DOCKETED	
Docket Number:	16-PIER-01
Project Title:	Natural Gas Program
TN #:	241349
Document Title:	California Hydrogen Business Council Comments - on FY 22-23 Gas R&D Budget Plan Workshop
Description:	N/A
Filer:	System
Organization:	California Hydrogen Business Council
Submitter Role:	Public
Submission Date:	1/31/2022 5:01:03 PM
Docketed Date:	1/31/2022

Comment Received From: California Hydrogen Business Council
Submitted On: 1/31/2022
Docket Number: 16-PIER-01

on FY 22-23 Gas R&D Budget Plan Workshop

Additional submitted attachment is included below.

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California Energy Commission
Docket No. 16-PIER-01

January 31, 2022

RE: Proposed Natural Gas Research Initiatives for Fiscal year 2022-2023

The California Hydrogen Business Council (CHBC)[1] appreciates the opportunity to submit comments on the CEC Proposed Natural Gas and Research and Development Workshop ("Gas R&D Workshop"), discussing the proposed energy-related gas research initiatives for fiscal year 2022-2023.

To summarize CHBC's responses to the questions for stakeholders is that the CEC should capitalize on existing resources like research previously done by other countries transitioning their gas grids to hydrogen, the CEC should plan an immediate response to the climate crisis by incorporating existing gas grid infrastructure into the decarbonization plan, and the CEC should offer more detailed questions to gather more informed responses on a topic as critical as gas grid research and development. The CHBC respectfully submits the following responses to the Gas R&D Workshop request for feedback.

1. **Scaled up Gas Decommissioning Pilots and Integrated Planning Tools**

   a. *What emerging zero-carbon fuels should be considered by the planning tool?*

      The gas decommissioning tool should not focus on the decommissioning of our existing gas infrastructure, but instead should focus on improving gas infrastructure to withstand zero-carbon fuels like hydrogen. Hydrogen has been successfully blended into the existing natural gas system at 20 percent[2]

[1] The CHBC is comprised of over 130 companies and agencies involved in the business of hydrogen. Our mission is to advance the commercialization of hydrogen in the energy sector, including transportation, goods movement, and stationary power systems to reduce emissions and help the state meet its decarbonization goals. **The views expressed in these comments are those of the CHBC, and do not necessarily reflect the views of all of the individual CHBC member companies.** CHBC Members are listed here: https://www.californiahydrogen.org/aboutus/chbc-members/

[2] HyDeploy, a UK gas blending pilot that is recommending the UK adopt a 20% hydrogen blend in the natural gas pipeline system by 2023. https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/011422-uks-gas-grid-ready-for-20-hydrogen-blend-from-2023-network-companies.

which starts the transition to decarbonizing the gas grid. The second step, which has been successfully piloted,[3] is to replace aging metal pipelines with polyethylene pipelines that can carry a 100 percent hydrogen blend and completely decarbonize the gas grid.

b. *What are potential challenges to large-scale pilots?* The potential challenge going forward with large-scale gas decommissioning pilots is that time is limited in our response to climate change and the technological solutions already exist. In 2020, natural gas alone accounted for 40 percent of California's power generation.[4] Natural gas serves as the source for many sectors and functions that require too much power for the state's electric grid to support now or in the near future, including heavy industry, building heat, water heat, and chemical production.[5] Additionally, the state's electrical grid was only 33 percent renewable in 2020, meaning fossil fuels were used for the remaining 67 percent of power on the electric grid.[6] Therefore, the state must utilize the resources available today to begin decarbonization by researching and developing a transition to a zero-carbon gas grid using hydrogen.

c. *What are the best practices in customer engagement on gas-to-electricity transition?* The CHBC has no comment to offer on this topic.

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[3] "Piped Hydrogen – Tested and Trusted." 2021. https://www.teppfa.eu/latest-news/piped-hydrogen-tested-and-trusted/; "HPDE Pipe is Hydrogen Ready." 2020. https://alkadyne.com.au/wp-content/uploads/2020/05/202-qen-wp-hdpe-pipe-hydrogen-ready_final.pdf.; :"Using the Natural Gas Network for Transporting Hydrogen – Ten Years of Experience." 2017. https://www.dgc.dk/sites/default/files/filer/publikationer/C1703_IGRC2017_iskov.pdf.

[4] "Natural Gas Explained." https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php#:~:text=Natural%20gas%20accounted%20for%2040,as%20lease%20and%20plant%20fuel..

[5] *Id.*

[6] https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2020-total-system-electric-generation.

d. *What are the recommendations on minimizing cost impacts and supporting equity?* To minimize cost impacts of transitioning the state's gas grid to hydrogen the CHBC recommends the CEC save resources by researching the pilots that have already been deployed in the UK for its gas grid transition and reshape the research and development for deployment in California. As noted in the footnotes, HyDeploy in the UK has successfully distributed a 20 percent hydrogen blend through existing metal pipelines[7] and several studies have been completed to show a full hydrogen transition is possible with polyethylene pipes.[8]

2. Large Volume Hydrogen Storage for Targeted Use Cases

a. *What are the promising use cases and suitable geological storage opportunities in California?* Hydrogen is a long-term energy storage solution that can capture the renewable power produced by the state's wind and solar resources to avoid curtailment. Once stored, hydrogen can be distributed through the gas pipelines or pumped through a fuel cell to support the electric grid, to power the state when renewable energy production is low or inoperable due to extreme weather events. Hydrogen has the potential to be stored geologically in salt caverns, which is being tested in Utah for the

[7] HyDeploy, a UK gas blending pilot that is recommending the UK adopt a 20% hydrogen blend in the natural gas pipeline system by 2023. https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/011422-uks-gas-grid-ready-for-20-hydrogen-blend-from-2023-network-companies

[8] "Piped Hydrogen – Tested and Trusted." 2021. https://www.teppfa.eu/latest-news/piped-hydrogen-tested-and-trusted/; "HPDE Pipe is Hydrogen Ready." 2020. https://alkadyne.com.au/wp-content/uploads/2020/05/202-qen-wp-hdpe-pipe-hydrogen-ready_final.pdf.; :"Using the Natural Gas Network for Transporting Hydrogen – Ten Years of Experience." 2017. https://www.dgc.dk/sites/default/files/filer/publikationer/C1703_IGRC2017_iskov.pdf.

Advanced Clean Energy Storage project,[9] and in depleted oil fields with the proper mineralogical composition.[10] The CHBC recommends the CEC support research and development of long-term hydrogen storage in depleted oil fields to utilize existing resources.

b. *What types of requirements should inform geological storage decision-making?* The CHBC recommends the CEC implement safety requirements related to long-term hydrogen storage in depleted oil fields.

c. *Recommendations on research approaches?* The CHBC recommends the CEC begin by researching long-term hydrogen storage in depleted oil fields by researching pilots from other states and countries who have tested the same or similar projects. It is essential the CEC does not reinvent the research process where other states or countries have already established a process that yielded positive results.

3. Industrial Clusters for Clean Hydrogen Utilization

a. *What are key criteria when determining what industries to cluster and where?* Key criteria to consider when determining what industries to cluster and where--in addition to the number of industries to be co-located, the most promising locations, the industrial sectors most compatible for regional hydrogen deployments in California, and safety for neighboring communities—are the location of hydrogen production plants, the hydrogen

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[9] https://www.forbes.com/sites/mitsubishiheavyindustries/2020/03/13/in-utah-hydrogen-and-a-massive-salt-dome-are-winning-the-west-for-renewable-energy/?sh=3a9c7e4c5c52.

[10] "Hydrogeochemical Modeling to Identify Potential Risks of Underground Hydrogen Storage in Depleted Gas Fields." 2018. https://www.mdpi.com/2076-3417/8/11/2282/pdf#:~:text=Large%20amounts%20of%20hydrogen%20can,aquifers%20%5B1%2C3%5D.&text=Depleted%20oil%20and%20gas%20fields%20have%20a%20huge%20storage%20capacity,qualify%20therefore%20for%20hydrogen%20storage.

refueling infrastructure necessary to support the transport of hydrogen, the hydrogen gas distribution infrastructure location and needed improvements, and the local air pollutant reduction potential within a hydrogen cluster.

b. *What California industries would benefit from clustering of hydrogen infrastructure?* The industries that would benefit from clustering of hydrogen infrastructure are cement production, steel production, ammonia production, chemical production, and light and heavy-duty transportation due to increased hydrogen production that will drive down costs of hydrogen for end-users.

c. *Are there relevant examples of similar clustering efforts nationally or internationally?* The CHBC has not had sufficient time to develop a response to this question and will follow-up at a later date if the opportunity presents itself.

d. *What are some resources that can help inform this research initiative?* The CHBC has not had sufficient time to develop a response to this question and will follow-up at a later date if the opportunity presents itself.

e. *What approaches should be considered when deploying hydrogen infrastructure?* The CHBC has not had sufficient time to develop a response to this question and will follow-up at a later date if the opportunity presents itself.

4. Mitigate Criteria Air Pollutants in Hydrogen-Based Power Generation

a. *What are the most promising energy innovations that could drive down costs of mitigation technologies?* This question is unclear and incomplete; more detail is needed for a proper response.

b. *What are suggested target metrics for the mitigation technologies?* This question cannot be answered effectively without an understanding of what is meant by "mitigation technologies." More detail is needed for a proper response.

c. *What types of demonstrations are needed to expand deployment of these technologies in the future?* This question cannot be answered effectively without an understanding of what is meant by "mitigation technologies." More detail is needed for a proper response.

d. *Are there technology development opportunities to accommodate both higher blends of hydrogen and emission reductions simultaneously?* As a trade association, CHBC is agnostic to particular configurations and technology solutions.

   However, the CHBC recommends the CEC choose the technologies that lend themselves to a low or zero carbon intensity score. A carbon intensity score captures the lifecycle emissions of a fuel with a metric of carbon emissions as compared to diesel and gasoline. Hydrogen, on a carbon intensity score, can have as low as -105 carbon intensity to as much as 70 carbon intensity depending on the production feedstock and process.[11] Pinpointing a carbon intensity metric as a basis for eligibility creates competition of fuel producers that drives down costs and engenders innovation as fuel producers work to meet decarbonization targets.

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[11] "LCFS Pathway Certified Carbon Intensities." California Air Resources Board. https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities.

Additionally, as it relates to NOx emissions, hydrogen blends can be accommodated without any increase in criteria pollutants. Actual criteria air emissions can vary by application. Where additional technologies can help further reduce criteria air pollutants, pilots and other hydrogen investments will lead to additional technology development that helps minimize these emissions in the future. The CHBC recommends research on this topic.

5. **Advanced Hydrogen Refueling Infrastructure Solutions for Heavy Transport**

   a. *Are there additional barriers or innovations that should be targeted or prioritized?* A barrier to wide-scale hydrogen refueling infrastructure for heavy transport is the lack of a set heavy-duty station goal and funding to support that goal. To ensure California's meets its air quality and decarbonization goals, it is critical the medium-and-heavy duty vehicles in the state are transitioned to zero-emission vehicles like fuel cell electric vehicle (FCEV) trucks and busses. The CHBC seeks a statewide goal of 200 heavy-duty hydrogen fueling stations by 2035[12] and the implementation of Hydrogen Refueling Infrastructure (HRI) credits for heavy-duty stations. The 200 heavy-duty hydrogen fueling station goal can be met if the HRI credits fund receives an additional 2.5% deficit allotment and an increase in the Low Carbon Fuel Standard (LCFS) program's credit capacity of 1,200 kilograms of hydrogen per day. The CHBC proposes a capacity increase that reflects the quantities of hydrogen needed to support the 70,000 heavy-duty FCEVs that will be utilizing the 200 heavy-duty hydrogen fueling stations.

[12] As referenced in the following report: https://cafcp.org/blog/california-fuel-cell-partnership-envisions-70000-heavy-duty-fuel-cell-electric-trucks-supported.

b. *What recommendations do you have on research approaches or performance metrics to target?* The CHBC recommends the CEC adopt the same performance metrics as the LCFS program administered by the California Air Resources Board (CARB).[13]

c. *How beneficial is the funding augmentation approach for potential applicants?* An increase in funding, an established 200 station goal, the creation of a separate HRI credit program for heavy-duty hydrogen refueling stations, and an increase in the LCFS capacity credit are critical to send the correct market signals to hydrogen station developers that their investment will result in commercialization of their product. California's agencies must work together in a holistic approach to decarbonization of the heavy transport sector.

The CHBC appreciates the opportunity to provide comments on the 16-PIER-01 and we look forward to the implementation of CHBC's recommendations. Further, we request additional time to comment on these topics, as the questions lack detail that is required for the development of research projects and pilots.

Respectfully Submitted,

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California Hydrogen Business Council

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[13] https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities.