

U.S. Department of Energy Hydrogen Study Development Questions

Due date February 11

Responses of the California Hydrogen Business Council

1. In your view, what are the biggest changes the industry has seen since the 2019-2020 U.S Hydrogen Industry Roadmap was developed?
 - a. One of the most positive changes since 2019-2020 has been the use of the carbon intensity score to identify the decarbonization potential of hydrogen. The “clean hydrogen” definition, signed into federal law through the Infrastructure Investment and Jobs Act (IIJA), identifies a carbon intensity standard that qualifies hydrogen as “clean.” In California, the highly successful Low Carbon Fuel Standard (LCFS)¹ also measures a fuel’s decarbonizing potential by using a carbon intensity score. “Clean hydrogen,” as defined in the IIJA is hydrogen produced with a carbon intensity equal to or less than two kilograms of carbon dioxide-equivalent produced at the site of production per kilogram of hydrogen produced².
 - b. Implementing a tangible metric like carbon intensity to identify the decarbonization potential of fuels, and therefore the eligibility of fuels for decarbonization funding and programs, is a sustainable way to grow the hydrogen market. With a tangible metric, businesses can develop, plan, and execute their hydrogen production scheme with confidence the fuel that is produced will be utilized, resulting in growing supply and dropping costs. Once a decarbonizing fuel, like hydrogen, is commercialized and affordable, it will have an impact on the decarbonization of all sectors.
2. What progress has been made towards the milestones and enablers outlined in the U.S. Hydrogen Industry Roadmap?
 - a. 2020 to 2022: Immediate Next Steps
 - i. *Establishing dependable and technology-neutral decarbonization goals in more states and at the federal level, which serve as a guide to specific policy and regulatory actions*
 1. As stated previously, the use of a carbon intensity score as a depending and technology-neutral decarbonization goal is an effective way to promote the production and commercialization of hydrogen.
 - ii. *Bringing new hydrogen solutions to the market, focusing on the most attractive segments in early adopter states*

¹ <https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities>

² H.R.3684 – 117TH Congress (2021-2022)

1. The CHBC supports all hydrogen solutions and encourages broad investment in hydrogen expansion across all sectors, while prioritizing those that showcase a glidepath to low, zero, or negative carbon intensity.
 - iii. *Scaling mature applications and through these actions delivering the cost reduction and performance improvements to open the next opportunities*
 1. The CHBC supports all hydrogen solutions and encourages broad investment in hydrogen expansion across all sectors, while prioritizing those that showcase a glidepath to low, zero, or negative carbon intensity.
3. In your view, which milestones for the **hydrogen value chain** – from production, to delivery & transport, to market adoption – are highest priority over the near-term to scale the US hydrogen economy? Why?
 - a. The most important part of the hydrogen value chain should be forecasting that reflects the industry members' existing product and development plans. Industry, across all sectors, is either already engaged in the hydrogen value chain or plans on doing so within the next few years. However, government has not kept up with the forecasting of industry and treats hydrogen and the supporting infrastructure as emerging technologies. Without inclusive forecasting, the milestones set for the hydrogen value chain will be insufficient to meet the necessary decarbonization and air quality targets. Therefore, the most important milestone to reach on the hydrogen value chain is accurate forecasting that reflects the hydrogen production, distribution, storage, and end-uses that are necessary to meeting our decarbonization and air quality goals
4. How can the Hydrogen Hubs & IJJA best support development of the industry in the near-term?
 - a. The inclusion of Hydrogen Hubs in the IJJA supports the development of the hydrogen industry in the near term by spurring competition in hydrogen production and sending market signals to industry members that hydrogen production is a priority for this Administration. It is essential the government continues to include hydrogen in the discussion of decarbonization and improving air quality, so that businesses will be confident in their hydrogen production investments. The best way to continue this support is to award more hydrogen hub projects throughout the United States.
5. Which actions can support the development of **clean hydrogen production**?
 - a. Steps needed to reduce the cost of hydrogen produced via renewably powered electrolysis?
 - i. To enable widescale renewable hydrogen production via electrolysis the cost of pulling renewable power from the grid needs to decrease. Specifically, when the power from wind and solar is pulled to produce

8. How do you think about the role of hydrogen pipelines vs. hydrogen trucking infrastructure in the US?
 - a. The CHBC recognizes the importance of both hydrogen pipelines as well as hydrogen trucking infrastructure as both serve varying purposes. First, hydrogen pipeline blending and dedicated hydrogen pipeline distribution is under research and development, with some projects coming into fruition later this year—like the UK’s “2020 Ten Point Plan for a Green Industrial Revolution,” that calls for a 20% hydrogen blend by 2023.⁵ Hydrogen pipeline distribution, whether that be blended or direct, will be useful in the heavy industry, residential, and urban areas. Hydrogen distribution via trucking will be useful as an immediate tool for deploying hydrogen at fueling stations everywhere—whether they are urban or rural—and for mobile refueling necessary for off-road equipment and vehicles that would emit harmful air pollutants if continuing to run on diesel. In the near and long term, both pipeline and trucking of hydrogen is key to distribution of hydrogen to decarbonize end-uses across all sectors. Like the hydrogen value chain, piping and trucking hydrogen serve an equally important role in hydrogen distribution and should be grouped together as hydrogen distribution plans are developed.

9. Which actions can support **market adoption** for hydrogen?
 - a. Steps needed to reduce hydrogen pipeline construction challenges & timelines?
 - i. The CHBC defers to industry members for their expertise on this matter. To accelerate construction, the CHBC recommends improving permitting and education efforts of AHJs.
 - b. How to accelerate adoption of hydrogen as an industrial feedstock?
 - i. Accelerating the adoption of hydrogen as an industrial feedstock requires hydrogen to be evaluated on a carbon intensity score so that the decarbonizing potential is clear and hydrogen production is encouraged. Further, increased funding towards research and development of hydrogen as an industrial feedstock will help accelerate the adoption of the fuel.

10. What industry-specific targets for clean hydrogen consumption have been set? Where are you seeing gaps in targets today?
 - a. The CHBC defers to the experts in industry.

11. Which actions can support **economic development and environmental justice** related to the hydrogen economy?
 - a. What steps can be taken to more actively engage and support communities?

⁵ <https://www.energynetworks.org/newsroom/britains-gas-grid-ready-to-deliver-hydrogen-across-the-country-from-2023-energynetworks-announce#:~:text=The%20Prime%20Minister's%20November%202020,the%20gas%20grid%22%20by%202023.>

- i. The CHBC recommends including environmental justice community members to share their thoughts on the US Hydrogen Roadmap. Additionally, the CHBC recommends consistent and clear messaging about hydrogen by referring to hydrogen's decarbonization potential as it relates to the carbon intensity score and the zero emissions of hydrogen at the end-use.
- b. Which talent areas do you see as emerging with the largest skills gaps in the US?
How can these gaps be closed?
 - i. The CHBC defers to those in industry for recommendations.