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EBA BRIEF

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Jurisdiction Over Hydrogen Pipelines and Pathways to an Effective Regulatory Regime

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I. Introduction

Hydrogen is expected to play a significant role in the nation's energy transition, but the development of the hydrogen market may be hindered by uncertainty over how pipelines that transport hydrogen will be regulated. No statute expressly provides for federal regulation of the construction or siting of interstate hydrogen pipelines, or their rates or services. However, three existing statutes could be construed to confer such jurisdiction. These include the Natural Gas Act, the Interstate Commerce Act, and the Interstate Commerce Commission Termination Act.

The article concludes that hydrogen is most logically classified as "artificial gas" under the Natural Gas Act, over which the Federal Energy Regulatory Commission (FERC or Commission) has jurisdiction only if it is blended with "natural gas" on interstate pipelines. Alternatively, FERC could assert more expansive jurisdiction over hydrogen as "natural gas" in its own right, but this would be susceptible to judicial challenges.

Finally, this article offers parameters for an effective regulatory regime that would encourage growth of the hydrogen market while providing rate protection to consumers and discusses regulatory and legislative pathways for implementing it.

ON THE DOCKET

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II. Background

It is expected that if a major hydrogen economy develops, substantial amounts of hydrogen will be transported by pipeline, both via blending into existing natural gas pipelines and in hydrogen-only pipelines.[1] Currently, there are approximately 1,600 miles of hydrogen pipelines in the United States, primarily serving refineries and ammonia plants in the Gulf of Mexico region.[2] Presently, rates and services for transportation on these pipelines are not regulated by any federal agency.[3]

Nonetheless, interstate hydrogen pipelines could be subject to one of the following statutes:

(1) the Natural Gas Act (NGA),[4] which requires FERC to regulate the interstate transportation of natural gas;
(2) the Interstate Commerce Act (ICA),[5] which requires FERC to regulate the interstate transportation of oil; or
(3) the Interstate Commerce Clause Termination Act (ICCTA), which requires the Surface Transportation Board (STB) to regulate the interstate transportation of "a commodity other than water, gas, or oil."[6]

The division of jurisdiction over different commodities is fairly straightforward. To paint with a broad brush: The NGA governs gases that can be used for energy. The NGA gives FERC jurisdiction over "natural" gas and any "artificial" gas that is blended with "natural" gas but exempts from federal regulation any "artificial" gas that is not blended with "natural" gas. Liquid sources of energy are regulated by FERC under the ICA, with the major exception of liquefied natural gas (LNG), which is regulated under the NGA.[7] Non-energy commodities are regulated by the STB under the ICCTA. While the foregoing summary conveys the big picture, the terms "natural gas," "oil," and "a commodity other than water, gas, or oil" each have their own wrinkles, discussed herein.

III. The Natural Gas Act

A. Overview of the Natural Gas Act and How It Would Affect Hydrogen Pipelines

The NGA gives FERC authority over the "transportation of natural gas in interstate commerce."[8] Under the NGA, FERC regulates interstate natural gas

pipelines from cradle to grave. To construct new interstate gas facilities, a company must obtain a certificate of "public convenience and necessity" from FERC, which, once granted, gives the company eminent domain authority.[9] Critically, this allows a pipeline company to condemn private property along its right-of-way (for its fair value) and repurpose it for construction and operation of the pipeline.

Interstate natural gas pipeline companies must file tariffs with FERC setting forth their rates and terms and conditions of service, all of which FERC must find "just and reasonable."[10] These pipelines must provide service on an open-access basis, without engaging in "undue prejudices or disadvantages" or unduly discriminating among different classes of customers.[11]

FERC could assert jurisdiction over interstate hydrogen pipelines under the NGA. The NGA defines "natural gas" as "either natural gas unmixed, or any mixture of natural and artificial gas."[12] As discussed in more detail below, "natural gas" could be construed to include hydrogen, or, more likely, hydrogen could be viewed as "artificial gas," which would be subject to the NGA only if blended with natural gas.

If hydrogen is deemed to be "natural gas," a FERC certificate of public convenience and necessity would be required for the construction of a hydrogen pipeline, and this certificate would vest the pipeline with the right of eminent domain. Operators of all interstate hydrogen pipelines would be required to charge just and reasonable rates and could be required to maintain public tariffs setting out their terms and conditions of service. NGA regulation would subject pipeline operators to FERC enforcement action for violations of NGA requirements, which could include civil penalties. As discussed in section VII below, however, FERC could waive most of the economic regulations under the NGA and permit hydrogen pipelines to charge "market-based" rates.

Alternatively, if hydrogen is deemed to be "artificial gas" it would be subject to the NGA only if it was mixed with "natural gas" on an interstate pipeline. As explained below, this classification applies to several other substances, including "renewable natural gas" that is derived from landfills and animal waste, as well as vaporized ethane and propane. Pipelines transporting such substances are not subject to FERC jurisdiction until the point at which they connect to an interstate natural gas pipeline.

If hydrogen is deemed to be "artificial gas," a company could construct a pure hydrogen pipeline without coordinated federal oversight regarding construction, siting, rates, or services. Such pipelines would be subject to state regulation. While some states confer the right of eminent domain to hydrogen pipelines,[13] most states do not regulate hydrogen pipelines. These pipelines also could be subject to federal permitting requirements under the Clean Water Act, Endangered Species Act, National Historic Preservation Act, and other federal laws. Depending on a given project's route, requirements under these statutes could include, for example, authorization from the Army Corps of Engineers for water crossings and permits for crossings of federal lands from the Bureau of Land Management.

Because the NGA covers "***any mixture*** of natural and artificial gas,"[14] an interstate hydrogen pipeline would become subject to the NGA if it were to carry even a small amount of natural gas. There is no *de minimis* exception to FERC's jurisdiction under the NGA.[15] As such, if hydrogen is viewed as "artificial gas," a company planning to build an interstate hydrogen pipeline could become FERC-jurisdictional by including a small amount of natural gas in its system.

B. Determining Whether a Substance Is Covered by the Natural Gas Act

1. "Natural Gas" Under the Natural Gas Act

While gas regulated under the NGA (both natural and artificial) historically has been comprised primarily of methane, the NGA's definition of natural gas has never been limited to gas of any particular chemical composition.[16] As commonly defined, "natural gas" includes not only methane that is produced from the earth, but also the other "liquefiable" constituent elements produced along with it, such as ethane, propane, and butane.[17] These "liquefiables" are processed and removed from the gas stream and are sold separately. This full stream of gas constitutes "natural gas" under the NGA, but the liquefiables, once removed, are no longer "natural gas."[18]

Other elements that are unrelated to the typical production of methane could be regarded as "natural gas" as well. For example, helium could have been viewed as "natural gas," but Congress exempted it from coverage under the NGA in the Helium Act of 1960, which specifically provides that helium is not subject to

FERC's jurisdiction under the NGA.[19] If "natural gas" was limited to methane, there would have been no need for Congress to exempt helium from the NGA.[20]

In parsing the definition of "natural gas" under the NGA, the Commission and the courts have looked to (a) commonplace understandings and dictionary definitions of the term, and (b) whether regulation of a particular substance is consistent with the goals and purpose of the NGA.

Commonplace Understandings and Dictionary Definitions

In determining that "natural gas" includes the full stream of gas produced from the earth rather than just methane, the Commission has considered the commonplace understanding of the term from the time the NGA was passed.[21] The Commission has rejected the argument that "natural gas" must be limited to the type of gas generally transported in interstate transmission lines, which is made up primarily of methane. Instead, the Commission has concluded that when Congress passed the NGA, it was not contemplating gas with "a particular chemical structure," but rather, viewed all gas that was "not artificial" as "natural."[22]

Definitions of "natural gas" in dictionaries and trade sources have supported the Commission's view that "natural gas" is typically, but not necessarily, methane. In finding that LNG is "natural gas" within the meaning of the NGA, the Commission has cited to *Boone's Petroleum Dictionary*, which defined "natural gas" broadly as "a mixture of gaseous hydrocarbons found in nature."[23] The Commission "has not defined natural gas by weight or composition of gases, and [has] specifically declined to do so."[24]

The "Goals and Purpose" of the NGA

In determining what constitutes "natural gas," the Commission has given primacy to the "goals and purpose" of the NGA over the chemical makeup of a given substance. In *Cortez Pipeline*, the Commission granted a petition for a declaratory order clarifying that its NGA jurisdiction would not attach to a carbon dioxide pipeline that would be used to facilitate enhanced oil recovery. The Commission's analysis started with the common understandings and dictionary definitions of the term and found it likely that at the time the NGA was passed, Congress understood "natural gas" to refer to "a mixture of gases, including a sufficient component of hydrocarbons to give it heating value."[25]

But rather than focusing on carbon dioxide's chemical makeup, the Commission looked more broadly, finding that its jurisdictional status "should be determined primarily by reference to the goals and purposes of the NGA."[26] The Commission explained that the goal of the NGA was to protect consumers against "exploitation at the hands of the natural gas companies," particularly due to "excessive rates and charges."[27] As applied to the *Cortez* carbon dioxide pipeline, the Commission concluded that assuming jurisdiction over the project "would advance no goal or purpose of the NGA."[28]

Similarly, the Commission's 1972 decision[29] that LNG is "natural gas" within the meaning of the NGA was supported by considerations regarding the purpose of the NGA:

> Failure to regulate LNG as natural gas would hinder the Commission in its ability to balance the needs of the natural gas industry with those of the consuming public dependent upon reliable supply and equitably priced natural gas. As LNG distribution becomes widespread, the underlying statute's effectiveness would be destroyed if it were not regulated in the same manner as other natural gas.[30]

Consideration of the goals and purpose of the NGA has also supported findings that the Commission has authority to regulate the helium portion of natural gas while it remains mixed with the broader gas stream, but not after its separation. For example, notwithstanding the Helium Act (discussed above), the U.S. Court of Appeals for the Eighth Circuit found that "natural gas" includes the helium component of the gas stream prior to its separation and that exempting helium while it remains within the broader gas stream would weaken the Commission's ability to protect consumers under the NGA.[31]

Ultimately, "natural gas" typically has been understood to be methane because that has been the primary component of the gas stream transported in the natural gas grid. Nevertheless, FERC has left the door open to considering whether other substances also may be classified as "natural gas" in light of the "goals and purpose" of the NGA.

2. "Artificial Gas" Under the Natural Gas Act

The NGA also addresses "artificial gas," which is subject to FERC's jurisdiction under the NGA only if mixed with "natural gas." Because section 2(5) of the NGA defines "natural gas" to mean "either natural gas unmixed, or any mixture of natural and artificial gas,"[32] artificial gas is only subject to the NGA if blended into the natural gas stream. Facilities carrying artificial gas are non-jurisdictional until the point at which they connect to an interstate natural gas pipeline facility; for instance, at tap and valve facilities.[33] Likewise, pipeline services for transportation only of "artificial gas" are not jurisdictional until the artificial gas is mixed with natural gas in interstate commerce.[34] Until then, the facilities that transport artificial gas and the services provided therefrom are subject to state regulation.

FERC has deemed several substances to fall within the category of "artificial gas." These include:

- methane created from coal[35] and naphtha feedstock,[36] and off-gases made from crude oil;[37]
- substances that are removed from the natural gas stream as liquids, processed, and later regasified and injected into the natural gas pipeline grid, such as propane[38] and ethane;[39]
- gasified waste products (which are now referred to as "renewable natural gas"), including gas generated from the decomposition of organic waste in landfills (landfill gas)[40] and gas derived from animal waste.[41]

The primary distinction between "natural" and "artificial" gas is that artificial gas is manufactured, while natural gas exists, well, naturally. The Commission has emphasized that artificial gas is "artificially created by the agency of man."[42] In *Algonquin SNG*, the Commission found that methane produced from naphtha feedstock was "artificial," rather than "natural" gas, because its production involved "a manufacturing process wherein the molecular structure of the components of the feedstock are rearranged and transformed.[43] In *Henry v. FPC*, the U.S. Court of Appeals for the District of Columbia Circuit upheld Commission determinations that synthetic gas manufactured from coal was "artificial gas," because it was "a wholly manufactured product."[44]

The Commission has rigorously applied the artificial/natural distinction, even when the goals and purpose of the NGA might support regulation of pipelines transporting "artificial gas."[45] In categorizing coal-derived gas as "artificial gas," the Commission

rejected the suggestion that "a need for regulation [can] fill a jurisdictional gap."[46] In affirming this decision, the D.C. Circuit noted that in the event a large industry were to emerge for such gas, Congress would need to decide "whether, to what extent, and by which agency, if any, it should be regulated."[47]

C. Assessment of Arguments for Regulation of Hydrogen Under the Natural Gas Act

Hydrogen is transported in pipelines in gaseous form, and this supports its regulation under the NGA (either as "artificial" or "natural" gas) rather than the ICA, which governs transportation of liquids. FERC could view hydrogen as "artificial gas" and jurisdictional under the NGA only when blended with natural gas in interstate pipelines. Alternatively, FERC could deem hydrogen to be "natural gas" in its own right and regulate it identically to other natural gas transported on the interstate pipeline grid.

Some recent precedent suggests that FERC views hydrogen as "artificial gas" rather than "natural gas." In *Magnum Gas Storage, LLC*, issued in April 2020, FERC approved the abandonment of a natural gas storage facility that the applicant stated would likely be used for hydrogen storage following abandonment.[48] FERC presumed that hydrogen storage was "non-jurisdictional," albeit without explanation.[49]

Subsequent to *Magnum Gas Storage*, in response to questions from Senator Martin Heinrich, FERC Chairman Richard Glick stated that FERC "has authority under the [NGA] over hydrogen blending with natural gas on interstate pipelines."[50] Chairman Glick did not state whether he viewed hydrogen as "artificial" or "natural" gas. His letter only addressed hydrogen that is blended with natural gas, and thus, his statement does not clarify whether he views hydrogen as NGA-jurisdictional when being transported independently of natural gas. Particularly when read in conjunction with the Commission's apparent disclaiming of jurisdiction over pure hydrogen transportation and storage in *Magnum Gas Storage*, Chairman Glick's letter supports a view of hydrogen as "artificial gas," subject to FERC's jurisdiction only when blended with natural gas.

Methods of hydrogen production also support its characterization as "artificial gas."[51] Hydrogen that is transported via pipelines is "artificially created by the agency of man."[52] While hydrogen is the most abundant element in the universe,[53] it is found mostly as a compound with other elements and must be extracted from these sources.[54] Today, 95% of hydrogen production comes from steam-methane reforming, in which high-temperature steam (700°C–1,000°C) is applied at high pressure to produce hydrogen from a methane source.[55] Hydrogen also can be produced through electrolysis, in which electricity is applied to split water into hydrogen and oxygen.[56] Regardless of how hydrogen is produced, it seems to involve a "manufacturing process"[57] in which its molecular structure is "rearranged and transformed,"[58] as the hydrogen molecule must be separated from other molecules to which it is attached. This supports the conclusion that hydrogen should be considered an "artificial" gas rather than a "natural" one.

FERC nevertheless could decide to characterize hydrogen as "natural gas" in its own right. The reasoning to support such a position appears to be more attenuated, and FERC would need to reconcile such a position with the precedent discussed above. The strongest argument for viewing hydrogen as natural gas is FERC's practice of demarking its jurisdiction under the NGA in light of the statute's goals and purpose.[59] The NGA was meant to protect consumers against price exploitation from natural gas companies. It also was meant to provide for efficient construction and siting of natural gas pipelines,[60] and, particularly in light of FERC's duties under the National Environmental Policy Act (NEPA), has been characterized as requiring FERC to balance the need for gas pipeline infrastructure against the adverse environmental impacts associated with such infrastructure.[61]

FERC's practice of considering the "goals and purpose" of the NGA to inform the reach of its jurisdiction thereunder could support the extension of its NGA jurisdiction to hydrogen. Hydrogen may emerge as a major heating and transportation fuel that could displace substantial amounts of natural gas. Arguably, failure to regulate hydrogen transportation under the NGA could undermine the NGA's effectiveness if captive customers of historically gas-dependent utilities begin to be served with hydrogen. As such, the same consumer protection considerations provided in the NGA apply to hydrogen transportation as well. Further, expedited construction of new hydrogen pipelines could help utilities comply with national, state, and local greenhouse gas emissions goals.[62] Application of the NGA to hydrogen pipelines, along with the environmental protection provided by the FERC

certification process and the right of eminent domain that accompanies it, would facilitate efficient and NEPA-compliant siting and construction of these facilities. FERC could attempt to rely on the similarity of uses between natural gas and hydrogen to support its regulation of both substances under the same statute.

Consideration of how hydrogen's regulation affects competition and energy markets would also support classifying it as "natural gas." In addition to being transported independently on pipelines, hydrogen will be transported on natural gas pipelines. It will compete with natural gas (not oil) for pipeline capacity and directly affect the transportation price of natural gas. Thus, the NGA's consumer protection mandates support regulation of hydrogen under the NGA.

However, FERC has only been willing to stretch the definition of "natural gas" so far.[63] Although hydrogen is a *naturally* occurring element that exists as a *gas* at standard temperature and pressure, it is not commonly understood to be "natural gas." This factor alone would make it difficult for FERC to classify hydrogen as "natural gas." Furthermore, FERC stated on one occasion that "natural gas" must be a "hydrocarbon",[64] and, although most hydrogen today is manufactured from natural gas, hydrogen itself is not a hydrocarbon.

While the NGA's goals and purpose could support classification of hydrogen as "natural gas," these statutory goals would apply similarly to other substances that have been deemed "artificial," rather than "natural" gas. For instance, coal-derived synthetic natural gas competes with natural gas, is transported in the same pipelines as natural gas, and affects the transportation price of natural gas. Nonetheless, FERC has deemed coal-derived synthetic natural gas to be "artificial gas," and the D.C. Circuit upheld that finding in *Henry v. FPC*.[65] The court's reasoning in that case could apply similarly to hydrogen: "[t]he need for regulation cannot, of its own force, expand the reach of Commission jurisdiction."[66]

IV. The Interstate Commerce Act

A. Overview of the Interstate Commerce Act and How It Would Affect Hydrogen Pipelines

The ICA provides FERC with jurisdiction over rates and services of oil pipelines. While oil pipelines' rates are subject to the same "just and reasonable" standard as natural gas pipelines, FERC imposes lighter-handed rate regulation over oil pipelines than natural gas pipelines.[67] Oil pipelines must file tariffs providing "just and reasonable" terms and conditions of service[68] and may not unduly discriminate among different customers in providing service.[69] Unlike natural gas pipelines, oil pipelines are "common carriers," meaning they normally must reserve some portion of their capacity—typically 10%—for "walk up" shippers that do not have long-term contracts with the pipeline.[70]

Importantly, unlike the NGA, the ICA does not provide for federal regulation of the construction and siting of pipelines.[71] Instead, oil pipelines must obtain state and local authorizations for construction and siting. As discussed below, this is a critical difference that makes the ICA poorly suited for effective regulation of hydrogen pipelines.

B. Determining Whether a Substance Is Covered by the Interstate Commerce Act

The most basic distinction between substances regulated under the NGA and ICA is that the NGA covers gases while the ICA covers liquids.[72] "Liquefiables" remain subject to the NGA while in gaseous form as part of the greater gas stream but become subject to the ICA once removed and liquefied. Ethane and naphtha, for instance, are regulated as artificial gases under the NGA when transported as a gas, but under the ICA when transported as a liquid.[73] The major exception to this distinction is LNG, which, despite being a liquid, is regulated under the NGA due to the NGA's emphasis on methane, because it is transported in gaseous form on interstate natural gas pipelines, and due to the market consequences that would result from failure to regulate LNG as natural gas.[74]

Interpretation of which liquids constitute "oil" under the ICA requires reference to the Department of Energy (DOE) Organization Act of 1977 (DOE Act), in which Congress transferred authority over the "transportation of oil by pipeline" from the Interstate Commerce Commission (ICC) to FERC.[75] The transfer of jurisdiction over oil pipelines to FERC was part of Congress's broader effort to "assur[e] coordinated and effective administration of Federal energy policy and programs."[76] Legislative history describes a purpose of the DOE Act—"to bring together in the Department of Energy all of the major energy programs in the Federal Government, including those programs relating to economic regulation of energy supply systems."[77]

The Commission has relied on the DOE Act's legislative history to define "oil" expansively to include "crude and refined petroleum and petroleum by-products, derivatives or petrochemicals."[78] In addition to petroleum products like gasoline, jet fuel, and diesel, this includes the "liquefiables" removed from the natural gas stream such as liquid ethane, propane, and butane, which are known as "natural gas liquids."[79]

When FERC is determining whether a substance qualifies as "oil" under the ICA, the analytical approach is similar the jurisdictional analysis under the NGA. FERC does not limit its inquiry to dictionary definitions. Rather, it looks more broadly to the ICA's goals and purposes, as informed by the DOE Act. For instance, FERC has found that anhydrous ammonia, an agricultural fertilizer derived from natural gas or petroleum refinery gas, is not subject to the ICA because it is not used for energy-related purposes.[80] Rather than applying a "hypertechnical" analysis of whether the substance was a petrochemical, FERC focused on whether there were "practical" reasons for asserting jurisdiction, emphasizing "the overall purposes of the DOE Act and acting in a manner that facilitates the purposes of that Act."[81] FERC highlighted the DOE Act intention for the same entity to regulate substances that compete with one another in markets and for pipeline capacity. It also noted that because anhydrous ammonia is not transported on pipelines that carry other commodities, it was unlikely to affect the costs of transporting other commodities or raise issues of pipeline cost allocation.[82]

Ethanol, on the other hand, is regarded as an "oil," notwithstanding that it is not a "petroleum by-product, derivative, or petrochemical."[83] In finding that ethanol is jurisdictional under the ICA, FERC did not discuss ethanol's physical composition. Instead, FERC focused on ethanol's use for energy-related purposes, the costs its transportation would have on energy markets, and the fact that it competes with "oils" for the same pipeline capacity.[84]

While FERC has not applied a consistent test to determine whether to assert ICA jurisdiction over different substances,[85] the big picture is clear: pipeline transportation energy-related liquids generally is regulated under the ICA.

C. Assessment of Arguments for Regulation of Hydrogen Under the Interstate Commerce Act

It has been argued that hydrogen should be considered "oil" under the ICA because it typically is manufactured from natural gas (and thus is a petroleum by-product or petrochemical) and can be used for energy.[86] This argument has major weaknesses. "Oil" refers to liquids, not gases. When in gaseous form, "petroleum by-products, derivatives, or petrochemicals" are classified as either "artificial gas" or "natural gas" under the NGA, not oil. Because hydrogen is transported on pipelines as a gas, not a liquid, it is not "oil" under the ICA.[87]

The regulatory division of gas and liquids pipelines reflects the way pipelines operate. Generally, gases are not transported in liquids pipelines, and liquids are not transported in gas pipelines. Further, the same liquids pipeline can transport several different petroleum products. Many oil pipelines transport products in "batches"; for instance, a pipeline might send gasoline for several hours, switch to jet fuel, and then switch to diesel fuel.[88] Because these substances can all be transported on the same pipeline, it makes sense to regulate them the same way.[89]

Classification of hydrogen as an "oil" also would be inconsistent with the DOE Act, the purpose of which was to establish "coordinated and systematic regulation of energy resources," including to better "coordinate the pricing" of energy sources.[90] Just as ammonia is non-jurisdictional partially because it does not compete with oil or gas for pipeline capacity,[91] hydrogen will not compete with oil for pipeline capacity. Instead, it will be a direct substitute for natural gas on natural gas pipelines. Thus, it will more directly affect the transportation price of natural gas than of liquid fuels regulated under the ICA. This further supports the conclusion that hydrogen should not be viewed as an "oil."

FERC's emphasis on the "practical" reasons for disclaiming jurisdiction over anhydrous ammonia also supports the conclusion that hydrogen is not subject to the ICA.[92] Because hydrogen will be transported in natural gas pipelines, several practical difficulties would arise from an attempt by FERC to regulate the same pipeline under two different and sometimes conflicting statutes, as detailed in section VII below. Practical problems would be made even worse if hydrogen were regulated under the NGA when blended into natural gas

pipelines but under the ICA when transported on hydrogen-only pipelines. In this case, FERC would regulate hydrogen under two different statutes—and their respective bodies of precedent—based on whether it is transported on a natural gas pipeline or a hydrogen-only pipeline. These practical difficulties support the conclusion that hydrogen should not be viewed as an "oil" under the ICA.

V. The Interstate Commerce Commission Termination Act

A. Overview of the Interstate Commerce Commission Termination Act and How It Would Affect Hydrogen Pipelines

The final federal regulatory possibility is for hydrogen to be subject to the ICCTA, which gives the STB jurisdiction over transportation of "a commodity other than water, gas, or oil."[93] The ICCTA applies similar requirements to pipelines that carry "other commodities" as the ICA does to oil pipelines. Pipelines under the ICCTA must provide the same "common carriage" and non-discriminatory service as oil pipelines.[94] These pipelines must charge "reasonable" rates,[95] and must maintain tariffs that provide rates and terms of service.[96] The STB lacks authority over construction and siting of pipelines; STB-regulated pipelines must obtain state and local permits for construction. To the extent STB-regulated pipelines require eminent domain authority, such authority can only be conferred by the states.

There are some notable differences between FERC's ICA jurisdiction over oil pipelines and the STB's jurisdiction over transportation of other commodities. Unlike the ICA, the ICCTA does not require pipelines to *file* tariffs. Instead, the ICCTA requires only that pipelines abide by their tariffs and provide them to any person upon reasonable request.[97] Also, unlike FERC, which can investigate oil pipeline rates on its own initiative, the STB only has authority to initiate rate investigations upon a complaint from a customer.[98]

In practice, the STB is a much smaller agency than FERC, and it primarily regulates railroads. It lacks FERC's expertise in pipeline ratemaking. As a practical matter, deeming STB to have jurisdiction over hydrogen transportation would present the complexity of having two separate regulators over any pipeline that transports both hydrogen and natural gas.

B. Determining Whether a Substance Is Covered by the Interstate Commerce Commission Termination Act

In 1977, the DOE Act transferred authority over oil pipelines to FERC and left the ICC with jurisdiction over the remaining non-energy pipelines. In 1995, the ICCTA terminated the ICC and transferred its authority over pipelines to the STB.

As a result, the STB has jurisdiction under the ICCTA over "non-energy" commodities, including anhydrous ammonia and phosphate slurry.[99] The ICCTA also gives the STB jurisdiction over one energy commodity—coal slurry—because it competes with coal, which is primarily transported by rail.[100] The STB likely has jurisdiction over carbon dioxide pipelines as well, though the STB has not attempted to regulate them.[101]

The ICC set forth the framework for analysis of its jurisdiction in *Gulf Central Pipeline*.[102] This decision addressed the same pipeline for which FERC had disclaimed jurisdiction of anhydrous ammonia on grounds that it is not an energy source. Consistent with FERC's analysis, the ICC disclaimed jurisdiction over anhydrous ammonia pipelines upon finding that anhydrous ammonia is not an "energy-related commodity" but is instead used as a fertilizer or base in making other fertilizers. The ICC explained that ammonia does not compete with energy sources or with the pipeline capacity they require.[103] The ICC also recognized that in the DOE Act, Congress intended for FERC to coordinate the regulation of energy transportation and monitor competition between sources. The STB is likely to apply this analysis to future potential questions concerning its jurisdiction over hydrogen transportation.

C. Assessment of Arguments for Regulation of Hydrogen Under the Interstate Commerce Commission Termination Act

The view that the STB has authority over hydrogen pipelines has received various levels of support dating back to the passage of the ICCTA, when Congress required the Government Accountability Office (GAO) to issue a report on how the STB's regulation affected pipeline competitiveness.[104] The GAO Report identified hydrogen, along with anhydrous ammonia, carbon dioxide, coal slurry, and phosphate slurry, as subject to the STB's regulation under the ICCTA.[105] The GAO provided no explanation to support its inclusion of

hydrogen, but it seems likely that it included hydrogen because it was not viewed as an energy source at the time the report was issued. Indeed, the GAO Report describes hydrogen as a feedstock for refining, rather than as the energy source it is viewed as today.[106] Therefore, its classification as an "other commodity" would have been consistent with the DOE Act's vesting of jurisdiction over non-energy pipelines with the ICC, as succeeded by the STB.

Even since hydrogen's energy potential became widely appreciated, the view has persisted in some scholarship that hydrogen pipelines are subject to the STB's jurisdiction under the ICCTA.[107] This includes a joint report issued by several federal agencies in 2007, which stated that the STB "regulates economic aspects of interstate hydrogen pipelines."[108] The Joint Statement provided no explanation as to why it viewed the STB as the regulator of hydrogen pipelines. More recently, the Congressional Research Service (CRS) similarly asserted that "[j]urisdiction over rates for interstate hydrogen pipelines resides with the [STB]."[109] The CRS Report provided no explanation for this assertion, citing only to the Joint Statement as support.

Given that neither of these reports provide any explanation or support for their positions that the STB has jurisdiction over hydrogen pipelines, they should be given little weight. They appear likely to be rooted in the GAO Report's inclusion of hydrogen pipelines in its list of pipelines subject to the STB's jurisdiction, which was issued before hydrogen was viewed as an energy source.

An argument for the STB to regulate hydrogen pipelines would have little support and major weaknesses. STB regulation of hydrogen pipelines would be inconsistent with the DOE Act, which established FERC to regulate energy pipelines and left jurisdiction over non-energy pipelines with the STB's predecessor, the ICC. Indeed, the STB describes its own jurisdiction as covering "non-energy" pipelines,[110] and the D.C. Circuit has affirmed the ICC's exercise of jurisdiction over anhydrous ammonia on the basis that it "not an energy or fuel source."[111] STB regulation of hydrogen pipelines would be out of step with its basic jurisdictional mandate.[112]

The STB's regulation of hydrogen pipelines also would violate the DOE Act's purpose of establishing coordinated regulation of energy pipelines at FERC. The DOE Act was expressly meant to eliminate the "[d]uplication, overlapping in jurisdiction, fragmentation of responsibilities, and conflicting mandates [that] have severely hampered the Government's ability to formulate, implement, and enforce a coherent and consistent national energy policy."[113] The Senate Report stated that the DOE Act would, through its "integrated organizational structure, provide for the reduction of overlap and unnecessary duplication."[114]

Since hydrogen is expected to be introduced into the natural gas pipeline grid, STB jurisdiction over hydrogen would place two federal regulators in charge of the same pipelines, with the STB regulating the hydrogen transportation while FERC regulates the natural gas transportation. Rather than creating "coordinated" regulation, STB jurisdiction would present the practical difficulty of having two different regulators oversee the same pipeline. Of all the possible legal regimes governing hydrogen pipelines, STB jurisdiction under the ICCTA has the least amount of support.

VI. Crafting an Effective Regulatory Regime

Stepping back, it is useful to consider what elements of regulation would benefit the hydrogen industry. Hydrogen is a nascent industry. It needs regulation that will allow rapid development of pipeline infrastructure to allow hydrogen to be delivered to market. Stringent economic regulation is unnecessary at this early stage, although principles of "open access" would facilitate broader participation in the market. General concepts that would support growth of the industry are described below.

Experienced regulator. FERC is the best-suited agency to regulate hydrogen pipelines. FERC and its predecessor, the Federal Power Commission, have been regulating the nation's interstate natural gas pipelines under the NGA since 1938. FERC has more relevant experience than other potential regulators (the STB or the states), and is more familiar to the natural gas pipeline industry.

Certificate authority and federal preemption. Hydrogen pipelines would benefit from the ability to obtain federal certificate authority that provides for preemption of conflicting regulation by state and local governments, which would avoid obstacles that could result from the need to undergo separate permitting processes in several states. FERC has this authority under the NGA and operates as the "lead agency" in the NEPA review process, allowing it to coordinate input of

several agencies charged with implementing federal environmental laws.

Eminent domain authority. Interstate hydrogen pipelines should be given the right of eminent domain, which is the power to "take" or "condemn" property in exchange for just compensation.[115] FERC-approved natural gas pipelines have this authority, and it has been indispensable to the major build-out of natural gas infrastructure that has occurred over the past decade.[116] By contrast, electric transmission facilities, which must undergo state and local permitting requirements and lack the federal right of eminent domain, have experienced notorious difficulties in siting and construction.[117]

Rate Oversight. Because hydrogen pipelines do not currently have monopoly power or captive customers, it is appropriate to allow the market to dictate pricing. Nevertheless, it could help the market develop if a federal regulator were given authority to require hydrogen pipelines to make their transportation rates public. This could help ensure that such rates remain just and reasonable and that pricing is not unduly discriminatory.

Open Access. "Open access" policies require pipelines to serve any shipper willing to pay published rates and meet the pipeline's terms of service. Application of these policies to hydrogen pipelines would facilitate diverse participation in the hydrogen market.

The foregoing discussion sets forth general parameters for effective regulation of hydrogen pipelines. Below, this article assesses how different forms of regulation would satisfy these parameters.

A. Regulating Hydrogen as "Artificial Gas" Under the NGA

If deemed to be "artificial gas," hydrogen would be subject to FERC jurisdiction if blended with natural gas on interstate pipelines but subject to state regulation if transported independently. This jurisdictional division would provide various benefits and costs. In the near-term, much hydrogen transported on interstate pipelines is likely to be blended with natural gas, and as a result would be subject to FERC jurisdiction under the NGA. These blended pipelines will receive the benefit of FERC's certificate authority under the NGA but could be subjected to full economic regulation as well.

This framework would provide pipeline developers some flexibility. A company planning to transport pure hydrogen but wishing to obtain FERC's certificate authority could blend a small amount of natural gas into its pipeline to become a blended "natural gas" pipeline subject to FERC's jurisdiction under the NGA. This would effectively allow a hydrogen pipeline to "opt-in" to FERC's NGA regulation by including natural gas and to "opt-out" by transporting pure hydrogen.

But to the extent companies seek to build interstate pipelines transporting purely hydrogen, they would experience difficulties associated with a patchwork of state permitting and regulatory requirements and the lack of federal eminent domain rights. This could inhibit the growth of a market for hydrogen transportation that is independent of natural gas. For instance, it could lead to growth of hydrogen markets in states with more favorable siting regulation but stagnation in areas like the Northeast, where it is comparatively difficult to construct pipeline infrastructure. In addition to siting difficulties, having FERC regulation over hydrogen transported on blended pipelines but state regulation over interstate pipelines only transporting hydrogen could create disparities in rates and access to transportation, resulting in an uneven development of the market.

B. Regulating Hydrogen as "Natural Gas" Under the Natural Gas Act

The NGA does not fit like a glove onto hydrogen pipelines. The NGA was enacted eighty-four years ago, in part to prevent abuses of monopoly power, but not to help a budding industry grow. While application of the NGA to interstate hydrogen pipelines would confer the benefits of federal preemption and eminent domain power, with those benefits would come application of a mature legal and regulatory regime with decades of precedent that could have unintended consequences for hydrogen pipelines, and possibly for existing natural gas pipelines as well.

If FERC were to assert jurisdiction over hydrogen as "natural gas," this likely would be challenged in the federal courts. Notwithstanding, and assuming FERC were to have NGA jurisdiction over hydrogen pipelines, it would not have to apply the NGA to hydrogen pipelines the same way it does to natural gas pipelines. To facilitate growth of the hydrogen market, FERC could pick and choose the extent to which it exercises its authority under the NGA.

FERC has granted "market-based" rate authority in different contexts, under which pipelines and customers negotiate rates without having any cost-based "recourse" rate.[118] For example, FERC routinely issues certificates of limited jurisdiction for "proprietary" natural gas pipelines, which deliver gas only to affiliated customers.[119] For these pipelines, FERC waives application of all regulatory requirements that apply to natural gas pipelines, including rate and tariff filing requirements and reporting requirements. FERC has explained that "the public interest would not be served by subjecting [proprietary pipelines] to all of the regulatory requirements applicable to conventional natural gas pipeline companies."[120]

FERC's regulation of LNG import and export terminals provides an instructive parallel to the hydrogen industry. In 2002, in an order approving construction of the Hackberry LNG import terminal, FERC announced that it would effectively lift all commercial regulation of new LNG import facilities to "provide incentives to develop additional energy infrastructure to increase much-needed supply into the United States."[121] FERC stated that it would allow LNG terminals to provide import services "at the rates, terms, and conditions mutually agreed upon" by parties and would not require them to "offer open-access service or maintain a tariff and rate schedules."[122] FERC explained that this "less intrusive" regulatory regime was appropriate because it would facilitate LNG terminals' recovery of their costs and because no captive customers would bear the risks of the projects.[123] FERC concluded that this "different form of regulation will better serve the public interest" than traditional open-access regulation.[124]

FERC continued to oversee the construction and siting of LNG projects pursuant to the NGA and NEPA. FERC noted in *Hackberry* that it could impose more stringent economic regulation in the future if it were to receive complaints of undue discrimination or other anti-competitive behavior.[125] In the Energy Policy Act of 2005 (EPAct 2005), Congress amended NGA section 3 to codify the *Hackberry* policy. This expressly prohibited FERC from conditioning approval of an LNG terminal on a requirement that service be offered on an open-access basis or on any regulation of rates, charges, or terms or conditions of service, or on the filing of a tariff.[126]

These examples illustrate FERC's flexibility in administering the NGA. Under the NGA, FERC could provide the hydrogen industry with the benefits of its regulation of siting and construction, without the burdens of stringent economic regulation. This could include, for instance, full exercise of FERC's authority under NGA section 7 to oversee the development of hydrogen pipelines, including preemption of state and local permitting requirements, and granting hydrogen pipelines the right of eminent domain. Of course, this would require FERC's robust certification process that includes review under NEPA and assurance that the siting process is fair to landowners and consistent with principles of environmental justice.[127] FERC also could require hydrogen pipelines to offer service on an open-access basis, to facilitate growth of the market for hydrogen transportation and to optimize the use of hydrogen infrastructure.

FERC could waive elements of the NGA that might inhibit growth of the hydrogen industry or are otherwise unnecessary. FERC could allow hydrogen pipelines to charge "market-based rates," and allow hydrogen pipelines to negotiate terms of service without close FERC oversight. FERC could choose the extent to which filing of tariffs and submission of other reports are necessary. This type of regulation—providing the hydrogen industry with the "carrots" of regulation but not the "sticks"—could facilitate growth of the industry at this early stage.

C. Regulating Hydrogen Under the Interstate Commerce Act

Unlike the NGA, the ICA grants FERC no certificate and siting authority. FERC's inability under the ICA to preempt state and local laws and provide pipeline companies the right of eminent domain would be a major drawback to regulation of hydrogen under the ICA.

Because Chairman Glick has stated that blends of hydrogen and natural gas are subject to the NGA, classification of hydrogen as "oil" under the ICA would result in bifurcated regulation.[128] Blends of natural gas and hydrogen would be subject to the NGA, while pure hydrogen would be subject to the ICA. This would provide pipeline companies similar flexibility as would classification of hydrogen as "artificial gas"—they could opt to become subject to the NGA by including some amount of natural gas in new hydrogen pipelines, or alternatively, they could opt to become subject to the ICA by building pure hydrogen pipelines.

Regulation under the ICA would have some benefits. As compared to regulation as "artificial gas,"

regulation of hydrogen under the ICA would provide uniform rate and tariff regulation from FERC, as opposed to the patchwork of state laws. It would also provide the benefits of FERC's common carrier requirements and the prohibition against undue discrimination.

However, regulation under the ICA would also create difficulties because hydrogen traveling in interstate pipelines would be subject to two different statutes, depending on whether it is blended with natural gas. Rates and services are regulated differently under the two statutes,[129] which could lead to differences in the costs of hydrogen transportation based on whether it is transported as a blend or independently.

Unlike the ICA, the NGA contains exemptions that reduce its reach into transactions that are more appropriately considered the province of state regulation. This includes exemptions for facilities used for "gathering" and "local distribution" of natural gas. The NGA also includes the "Hinshaw" exemption, which exempts gas transported to a state border or within a state if the gas is used entirely in that state and it is subject to regulation by that state. Lacking these exemptions, regulation of hydrogen under the ICA would introduce FERC oversight into transportation that could be effectively regulated at the state level.

Also, FERC's requirements for allocating pipeline capacity under the ICA could be unhelpful if applied to hydrogen. Under the ICA, when nominations exceed capacity, pipelines allocate capacity using "prorationing." Historically, FERC has permitted oil pipelines to use proration either by a *pro rata* method, which awards capacity to shippers in proportion to their nominations in each nomination cycle, or by giving shippers preference based on their history of shipping on the pipeline.[130] By contrast, NGA-regulated pipelines typically allocate capacity based on open seasons or auctions, or based on "net present value." This allows pipelines to account for rate, quantity, and length of contract in allocating capacity.[131] As compared to regulation under the NGA, ICA regulation could reduce hydrogen pipelines' flexibility to allocate scarce capacity based on price, quantity, and length of a contract.

D. Regulating Hydrogen Under the ICCTA

Regulation of hydrogen pipelines under the ICCTA would introduce similar problems to regulation under the ICA, but with the added difficulties resulting from the STB being the regulator. Like the ICA, the ICCTA provides for regulation of pipelines' rates and services, but no authority over siting and construction. Because the STB is a small agency that lacks expertise in the energy industry, the ICCTA is ill-suited to govern hydrogen pipelines. To the extent hydrogen is blended into natural gas pipelines, STB regulation would create the unnecessary complexity of having both the STB and FERC regulate the same pipelines.

VII. Conclusion and Next Steps: Regulatory Clarity or Legislation

Under current law, hydrogen is most logically classified as "artificial gas" under the NGA, because in most cases it is "artificially created by the agency of man."[132] As artificial gas, hydrogen would be subject to FERC's jurisdiction under the NGA if blended with natural gas on interstate pipelines but under jurisdiction of the states if transported independently. Alternatively, FERC could assert jurisdiction over hydrogen as "natural gas" in its own right because hydrogen arguably is a "natural" gas and because this would help effectuate the NGA's general purposes. This would require an expansive interpretation of the NGA that would be susceptible to judicial review. Hydrogen is not "oil" because "oil" is a liquid, and hydrogen is transported on pipelines as a gas. Nor is hydrogen an "other commodity" under the ICCTA because that statute applies almost entirely to non-energy commodities and because the STB is not well-suited to regulate the hydrogen industry.

Greater clarity from FERC or Congress would help to resolve uncertainty and facilitate development of the hydrogen industry at scale. FERC could provide this clarity by declaring that it views hydrogen as "artificial gas" under the NGA, subject to its jurisdiction only when blended with natural gas on interstate pipelines. This position would likely be affirmed upon judicial review if it were challenged and would therefore provide the benefit of resolving current uncertainty. FERC also could assert jurisdiction over hydrogen as "natural gas" under the NGA, but this would be more susceptible to rejection from the courts and might cause protracted uncertainty.

Absent clarity from FERC, or if regulation of hydrogen as "artificial gas" proved inadequate, Congress could pass legislation to prescribe how hydrogen is to be regulated. This could occur by amending the NGA to include "hydrogen" in its definition of "natural gas." Of course, hydrogen does not need to be wedged into any

existing statutes—Congress could pass a "Hydrogen Act," cut from whole cloth.

Regardless of the legislative vehicle, Congress could give FERC similar authority over construction and siting of hydrogen as it has under the NGA. It also could craft a more flexible approach that gives FERC "backstop" siting authority only in the event a pipeline company cannot obtain required state permits and land rights, or it could utilize an "opt-in" approach under which hydrogen pipelines may choose to become subject to the siting authority of FERC or the states.

Concerning economic regulation, Congress could impose the same "just and reasonable" rate requirements that exist under the NGA and ICA, giving FERC discretion over how closely it wishes to regulate hydrogen pipelines' rates and services. To avoid the drawbacks of stringent economic regulation, Congress could set limits on FERC's ability to impose rate and service regulation upon hydrogen pipelines, as it did in EPAct 2005 when it amended the NGA to facilitate imports of natural gas. Ideally, hydrogen legislation would support the hydrogen industry's growth by facilitating expeditious siting and construction of hydrogen pipelines and by providing for light-handed economic regulation.

About the Author

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He also assists pipeline clients with compliance, complaints, enforcement and rulemaking proceedings before FERC and with litigation before the U.S. Court of Appeals for the D.C. Circuit. Michael also is advising the Clean Hydrogen Future Coalition regarding issues related to the development of interstate hydrogen pipelines, including the federal regulation of hydrogen transportation.

[1] Preliminary estimates indicate that gaseous hydrogen can be injected into a natural gas pipeline network at concentrations of up to 20% by volume without substantial impact to end users or pipeline material. *See* Argonne Nat'l Lab'y, *Assessment of Potential Future Demands for Hydrogen in the United States*, at xvi (Oct. 2020), https://greet.es.anl.gov/publication-us_future_h2 (last visited Sept. 15, 2022); M.W. Melaina, et al., *Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues*, NREL/TP-5600-51995, NAT'L RENEWABLE ENERGY LAB'Y (2013), https://www.nrel.gov/docs/fy13osti/51995.pdf (last visited Sept. 15, 2022).

[2] Paul W. Parfomak, Cong. Rsch. Serv., R46700, Pipeline Transportation of Hydrogen: Regulation, Research, and Policy 5 (Mar. 2, 2021) ("CRS Report"), https://crsreports.congress.gov/product/pdf/R/R46700.

[3] Safety of hydrogen pipelines is regulated by the Department of Transportation ("DOT"), Pipeline and Hazardous Materials Safety Administration ("PHMSA"). *See* 49 C.F.R. § 192.3 (2022) (defining "gas" to include "flammable gas," which includes hydrogen). This article does not discuss safety regulation.

[4] 15 U.S.C. §§ 717-717z (2022).

[5] 49 U.S.C. app. §§ 1-27 (1988).

[6] 49 U.S.C. § 15301(a) (2022).

[7] LNG is supercooled and condensed natural gas. LNG is not a liquid at ambient temperatures.

[8] 15 U.S.C. § 717(b).

[9] *Id.* § 717f(h).

[10] *Id.* §717(d).

[11] *Id.* § 717c(b).

[12] *Id.* § 717a(5).

[13] *See, e.g.*, Tex. Nat. Res. Code Ann. §§ 111.002 (classifying operators of hydrogen pipelines as "common carriers"), 111.019 (granting eminent domain authority to common carrier pipelines).

[14] 15 U.S.C. § 717a(5) (emphasis added).

[15] *See* Opinion No. 610, *United Gas Pipe Line Co.*, 47 F.P.C. 245, 258 ("Section 1(b) of the [NGA] does not delimit the amount of gas to be transported or sold in interstate commerce necessary for the exercise of Commission jurisdiction"), *aff'd*, Opinion No. 610-A, 47 F.P.C. 1021 (1972), *aff'd*, Louisiana Power & Light Co. v. FPC, 483 F.2d 623, 632 (5th Cir. 1973) (noting that the Commission had "found that any amount of interstate gas would give jurisdiction"), *cert. denied*, 416 U.S. 974 (1974); Connecticut Light & Power Co. v. FPC, 324 U.S. 515, 536 (1945) ("We do not find that Congress has conditioned the jurisdiction of the Commission upon any particular volume or proportion of interstate energy involved, and we do not think it would be appropriate to supply such a jurisdictional limitation by construction."); Opinion No. 559, *Union Transmission, Inc.*, 41 F.P.C. 810, 818 (1969) ("The fact that the quantity of gas System transports to South Coffeyville is minimal (1/4 of 1%) in relation to its total volumes, and would be its only sale outside the State of Kansas, has no relevance to the issue of whether System at this point is engaged in interstate commerce by reason of such deliveries since Commission jurisdiction would attach regardless of the *de minimis* aspect of the situation.").

[16] *Cortez Pipeline Co.*, 7 F.E.R.C. ¶ 61,024, at p. 61,041 (1979) (choosing not to "[r]efin[e] the term 'natural gas' to mean a certain chemical composition or mixture or as having a certain caloric content or vapor tension . . . .").

[17] *See In re Deep S. Oil Co. of Tex.*, 14 F.P.C. 308, 322-24 (initial decision), *aff'd*, Opinion No. 284, 14 F.P.C. 83 (1955) (order on initial decision), *aff'd*, Deep S. Oil Co. of Tex. v. FPC, 247 F.2d 882, 888 (5th Cir. 1957).

[18] *See* 14 F.P.C. at 312. The liquefiables are considered "natural gas" while commingled with the broader stream of gas, but not after processing. *See generally* Mobil Oil Corp. v. FPC, 483 F.2d 1238, 1238-240 (D.C. Cir. 1973) (FERC lacks authority under the NGA to regulate liquids). As discussed below, if these components are processed and liquefied, they are regulated under the ICA. However, if they are processed and subsequently reinjected into the natural gas grid, they generally are viewed as "artificial gas," despite their "natural" origins.

[19] 50 U.S.C. § 167i.

[20] *See, e.g.*, *Panhandle E. Pipe Line Co. v. FPC*, 359 F.2d 675, 679 (8th Cir. 1966) (describing the Helium Act as providing an "exemption" to the NGA for "helium 'itself', either while commingled with natural gas or after it has been extracted"); *Northern Nat. Gas Co. v. Grounds*, 441 F.2d 704, 720 (10th Cir. 1971) (explaining that the purpose of the Helium Act's exclusion of helium from the NGA was to provide "assurance that rate of return" for helium pipelines would not be determined by Commission standards); *Dorchester Gas Producing Co.*, 58 F.P.C. 2765, 2768 (1977) (noting that the Commission lacks jurisdiction over helium "by virtue of the [Helium Act]").

[21] 14 F.P.C. at 323.

[22] Id.; see generally id. at 322-24.

[23] Opinion No. 613, *Distrigas Corp.*, 47 F.P.C. 752, 815, *reh'g denied*, Opinion No. 613-A, 47 F.P.C. 1465 (1972), *aff'd*, Distrigas Corp. v. FERC, 608 F.2d 25 (1st Cir. 1979) (quoting *Boone's Petroleum Dictionary* (1960)). *See also id.* (citing *Webster's Third New International Dictionary*, Unabridged, to define "natural gas" as "[g]as issuing from the earth's crust through natural openings or bored wells; esp.: any of various combustible gaseous mixtures that when in the dry state contain largely methane."). The hearing examiner also cited a natural gas ratemaking manual, which defined natural gas as "[a] naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in porous geological formations beneath the earth's surface, often in association with petroleum. The principal constituent is methane." *Id*. (citing Am. Gas Ass'n, Rate Committee, *Gas Rate Fundamentals, Revised Edition*, at 348-49 (1969). Today, Merriam-Webster's dictionary defines "natural gas" as "gas issuing from the earth's crust through natural openings or bored wells *especially*: a combustible mixture of methane and other hydrocarbons used chiefly as a fuel and raw material." *Merriam-Webster*, https://www.merriam-webster.com/dictionary/natural%20gas (last visited Sept. 15, 2022).

[24] *Distrigas Corp.*, 47 F.P.C. at 818. (initial decision) (citing 14 F.P.C. 83 and 14 F.P.C. 308). *See also In re Deep S. Oil Co. of Tex.*, 14 F.P.C. at 323 ("I am unable to see any rational basis for the conclusion that Congress intended that regulation under the [NGA] be confined to fuel gas consisting 'almost entirely of methane and ethane.'").

[25] 7 F.E.R.C. ¶ 61,024, at 61,041.

[26] *Id*. (citing FPC v. La. Power & Light Co., 406 U.S. 621, 631 (1972); Henry v. FPC, 513 F.2d 395, 399-402 (D.C. Cir. 1975)).

[27] *Id*. at 61,042 (citations omitted).

[28] *Id*.

[29] 47 F.P.C. 752. References to the "Commission" refer either to the Federal Power Commission, or the Federal Energy Regulatory Commission, as appropriate.

[30] 47 F.P.C. at 818. *See also* Opinion No. 735, *Marathon Oil Co.*, 53 F.P.C. 2164, 2173 (1972) (finding LNG liquefaction facilities jurisdiction because they were an "integral part of the interstate flow" of natural gas), *reh'g denied*, Opinion No. 735-A, 54 F.P.C. 660 (1975).

[31] *Panhandle E. Pipe Line*, 359 F.2d at 679-80.

[32] 15 U.S.C. § 717a(5).

[33] *Henry*, 513 F.2d 395.

[34] *See* 52 F.E.R.C. ¶ 61,311, at pp. 62,253-54.

[35] Opinion No. 663, *El Paso Nat. Gas Co.*, 50 F.P.C. 651, 658-61 (1970), *reh'g denied*, 50 F.P.C. 1128 (1973), *aff'd*, *Henry*, 513 F.2d 395.

[36] Opinion No. 637, *Algonquin SNG, Inc.*, 48 F.P.C. 1216 (1972), *order on reh'g*, Opinion No. 637-A, 49 F.P.C. 34 (1973).

[37] *Southern Jersey Gas Co. v. SunOlin Chem. Co.*, 40 F.E.R.C. ¶ 61,267 (1987), *reh'g denied*, 47 F.E.R.C. ¶ 61,031 (1989).

[38] 52 F.E.R.C. ¶ 61,311, at 62,253-54 ("Propane is a hydrocarbon that is produced by separating it from a naturally occurring mixture of hydrocarbons and as such is the product of an engineering process.").

[39] *Columbia Gas Transmission Corp.*, 17 F.E.R.C. ¶ 61,020 (1981) ("Although ethane is itself non-jurisdictional, the sale or transportation of vaporized ethane which is commingled with natural gas is subject to Commission jurisdiction"), *order on reh'g*, 29 F.E.R.C. ¶ 61,255 (1984).

[40] *Natural Gas Pipeline Co. of Am.*, 13 F.E.R.C. ¶ 61,165 (1980); *Fla. Gas Transmission Co.*, 29 F.E.R.C. ¶ 61,251 (1984).

[41] Natural Gas Pipeline Co. of Am., 55 F.P.C. 2424 (1976).

[42] 13 F.E.R.C. ¶ 61,165, at 61,352 (quoting *Natural Gas Pipeline Co. of Am.*, 53 F.P.C. 802, 804 (1975)).

[43] 48 F.P.C. at 1221. *See also id.* ("That which is produced by manufacture cannot, in our view, be equated with that which occurs naturally, particularly where the statute under which we operate establishes a clear demarcation between that which is jurisdictional and that which is not, with the line of demarcation being drawn between that which is natural and that which is artificial.").

[44] 50 F.P.C. at 661, *aff'd*, *Henry*, 513 F.2d 395.

[45] It bears noting that these boundaries are not necessarily as clear as the Commission has suggested. For instance, the Commission views propane as "artificial gas," because it is "produced by separating it from a naturally occurring mixture of hydrocarbons and as such is the product of an engineering process." 52 F.E.R.C. ¶ 61,311, at 62,253. The same could be said about methane, which is viewed as "natural gas," but the Commission does not appear to have considered this issue, and in practice, the distinction is easy enough to apply.

[46] 50 F.P.C. at 662, *aff'd*, *Henry*, 513 F.2d at 402.

[47] *Henry*, 513 F.2d at 405.

[48] *Magnum Gas Storage, LLC*, 171 F.E.R.C. ¶ 61,069, at P 2 n.4 (2020).

[49] *Id.*

[50] Letter from Richard Glick, FERC Chairman to Sen. Martin Heinrich, FERC Accession No. 20211027-4000, at 2 (Oct. 26, 2021).

[51] It bears noting that at the time the Hepburn Act was enacted, artificial gas was often composed of significant amounts of hydrogen, sometimes as much as half. *See* Nat'l Grid & Atl. Hydrogen Inc., *Hydrogen-Enriched Natural Gas: Bridge to an Ultra-Low Carbon World*, at 4 (2009), https://www.osti.gov/etdeweb/servlets/purl/21396875.

[52] 53 F.P.C. at 804. *See also* 52 F.E.R.C. ¶ 61,311, at 62,253 ("[p]ropane is a hydrocarbon that is produced by separating it from a naturally occurring mixture of hydrocarbons and as such is the product of an engineering process.").

[53] Royal Soc'y of Chemistry, *Hydrogen*, https://www.rsc.org/periodic-table/element/1/hydrogen (last visited Sept. 15, 2022).

[54] W. PARFOMAK, CONG. RSCH. SERV., R46700, PIPELINE TRANSPORTATION OF HYDROGEN: REGULATION, RESEARCH, AND POLICY 4 (Mar. 2, 2021). *See generally* Dept. of Energy ("DOE"), Off. of Energy Efficiency & Renewable Energy, *Hydrogen Production Processes*, https://www.energy.gov/eere/fuelcells/hydrogen-production-processes (last visited Sept. 15, 2022).

[55] DOE, Off. of Energy Efficiency & Renewable Energy, *Hydrogen Production: Natural Gas Reforming*, https://www.energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming (last visited Sept. 15, 2022).

[56] DOE, Off. of Energy Efficiency & Renewable Energy, Hydrogen Product: Electrolysis, https://www.energy.gov/eere/fuelcells/hydrogen-production-electrolysis (last visited Sept. 15, 2022).

[57] 50 F.P.C. at 658-61, *aff'd*, *Henry*, 513 F.2d 395.

[58] 48 F.P.C. at 1221.

[59] 7 F.E.R.C. at 61,041-42.

[60] *See generally* Legislative History of the Natural Gas Act: Pub. L. No. 80-245: Ch. 333, 1st Sess. (1947).

[61] See Certification of New Interstate Nat. Gas Facilities, 178 F.E.R.C. ¶ 61,107, at PP 73-74 (2022).

[62] *See, e.g.*, Application of Southern Cal. Gas Co. (U904g) for Authority to Establish a Memorandum Account for the Angeles Link Project, California Pub. Util. Comm'n (Feb. 17, 2022), https://www.socalgas.com/sites/default/files/A22-02-SOCALGAS-Angeles_Link_Memorandum_Account_Application.pdf.

[63] In *Dominion Energy Transmission, Inc.*, 175 F.E.R.C. ¶ 61,091, at P 2 n.5 (2021), FERC determined that "renewable natural gas" and "biogas," when transported on a major interstate natural gas pipeline, fell "under the broader category of natural gas, which section 2(5) of the [NGA] defines as 'either natural gas unmixed, or any mixture of natural and artificial gas.'" FERC did not state whether these were "natural gas" or "artificial gas," but in light of past precedent regarding renewable natural gas as "artificial gas," and the fact that all gas under its review already was blended into the pipeline's general natural gas stream, it is reasonable to interpret FERC as viewing these substances as "artificial gas."

[64] 52 F.E.R.C. ¶ 61,311, at 62,253 ("review of the legislative history of the NGA leads to the conclusion that natural gas within the meaning of the NGA has to be a hydrocarbon or mixture of hydrocarbons"). *See also Natural Gas Interchangeability*, 115 F.E.R.C. ¶ 61,325, at P 4 (2006) ("Principally methane, natural gas is commonly found in nature mixed with other hydrocarbons and varying amounts of contaminants."), *order on reh'g*, 126 F.E.R.C. ¶ 61,210 (2009).

[65] *Henry*, 513 F.2d 395.

[66] *Id.* at 402.

[67] 49 U.S.C. app. § 1(5).

[68] *Id.* § 6(1).

[69] *Id.* § 3(1).

[70] *See id.* § 1(4). *See also Medallion Pipeline Co.*, 169 F.E.R.C. ¶ 61,202, at P 19 (2019) ("We find that Medallion's reservation of up to 90% of the Project's capacity allows at least 10% of capacity to remain available for walk-up shippers . . . is consistent with Commission precedent.") (citing *NORCO Pipe Line Co.*, 152 F.E.R.C. ¶ 61,170, at P 19 (2015); *Sunoco Pipeline L.P.*, 139 F.E.R.C. ¶ 61,259, at P 14 (2012); *CCPS Transp., LLC*, 121 F.E.R.C. ¶ 61,253, at P 17 n.33 (2007)).

[71] *See, e.g.*, Opinion No. 522, *SFPP, L.P.*, 140 F.E.R.C. ¶ 61,220, at P 50 n.72, *clarified*, 141 F.E.R.C. ¶ 61,051 (2012), *order on reh'g*, Opinion No. 522-A, 150 F.E.R.C. ¶ 61,097 (2015), *reh'g denied*, Opinion No. 522-B, 162 F.E.R.C. ¶ 61,229 (2018).

[72] *See generally Mobil Oil*, 483 F.2d at 243-46 (holding that FERC lacks jurisdiction to regulate liquefiables under the NGA); *Gulf Cent. Pipeline Co.*, 50 F.E.R.C. ¶ 61,381, at p. 62,164 (1990) (describing oil pipelines as "pipelines that handle a range of ***liquid*** products that are derived from oil, condensate, and natural gas, and are used for heating or transportation purposes") (emphasis added), *aff'd*, CF Indus., Inc. v. FERC, 925 F.2d 476 (1991).

[73] *Compare* 17 F.E.R.C. ¶ 61,020 (vaporized ethane injected into gas grid is artificial gas), *with Williams Olefin Feedstock Pipelines, L.L.C.*, 145 F.E.R.C. ¶ 61,303 (2013) (liquefied ethane is jurisdictional under the ICA); *Algonquin SNG*, 48 F.P.C. 1216 (gasified naphtha is regulated as an "artificial gas"), *with Oil Pipeline Capacity Allocation Issues and Anomalous Conditions*, 178 F.E.R.C. ¶ 61,105, at P 5 (2022) (liquid naphtha is regulated as an "oil").

[74] *See* 47 F.P.C. at 817-18. *See supra* notes 20-30 and accompanying text.

[75] *See* 49 U.S.C. § 60502 (2020) (transferring jurisdiction over "the establishment of a rate or charge for the transportation of oil by pipeline.").

[76] 42 U.S.C. § 7112.

[77] S. REP. NO. 95-164, at 1-2 (1971) (cited in *Gulf Cent. Pipeline Co.*, 7 ICC 2d 52, 57 (1990), *aff'd*, *CF Indus., Inc. v. ICC*, 946 F.2d 1563 (D.C. Cir. 1991)). Congress determined that "a strong national energy program is needed to meet the present and future energy needs of the Nation consistent with overall national economic, environmental and social goals," and that "formulation and implementation of a national energy program require the integration of major Federal energy functions into a single department in the executive branch." 42 U.S.C. §§ 7111(3) & (5).

[78] 50 F.E.R.C. ¶ 61,381, at 62,164, *aff'd*, *CF Indus.*, 925 F.2d 476 (quoting S. REP. NO. 95-367 (1977) (Conf. Rep.) ("It is the intent of the conferees that the term 'transportation of oil by pipeline' shall include pipeline transportation of crude and refined petroleum and petroleum by-products, derivatives or petrochemicals.");

[79] *See generally* Ass'n of Oil Pipe Lines v. FERC, 83 F.3d 1424, 1433 n.17 (D.C. Cir. 1996) ("Crude oil pipelines transport unrefined petroleum; product pipelines transport refined petroleum products and liquid hydrocarbons other than crude oil, such as gasoline, diesel fuel, and natural gas liquids.").

[80] 50 F.E.R.C. ¶ 61,381, at p. 62,164, *aff'd*, *CF Indus.*, 925 F.2d 476.

[81] *Id*. at 62,165.

[82] *Id*. at 62,166.

[83] *See Palmetto Prods. Pipe Line LLC*, 151 F.E.R.C. ¶ 61,090, at PP 30-31 (2015).

[84] Id.

[85] *Compare* 145 F.E.R.C. ¶ 61,303, at P 15 (in asserting jurisdiction over a liquid ethane pipeline, describing its jurisdictional "test" as "whether the product being transported is a naturally-occurring hydrocarbon that is used or can be used for energy-related purposes, as opposed to having only a non-fuel, feedstock function").

[86] *See, e.g.*, William G. Bolgiano, *FERC's Authority to Regulate Hydrogen Pipelines Under the Interstate Commerce Act*, 43 ENERGY L. J. 1, 67-68 (2022). To the extent hydrogen is manufactured using renewable energy and through electrolysis, it is even further removed from a plausible classification as "oil."

[87] *See* DOE, Off. of Energy Efficiency & Renewable Energy, *Hydrogen Pipelines*, https://www.energy.gov/eere/fuelcells/hydrogen-pipelines (last visited Sept. 15, 2022).

[88] *See* Pipeline 101, *How Do Pipelines Work*, https://pipeline101.org/topic/pipeline-transportation-and-batching/ (last visited Sept. 15, 2022).

[89] This basic difference in between liquids and gas pipelines is reflected in other forms of regulation as well; for instance, different sets of safety regulations apply to gas and liquids pipelines. *See* 49 C.F.R. Parts 191 and 192 (2021) (covering natural gas pipelines) and 195 (covering hazardous liquids pipelines, including petroleum and petroleum products pipelines).

[90] 50 F.E.R.C. ¶ 61,381, at 62,165, *aff'd*, *CF Indus.*, 925 F.2d 476. *See* S. REP. NO. 95-164 at 1-2 (1977).

[91] 50 F.E.R.C. ¶ 61,381, at 62,164-66.

[92] *Id*. at 62,165.

[93] 49 U.S.C. § 15301(a).

[94] *See id.* § 15701(a). The ICA's exemption for proprietary pipelines applies identically to pipelines carrying commodities subject to the STB's jurisdiction. *See id.* § 15102(2) defining a "pipeline carrier" as a "person providing pipeline transportation for compensation.").

[95] *Id.* § 15501(a).

[96] *See id.* § 15502.

[97] *Id.* § 15701(b).

[98] *Id.* § 15901(a).

[99] FERC has stated that the STB has jurisdiction over ethylene and propylene which are used in manufacturing but not as energy sources. *See Texaco Petrochemical Pipeline LLC*, 107 F.E.R.C. ¶ 61,151 (2004); *Enterprise Lou-Tex. Propylene Pipeline L.P.*, 111 F.E.R.C. ¶ 61,068 (2005).

[100] *See Gulf Cent. Pipeline*, 7 ICC 2d at 58, *aff'd*, *CF Indus.*, 946 F.2d 1563.

[101] Precedent regarding the STB's jurisdiction over carbon dioxide pipelines has been inconsistent. In *Cortez Pipeline Co.*, the ICC disclaimed jurisdiction over carbon dioxide pipelines based on a belief that the ICCTA excluded "all gas types" from the STB's jurisdiction. 45 Fed. Reg. 85177, 85178 (Dec. 24, 1980), *aff'd*, 46 Fed Reg. 18,805 (1981). Subsequent precedent, and general consensus among commentors, supports that the STB does have jurisdiction over carbon dioxide pipelines. *See generally* Bolgiano, *supra* note 85, at 53 nn.326-27 (citing commentary).

[102] 7 ICC 2d at 58, *aff'd*, *CF Indus.*, 946 F.2d 1563.

[103] *Gulf Cent. Pipeline*, 7 ICC 2d at 57, *aff'd*, *CF Indus.*, 946 F.2d 1563. Like hydrogen, the energy potential of ammonia has become more widely appreciated in recent years. Increased use of ammonia for energy purposes could lead to reconsideration of how its transportation should be regulated.

[104] *See* U.S, Gov't Accountability Off., GAO-98-99, Surface Transportation: Issues Associated with Pipeline Regulation by the Surface Transportation Board, App. I (Apr. 1998) ("GAO Report"), 99https://www.gao.gov/products/rced-98-99.

[105] *Id*. at 7-9. While coal slurry is an energy source, the STB has jurisdiction over slurry pipelines because it competes with coal, which is primarily transported by rail. *See Gulf Cent. Pipeline*, 7 ICC 2d at 58, *aff'd*, *CF Indus.*, 946 F.2d 1563.

[106] U.S, Gov't Accountability Off., GAO-98-99, Surface Transportation: Issues Associated with Pipeline Regulation by the Surface Transportation Board, 29 (Apr. 1998) (discussing hydrogen's use as for "refining crude oil for gas or as an aid in the production of some products," such as "margarine or shortening to turn liquid oils into semisolid and solid fats.").

[107] *See, e.g.*, Matthew Field and William G. Bolgiano, *Federal Regulation of Interstate Hydrogen Pipelines* (May 6, 2021), https://www.venable.com/insights/publications/2021/05/fed-regulation-of-interstate-hydrogen-pipelines (last visited Sept. 15, 2022) (asserting that "[h]ydrogen pipelines fit squarely within the regulatory framework for 'miscellaneous' non-oil, non-gas, non-water pipelines administered by the [STB] under the [ICCTA].").

[108] DOT, Statement Regarding a Coordinated Framework for Regulation of a Hydrogen Econ., 72 Fed. Reg. 609, 618 (Jan. 5, 2007) ("Joint Statement").

[109] W. Parfomak, Cong. Rsch. Serv., R46700, Pipeline Transportation of Hydrogen: Regulation, Research, and Policy 10 (Mar. 2, 2021).

[110] STB, "About STB," https://www.stb.gov/about-stb/ (last visited Sept. 15, 2022).

[111] *Gulf Cent. Pipeline*, 7 ICC 2d at 57, *aff'd*, *CF Indus.*, 946 F.2d 1563.

[112] While the STB does regulate coal slurry pipeline, this is because slurry competes with coal, which moves primarily by rail, subject to STB jurisdiction. 50 F.E.R.C. ¶ 61,381, at pp. 62,165-66, *aff'd*, *CF Indus.*, 925 F.2d 476; *Gulf Cent. Pipeline*, 7 ICC 2d at 58, *aff'd*, *CF Indus.*, 946 F.2d 1563.

[113] S. Rep. No. 95-164, at 2 (1977).

[114] *Id*. at 4.

[115] U.S. CONST. amend. V, cl. 4 ("nor shall private property be taken for public use, without just compensation").

[116] *See* 15 U.S.C. § 717f(h). Since 1999, FERC has issued certificates approving construction of over 23,000 miles of major interstate natural gas pipelines. *See* FERC, *Approved Major Pipeline Projects (1997-Present)* (last updated Aug. 30, 2022), https://tinyurl.com/4zsas4hr.

[117] *See generally* RTO Insider, *SunZia Transmission Project: Not a 'Unicorn,' but not 'Repeatable*' (May 16, 2022), https://www.rtoinsider.com/articles/30127-sunzia-project-not-unicorn-but-not-repeatable (describing 16-year struggle for siting of interstate electric transmission line).

[118] See generally Alternatives to Traditional Cost-of-Service Ratemaking for Natural *Gas* Pipelines and Regulation of Negotiated *Transportation* Services of Natural *Gas* Pipelines, 74 F.E.R.C. ¶ 61,076, at pp. 61,227-37 (describing market-based rates), order on reh'g and clarification, 75 F.E.R.C. ¶ 61,024, reh'g denied, 75 F.E.R.C. ¶ 61,066 (1996). See also Elizabethtown Gas Co. v. FERC, 10 F.3d 866, 870 (D.C. Cir. 1993) (affirming FERC approval of market-based rates, under appropriate circumstances, as meeting the requirements of the NGA.)

[119] *See, e.g.*, *DCP Midstream LP*, 138 F.E.R.C. ¶ 62,080, at p. 64,305 (2012) (granting certificate for construction of new pipeline, blanket construction certificate authorizing future routine construction activities, and waiving the Commission's "otherwise applicable regulatory requirements"), *vacated on other grounds*, 156 F.E.R.C. ¶ 61,0058 (2016); *Western Gas Res., Inc.*, 119 F.E.R.C. ¶ 61,308, at P 17 (2007); *Western Gas Res., Inc.*, 85 F.E.R.C. ¶ 61,087 (1998); *Continental Nat. Gas Co.*, 83 F.E.R.C. ¶ 61,065, at ordering para. (C) (1998) (granting certificate and waiving "all applicable Commission regulations").

[120] *See, e.g.*, *Blue Mountain Midstream LLC*, 162 F.E.R.C. ¶ 62,157, at p. 64,354 (2018).

[121] Hackberry LNG Terminal, L.L.C., 101 F.E.R.C. ¶ 61,294, at P 23 (2002), order issuing certificate and granting reh'g sub nom., Cameron LNG, 104 F.E.R.C. ¶ 61,269 (2003).

[122] *Id.* at P 22.

[123] *Id*.

[124] *Id*.

[125] *Id*.

[126] EPAct of 2005, Pub. L. No. 109-58, § 311(e), 119 Stat. 594, 686 (codified at 15 U.S.C. § 717b(e)(3)(B)(ii)).

[127] *See generally* 178 F.E.R.C. ¶ 61,107, at PP 86-93 (discussing application of environmental justice principles to new natural gas pipeline projects).

[128] This ignores that if hydrogen were in fact "oil" it would not be subject to the NGA, even if blended with natural gas, because the NGA only governs natural gas and mixtures of natural gas and artificial gas.

[129] *Compare* 18 C.F.R. Parts 340-342 (providing oil pipeline rate methodologies and tariff requirements), *with* 18 C.F.R. Parts 154 and 284 (providing natural gas pipeline rate and service requirements).

[130] See generally Oil Pipeline Capacity Allocation Issues and Anomalous Conditions, 178 F.E.R.C. ¶ 61,105 at P 4.

[131] See generally Algonquin Gas Transmission, LLC, 120 F.E.R.C. ¶ 61,072, at P 25 (2007).

[132] 13 F.E.R.C. ¶ 61,165, at p. 61,352 (quoting *Nat. Gas Pipeline Co. of Am.*, 53 F.P.C. 802, 804 (1975)). *See also*, 52 F.E.R.C. ¶ 61,311, at p. 62,253 ("Propane is a hydrocarbon that is produced by separating it from a naturally occurring mixture of hydrocarbons and as such is the product of an engineering process.").

After the Storm: Changes to Texas Electricity Regulation in the Wake of Winter Storm Uri

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Nineteenth-century German philosopher Friedrich Nietzsche once said, "What does not kill me makes me stronger."[1] Those who lived through Winter Storm Uri in February 2021, however, may disagree when it comes to the Texas electric grid.

The storm and its resulting blackouts caused 69% of Texans to be without power—for several days in some areas. Failures in other critical infrastructure also led to disruptions in water service for 49% of Texans.[2] As a result, at least 246 people died, and the total economic damage was estimated to be between $200 and $300 billion.[3] The storm and its aftermath also left lingering doubts about the ability of the grid to effectively function in the coming years.

The actions taken in the aftermath of the storm defy easy characterization. Some have served to reduce the risk of future outages; others have done little to reduce the risk at a high cost to consumers. And some risks remain unaddressed or may have been exacerbated by regulatory action.

In this article, I summarize some of the major changes that have been implemented in the wake of the storm as well as major regulatory changes now being considered by the state's electricity regulator, the Public Utility Commission of Texas (PUCT), and the grid operator, the Electric Reliability Council of Texas (ERCOT). I also briefly note where some actions by state policymakers may prove counterproductive over the long term.

I. The Cause of the 2021 Blackouts

To understand the changes made to and being considered for the ERCOT system in the wake of the blackouts, it is helpful to provide a background and explain briefly what happened during the blackouts in February 2021.

Electric demand in Texas tends to be highest during the summer, and the system is optimized around that fact. As a result, historically, far less attention has been paid to distinct risks to the system that could exist during periods of extreme cold. In early 2021, not only did Texas face extreme winter warnings throughout the entire state, with temperatures in some areas dropping to century-long record lows, but temperatures stayed unusually low for extended periods.[4] This, combined with ice events and other weather effects, compounded the stress on the system.

The unusually cold weather increased the demand for electricity to heat Texas homes and businesses. In February 2021, ERCOT set an all-time winter record for electrical demand of 69,692 MW, which was more than 13,000 MW higher than the peak in February 2020.[5] Absent the forced outages, demand would have been even higher. Yet increased demand was not the main problem. Rather, at the same time that Texans were trying to use more electricity than ever before, extremes of cold and ice were rendering a substantial portion of the state's generators unable to function.[6] The level of generator outages was staggering. At its worst point, more than one-third of all power generation was offline, and the outages occurred for every fuel type: coal, natural gas, wind, and even nuclear.[7]

According to a review by the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation (NERC), a majority of generation outages during Winter Storm Uri were due to freezing equipment or other on-site problems. An additional 31% were due to fuel-supply issues, mostly at natural gas plants; this is in line with data showing that combined daily natural gas production for Texas, Oklahoma, and Louisiana fell by more than half during February 2021.[8] As a result, even many plants that could have still operated in the cold were not able to run because they could not obtain fuel.

II. Changes to the ERCOT System Post-Uri

After Winter Storm Uri, the Texas legislature passed SB 2 and SB 3, major pieces of legislation aimed at reforming Texas's electric market.[9] SB 3 required Texas generators to weatherize their power plants so that they would be operable in extreme weather conditions.[10] The legislation also reorganized the ERCOT board, took steps to increase preparation, planning, and communication for future events, and contained a variety of other provisions making adjustments to the electricity market.[11] The weatherization requirements for power plants were

promptly implemented by PUCT.[12] Efforts to protect natural gas infrastructure, which lies within the purview of a different regulatory body (the Texas Railroad Commission) have been slower and less extensive.[13]

III. Changes Currently Under Consideration

Aside from these issues, some policymakers and advocates have sought to make additional changes to the state's electricity market to address what they see as other risks to the grid. Chief among these perceived risks is a lack of investment in new, "dispatchable" generation—generation that can ramp up or down in response to grid needs.[14] The concern is that without such generation, there will be a chronic shortage of electricity in ERCOT.[15] Were this situation to come to pass, it would likely manifest differently than it did in February 2021: Instead of millions being without power for days due to an extreme weather event, a chronic shortage of power would exist, even during normal times. The worry is not so much that the grid will have trouble maintaining reliability during extreme events but that it will struggle even during so-called "blue sky" conditions.[16]

While these issues largely were not in play during February 2021, advocates view the event as a wider wake-up call to address other potential problems with the grid that could affect electric reliability.[17]

These concerns have led PUCT to consider a series of potential redesigns of the Texas electric market. PUCT is currently considering three proposals, collectively known as "Phase 2" of the market redesign,[18] which alone or in combination aim to address "blue sky" risk.

The first proposal, championed by PUCT Chairman Peter Lake, would establish what is known as a load-serving entity (LSE) reliability obligation.[19] This scheme involves a series of steps. PUCT and ERCOT would first calculate the amount of available generation needed to ensure that the desired level of electric reliability would be achieved.[20] ERCOT would then assign to each existing power plant or other generation resource a rating based on how much of their capacity can be relied upon during each season of the year.[21] This rating would consider factors that may limit the ability of the resource to send power to the grid, including intermittency—limitations on the duration that the resource can generate at any one time.[22] Finally, each LSE (utilities or other electric providers) would be assigned the responsibility to arrange an amount of electricity supply expected to meet their demand.[23] Power plants or other generation resources with a lower rating would count less toward meeting this requirement than resources with higher ratings. For example, an LSE with an 80 MW obligation could meet it by procuring power from a generator with 100 MWs of capacity and an 80 percent rating or one with 160 MW of capacity with a 50 percent rating, or by some other combination. Obligations must be met in advance. LSEs that fail to meet their obligations would be assessed a penalty, the proceeds of which would be used by ERCOT to procure the necessary generation resources itself.[24]

The second proposal, advanced by Commissioner William McAdams, is to encourage "dispatchable generation" through the creation of a dispatchable energy credit (DEC) or dispatchable portfolio standard system.[25] Under this system, generators would be required to buy credits from new dispatchable generation, which should help incentivize investment in new dispatchable capacity.[26] To qualify as dispatchable generation, a resource would have to be able to ramp up generation when called upon to do so by state authorities.[27] It is anticipated that most of the generation that would qualify for the dispatchable credits would be either natural gas or combined solar and storage projects.

The final Phase 2 proposal, originally put forward by Commissioner Lori Cobos, is known as a backstop reliability service (BRS) or strategic reliability service.[28] Under this system, ERCOT would be able to pay generators to stand ready to provide additional power when needed.[29]

IV. Phase 2 Reforms Are Not Necessary

While each of the Phase 2 proposals has its advocates among the PUCT Commissioners, it is not yet clear if any can command majority support. It is also unclear whether the risks cited by advocates justify such major market changes—all three proposals would impose significant additional costs on consumers. ERCOT's independent market monitor suggests that actions already taken by the PUCT and ERCOT to hedge against the risk of blackouts will cost Texas ratepayers $1.5 billion a year through higher electric bills.[30] How much additional cost would come from the Phase 2 proposals is difficult to estimate. The

cost of each of the three options will depend on the scale at which they are deployed, but the cost for any of the three would likely need to be sizable if the proposals are to achieve their stated purpose.

Of note, depending on design, the DEC and BRS systems could have the unintended effect of increasing instability and supply shortages on the grid. Both systems strive to encourage additional generation through subsidies.[31] Yet subsidizing additionality (e.g. only new generation) has the potential to undercut existing generation.[32] This could force premature generation retirements, offsetting supply gains from the subsidized generation.

As mentioned above, none of the Phase 2 proposals would have prevented the blackouts associated with Winter Storm Uri even if they had been in place long ahead of time.[33] The Phase 2 proposals are intended to incentivize new generation capacity. Yet, in Winter Storm Uri, what Texas lacked was not generation capacity but generation capacity able to function in the extreme weather environment. In fact, it remains unclear what level of reliability benefit the different Phase 2 proposals would provide over and above the status quo. Even if Texans are willing to pay for additional reliability, the Phase 2 proposals lack a clear quantification of reliability benefits makes it impossible to say ratepayers would be getting good value for their money from any of the Phase 2 reforms.

The market signals that the Phase 2 reforms are not necessarily needed to draw new generation to Texas -- Texas has a robust electric generation market, and investment continues to be made in new generation, with over 217 GW of new generation under study in its the interconnection queue as of July 2022.[34] However, this new generation largely consists of renewable energy projects, which are criticized by market redesign advocates as inherently unreliable.[35] The limitations of intermittent resources are, of course, well known. Yet it is a mistake to think of some energy types as completely reliable and others as unreliable. There is no such thing as "perfect" capacity and the grid must contain the proper combination of resources necessary to meet customers' desires for reliable supply. Without clear reliability objectives, Phase 2 could easily result in spending more money without reducing the risk of customer outages.

V. Conclusion

Winter Storm Uri has led to significant action by state lawmakers, regulators, and industry to prevent future outages. These actions have not eliminated all risks to the system and have certainly not eliminated the fear of future outages. Yet it remains unclear whether further action of the type currently being contemplated by PUCT would enhance reliability. While many Texans worry about whether the lights will stay on, they may soon face another shock as the costs of regulatory actions begin to be reflected in their monthly electricity bills.

About the Author

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[1] Friedrich Nietzsche, Twilight of the Idols (1889).

[2] Jess Donald, *Winter Storm Uri 2021: The Economic Impact of the Storm*, FISCAL NOTES, (Oct. 2021). https://comptroller.texas.gov/economy/fiscal-notes/2021/oct/winter-storm-impact.php.

[3] Patrick Svitek, *Texas puts final estimate of winter storm death toll at 246*, THE TEX. TRIBUNE (Jan. 2, 2022). https://www.texastribune.org/2022/01/02/texas-winter-storm-final-death-toll-246/amp; *Reliability and Resilience in the Balance,* AM. SOC'Y OF CIV. ENG'RS (ASCE) TEX. SECTION (Feb. 16, 2022). https://www.texasce.org/wp-content/uploads/2022/02/Reliability-Resilience-in-the-Balance-REPORT.pdf.

[4] *Valentine's Week Winter Outbreak 2021: Snow, Ice, & Record Cold*, NAT'L WEATHER SERV. (Aug. 15, 2022). https://www.weather.gov/hgx/2021ValentineStorm.

[5] *ERCOT Monthly Operational Overview (February 2021)*, ERCOT, (Mar. 23, 2021). https://www.ercot.com/files/docs/2021/03/23/ERCOT_Monthly_Operational_Overview_202102.pdf.

[6] *The Timeline and Events of the February 2021 Texas Electric Grid Blackouts*, THE UNIV. OF TEX. AT AUSTIN ENERGY INST., (July 2021). https://energy.utexas.edu/sites/default/files/UTAustin%20%282021%29%20EventsFebruary2021TexasBlackout%2020210714.pdf.

[7] *Id.*

[8] *February 2021 Cold Weather Grid Operations: Preliminary Findings and Recommendations*, NERC (Sept. 23, 2021), https://ferc.gov/media/february-2021-cold-weather-grid-operations-preliminary-findings-and-recommendations-full.

[9] SB 2, Texas 87th Reg. (2021); SB 3, Texas 87th Reg. (2021).

[10] Id.

[11] Id.

[12] *Rulemaking to Establish Electric Weatherization Standards*, Proposal For Publication For New 16 TAC § 25.55 As Approved at the August 26, 2021 Work Session, Pub. Util. Comm'n of Tex. Proj. No. 51860 (Aug. 26, 2021), http://interchange.puc.texas.gov/Documents/51840_68_1150025.PDF.

[13] Mitchell Ferman, *Texas senators blast regulator for power grid winterization loophole lawmakers wrote into law*, THE TEXAS TRIBUNE (Sept. 28, 2021). https://www.texastribune.org/2021/09/28/texas-power-grid-loophole.

[14] Brent Bennett, *Improving the ERCOT Grid Through a Reliability Requirement for Variable Generation*, TEX. PUB. POL'Y FOUND. 3 (Oct. 18, 2021), https://www.texaspolicy.com/wp-content/uploads/2021/10/LP-ImprovingReliabilityofERCOTGrid-10-18-21-BrentBennett-FINAL.pdf.

[15] Id.

[16] Id.

[17] *See, e.g.*, T. Lynn Allen, *Power Failure by Design: The Texas Energy Market*, AMER. BAR ASS'N (ABA), (June 11, 2021) https://www.americanbar.org/groups/litigation/committees/environmental-energy/articles/2021/summer2021-power-failure-by-design-the-texas-energy-market/.

[18] *See Review of Wholesale Electric Market Design,* Approval of Blueprint for Wholesale Electric Market Design and Directives to ERCOT, Pub. Util. Comm'n. of Tex. Proj. No. 52373 (Jan. 13, 2022), https://interchange.puc.texas.gov/Documents/52373_336_1180125.PDF.

[19] Arne Olson, et al., *The Load-Serving Entity (LSE) Reliability Obligation*, ENERGY + ENV'T. ECON., (Sept. 30, 2021) https://www.nrg.com/assets/documents/energy-policy/e3-ercot-whitepaper-2021-09-29.pdf.

[20] *Id.* at 4.

[21] Id.

[22] Id.

[23] *Id.*

[24] Id.

[25] Memorandum from Will McAdams, Comm'r. Pub. Util. Comm'n. of Tex. to Chairman Peter M. Lake, Pub. Util. Comm'n. of Tex. (Nov. 17, 2021), https://interchange.puc.texas.gov/Documents/52373_250_1168223.pdf.

[26] Id.

[27] Id.

[28] Memorandum from Lori Cobos, Comm'r. Pub. Util. Comm'n. of Tex. to Chairman Peter M. Lake, Pub. Util. Comm'n. of Tex. (Nov. 18, 2021), https://interchange.puc.texas.gov/Documents/52373_253_1168575.pdf.

[29] *Id.*

[30] Shelby Webb, *ERCOT's plant to keep power in reserve could cost Texans $1.5 billion,* HOUSTON CHRONICLE (June 23, 2022). https://www.houstonchronicle.com/business/energy/article/ERCOT-s-conservative-operating-model-17260290.php.

[31] *See* McAdams, *supra* note 25; Cobos, *supra* note 28.

[32] *See, e.g.,* John Bonnin, *What's a Dispatchable Energy Credit and what does it accomplish*, PCI ENERGY SOL. (Oct. 12, 2022), https://www.pcienergysolutions.com/2022/10/12/whats-a-dispatchable-energy-credit-and-what-does-it-accomplish/.

[33] Josiah Neeley, *The Texas Blackout Blame-Game*, REASON (Feb. 22, 2021), https://reason.com/2021/02/22/the-texas-blackout-blame-game/.

[34] ERCOT MARKET INFORMATION LIST, GIS REPORT JULY 2022 (Aug. 1, 2022), https://www.ercot.com/mp/data-products/data-product-details?id=PG7-200-ER.

[35] Josiah Neeley, *Unreliable Arguments Against Renewables*, R ST. POL'Y STUDY NO. 184 (Oct. 2019), https://www.rstreet.org/2019/10/16/unreliable-arguments-against-renewables.