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Green Hydrogen Coalition Comments on Docket # 20-IEPR-02 2020 Integrated Energy Policy Report Update

Additional submitted attachment is included below.

Comments of the Green Hydrogen Coalition

to

the California Energy Commission (CEC)
Docket # 20-IEPR-02
2020 Integrated Energy Policy Report Update

Green Hydrogen Coalition

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A. Overview of Comments

The Green Hydrogen Coalition ("GHC"), a California educational non-profit, is pleased to provide comments in response to the California Energy Commission (CEC) *2020 Integrated Energy Policy Report Update* (Docket 20-IEPR-01, "2020 IEPR Update") and with regard to its focus on Transportation (20-IEPR-02).

The GHC was formed in 2019 in recognition of the game-changing potential of green hydrogen to accelerate multi-sector decarbonization to combat climate change, including providing a commercially viable and cost-effective solution as a renewable fuel source for transportation, micro-grids, and long-duration energy storage to effectively and reliably realize decarbonization goals. The GHC's mission is to facilitate policies and practices that advance green hydrogen production and use at scale in all sectors of the economy where it will accelerate a carbon-free energy future and result in multi-sector decarbonization, investment and jobs.

The energy system today is undergoing a significant transformation, including high penetration of renewable energy resources, expanded use of electric vehicles (EV's) and alternative fueled vehicles, repurposing of energy infrastructure, and changing load and utilization profiles. This transformation to an affordable, clean energy economy for everyone requires implementing long-duration energy storage to support reliability and provide for multi-sector fuel and feedstock supplies, which will directly contribute to accelerating the realization of an efficient, zero-emissions transportation system in California and beyond.

Creating pathways for the *scaling of production and use of green hydrogen, a renewable fuel and viable bulk long duration energy storage solution*, can provide a cornerstone of technology and storage that supports accelerated decarbonization across many sectors, including heavy-duty vehicles, light-duty vehicles, other off-road transportation applications, and the charging and infrastructure systems need to support this transition. Expanding production and utilization of green hydrogen as a key resource for meeting the demands for California's clean energy system, across power, transportation, and industry. Additionally, expanded green

hydrogen deployment will promote reduced energy cost, increased reliability and resiliency, fuel diversity, and job creation.

Technologies exist today to produce green hydrogen, and near-term opportunities are available for development of charging infrastructure in the transportation sector, storage, fuel cells, and large-scale commercial operations. Utilization of low-cost existing and expanded renewable energy resources can be used to produce and store green hydrogen.

Today, the Intermountain Power Project, located in Delta, Utah, is preparing to convert from coal-fired generation to advanced combustion using natural gas and 30% green hydrogen by summer 2025, increasing to 100% green hydrogen on or before 2045. Advancement of this project will provide a clean source of power, combining electrolytic green hydrogen production, combustion, storage, and existing infrastructure to provide energy to customers located in California and a reliability reserve for the region. The scale up of this project will demonstrate production, combustion, and storage of green hydrogen in adjacent underground purpose-built salt caverns. In addition to combusting the green hydrogen, the project also envisions on site fuel cells to enhance grid flexibility. Producing *green hydrogen at scale will drive down its production cost and further accelerating the use of green hydrogen to decarbonize the energy system as a fuel for back-up generation, transportation, and fuel cells.* It can also serve as a regional and national feedstock for industrial, chemical, and agricultural applications.

Given the diverse and multi-sector uses of green hydrogen and its unique capability to provide for flexible energy storage, the GHC supports and recommends that the CEC include green hydrogen in its evaluation and modeling to deliver zero-emission transportations solutions, meet future energy demands, and realize *multi-sector zero-carbon solutions.*

B. <u>About the Green Hydrogen Coalition</u>

The GHC is a California a 501 (c)(3) educational non-profit corporation. The GHC was formed in 2019 in recognition of the game changing potential of green hydrogen to accelerate multi-sector decarbonization to combat climate change, including providing a

commercially viable and cost-effective solution as a renewable fuel source to displace fossil methane and to achieve reductions in short (and long-lived) greenhouse gas pollutants, achieve zero-emission transportation systems, and provide a carbon-free resource for grid stability. The GHC's mission is to facilitate policies and practices that advance green hydrogen production and use in all sectors of the economy where it will accelerate a carbon-free energy future and result in multi-sector decarbonization, investment and jobs.

The purpose of the work of the GHC is to *accelerate* decarbonization to combat climate change. Our core principles include advocating for policies that promote competition and are technology and business model neutral; engaging in respectful and constructive collaboration with stakeholders; taking part in solutions that promote environmental justice; acting with integrity and safety; and realizing impact. We believe our mission and values are aligned well with the CEC's mandate "that the state's energy system must quickly transition away from fossil fuel combustion and towards zero and near-zero emission fuels and technologies, while protecting consumers and ensuring disadvantaged communities benefit from this transition."

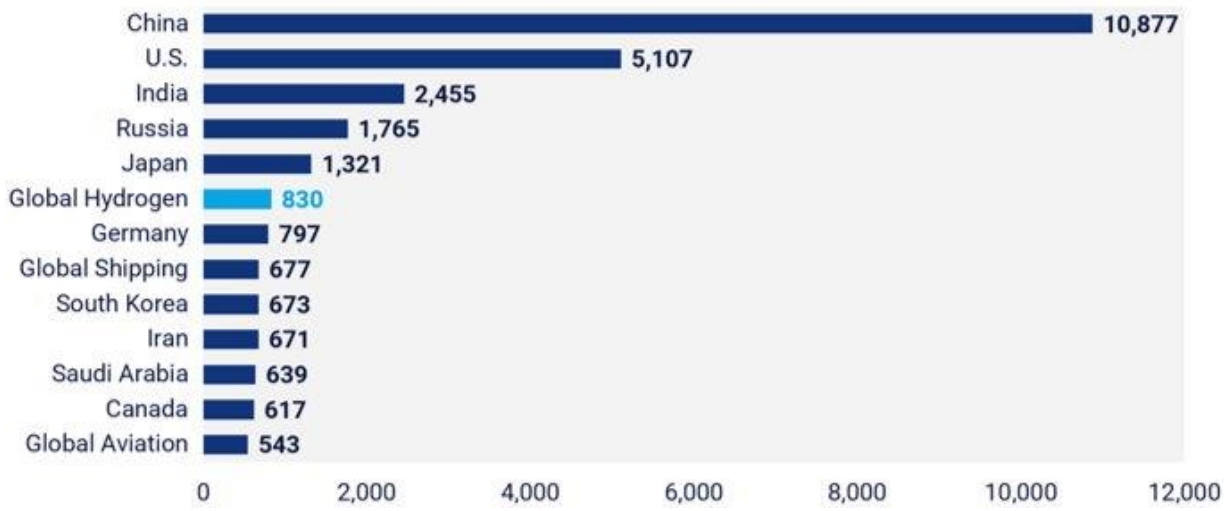
Our sponsors include both renewable electricity users and providers and those in the renewable natural gas industry. The GHC is a strong advocate of the purpose and need for comprehensive energy planning to support the state's climate and renewable energy goals. The GHC is pleased to engage in the California Energy Commission (CEC) Integrated Energy Planning Report and the 2020 Update (20-IEPR-01).

C. Green Hydrogen Description and Uses

Hydrogen is a mainstream commodity that can be utilized in many applications across many sectors of the economy, including displacing the use of fossil fuels in existing pipeline infrastructure. Hydrogen is widely used today for many industrial processes, however more than 99% of the hydrogen used today is produced from fossil fuels, which produce greenhouse gas emissions ("GHGs").

Green hydrogen, in contrast, is commercially produced today from renewable electricity by electrolysis, from biogas by steam reforming, and from biomass through thermal conversion. Green hydrogen is a clean and safe energy carrier that can be used as a fuel for transportation and electricity production, as well as a means for multi-day and seasonal renewable energy storage. It can also be used as a feedstock for industry, displacing millions of metric tons of hydrogen made from fossil fuels today (grey hydrogen).[1] Global production of hydrogen today, if treated as a country, would be the sixth largest GHG emitter, accounting for more emissions than Germany.

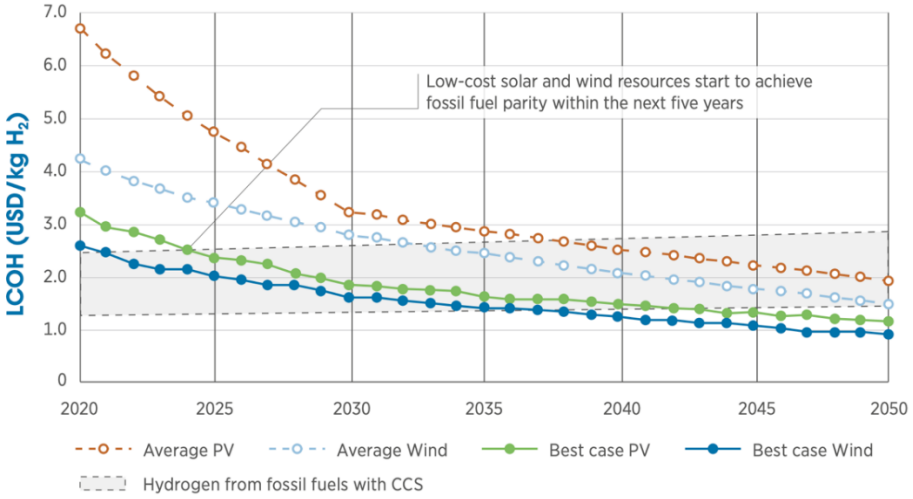
2017 CO2 Emissions by Country and Sector (Mt CO2/year)



Source: Wood MacKenzie

Green hydrogen, in contrast, produces no carbon emissions. Further, once scaled, has the potential to be *lower* cost than hydrogen made from fossil fuels.

[1] The definition of Green Hydrogen should ultimately be harmonized with low GHG definitions as adopted by the European Commission - Link



Source: *IRENA, 2019*: Dolf Gielen, Emanuele Taibi and Raul Miranda, 2019. *Hydrogen: A Renewable Energy Perspective.* International Renewable Energy Agency (IRENA). Report.

Green hydrogen not only displaces grey hydrogen in multiple current industrial uses, but it will also serve as a precursor ingredient to create synthetic fuels to decarbonize the most challenging sectors of the economy such as heavy industry, *heavy-duty transport,* and aviation. Production and use of green hydrogen are currently being pursued globally to decarbonize these sectors and meet climate goals.

Today, hydrogen is transported by ships, trucks, and dedicated pipeline infrastructure. It can be blended into existing natural gas pipelines to displace methane and reduce its carbon content, cutting short-lived climate pollutant emissions and helping to decarbonize many gas end uses, including thermal electric generation. For example, Hawaii's natural gas pipeline system on the island of Oahu already has a 12% hydrogen content.[2] Increasing the green hydrogen content in California's natural gas pipeline system would be a huge step towards decarbonizing the natural gas pipeline system and many downstream uses and provide a robust pathway for employment, investment and decarbonization across all communities. Green hydrogen thus has an inextricable role in helping to decarbonize energy system and in reducing short and long-term greenhouse gas pollutants and meet climate goals.

[2] https://www.hawaiigas.com/about-us/ and https://www.hawaiigas.com/clean-energy/hydrogen/

The fundamental challenge for all commercially viable pathways to produce green hydrogen today is how to *achieve scale* and reduce cost. Globally, production of green hydrogen is currently being pursued to help get to scale, accelerate decarbonization and to meet climate goals. Expanding green hydrogen use to offset fossil fuels by establishing standards and interconnection protocols for injecting renewable hydrogen into natural gas pipelines is critical to achieving scale, reducing cost for green hydrogen, and increasing use across multiple sectors, including transportation.

Green hydrogen to support electric generation is being commercially developed at the Intermountain Power Project ("IPP"), an existing 1,800 MW coal-fired electric generation plant located in Delta Utah that primarily provides electric generation for southern California. IPP will be converted to a combined cycle gas generation, and on its first day of operation in 2025 will combust a blend of natural gas and 30% green hydrogen by volume, ultimately increasing the green hydrogen content to 100% by 2045.[3] The green hydrogen used by IPP will be produced from curtailed and low-cost wind and solar via electrolysis, a proven pathway to producing green hydrogen at scale.

Replacing natural gas generation with a combination of renewables and energy storage will be key to meeting decarbonization goals while achieving reliability, and is a pathway for a more rapid and cost-effective energy transition by utilizing existing infrastructure and human resources to create the long-term green energy economy. Added cost effectiveness is realized in this transition by leveraging existing infrastructure to support the large-scale integration of renewables through use of existing gas pipelines for the transmission, distribution, and storage of *green hydrogen.* As grids move toward larger penetrations of renewables, so does our need toward securing bulk energy storage to absorb the increasing percentage of daily, weekly, and seasonal surplus renewable energy and shift it to periods of time when the grid faces sustained shortages. A more flexible, clean energy grid further supports expansion and integration of

[3] http://www.ladwpintake.com/the-future-of-ipp-is-green/

electric vehicles and other zero-emitting transportation solutions, including fuels cells and charging station for hydrogen-fueled vehicles.

The IPP conversion is strategically important regionally, as it will also be the first step in the creation of a strategic renewable reliability reserve in the adjacent underground salt dome formation, which is the lowest cost commercially available means of storing hydrogen today. The salt dome in Delta, Utah is the largest in the Western United States and presents a viable pathway to create the world's first *strategic renewable energy reserve*.

The GHC's role in the IPP conversion and creation of a regional strategic renewable energy reserve is to identify and advocate for the regulatory changes necessary to ensure that the IPP conversion is successfully realized. This will entail close collaboration with local, state, and regional stakeholders and direct engagement in long-term energy planning processes associated with both gas and electric utilities, gas-fired electric generators, and renewable energy developers. We believe this process and approach can provide a strategic pathway for collaborations across states seeking long-duration energy storage and accelerated decarbonization in multiple industrial, agricultural, and transportation systems.

D. Recommendations

The GHC recommends and appreciations the appreciates the CEC's consideration and inclusion of green hydrogen as a game-changing resource for transportation, micro-grids, long-duration energy storage, energy reliability and resilience, and a unique resource to provide multi-sector decarbonization.

We recommend that consideration for the role of green hydrogen is consistent with the goals of the 2020 IEPR Update and its vision for clean transportation systems to "meet California's 2025 and 2030 zero-emission vehicle goals, as well as the state's 2045 carbon neutrality goal." We believe that expanding the inclusion of green hydrogen in the CEC's modeling and planning overall d is consistent with targeting the expansion of zero emission fuels and vehicles, including commercial trucks and off-road equipment.

We also recommend that the CEC can play a significant role in breaking down market barriers for green hydrogen though its planning and programs. By providing support for green hydrogen infrastructure, in the transportation sector and beyond, the CEC can expand California's clean energy system and accelerate the diversity of clean fuel resources for on-road and off-road transportation, across other multi-sector applications, and create the clean, reliable power network needed to meet California's renewable energy and climate goals..

Expanded infrastructure will necessarily include deployment of fuel cells and expand potential for providing back up generation and grid services for flexibility and reliability. As part of the IEPR's overview of energy policy, the GHC recommends identifying the importance of fuel cell and green hydrogen infrastructure to meet the state's policy climate and energy goals.

The CEC is a powerful voice to demonstrate that there is a vision and a roadmap to "green" hydrogen. As part of the 2020 IEPR update, we recommend that the CEC host a workshop on green hydrogen and its many applications for power, gas, industry, and transportation.

As a non-profit aligned with the decarbonization goals among states nationally, the GHC is focused on the role of green hydrogen to transition our energy systems to a cleaner future. We believe that green hydrogen is a critical backbone for California's clean, reliable energy future and an accelerated the transition to a carbon-free system that benefit everyone.

The GHC's appreciates the leadership of the CEC in addressing this foundational issue in its 2020 IEPR Update.

Respectfully submitted,
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