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Hydrogen Sector Needs More Regulatory Certainty

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Hydrogen is having more than just a moment. Consistent announcements for new hydrogen project developments, technological breakthroughs and large investments over the last several years have shown the potential of this largely undeveloped fuel.

Hydrogen and other forms of renewable energy recently got a big boost when President Joe Biden signed the Inflation Reduction Act into law on Aug. 16.[1] Of note, the IRA provides $369 billion in funding for climate change and energy security initiatives, and includes a wide range of tax incentives and tax credits for clean energy — including tax benefits for the production, storage and utilization of hydrogen.[2]

The IRA also provides approximately $70 billion in new funds to the U.S. Department of Energy's Loan Program Office to support U.S. infrastructure and development.[3] Coupled with the applicable funding and tax credits included in the IRA, the promise of hydrogen's vast potential has never been more real.[4]

Hydrogen can leverage renewable resources to produce power when needed most, offer a new form of stored energy — either as hydrogen or converted to ammonia — and provide an alternative, emissions-free fuel[5] to a whole host of sectors within and beyond the energy industry.[6] Moreover, existing infrastructure, which is already designed, built and operating safely and efficiently to move product to market, can, in theory, transport and distribute vast quantities of hydrogen.[7]

Although hydrogen has been making front-page news for several years, the recent passage of the IRA, combined with supply constraints, geopolitical developments and conflicts abroad, rising fuel prices, and continued short- and long-term efforts to address climate change have exponentially intensified the need to explore the possibilities hydrogen offers.[8]

Some notable examples of recent hydrogen announcements, both globally and within the U.S., include:

- Substantial investment commitments by various governments — including the DOE's $8 billion program to develop regional clean hydrogen hubs, called H2Hubs, across the U.S., as part of the Bipartisan Infrastructure Law;[9]

- New technological breakthroughs in which researchers and companies have been able to run 100% hydrogen through traditionally gas-fired turbines;[10]

- Multiple regulated utilities initiating projects to inject green hydrogen into their existing distribution systems;[11] an

- Larger and more ambitious hydrogen development projects coming to fruition, including the world's largest storage facility to be built in Delta, Utah, and the U.S.' largest green hydrogen energy infrastructure system, the Angeles Link, to be built in the Los Angeles region.[12]

Notwithstanding these positive announcements, there are significant obstacles that stand in the way of producing and consuming hydrogen on a large scale. Most importantly, various forms of hydrogen can still be quite expensive to produce, and require significant capital investment.[13]

To overcome these perceived barriers, more must be done beyond hydrogen research, development and investment. Increased market liquidity, stretching beyond local developments and one-off projects with limited end uses, is needed soon.

And while various governments have made significant contributions to date, expecting or asking the federal government to continue to do so long-term is both unrealistic and unwarranted. Instead, what is needed at this juncture is for the government to use other means to help clear the path for hydrogen markets to develop — including opportunities to move hydrogen production to more end-use markets, via existing and new infrastructure.

To even have a chance to fully unlock the potential of hydrogen, the energy industry — including existing hydrogen pipeline companies, investors and financial institutions — needs to know how hydrogen as a more widely used fuel will be regulated on a long-term basis.

Policymakers in the U.S. and globally must make the necessary regulatory investments in hydrogen and its infrastructure to allow the marketplace to decide if significant real-world use of hydrogen as a fuel is practical.[14]

As it stands, there is no clear, much less comprehensive, regulatory road map for interested companies or project developers to use to fully assess the long-term business and regulatory implications of trying to move and distribute large volumes of hydrogen.

To move beyond localized hydrogen projects, the energy industry needs to better understand the regulatory scheme applicable to transporting large amounts of hydrogen. Only then can the market confidently determine where to make long-term investments in a risky, highly leveraged and capital-intensive environment.

The current regulatory regime in the U.S. is scattered, indirect and limited. Because the underlying legislation that regulates other parts of the energy industry — natural gas, oil, power and pipeline facilities, for instance — did not envision hydrogen as a major fuel source, significant gaps exist in hydrogen's regulatory structure.

The primary federal agencies directly positioned to heavily influence the further development of the hydrogen industry and corresponding infrastructure include the DOE, the Federal Energy Regulatory Commission, the Pipeline and Hazardous Materials Safety Administration, the Surface Transportation Board and the U.S. Environmental Protection Agency.

While each of these regulatory bodies has some form of oversight over hydrogen — whether it be for development, deployment or end use — the current regulatory framework only addresses hydrogen indirectly.[15] There is no comprehensive framework in place to regulate hydrogen as a significant fuel source that is consistently transported in large quantities for end-use purposes beyond the industrial sector.

For instance, FERC's regulatory oversight of pipeline companies is both guided and limited by the Natural Gas Act. As the name implies, the legislation and the implementing regulations developed by FERC were intended to regulate natural gas (CH4) — not hydrogen (H2).

While some have argued that hydrogen can be blended with natural gas in small amounts and still be regulated by FERC as natural gas,[16] such theoretical and ancillary regulation of hydrogen is hardly the requisite regulatory scheme that will provide market participants with sufficient assurances underpinning further investment in hydrogen.

Consider, for example, the fact that hydrogen cannot be used on all pipelines, due to the risk of hydrogen embrittlement, particularly on steel.[17] Whether a regulated pipeline utility decides to make a significant investment to modernize or otherwise replace existing facilities to help transport or distribute hydrogen — even if blended with natural gas — requires a thorough understanding of the short- and long-term regulatory implications for such an endeavor.

Simply trying to predict what that regulatory scheme might look like adds unnecessary — and likely untenable — risk to the equation. Market participants cannot and will not make meaningful investments without knowing how and where their investment will be regulated. As it currently stands, the unknowns are too great, and the risks are too high.

A clear decision and corresponding message — via new legislation or formal agency rulings, regulations and orders — must be made to properly allow for further development and long-term commitments to hydrogen at scale.

The energy industry as a whole would benefit from the creation of a central regulatory scheme — whether implemented by FERC, the EPA, PHMSA, the Surface Transportation Board, or the DOE, or as a coordinated effort between different agencies — that clarifies the otherwise scattered regulatory regime that currently exists,[18] and does not disrupt or overburden existing hydrogen facilities and companies, who are similarly unsure of what new or expanded regulatory frameworks may or may not apply to them.

However difficult this task may be, only when it is complete can the energy industry fully analyze where and when to invest large sums of money and the human resources needed to make theoretical hydrogen projects a reality.

Energy companies and other businesses, as well as state governments, are relying on a significant increase in hydrogen end-use consumption as a fuel to meet various net-zero or carbon-neutral goals by 2040 and beyond. Although the industry's ability to utilize hydrogen on a large scale is still unknown, significant production and transportation of hydrogen is a vital and necessary part of achieving a cleaner energy future.

Given the amount of work that needs to be done to promote and facilitate the development of large-scale hydrogen production and consumption, governments and elected leaders — particularly in the U.S. — should be

proactive, and leverage collective experiences based on the existing regulatory scheme for pipeline facilities, both at the state and federal level.

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[1] Inflation Reduction Act of 2022, Pub. L. No. 117-169 (2022).

[2] Among other things, the IRA: creates a new ten-year production tax credit for clean hydrogen projects (up to $3/kg for low carbon hydrogen) and permits taxpayers to elect an investment tax credit in lieu of the PTC; makes energy storage technologies, including hydrogen, eligible for an ITC; and extends the clean vehicle tax credit to hydrogen-fueled vehicles.

[3] The clean hydrogen PTC/ITC, in conjunction with the additional Loan Program Office funding, is expected to quickly spur new and additional investment in clean hydrogen production. The IRA also permits taxpayers to combine the clean hydrogen PTC/ITC with ITCs for renewable power generation and storage. These developments will likely make “green” hydrogen cost competitive with any other form of hydrogen production.

[4] Hydrogen offers the highest energy content by weight of any fuel. See Paul W. Parformak, Cong. Research Serv., R46700, Pipeline Transportation of Hydrogen: Regulation, Research, and Policy 2 (2021).

[5] Not all hydrogen is produced using renewable resources. Because hydrogen does not exist by itself in nature, it must be isolated from other elements by severing the chemical bonds of such elements, such as H20. The process for doing so derives the common color scheme for producing hydrogen from the most to least carbon-intensive: Brown hydrogen is produced predominantly using coal gasification; grey hydrogen is created by steam reforming using natural gas; blue hydrogen utilizes carbon capture of the greenhouse gases produced by grey hydrogen; and green hydrogen is produced via electrolysis from carbon-neutral sources, such as solar, wind and other forms of renewable energy. Hydrogen itself does not produce greenhouse gas when burned.

[6] Currently, the predominant end-use for hydrogen is within the industrial sector, including oil refining, ammonia production, methanol production and steel production. However, long-term end-use opportunities and growth includes utilizing hydrogen fuel cells within the transportation sector (particularly long-haul trucks); burning hydrogen or ammonia in gas turbines (particularly those designed to meet peak demands) within the power sector; and blending hydrogen into existing natural gas networks for end-use purposes within the residential and commercial sectors.

[7] According to the DOE, “there is little doubt that the existing infrastructure of pipelines, compressor stations, and seasonal, subsurface storage can be retrofitted and redeveloped to carry hydrogen gas, whether blended with natural gas or pure.” See DOE, DE-FOA0002400, Financial Assistance Funding Opportunity Announcement: Fossil Energy Based Production, Storage, Transport and Utilization of Hydrogen Approaching Net-Zero or Net-Negative Carbon Emissions 98 (2021).

[8] Even before the conflux of these developments, clean hydrogen was described as enjoying unprecedented political and business momentum. See International Energy Agency, The Future of Hydrogen: Seizing Today’s Opportunities, June 2019, available at: https://www.iea.org/reports/the-future-of-hydrogen.

[9] DOE, DOE Launches Bipartisan Infrastructure Law’s $8 Billion Program for Clean Hydrogen Hubs Across

U.S., June 6, 2022, available at https://www.energy.gov/articles/doe-launches-bipartisan-infrastructure-laws-8-billion-program-clean-hydrogen-hubs-across. In addition, the Bipartisan Infrastructure Law allocated $1 billion for a Clean Hydrogen Electrolysis Program to reduce costs of hydrogen produced from clean electricity and $500 million for Clean Hydrogen Manufacturing and Recycling Initiatives to support equipment manufacturing and strong domestic supply chains.

[10] Such examples include the record announcement from the University of Stavinger in Norway this past May. New Atlas, Researchers Run a Gas Turbine on Pure Hydrogen in World First, June 10, 2022, available at https://newatlas.com/energy/gas-turbine-hydrogen/. Meanwhile in the United States, recent announcements have been made regarding various hydrogen and natural gas blends on larger, advanced-class gas turbines, including Georgia Power's 2.5 GW Plant McDonough-Atkinson facility using 20% hydrogen by volume from a project team that includes Mitsubishi Power, Georgia Power and the Electric Power Research Institute. Power Magazine, Southern Co. Gas-Fired Demonstration Validates 20% Hydrogen Fuel Blend, June 16, 2022, available at https://www.powermag.com/southern-co-gas-fired-demonstration-validates-20-hydrogen-fuel-blend/.

[11] See S&P Global Market Intelligence, New Jersey Resources Starts up 1st East Coast Green Hydrogen Blending Project, Nov. 10, 2021, available at: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/new-jersey-resources-starts-up-1st-east-coast-green-hydrogen-blending-project-67570888.

[12] Reuters, U.S. Agrees $500 Million Loan Guarantee for Utah Hydrogen Storage Project, June 8, 2022, available at https://www.reuters.com/business/energy/us-agrees-500-mln-loan-guarantee-utah-hydrogen-storage-project-2022-06-08/; SoCalGas, Angeles Link: Shaping the Future with Green Hydrogen, available at https://www.socalgas.com/sustainability/hydrogen/angeles-link.

[13] Although estimates vary, prior to the passage of the IRA, green or low-carbon hydrogen was projected to become cost-competitive, relative to other forms of hydrogen, by 2040. Wood Mackenzie, Hydrogen Production Costs to 2040: Is a Tipping Point on the Horizon?, available at: https://www.woodmac.com/our-expertise/focus/transition/hydrogen-production-costs-to-2040-is-a-tipping-point-on-the-horizon/.

[14] As part of the negotiation process in developing the IRA, Democratic leaders agreed to advance comprehensive permitting reform legislation for major infrastructure projects before the end of the fiscal year. A summary of the permitting reform legislation provides that it would establish a list of 25 high-priority energy infrastructure projects that would have to be balanced among various types of energy, including hydrogen. The summary also calls for clarity concerning FERC's jurisdiction over interstate hydrogen pipeline, storage, import and export facilities. Unlike the IRA, the permitting reform legislation will require 60 votes within the U.S. Senate to be approved.

[15] For instance, PHMSA's jurisdictional reach is limited to ensuring that minimum safety requirements are met for pipeline facilities and the transportation of gas, including flammable gas such as hydrogen. See 49 C.F.R. Part 192 (2022).

[16] The Natural Gas Act defines natural gas as "either natural gas unmixed, or any mixture of natural gas and artificial gas." 15 U.S.C. § 717A(5) (2018). Others argue that FERC could regulate hydrogen pipeline facilities — carrying and transporting a fuel product — under the Interstate Commerce Act, or that the Surface Transportation

Board could do so under the Interstate Commerce Commission Termination Act.

[17] Similar considerations include hydrogen's volume requirements, transportation speed, heat content and potential impacts on existing generator facilities, along with the underlying warranties from original equipment manufacturers.

[18] While various state agencies must do the same, some already have a regulatory structure in place. For instance, hydrogen is specifically regulated as a common carrier under the Texas Natural Resource Code. Tex. Nat. Res. Code Ann. § 111.002(6) (2022).

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