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National Fuel Cell Research Center Comments on Docket No 21-IEPR-01 Volume III

Additional submitted attachment is included below.

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VIA ELECTRONIC FILING

California Energy Commission
Docket Unit, MS-4
Docket No. 20-IEPR-01
715 P Street
Sacramento, CA 95814-5512

Subject: Draft 2021 Integrated Energy Policy Report, Volume III: Decarbonizing the State's Gas System

The National Fuel Cell Research Center (NFCRC) submits these comments in response to the Notice of Availability and Request for Comments on the Draft 2021 Integrated Energy Policy Report (Draft IEPR), Volume III: Decarbonizing the State's Gas System released on January 13, 2022.

I. Introduction

The NFCRC facilitates and accelerates the development and deployment of fuel cell technology and 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 power and energy storage sectors. The NFCRC was established in 1998 at the University of California, Irvine by the U.S. Department of Energy and the California Energy Commission (Commission) in order to develop advanced sources of power generation, transportation and fuels and has overseen and reviewed thousands of commercial fuel cell applications.

II. Comments on the Draft 2021 Integrated Energy Policy Report, Volume III: Decarbonizing the State's Gas System

The NFCRC appreciates the Commission's attempt to include renewable gas and hydrogen in the 2021 Draft IEPR Volume III. The NFCRC would like to offer recommendations for greater acknowledgment of commercial hydrogen and fuel cell systems being used in other jurisdictions for firm power to balance renewables and produce more resilient electric generation.

Overall, the NFCRC recommends a definitive inclusion of renewable hydrogen and fuel cell systems to ensure greater emissions reduction in all sectors, while adding desperately needed reliability, resilience, and grid services. Non-combustion use of hydrogen in fuel cell systems should play a greater role, as an end use that avoids criteria air pollutant and greenhouse gas emissions.

A. *Chapter 4: Opportunities for Renewable Gas and Renewable Hydrogen*

a. Hydrogen Production

Consistent with federal policy, the NFCRC would like to highlight the use of a carbon intensity standard[1] for clean hydrogen production to ensure accurate and consistent measurement of carbon emissions reductions. **The Commission should discontinue use of the subjective "colors" of hydrogen (i.e. grey, blue, green) and focus instead on the technical and objective carbon intensity standard, especially when deciding on investment strategies to meet SB 100 objectives, and the IEPR should reflect this recommendation.**

b. Uses of Hydrogen

The Draft IEPR, Volume III discusses *Uses of Hydrogen* for energy and electricity production.[2] Fuel cells are required for non-combustion, non-emitting end uses of hydrogen. **The IEPR should acknowledge that 1) commercial load-following fuel cell systems are capable of demand response and addressing capacity shortfalls;**

[1] H.R. 2684 SEC. 40315. CLEAN HYDROGEN PRODUCTION QUALIFICATIONS. Available at congress.gov: H.R.3684 - 117th Congress (2021-2022): Infrastructure Investment and Jobs Act | Congress.gov | Library of Congress

[2] Draft IEPR Volume III at 69.

and 2) fuel cell systems can be called on to ramp up and provide peak power, directly offsetting locational marginal emissions that are created during peak load events. For reliability purposes, California also requires local generation (DER) to address peak load issues currently addressed by diesel combustion generators (both peaking plants and backup diesel generators). Diesel generators have a disproportionate impact in non-attainment zones and disadvantaged communities. Fuel cell systems are replacing diesel generators for both primary and backup power around the U.S., and in Japan, Korea, China, and most of Europe.

c. Electric Generation

The *Electric Generation* section of the Draft Future of Renewable Hydrogen discussion[3] should include non-combustion use of hydrogen in fuel cells systems. It is somewhat misleading to focus this section on combustion of hydrogen with large turbines. Both gas turbine combined cycle plants and fuel cells can be used over time to reduce both air quality pollutants and greenhouse gas emissions.

Larger hydrogen fuel cell systems are operating around the world today and leading the transition to zero-emission fuel cell systems. **The NFCRC recommends adding the following example of an operational non-combustion fuel cell system for power generation to the paragraph discussing larger hydrogen fuel cells**:

> The Daesan Green Energy Fuel Cell Power Plant is a joint venture between Korea East-West Power, Hanwha Energy and Doosan. The fuel cell system captures and uses byproduct hydrogen from a chemical plant to operate a zero-emission 50.2 MW fuel cell system, providing 400,000 MWh of annual firm zero emissions electricity to the Korean grid.[4]

B. *Chapter 5: Decarbonization and Gas System Planning*

1. Decarbonization Through Building Electrification and Gas System Implications from Building Decarbonization

Building electrification is an important component of California's efforts to reduce carbon emissions and mitigate the public health burdens of energy-related local air

[3] Id.
[4] Available at: Hanwha, Doosan open by-product hydrogen fuel cell power plant - ScienceDirect

pollution. Effective building electrification strategies focus on eliminating fossil fuel use and combustion within buildings by promoting the use of heat pumps, induction stoves, and other technologies. The NFCRC suggests, however, that when building electrification rules are applied to DER like non-combustion fuel cells, and related infrastructure outside of buildings, these rules run the risk of inadvertently promoting the increased operation of peaking power plants and the use of diesel backup generators. This is because on-site DER like fuel cells interact with the electric grid to displace less efficient and higher emitting peaker plants and diesel backup generators. Hydrogen-based fuel cell systems are a direct, zero-emission replacement for diesel generators. **The NFCRC recommends that IEPR building electrification measures support infrastructure for on-site smaller and cleaner DER and microgrids, and prohibit fuel supplies to higher polluting peaker plants and diesel generators that back up those larger and dirtier central station plants to avoid protecting the very dirtiest forms of power generation from competition by cleaner alternatives.** This would avoid the unintended consequence of extending the life and expanding the use of dirty peaking power plants and diesel generators which will in turn exacerbate air quality impacts on the local communities near those plants and diesel generators.

2. **The *United States Department of Energy: Hydrogen Shot* section[5] Should Include Details on the 2021 Infrastructure Investment and Jobs Act.**

In addition to the June 7, 2021 announcement of the United States Department of Energy (DOE) Hydrogen Shot**, the Draft IEPR Volume III should be updated to include the very significant Federal Infrastructure Investment and Jobs Act,[6] signed by President Biden on November 5, 2021, with the intention to update and upgrade America's aging infrastructure.** The following summary of the Hydrogen investments in the Act merits inclusion in the final 2021 IEPR:

> The groundbreaking 2021 Infrastructure Investment and Jobs Act (Bipartisan Infrastructure Bill) includes a total of $9.5 billion for clean hydrogen programs (Section 813-816, 822):

[5] Draft IEPR Volume III at 74.
[6] Available at congress.gov: H.R.3684 - 117th Congress (2021-2022): Infrastructure Investment and Jobs Act | Congress.gov | Library of Congress

a. Definition of "clean hydrogen" – Hydrogen produced with a **carbon intensity** equal to or less than 2 kilograms of carbon dioxide-equivalent produced at the site of production per kilogram of hydrogen produced. Sec. 822(b)(1)(B).

b. Regional Hydrogen Hubs - $8 billion to develop at least 4 large-scale hydrogen production and utilization projects in diverse geographies with diverse feedstocks and multi-sector end uses of hydrogen.

c. Clean Hydrogen Electrolysis Program - $1 billion for research, development, demonstration, commercialization, and deployment program for commercialization to improve efficiency, durability, and reduce cost of producing clean hydrogen using electrolyzers. Includes hybrid storage.

d. Clean Hydrogen Manufacturing and Recycling - $500 million to support a clean hydrogen domestic supply chain.

e. Clean School Bus Program - $1 billion for adoption of clean school buses and zero-emission school buses.

f. Grants for Charging and Fueling Infrastructure - $7.5 billion for grant program to award grants to install publicly accessible electric vehicle charging infrastructure, hydrogen fueling infrastructure, propane fueling, or natural gas fueling infrastructure directly related to the charging or fueling of a vehicle.

g. Electric of Low-emitting Ferry Pilot Program - $50 million to provide grants for the purchase of electric or low-emitting ferries and the electrification of or other reduction of emissions from existing ferries.

h. Port Infrastructure Development Program - $2.25 billion for projects that improve the resiliency of ports to address sea-level rise, flooding, extreme weather events, earthquakes, tsunamis, and projects that reduce or eliminate port-related criteria pollutant or greenhouse gas emissions. This includes workforce training and development.

i. Clean Hydrogen Research and Development Program – to advance research and development to demonstrate and commercialize the use and storage of clean hydrogen in the transportation, utility, industrial, commercial, and residential sectors. Incorporates fossil fuels with carbon capture, utilization, and sequestration, renewable fuels, biofuels, and nuclear energy.

j. National Clean Hydrogen Strategy and Roadmap – directs the development of the first US national strategy to facilitate a clean hydrogen economy by May 15, 2022.

k. Clean Hydrogen Production Qualifications – directs the development of a clean hydrogen production carbon intensity standard.

Closing Comments

The NFRC appreciates the opportunity to comment on the Draft 2021 Integrated Energy Policy Report (IEPR), Volume III: Decarbonizing the State's Gas System.

Respectfully submitted,

_____/s/_____

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