book**

The National Fuel Cell Research Center ("NFCRC") appreciates the opportunity to respond to the request for Informal Comments and Recommended Solutions on the California Customer Choice Draft Green Book ("Green Book") issued by the California Public Utilities Commission (CPUC) on May 3, 2018.

The NFCRC facilitates and accelerates the development and deployment of fuel cell technology and fuel cell systems; promotes strategic alliances to address the market challenges associated with the installation and integration of fuel cell systems; and educates and develops resources for the various stakeholders in the fuel cell community.

The NFCRC encourages the CPUC to take a holistic approach to Customer Choice on an energy system level. To date, California, through legislation and regulation, has created a prescriptive energy system that directs technologies and resources to be used to achieve its energy and environmental goals. To ensure the move to a cleaner, more resilient and flexible grid, and to encourage disaggregated local providers to do the same, California must consider diverse future sources of clean power, heat and fuel as an integrated system.

**Comments on Topics of Primary Interest to the NFCRC**

## A. Grid Safety and Cybersecurity

- ***Can California provide investment and operational certainty to address reliability and resiliency, especially in the face of catastrophic events that impact the electric sector, such as the 2017 wildfires?***
    - ***With so many decision-makers entering into the market to provide electrical supply, how do we ensure coordination to provide all the energy needs for reliability purposes?***
    - ***Who will provide backstop procurement for resource adequacy if there are shortages of power needs identified in planning and a disaggregated set of electricity purchasers cannot fill the need?***
    - ***Who will coordinate supply and operations during local events where resources must come from outside the region? What is the responsibility of non-utility electricity suppliers to help meet unexpected contingencies?***
    - ***What role do non-utility providers play to ensure adequate responses to catastrophic and emergency events?***

**A1. Issue: What role do non-utility providers play to ensure adequate responses to catastrophic and emergency events?**

**A2. Recommended Solution:**

**The CPUC, in collaboration with the ISO, should determine how best to create mechanisms through market-based products or tariffs that will compensate entities that enhance resiliency through investment in capabilities such as the ability to island from the grid during a catastrophic or emergency event. Mechanisms should also be created to permit the exchange of energy and perhaps other energy services among self-generators and microgrid operators.** Such mechanisms would help to ensure that the inherent resiliency advantages of distributed resources, is realized through investment in such resources. The customer choice framework must also eventually allow for the "wheeling" of power. While the Green Book considers net energy metering, a flexible customer approach where entities buy and sell energy and related products and services is needed to facilitate the ability of individual agents on the macrogrid and on microgrids to manage their supply, demand and power quality.

## B. Decarbonization goals: IRP and its relationship to the Renewables Portfolio Standard

- ***How does California continue its course as a global leader in achieving deep decarbonization as regulated utilities provide electricity to fewer Californians?***
    - ***Does there need to be a single entity for policy target setting, implementation, oversight and enforcement?***

- ***How can California continue to support innovation and provide financing for scaling up new technologies?***
- ***What is needed reduce the use of fossil fuels such as natural gas, which is used not just for electric power, but also for industry and in homes and buildings?***
- ***How are the utilities compensated for providing the essential infrastructure to achieve these policies?***

**B1. Issue: Enforcement of decarbonization in a distributed energy system.**

**B2. Recommend Solution and Course of Action:**

To date, overall decarbonization policy has been driven by legislation and implemented by the California Air Resources Board (ARB) and other agencies. To the extent sources of greenhouse gas (GHG) emissions migrate from being under public utility control to other market participants, the **ARB should determine the regulations needed to keep the associated emissions under the GHG cap. Broadening the Cap and Trade program and equipment performance standards are two approaches to consider**. Oversight and enforcement should be led by a single entity and implemented at a local level. The NFCRC affirms the recognition that in order to maintain the reliability of the electric system while integrating increasing amounts of renewable energy for decarbonization, key technologies are required, examples of which are electric batteries, hydrogen, and clean 24/7 load-following fuel cell power generation, capable of eventually operating on renewable hydrogen.

**B3. Issue: California needs to provide support and financing for innovative new technologies.**

**B3. Recommend Solution and Course of Action:**

**Support for developing and deploying innovative technologies is an excellent use of Cap and Trade revenues. In deploying those funds, the state should take an integrated and holistic system view to address the rapidly converging energy and transportation sectors.** The NFCRC requests that California regulators look beyond pure electrification (solar, batteries and battery-electric vehicles) and instead embrace a more comprehensive energy vision. That vision should include both renewable fuel for a spectrum of energy and transportation applications for which it is well-suited, and microgrids as a key building block of the future energy system. Hydrogen produced from renewable electric or organic feedstock will play a key

role in the future of the merged energy and transportation sectors. Additionally, electrolytic hydrogen can serve as a critical long-duration storage resource at the terawatt scale. Current PUC policy has yet to recognize the reality of this potential. Presently, storage procurement regulations exclude hydrogen energy storage, and retail electric rates applied to this essentially wholesale resource create a dramatic barrier to deployment. Changing these policies will dramatically support cleaner energy for California.

Microgrids also create value on multiple levels as a complete system beyond their individual components of fuel cell generation, loads, controls, monitoring, and intermittent solar resources, and should therefore be incorporated into the resource planning processes of all service providers. As California moves into the future, incentives for individual technologies will give way to a need for system-wide valuation of services provided by generation sources. Compensation mechanisms will be needed for systems that can deliver backup power within a service territory, as well as the ability to island from the grid where relevant.

**B4. Issue: The use of fossil fuels needs to be reduced, beyond use for electric power.**

**B4. Recommend Solution and Course of Action: Support clean combined heat and power, the replacement of diesel generators, as well as renewable fuel generation, through long-term tariffs and removal of irrelevant regulatory barriers.**

A number of customer energy needs are difficult to serve with "pure" electric solutions. For a holistic approach to decarbonize the distributed energy system, the production of electric power, heat and transportation fuels should be considered. These and the use of natural gas in particular, must be addressed by first maximizing the use of fuel that is consumed and, over time, replaced with renewable hydrogen and methane. To reduce the use of fossil fuels in industry and in homes and buildings, a diverse portfolio of technologies is needed. Clean, non-combustion combined cooling, heat, and power technologies offer dramatic reductions in GHG. Rather than seeking to identify one-time grant funding, the NFCRC recommends supporting tariffs that facilitate the use of onsite clean and efficient energy generation and replicating these tariffs across the State. Additional regulatory barriers, such as standby charges, should also be addressed. Combined cooling, heat, and power programs should identify fuel cells as the cleanest, most efficient method to produce on-site heat and power.

In addition to generating electrical power, stationary fuel cells have the capability to cogenerate a thermal product. This option, referred to as Combined Cooling, Heat, and Power (CCHP), is to capture and utilize the heat produced by the fuel cell for the provision of cooling, heat, hot water, or steam. This results in overall fuel cell system efficiencies (electrical power generation and use of the captured thermal energy) ranging from 55% to 80% and, with a judicious design, exceeding 90%. This attribute also displaces the fuel and emissions that would otherwise be associated with (1) boilers when using the thermal energy as heat, and (2) the displaced electricity to drive chillers when using the thermal energy for cooling. The resultant effect is to substantially reduce CO2 emissions, criteria pollutant emissions, and the demand on fuel reserves. In contrast to combustion heat engines, fuel cells are unique in providing high fuel-to-electricity efficiency and high quality (i.e., high temperature) heat, as well as producing virtually zero emission of criteria pollutants.

The 2012 Clean Energy Jobs Plan set an ambitious target of 6,500 MW for combined cooling, heat, and power deployment in California over twenty years. Advances in technology will increase the economic potential for CCHP at smaller size levels. The CPUC should take stronger action to remove barriers to CCHP deployment through the development of utility tariffs that are more favorable to self-generation and microgrids.

Additionally, California should look beyond decarbonization and further reduce the use of fossil fuels locally by expanding the efforts initiated in AB 617. Similar to comments submitted on the Customer Choice workshop in November 2017, the NFCRC emphasizes the additional consideration of air quality in distributed and integrated resource planning and power generation. California has current programs, such as the Self Generation Incentive Program and net metering that value the reduction of greenhouse gas emissions in determining eligibility for incentives. While criteria air pollutant reduction is measured, it is not a fundamental requirement, which decreases the value of such distributed energy resources in these programs. As energy sources become more distributed and operate at a local level, the expansion of AB 617 could create new policy that provides oversight and requires new local sources to meet air pollution emission limits and appropriately value the reduction of criteria air pollutants.

Expanded self-generation from onsite or decentralized clean energy sources will allow local energy systems to be developed that address current emissions from industrial and commercial customers. Many of these current local sources are combustion-based CCHP and

diesel generators used by commercial and industrial customers. The air districts currently have the responsibility of oversight and permitting of these stationary sources, and many of the districts already waive permits for clean and non-combustion power sources such as fuel cell systems in support of reducing the use of fossil fuel for industrial, commercial and residential power and heat at a local level. Beyond the existing waiver of permitting requirements for fuel cell systems, the California Air Districts should incentivize the replacement of diesel backup generators with fuel cells. Recognizing the superior co-benefits of fuel cells, a program can be created to both limit new permitting of diesel generators for primary generation, and to provide an option to use fuel cell systems instead of diesel generators for onsite and backup power.

Also, because the greatest current source of air pollution is transportation, the production and use of transportation fuel in the energy system should be taken in to account. Customer Choice should create a future energy system that maximizes the co-production of power, heat and fuel at decentralized, local facilities to minimize the need for transmission, distribution and transportation.

Sincerely,

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