Energy incentives for climate-friendly hydrogen fuel cells help transform transportation

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Many industries have and continue to incorporate hydrogen and fuel cell technologies as part of their decarbonization efforts, a crucial aspect of addressing climate change. New hydrogen fuel cell vehicles have been debuted, and fuel cells have been identified as a viable zero-emission replacement for heavy-duty vehicles, which account for about 25% of the greenhouse gas (GHG) emissions from the transportation sector, making them a key target for decarbonization efforts.

Deploying hydrogen fuel cell technologies at scale will require alignment of multiple factors, including the production, transportation, and storage of hydrogen and maintaining a reliable hydrogen supply. This alignment is essential to mitigate climate change by reducing emissions and promoting sustainability.

Why hydrogen?

The incorporation of hydrogen and fuel cell technologies is supported by the inherent benefits of the technology for the climate, as well as government funding, incentives, and mandates. In addition to being a zero-emission technology, hydrogen fuel cell vehicles can operate at full power without loss of voltage before refueling, withstand cold environments, and refuel quickly.

Substantial government funding and incentives are available to support hydrogen infrastructure, clean hydrogen production, and fuel cell technology development, demonstration, and deployment. Most recently, the Biden administration made available $1.3 billion for electric vehicle charging and hydrogen, propane, and natural gas fueling infrastructure in urban and rural communities and along designated highways, interstates, and major roadways.

This funding opportunity helps implement the National Zero-Emission Freight Corridor Strategy, which prioritizes and sequences the deployment of zero-emission medium-duty and heavy-duty vehicle charging and hydrogen fueling infrastructure in key hubs and corridors between 2024 and 2040.

Federal and state mandates, commitments, and strategies have prioritized decarbonization of hard-to-abate sectors, such as the transportation sector. For example, the Environmental Protection Agency (EPA) issued stronger standards to reduce GHG emissions from heavy-duty vehicles beginning in model year 2027. In addition, states such as California have mandated the transition to zero-emission vehicles. These standards and mandates are expected to accelerate the transition and adoption of zero-emission vehicles, which will be key to addressing climate change in the coming decades.

Hydrogen production, transportation and storage

Hydrogen can be produced in several ways and using different sources, which contribute to the environmental impact of the hydrogen produced. For example, green hydrogen is produced by electrolysis of water using renewable electricity, making it a clean and sustainable energy source. Blue hydrogen is produced from natural gas using steam methane reformation (SMR), and the carbon dioxide is captured and stored, mitigating the environmental impact of the production process. On the other hand, grey hydrogen is produced through the same process, but the carbon dioxide is not captured.

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Generally, the lower the environmental impact of the hydrogen, the more expensive it is to produce. However, federal tax incentives, such as the hydrogen production tax credit under Section 45V of the Internal Revenue Code and the investment tax credit under Section 48, and credits available at the state level, such as the California Low Carbon Fuel Standard (LCFS) credits, can help reduce the overall cost.

Another benefit of hydrogen is that it can be produced at a location relatively close to the point of consumption, though some form of transportation to the end user is often required. Pipelines are one option, but existing pipeline infrastructure is largely concentrated in the Gulf Coast and California. Hydrogen can also be transported in compressed form by truck, ship, or barge, but this can be costly.

However, the expansion of hydrogen infrastructure needed for nationwide transportation and distribution is underway through

efforts such as the U.S. Department of Energy's (DOE) Regional Clean Hydrogen Hubs Program and fueling infrastructure funding opportunities.

There are also storage considerations for hydrogen. Storing it as a gas requires high-pressure tanks, while storing it as a liquid requires well-insulated cryogenic storage vessels. Whether hydrogen can be stored onsite depends on several factors, including whether the site can accommodate the equipment needed to store hydrogen. DOE has made available funding to support the research, development, and demonstration of hydrogen storage vessels, hydrogen fueling and transfer components.

Importance of affordable and reliable hydrogen supply

Maintaining an affordable and reliable supply of hydrogen remains one of the most significant issues facing the use of hydrogen and the adoption of fuel cell technologies in decarbonization efforts. The availability, accessibility, and development of hydrogen infrastructure impact the ability to maintain the necessary hydrogen supply at points of end use (e.g., fueling stations), and the end user's confidence in fuel availability and willingness to transition to hydrogen fuel cell powered vehicles or equipment. Hydrogen supply has been one of the main causes for downtime at hydrogen refueling stations.

The regional hydrogen hubs are expected to promote hydrogen supply and encourage the development of hydrogen production plants and infrastructure expansion. As this continues to develop, stakeholders should bear in mind the applicable regulatory requirements and agencies that may exercise jurisdiction over hydrogen infrastructure.

Hydrogen pipelines are subject to the jurisdiction of the Pipeline & Hazardous Materials Safety Administration, Occupational Safety and Health Administration, and EPA. The Federal Energy Regulatory Commission could also assert jurisdiction over hydrogen pipelines and storage facilities, and the Surface Transportation Board could assert its authority to exercise economic regulation over such pipelines.

The eligibility requirements for the Section 45V production tax credit is another important issue for stakeholders. The tax credit provides up to $3 per kilogram of hydrogen to projects with low lifecycle GHG emissions.

Credit availability will turn on how strictly the "three pillars" of (1) temporal matching, (2) additionality or incrementality, and (3) geographic correlation or deliverability will be applied under the forthcoming final guidance and regulations.

The definition of clean hydrogen under the proposed guidance for claiming the Section 45V tax credit imposes strict qualification criteria.

In order for hydrogen to be considered "clean" and eligible for the tax credit, (1) the hydrogen production facility must draw from a generation facility that became commercial (or had an increase in the maximum output that the facility can produce) no more than 36 months before the hydrogen production was placed in service (incrementality), (2) until Dec. 31, 2027, the electricity used to make the hydrogen must be generated in the same year that the hydrogen production facility uses the electricity to produce hydrogen and, beginning on Jan. 1, 2028, the electricity must be generated in the same hour as the electricity that is used by the hydrogen production facility to produce hydrogen (temporal matching), and (3) the electricity must be generated by a source that is in the same geographic region as the hydrogen production facility (deliverability).

While the Treasury Department and IRS consider the nearly 30,000 comments submitted in response to the proposed guidance, the rules set forth in the proposed regulations may generally be relied on for taxable years beginning after Dec. 31, 2022, and before the release of final regulations.

Conclusion

The advancements in hydrogen fuel cell technologies, hydrogen infrastructure, and the market as a whole are expected to drive more widespread adoption of hydrogen fuel cell powered vehicles and an increase in the demand for hydrogen. This transition to less emission-intensive, more climate-friendly transportation options will remain a key focus of global decarbonization efforts and will depend on a variety of factors, including those addressed above.

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About the author

Pamela Wu, a partner at **Morgan Lewis**, represents companies in the energy industry in a range of matters involving rates, market rules and regulation, and energy commodity trading before the Federal Energy Regulatory Commission (FERC) and Commodity Futures Trading Commission (CFTC). She advises clients seeking to reduce their carbon footprint through new infrastructure assets, clean energy technologies, and transacting carbon credits and carbon offsets. An active member of the firm's energy commodity trading and compliance working group, hydrogen working group, electric vehicles working group, and renewables working group, she is resident in the Washington, D.C., office and can be reached at pamela.wu@morganlewis.com.

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