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Hydrogen Regulation

Considerations for a Hydrogen Regulatory Framework in the United States

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Executive Summary

"Clean hydrogen will shore up our energy security and independence and ensure that energy workers who've powered our nation for the last century will propel us for the next 100 years."

Jennifer Granholm, U.S. Secretary of Energy

Interest and investment in hydrogen are rapidly gaining traction in the United States (U.S.), largely in recognition of hydrogen's long-term potential as a low-carbon solution for hard-to-electrify sectors, such as heavy duty industry and transportation. Additionally, there is an increasing realization of the tremendous benefits hydrogen can provide as a fuel diversification strategy, including reducing exposure to volatile global energy commodity prices and bolstering energy security and independence. The U.S. federal government has signaled its support for a clean hydrogen economy by injecting billions of dollars in funding to stimulate the industry and demonstrate clean hydrogen's potential. Further, some state governments are beginning to provide incentives like grants and tax credits to attract hydrogen development within their borders.

Despite the U.S.'s increasing interest and investment in hydrogen, the creation of complementary federal and state regulations lags, risking diminishing returns to expansive, taxpayer-funded government initiatives. While private industry has swooped in to take advantage of this generational funding opportunity, there is increasing acknowledgment that broader commercialization will require greater certainty around the regulatory landscape and market rules. The concept of "regulatory certainty" is a cornerstone of the long-standing regulatory compact established for investor-owned electric, gas, and water utilities. Regulatory certainty asserts that the regulator will grant the utility an exclusive right to operate in a particular area in exchange for providing non-discriminatory service to all interested customers in its service territory. Further, in exchange for the utility offering prices (i.e., rates) and services that promote safety, reliability, resilience, and affordability, the regulator permits the utility to earn a reasonable rate of return on its investments to serve customers. This latter component is particularly crucial in the context of the emerging hydrogen sector, as the assurance of cost recovery could induce utilities to invest large sums in infrastructure to produce, store, and transport hydrogen from supply regions (e.g., hydrogen hubs and areas with excess renewable energy supply) to demand centers (e.g., industrial clusters). Providing regulatory certainty has been key to developing foundational sectors of our economy (i.e., electric, natural gas, and water utilities) over the past century, raising the question of whether a similar regulatory framework is needed in the U.S. for hydrogen.

Guidehouse ultimately concludes that, while there are strong arguments both for and against regulating hydrogen as a public utility service, a well-defined and consistent regulatory framework is needed to support long-term hydrogen sector growth. Absent further policy and regulatory intervention that enables extensive infrastructure investment, hydrogen sector growth is likely to stall, risking the loss of momentum gained in recent years and leaving the U.S. behind other global hydrogen leaders, such as the European Union (E.U.). We also find that for a hydrogen regulatory framework to prove successful, it must address the fundamental financial challenge facing the industry and provide regulatory certainty for developers. In the coming years, it will be critical for federal, state, and local governments to work together to construct a robust hydrogen regulatory framework that supports growth, while also protecting consumer interests and meeting long-term policy objectives.

Guidehouse Recommendations on Hydrogen Regulation in the U.S.

Federal Leadership is Paramount for Ensuring Regulatory Consistency

States Should Act Toward Regulating Hydrogen as a Public Utility Service to Provide Regulatory Certainty

Hydrogen Sector Collaboration is Critical to Achieving Mutually Beneficial Outcomes

International Developments Should be Monitored for Lessons Learned, Best Practices, and Alignment

Is There a Need for Regulation?

Federal and state governments have made some inroads concerning the regulation of hydrogen production, storage, and transportation, but regulatory authority is currently scattered, inconsistent, and generally lacking in depth. As with any emerging industry, questions over what regulations, if any, are needed arise naturally. While the need to regulate hydrogen for safety reasons is unquestionable, the need to regulate hydrogen as a public utility service, including rate regulation, is more subject to debate. In this section, we discuss the arguments for and against regulating hydrogen as a public utility service, with consideration of the unique financial challenges facing the nascent industry and the potential benefits of regulatory certainty.

Arguments for Regulation

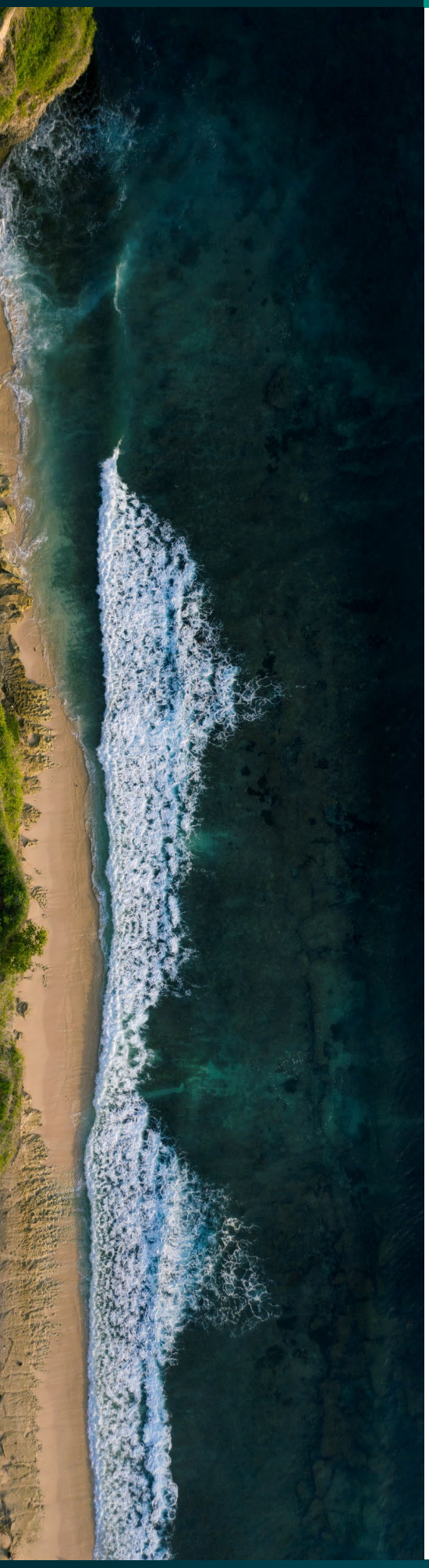
Those who support regulating hydrogen as a public utility argue that the hydrogen ecosystem (i.e., production, storage, and transport) shares the following characteristics, dynamics, and relationships with currently regulated public utility services, particularly electric and gas utilities.

1. Capital-Intensive Industries – Hydrogen production, storage, and transport are all capital intensive and require significant infrastructure investment to reliably connect supply to end-users. This in and of itself creates a significant barrier to entry, as there is significant investment risk absent some degree of regulatory certainty on cost recovery and return on investment.
2. Essential Good – While initial hydrogen consumers are likely to be larger commercial and industrial customers, the long-term need for affordable, reliable, and clean energy suggests that, in the future, hydrogen could become an essential good that necessitates consumer protections, particularly around pricing.
3. Siting and Permitting Barriers – As with utilities, hydrogen development efforts may be hindered by siting and permitting hurdles. Policies and regulations at the federal, state, and local levels can help overcome these challenges. Examples of such policies and regulations include granting hydrogen developers eminent domain authority, like that of natural gas utilities today, and establishing procedures that support inter-agency coordination to streamline regulatory approval processes.
4. Interdependencies with Other Utilities – Potential interdependencies exist between the hydrogen sector and already regulated natural gas and electric utilities.

Arguments Against Regulation

Those who oppose hydrogen regulation as a public utility service argue that the market needs time to mature before imposing such a regime, particularly in the case of rate regulation. Regulating hydrogen as a public utility service could stifle near-term growth and innovation by increasing costs, extending development timelines, and imposing additional hurdles.

1. Nascent Industry – Implementing a new, likely complex regulatory framework for hydrogen, considering that there is little precedent today, could introduce unforeseen risks that could take years, if not decades, to unwind. In a June 2023 congressional hearing, FERC Commissioner James Danley cautioned against granting FERC authority over hydrogen, stating, "I would generally advise you not to advise nascent industries, especially those that you actually wish to promote, to the full panoply of federal regulation immediately."
2. Similarity to Liquid Fuels – It is important to recognize that hydrogen is likely to be consumed in a manner unique from how electric, gas, and water utility services are consumed today. It is anticipated that early hydrogen users will be large industrial users, who are familiar with navigating liquid fuel markets. This suggests that the central purpose of rate regulation, protecting residential and small-commercial customers from unreasonably high prices, is less relevant to the hydrogen sector today.



U.S. Current State

In the U.S., the prevailing hydrogen regulatory regime is relatively limited in scope (compared to more established energy sectors such as oil, gas, and electric), comprising a patchwork of safety, emissions, and pricing rules overseen by a string of federal agencies. Today's hydrogen framework can be characterized as primarily focused on maintaining public health and safety in the design, construction, operation, and maintenance of hydrogen assets. There is currently almost no oversight of end-use consumer protections from pricing or quality of service perspectives.

Federal Safety

Today, federal agencies ensure that adequate controls are in place to safely transport, store, and deliver hydrogen. In accordance with the Natural Gas Pipeline Safety Act of 1968 and Hazardous Liquid Pipeline Safety Act of 1979, the U.S. Department of Transportation (DOT) has primary authority to regulate the safety of interstate and intrastate energy commodity pipelines, including that of hydrogen, which is classified as a flammable gas by federal standards. Such duties are executed by the DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA), which currently regulates about 700 miles of hydrogen pipelines in the U.S.

Federal Emissions

In addition to administering safety rules, federal agencies have also set regulations for emissions generated by hydrogen activities. Considering that hydrogen can be produced from a variety of resources with varying degrees of carbon intensity (e.g., natural gas, biogas, wind, solar), the U.S. Environmental Protection Agency (EPA) governs hydrogen production facilities and their associated GHG emissions. Through 40 CFR Part 98, the EPA requires hydrogen production facilities to file annual reports containing data on carbon dioxide, methane, nitrous oxide, and other GHG emissions.

Federal Pricing & Rates

Federal agencies provide limited economic regulation over interstate hydrogen pipelines today. Under the Interstate Commerce Commission Termination Act of 1995, the Surface Transportation Board (STB) has statutory authority to establish rates and rules for the interstate transportation of all commodities other than water, natural gas, and oil, which are regulated by the Federal Energy Regulatory Commission (FERC). As a result, hydrogen pipeline rate regulation currently falls under the STB's jurisdiction. However, the STB's regulatory reach is narrow and informal. Compared to FERC-jurisdictional entities, hydrogen pipeline operators are not required to engage in a traditional rate-setting process, in which they file tariffs and justify the "just and reasonable" nature of their proposed rates. Instead, the STB merely provides a forum to resolve disputes on an ad hoc basis. Parties may petition the STB to challenge operators' rates or terms of service, but barring any complaints, regulatory oversight is limited.

State Regulations

Some states are beginning to explore the development of policies and regulations for the hydrogen sector, but today these efforts are limited in scope. Currently, no state has developed a comprehensive framework for the regulation of hydrogen as a public utility service in the same manner that natural gas, electric, and water utilities are regulated today.

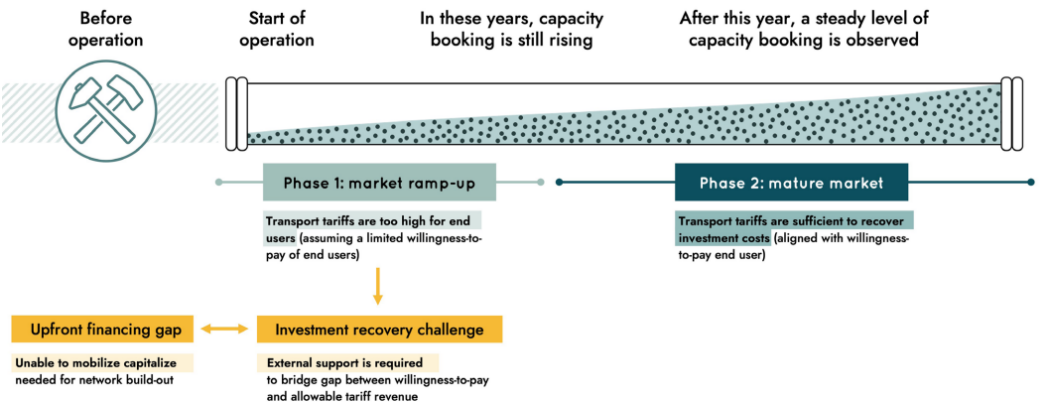
Case Study

European Hydrogen Backbone

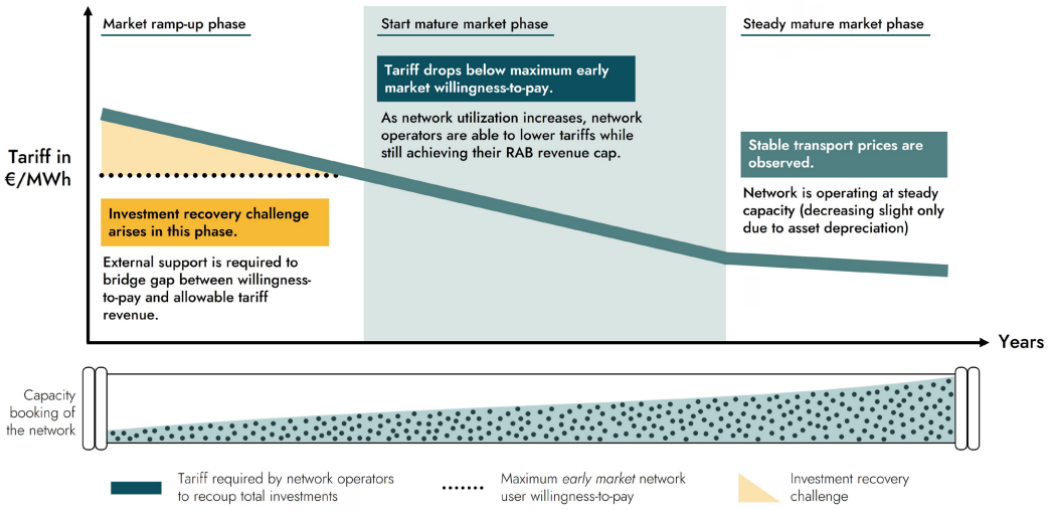
Beyond its similarity to currently regulated public utilities, the build-out of a novel hydrogen infrastructure network presents a unique financial challenge, suggesting that policy and regulatory intervention is needed to support such early-stage market development. Understanding this challenge is key to developing a hydrogen regulatory framework that facilitates rather than hinders growth. Fundamentally, prospective hydrogen developers face a classic "chicken and egg" economic problem. Dedicated hydrogen infrastructure is needed to connect hydrogen supply with consumer demand, as well as to ultimately build consumer confidence in hydrogen as an energy carrier. However, recovery of the significant hydrogen infrastructure build-out costs relies on high utilization of those assets and assurance that developers can recover their costs, including a reasonable return on investment. As a result, near-term external financial support may be required to avoid penalizing proactive early adopters with high hydrogen tariffs. Essentially, what we see with the hydrogen sector is the type of market imbalance that governments often step in to address.

Guidehouse examined this financial challenge in the context of the European Hydrogen Backbone (EHB). We found that while the EHB is projected to be financially self-sustaining in the long term, there is significant investment risk during the development phase, when demand is gradually increasing but still relatively low. This phase presents an *investment recovery challenge* when early-market tariff revenues are not able to match the full revenue allowed by regulators (assuming traditional gas cost recovery rules) due to the still-developing user base. This challenge occurs *after* the capital expenditures required to bring the network into operation. This investment risk can result in an "upfront financing gap" for hydrogen, as developers are unable to attract sufficient capital to develop the hydrogen ecosystem. The following figures illustrate this issue.

Hydrogen Sector Financial Challenge



Tariff Required to Realize Regulated Return Across Different Financial Phases



Source: *EHB Implementation Roadmap – Cross Border Projects and Costs Update* (prepared by Guidehouse). November 2023. Located at: https://ehb.eu/files/downloads/EHB-2023-20-Nov-FINAL-design.pdf.

Conclusion and Recommendations

While supportive hydrogen policies enacted at the federal level and in some states are driving initial exploration and investment in limited-scale hydrogen development (e.g., clean hydrogen hubs and hydrogen demonstration projects), broader commercialization is being hindered by a lack of regulatory certainty. Considering the balance of arguments for and against, **we believe that regulation of hydrogen as a public utility service is needed to support long-term hydrogen sector growth**. Absent this type of policy and regulatory intervention, hydrogen sector growth could stall, risking momentum gained through taxpayer-funded initiatives to be lost.

For a hydrogen regulatory framework to prove successful, it must address the fundamental financial challenges faced by hydrogen as a nascent industry and provide regulatory certainty to hydrogen developers and the capital markets that support them. Federal, state, and local governments must work together to construct a consistent regulatory framework that supports growth of the hydrogen sector while protecting consumer interests. To further these objectives, Guidehouse provides the following recommendations regarding future hydrogen regulation in the U.S.:

Federal Leadership is Paramount for Ensuring Regulatory Consistency – FERC, DOE, PHMSA, EPA, and other relevant federal agencies should move swiftly to collaborate with hydrogen industry members to establish a harmonious hydrogen regulatory framework that considers the unique, but complementary roles of federal, state, and local governments.

States Should Act Toward Regulating Hydrogen as a Public Utility Service to Provide Regulatory Certainty – State legislatures should consider granting authority to state utility regulators to develop and enforce hydrogen sector regulations. At a minimum, state legislatures should direct and provide funds for utility regulators and state energy offices to study the potential need for and design of hydrogen regulations.

Hydrogen Sector Collaboration is Critical to Achieving Mutually Beneficial Outcomes – Hydrogen market players, such as developers, carriers, and end-users, should work collaboratively to advocate for policies and regulations that support industry growth and market maturity while also protecting consumer interests. Focus is needed on addressing the industry's fundamental financial challenges, with the consideration of policies and regulations including:

- Allowing hydrogen developers to defer recovery of their infrastructure costs until the market sufficiently matures
- Developing policy mechanisms and regulatory regimes, such as grants, subsidies, or guaranteed revenues, that provide assurance for cost recovery and a reasonable return on investment as the industry matures and demand increases
- In applicable jurisdictions, providing subsidies to the hydrogen sector through carbon market revenues to make pricing more attractive to consumers as the industry matures and costs decline
- Cross-sector policies and regulations that help streamline permitting, reduce operating costs, address market barriers to clean hydrogen production, and promote hydrogen blending into natural gas supplies to spur the market

International Developments Should be Monitored for Lessons Learned, Best Practices, and Alignment – Relevant federal and state agencies should establish processes to monitor international developments, particularly those in the E.U., for lessons learned and best practices, as well as build information-sharing relationships with E.U. regulators. As hydrogen will be a global commodity, it is critical that U.S. policy aligns with global market developments.

ABOUT GUIDEHOUSE

Guidehouse is a leading global provider of consulting services to the public sector and commercial markets, with broad capabilities in management, technology, and risk consulting. By combining our public and private sector expertise, we help clients address their most complex challenges and navigate significant regulatory pressures focusing on transformational change, business resiliency, and technology-driven innovation. Across a range of advisory, consulting, outsourcing, and digital services, we create scalable, innovative solutions that help our clients outwit complexity and position them for future growth and success. The company has more than 16,000 professionals in over 55 locations globally. Guidehouse is led by seasoned professionals with proven and diverse expertise in traditional and emerging technologies, markets, and agenda-setting issues driving national and global economies. For more information, please visit guidehouse.com.

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