FERC'S AUTHORITY TO REGULATE HYDROGEN PIPELINES UNDER THE INTERSTATE COMMERCE ACT

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Synopsis: As recognized in the recent infrastructure bill, hydrogen and hydrogen pipelines will play an important role in the economy as we strive to slow and reverse climate change. This article seeks to determine how hydrogen pipelines can or should be regulated. It proposes that the Federal Energy Regulatory Commission (FERC) has the authority to regulate the transportation of hydrogen by pipeline under the Interstate Commerce Act (ICA), which governs FERC's regulation of pipelines carrying crude oil, refined petroleum products, and natural gas liquids. Separately, FERC can regulate the transportation of blends of hydrogen and natural gas under the Natural Gas Act (NGA)—and pipelines can employ capacity leases to keep clear when the latter becomes the former.

America's pipeline regulatory regime is comprehensive, covering the transportation of all commodities other than water. Any non-water pipeline will fall under one of three regulatory regimes: (1) the NGA administered by FERC; (2) the ICA administered by FERC; or (3) the Interstate Commerce Commission Termination Act (ICCTA) administered by the Surface Transportation Board (STB). This article proposes a test to determine how pipelines are regulated depending on what they carry.

This article surveys the legislative history and precedent to distill a test delineating jurisdiction between the three conterminous regimes that govern the transportation of different commodities by pipeline. The NGA governs pipelines carrying naturally occurring methane and mixtures of naturally occurring methane and other commodities, including manufactured methane. The ICA governs pipelines carrying petrochemicals with potential energy uses and their renewable substitutes. And finally, ICCTA governs pipelines carrying any remaining commodity other than water and manufactured methane. Pipelines carrying water and purely manufactured methane are the only interstate pipelines not subject to federal economic regulation. In constructing this test, this article identifies which regime applies to pipelines carrying biomethane, liquid biofuels, and carbon dioxide.

The article then applies this pipeline commodities jurisdictional test to hydrogen-based on a detailed factual analysis of its current origins from fossil

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fuels, its potential generation from renewable sources, and its current and future energy uses, particularly in petroleum and biofuel refining. Applying this test to hydrogen shows that FERC can regulate the introduction of hydrogen into a natural gas pipeline under its NGA authority. More importantly, this article contends FERC has authority over pipelines transporting pure hydrogen under the ICA equivalent to its authority over pipelines carrying oil, refined petroleum products, and ethane and other natural gas derivatives used for energy. Hydrogen from renewable sources would also be subject to FERC's ICA regulation under authority analogous to its jurisdiction over pipelines carrying ethanol.

Hydrogen has the exciting potential to power crucial sectors of the economy where other renewables cannot stack up. It is also needed to make renewable hydrocarbons, to grow our food, and even to power nuclear fusion. Every liquid fuel (conventional or renewable) almost certainly contains hydrogen that was obtained by a refiner in its pure form. Hydrogen made from renewable resources can be most efficiently transported by pipeline and there is a growing consensus that a new hydrogen pipeline network will be needed. Hydrogen pipelines are generally considered subject to STB regulation. However, FERC would be the more appropriate and abler regulator, and its more developed body of ICA precedent would provide greater regulatory certainty. The urgent need to adopt renewable fuels calls for unprecedented levels of technological, economic, and societal adaptation. In this narrow world of pipeline law, we are fortunate to have a regulatory regime that is up to the task. A better understanding of the federal pipelines regulatory regime can chip away at the uncertainty holding back investment in renewable infrastructure as well as provide the means to protect emerging consumer interests.

I. INTRODUCTION

This article explores how—if at all—hydrogen pipelines might be regulated. To do this it first tries to answer the question: how are pipelines regulated based on the product they carry? Answering this question also provides significant insight into how pipelines carrying other renewable energy commodities should and can be regulated. The article focuses on hydrogen because hydrogen pipelines face the greatest amount of regulatory uncertainty and placing them

within the jurisdictional framework requires a deeper analysis with broader implications. In addition, it is growing increasingly clear that renewable hydrogen is needed to transition the economy from fossil fuels.

To place hydrogen within the pipeline regulatory framework, that framework first must be identified. This question—how pipelines are regulated depending on the commodity—does not appear to have been addressed in the academic literature before now. Because this has not yet been done, the article begins by articulating a test to determine how pipelines are regulated based on the commodity they carry. This article begins with a survey of the relevant legislative history from the Hepburn Act of 1906 through the Interstate Commerce Commission Termination Act (ICCTA) passed in 1995. The statutes establish that pipelines carrying any commodity besides water will fall under one, and only one, of three regulatory regimes:

(1) the Natural Gas Act[1] administered by the Federal Energy Regulatory Commission;

(2) the Interstate Commerce Act[2] administered by the Federal Energy Regulatory Commission; or

(3) the Interstate Commerce Commission Termination Act[3] administered by the Surface Transportation Board.

Since the passage of the Natural Gas Act (NGA) in 1938, transportation of all commodities (besides water) by interstate pipelines has been subject to federal regulation under one of two (and later three) regimes. Regulatory responsibility over these pipelines has been shuffled among various agencies, but the jurisdictional scope has never shrunk. Because these pipeline regimes are comprehensive and conterminous, any commodity must fall somewhere among them.

To determine more precisely which regime applies to pipelines carrying different commodities, the article then surveys the precedent delineating jurisdiction between these three regimes. It then identifies the questions and answers needed to place a commodity in a particular regime. In doing so, the article illustrates how this framework applies to three renewable energy commodities: biomethane, drop-in liquid biofuels, and carbon dioxide. The rule distilled is as follows. Pipelines carrying water and pure synthetic methane are unregulated.[4] Pipelines carrying naturally occurring methane, including in mixtures with syn-

1. *See generally* 15 U.S.C. §§ 717-717z (2022).

2. *See generally* 49 U.S.C. app. §§ 1-27 (1988).

3. *See generally* 49 U.S.C. §§ 10101-16106 (2022).

4. This article is concerned with economic regulation of pipeline transportation at the federal level. That is, regulation of the terms, rates, and availability of transportation such as by the NGA, the ICA, and ICCTA. When this article uses the term "unregulated," therefore, it is referring the absence of federal economic regulation. An "unregulated" pipeline may, for instance, still be subject to regulation by the Pipeline and Hazardous Materials Safety Administration or subject to state economic regulation but that is beyond the scope of this article.

thetic methane or other elements, are subject to the NGA. Pipelines carrying energy petrochemicals and their non-petrochemical substitutes are regulated under the Interstate Commerce Act (ICA). Pipelines carrying everything else would be subject to ICCTA administered by the Surface Transportation Board (STB). The article briefly states the different ramifications of these different regimes, with a focus on the different scopes of jurisdiction.

Finally, the article applies the framework to hydrogen and concludes that the transportation of hydrogen by pipeline is most appropriately regulated under the ICA as administered by FERC (rather than under ICCTA administered by the STB), while the transportation of a mix of hydrogen should be subject to the NGA, also administered by FERC.[5] This conclusion is compelled by detailed application of the relevant facts precedent to as well as broader adherence to the purpose underlying the statutes. Specifically, hydrogen is not methane, though it can be blended with methane and is largely derived from it. Further, hydrogen used today is largely derived from petroleum sources and has numerous energy applications, and hydrogen derived from renewable sources, will continue to compete directly with fossil-derived fuels. As a practical matter, FERC would be also the more appropriate, and abler, regulator of hydrogen pipelines and could better foster their development.

II. THE NEED FOR HYDROGEN, HYDROGEN PIPELINES, AND RENEWABLE PIPELINE REGULATION

Hydrogen is often called the "swiss army knife of decarbonization."[6] But this analogy only tells half the story. For many industries, hydrogen is not just one of many available tools to replace fossil fuels, but is rather the only proven option. This is especially true for numerous essential and carbon-intense sectors of the economy that have proven stubbornly difficult to decarbonize. The resource was singled out with its own section in Congress's recent infrastructure spending bill.[7] Hydrogen is also essential to producing biofuel, so it will remain crucial even if biofuels are chosen over hydrogen fuel cells for certain sectors, such as aviation. Clean hydrogen, unlike conventional hydrogen, will require pipelines to transport economically. Currently, there is perceived regulatory uncertainty regarding hydrogen pipelines, which must be resolved to encourage investment in this infrastructure that will soon be essential. This article aims to chip away at that uncertainty.

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5. The article also proposes that capacity leases could be employed when needed to delineate the former from the latter.

6. *See, e.g.*, HYDROGEN: A CLEAN SOLUTION TO HEAVY-DUTY DIESEL TRANSPORTATION 1 (Dec. 14, 2021), https://www.lexology.com/library/detail.aspx?g=f31dfaf4-906d-48e6-ba75-96f4e288c11a; Abby Smith, *Biden administra-tion and industry alike see hydrogen as 'Swiss Army knife' for eliminating emissions*, WASH. EXAM'R (Apr. 15, 2021), https://www.washingtonexaminer.com/policy/energy/biden-administration-and-industry-alike-see-hydrogen-as-swiss-army-knife-for-eliminating-emissions.

7. Infrastructure Investment & Jobs Act §§ 40311-40314, Pub. L. No. 117-58, 135 Stat. 429, 1,005-15 (2021) (codified at 42 U.S.C. §§ 16151-16166) (Subtitle B—Hydrogen Research and Development) [hereinafter Infrastructure Act].

A. Sources of Hydrogen

Hydrogen, the most abundant element in the universe, is unique among energy carriers in terms of its diversity of potential sources. These are often described in terms of the so-called "rainbow" of hydrogen that categorizes the resource by its origin in terms of environmental impact. For instance, hydrogen made from splitting water molecules with wind or solar electricity is "green" whereas hydrogen made by reforming methane and releasing the carbon dioxide is "gray."[8] This article eschews the "rainbow" labelling because the pipeline jurisdictional test does not care about carbon intensity. Rather, it is primarily concerned with whether or not the product is a petroleum derivative.

1. Fossil Sources of Hydrogen

Despite its potential as a renewable fuel, hydrogen today is primarily produced from natural gas through a process called steam methane reforming. Methane—the essential component of natural gas—is composed of one carbon and four hydrogen atoms (CH_4). In steam methane reforming, steam (H_2O) is added to methane in the presence of heat and a catalyst, producing hydrogen (H_2) and carbon monoxide (CO) which is turned into carbon dioxide (CO_2).[9] These carbon oxides are usually released freely, contributing to climate change. Hydrogen can also be extracted from coal. Hydrogen derived from natural gas through steam methane reforming is called "gray" hydrogen and hydrogen derived from coal is called "brown" hydrogen.[10]

a. Low Carbon Fossil Options

Hydrogen can also be extracted from fossil fuels while producing fewer greenhouse gases. The recent Infrastructure Act specifically recognizes this and in fact mandates that one of four proposed "hydrogen hubs" be based on the production of hydrogen from fossil fuels.[11] The bill also prioritizes hydrogen projects in natural gas producing regions.[12] The most straightforward method of limiting emissions is employing conventional steam reforming of methane while also capturing and sequestering the carbon dioxide. This is called "blue" hydrogen.[13] There are other methods as well. For instance, with methane pyrolysis,

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8. U.S. ENERGY INFO. ADMIN., HYDROGEN EXPLAINED, PRODUCTION OF HYDROGEN, https://www.eia.gov/energyexplained/hydrogen/production-of-hydrogen.php. Hydrogen made from biomass or waste or reformed from biomethane is usually considered "green" hydrogen as well.

9. U.S. DEP'T OF ENERGY, HYDROGEN PRODUCTION: NATURAL GAS REFORMING, https://www.energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming.

10. WHITE & CASE LLP, GLOBAL HYDROGEN GUIDE: EMERGING POLICY AND REGULATORY INITIATIVES 3 (2021).

11. Infrastructure Act § 40314, 135 Stat. at 1,008-10 (codified at 42 U.S.C. § 16161a).

12. *Id.*, 135 Stat. at 1,009 (codified at 42 U.S.C. § 16161a(c)(3)(D)). The bill also authorized grants for the Appalachian Regional Commission to "establish a regional energy hub in the Appalachian region for natural gas and natural gas liquids, including hydrogen produced from the steam methane reforming of natural gas feedstocks." *See id.* § 11506, 135 Stat. at 584 (codified at 40 U.S.C. §§ 14102-14704).

13. The climate impact of this has been the subject of much scrutiny, with one study finding that blue hydrogen could be worse for the climate than burning methane. *See* S&P GLOBAL PLATTS, *New study questions*

the methane is heated until it is separated into hydrogen and solid carbon (which also has economic value).[14] This is called "turquoise" hydrogen to distinguish it from (less green) "blue" hydrogen. And, of course, new technologies are continually being developed.[15]

2. Renewable Sources of Hydrogen

Hydrogen can also be obtained from myriad renewable sources.[16] This is, after all, what is driving all the recent interest in hydrogen as an energy carrier. Some green methods of producing hydrogen are even carbon negative. Currently, "green" hydrogen is more expensive to produce than conventional fossil hydrogen, but that cost is steadily declining.[17] In fact, Biden's Department of Energy has made reducing the price of green hydrogen by 80% the subject of its inaugural "Earthshot."[18]

a. Biomass

Hydrogen can be made from biomass, including biomethane.[19] The most attractive feature of biomass hydrogen is that it should theoretically be carbon negative when more carbon is captured than released.[20] Some companies hope to market carbon-neutral or even carbon-negative hydrogen from natural gas by mixing enough biomethane into the feedstock to offset the carbon that is not captured.[21]

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climate sense of blue hydrogen in UK strategy (Aug. 12, 2021), https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/081221-new-study-questions-climate-sense-of-blue-hydrogen-in-uk-strategy.

14. *See* S&P Global Platts, *Bill Gates-backed startup to build 'turquoise hydrogen' pilot by end of 2022* (Jul. 7, 2021), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/bill-gates-backed-startup-to-build-turquoise-hydrogen-pilot-by-end-of-2022-65354106, interestingly this was known to Congress around the time it was considering how to regulate gas pipelines. *See* Report No. 84-A at 48 ("other uses of natural gas as a raw material") (discussed infra).

15. *See, e.g.*, Leigh Collins, *We will make zero-CO2 hydrogen from natural gas so cheaply we could give it away for free*, (Sept. 30, 2021), https://www.rechargenews.com/energy-transition/-we-will-make-zero-co2-hydrogen-from-natural-gas-so-cheaply-we-could-give-it-away-for-free-/2-1-1075224.

16. In addition, there is the (yet unproven) potential to gather hydrogen from naturally occurring reservoirs, sometimes called "white" hydrogen. *See* Bella Peacock, *Natural hydrogen exploration 'boom' snaps up one third of South Australia*, PV MAG. (Feb. 2, 2022), https://www.pv-magazine.com/2022/02/02/natural-hydrogen-exploration-boom-snaps-up-one-third-of-south-australia/.

17. *Hydrogen Shot*, U.S. DEP'T OF ENERGY, HYDROGEN & FUEL CELL TECH. OFF. (2021) https://www.energy.gov/eere/fuelcells/hydrogen-shot.

18. *Id.*

19. RAFAEL LUQUE, CAROL KI LIN, KAREN WILSON, & JAMES CLARK, HANDBOOK OF BIOFUELS PRODUCTION: PROCESSES AND TECHNOLOGIES (Woodhead Publ'g, 2d ed. 2016), (Chapter 15 "Production of bio-syngas and bio-hydrogen via gasification").

20. *Clean Hydrogen & Negative CO_2 Emissions*, NAT'L ENERGY TECH. LAB'Y, https://netl.doe.gov/coal/gasification/negative_ghg_emissions.

21. Leigh Collins, *We will make zero-CO2 hydrogen from natural gas so cheaply we could give it away for free*, RECHARGE NEWS (Sept. 30, 2021), https://www.rechargenews.com/energy-transition/-we-will-make-zero-co2-hydrogen-from-natural-gas-so-cheaply-we-could-give-it-away-for-free-/2-1-1075224; Shayne Willette, *Don't Forget About Biomass Gasification For Hydrogen*, FORBES (Apr. 22, 2022), https://www.forbes.com/sites/pikeresearch/2020/04/22/dont-forget-about-biomass-gasification-for-hydrogen/?sh=3f581413724f.

b. Electrolysis of Water

The quintessential "green" hydrogen is produced by the electrolysis of water powered with renewable electricity. In this method, renewable electricity is used to split water molecules (H_2O) into hydrogen and oxygen.[22] So-called "pink" hydrogen is made by electrolyzing water with nuclear energy.[23] In theory, this "green" hydrogen can be generated anywhere with access to renewable electricity and water. However, most agree that economies of scale will support concentrating production of green hydrogen where renewable electricity is cheapest and then transporting the hydrogen by pipe to where it will be consumed.[24] The alternative would be to transmit the renewable energy by cable to the point of water electrolysis, which would be more expensive and would also burden the existing electrical grid.[25] Therefore, hydrogen pipelines will become increasingly relevant as hydrogen is increasingly sourced from wind, solar, or nuclear sources.

B. Uses of Hydrogen

Just as hydrogen can be derived from numerous sources, it also has many applications. While fossil energy is the dominant use of hydrogen today, with renewable energy likely being the dominant use in the future, hydrogen also has many smaller, but essential non-energy applications. Hydrogen will remain needed in all these sectors after the transition from fossil sources to renewable ones.

1. Current Uses of Hydrogen

Numerous sectors of the economy rely on hydrogen. Currently, hydrogen's primary use is in the energy sector as an important input to fossil and renewable hydrocarbon fuels. Its second biggest use is in agriculture, where it used to grow half the world's food.[26] It also has other smaller, yet essential, applications.

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22. *Hydrogen Production: Electrolysis*, U.S. DEP'T OF ENERGY, HYDROGEN & FUEL CELL TECH. OFF., https://www.energy.gov/eere/fuelcells/hydrogen-production-electrolysis.

23. *The hydrogen colour spectrum*, NAT'L GRID, https://www.nationalgrid.com/stories/energy-explained/hydrogen-colour-spectrum.

24. *See* HYDROGEN COUNCIL AND MCKINSEY & CO., HYDROGEN INSIGHTS: A PERSPECTIVE ON HYDROGEN INVESTMENT, DEPLOYMENT AND COST COMPETITIVENESS 20 (Feb. 2021), https://hydrogencouncil.com/wp-content/uploads/2021/02/Hydrogen-Insights-2021.pdf ("Hydrogen pipelines can effectively transport renewable hydrogen across long distances. They can transport 10 times the energy at one-eighth the cost associated with electricity transmission lines. Furthermore, hydrogen pipelines have a longer lifespan than electricity transmission lines and offer dual functionality, serving as both a transmission and storage medium for green energy"); *see also* Joshua D. Rhodes et al., White Paper, *Renewable Electrolysis in Texas: Pipelines versus Power Lines*, ENERGY INSTITUTE, THE UNIV. OF TEX. AT AUSTIN (2019), https://sites.utexas.edu/h2/files/2021/08/H2-White-Paper_Hydrogen-Pipelines-versus-Power-Lines.pdf (concluding that pipelines would be preferred even for movements across Texas).

25. HYDROGEN COUNCIL & MCKINSEY, *supra* note 24; Joshua D. Rhodes et al., *supra* note 24.

26. *See* discussion below in section VI.B.2.a.(i)-(iii).

a. Energy (Refining)

Every time we power an internal combustion engine with any sort of ubiquitous liquid fossil fuel, we are almost certainly also burning hydrogen that was at one point acquired by a refinery in its pure form. Refineries are by far the largest consumers of hydrogen today.[27] Importantly for our purposes, refiners use hydrogen for both its chemical *and* its energy properties. In fact, most hydrogen acquired by refiners is meant to become part of fuel that is eventually burned in internal combustion engines and jets. Hydrogen is directly essential to two key operations of refineries: hydrocracking (upgrading) and hydrotreating (removing impurities). In hydrocracking hydrogen is used to "upgrade" heavier products by joining hydrogen with split, or "cracked," hydrocarbon molecules, making them lighter. In hydrotreating, hydrogen is used to remove "heteroatom," impurities, primarily sulfur. For instance, to remove sulfur, refiners split molecules that contain sulfur and use some of the hydrogen to bond with the sulfur (to enable its removal in the form of hydrogen sulfide, H_2S) and some of the hydrogen to increase the hydrogen content of the remaining hydrocarbon molecules.[28] In this way, the typical car-owner is as much a consumer of hydrogen, as they are a consumer of crude oil. The specific facts of these refining operations are discussed in more detail in the section applying FERC's jurisdictional test to hydrogen.[29]

b. Agricultural & Other

In addition to the energy sector, hydrogen has numerous other essential uses. For instance, half of humanity's food is grown with the aid of ammonia fertilizer (NH_3) made with hydrogen.[30] This is the second largest application of hydrogen (though it is still dwarfed by refining).[31] In fact, the production of ammonia alone accounts for 1% of worldwide emissions.[32] Of note, there is already a large interstate ammonia pipeline network regulated by the STB. Hydrogen has other uses in the chemical and industrial sectors and is also used in laboratories. These consume a relatively small share of all hydrogen produced, but that hydrogen is nevertheless crucial and irreplaceable in those sectors. Demand for hydrogen in all these sectors will continue well past the transition from fossil fuels.

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27. ENERGY FUTURES INITIATIVE, THE FUTURE OF CLEAN HYDROGEN IN THE UNITED STATES: VIEWS FROM INDUSTRY, MARKET INNOVATORS, AND INVESTORS 21 (Sept. 2021), available for download at https://energyfuturesinitiative.org/reports/the-future-of-clean-hydrogen-in-the-united-states/.

28. *See* discussion below in section VI.B.2.

29. *See* discussion below in section VI.B.2.a.(i)-(iii).

30. *See* Leigh K. Boerne, *Industrial ammonia production emits more CO2 than any other chemical-making reaction. Chemists want to change that*, CHEMISTRY & ENG'G NEWS, (June 15, 2019), https://cen.acs.org/environment/green-chemistry/Industrial-ammonia-production-emits-CO2/97/i24.

31. ENERGY FUTURES INITIATIVE, *supra* note 27, at 21.

32. Robert F. Service, *New reactor could halve carbon dioxide emissions from ammonia production*, AM. ASS'N FOR THE ADVANCEMENT OF SCI. (Nov. 6, 2019), https://www.science.org/content/article/new-reactor-could-halve-carbon-dioxide-emissions-ammonia-production.

2. Uses of Hydrogen in a Net Zero Economy:

Consensus is building that hydrogen will play an important part in a net-zero economy. The recent Infrastructure Act correctly identifies that hydrogen "provides economic value and environmental benefits for diverse applications across multiple sectors of the economy."[33] Hydrogen can be perfectly clean and is uniquely versatile. It can power an electric fuel cell where the only emission is clean water, or it can be burned for heat and produce only water vapor and some nitrogen oxides. It can supply power wherever electric or thermal energy are needed. Hydrogen is a less efficient energy carrier than most batteries, so its most promising applications are where electrification via batteries is not feasible.[34] These industries include aviation, maritime shipping, mining, long-distance and heavy-duty transportation. It also includes heavy industrial sectors such as steel and concrete production that need high temperature that cannot be generated by electricity at all. In addition, hydrogen would still be irreplaceable in all its current applications, including non-energy applications, after the transition from fossil fuels.[35]

a. Increased Hydrogen Demand for Refining Biofuels

In some industries, such as aviation, there is a debate as to whether hydrogen or biofuels will take over from fossil fuels.[36] But hydrogen would still be needed to refine those biofuels. In fact, more hydrogen is needed to refine biofuels than to refine petroleum.[37] The exact mechanics are described further be-

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33. Infrastructure Act § 40311, 135 Stat. at 1,006 (Congressional findings).

34. *See* Leigh Collins, *IPCC report: Clean hydrogen needed for net zero, but only where green electric solutions not feasible*, RECHARGE NEWS (Apr. 6, 2022) (discussing IPCC, MITIGATION OF CLIMATE CHANGE (2022)); HYDROGEN COUNCIL & MCKINSEY, *supra* note 24, at 26 (Exhibit 17, "Hydrogen competitiveness per end application in 2030").

35. *See* AMGAD ELGOWAINY ET AL., ARGONNE NAT'L LAB., ASSESSMENT OF POTENTIAL FUTURE DEMANDS FOR HYDROGEN IN THE UNITED STATES (2020) [hereinafter H2@SCALE].

36. *See, e.g.*, Hugo del Campo, et al., *The sky is the limit Perspectives on the emerging European commercial aircraft value chain recovery and beyond*, MCKINSEY & CO. (Oct. 20, 2021), https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/the-sky-is-the-limit-perspectives-on-the-emerging-european-commercial-aircraft-value-chain-recovery-and-beyond?cid=other-pso-lkn-mip-mck-oth-2110&li_fat_id=80ddce9d-da08-49db-bd30-bd33aa31438f ("For narrow-body aircraft and regional jets, only about 50 percent believe SAF will dominate, while the other half see hydrogen as the dominant new sustainable fuel."). Another such industry is heavy trucking. *See* Jack Ewing, *Truck Makers Face a Tech Dilemma: Batteries or Hydrogen?* N.Y. TIMES (Apr. 11, 2022), https://www.nytimes.com/2022/04/11/business/electric-hydrogen-trucks.html; William Boston, *The Electric-Truck Battle to Come: Batteries Versus Hydrogen Fuel Cells*, WALL ST. J. (Nov. 9, 2021), https://www.wsj.com/articles/the-electric-truck-battle-to-come-batteries-versus-hydrogen-fuel-cells-11636466414.

37. U.S. DEP'T OF ENERGY, OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, SUSTAINABLE AVIATION FUEL: REVIEW OF TECHNICAL PATHWAYS 33 (2020), https://www.energy.gov/sites/prod/files/2020/09/f78/beto-sust-aviation-fuel-sep-2020.pdf ("Hydrogen demand is required for all routes (hydrocracking large molecules, building up small molecules, or saturating direct fermentation molecules)"); *id.* at 47 ("Hydrogen demand is high for all biofuels and unusually high for [sustainable aviation fuel]"); IEA, BIOENERGY, 'DROP-IN' BIOFUELS: THE KEY ROLE THAT CO-PROCESSING WILL PLAY IN ITS PRODUCTION (2019), https://www.ieabioenergy.com/wp-content/uploads/2019/09/Task-39-Drop-in-Biofuels-Full-Report-January-2019.pdf ("The important role of hydrogen in upgrading biological feedstocks was emphasised as a key challenge for the future development of drop-in biofuels. This is even more pertinent now, particularly finding cheap and renewable sources of hydrogen").

low,[38] but hydrogen is needed both for removing impurities and for upgrading the product wherein the hydrogen becomes a part of the hydrocarbon "drop-in" fuels that are compatible with existing engines. Even without clean hydrogen mandates, voluntary demand for clean hydrogen to make clean fuels has already created market opportunities.[39]

b. Combusted for Thermal Energy

Many promising applications of renewable hydrogen would involve combusting it for its direct heat, much like how natural gas is used today. This would be particularly important in heavy industries that requires high temperatures that cannot be achieved with electrification. For example, glass, steel, and cement are all vital to our modern life—and are all needed to build our post-fossil fuel infrastructure. These industries account for a large share of industrial emissions, which is growing with increasing demand for these commodities. Hydrogen is seen as the most promising means of decarbonizing these sectors.[40]

Traditional utilities and power suppliers have also expressed great interest in hydrogen as a means of decarbonizing gas turbine power plants and even home gas distribution.[41] Using hydrogen or mixing hydrogen with natural gas to power a turbine generator would provide another means of transmitting and, importantly, storing of renewable energy. Many utilities are actively exploring this strategy, notably the Intermountain Power Project in Utah.[42]

c. Fuel Cell Energy

Hydrogen can also produce electric power when run through a fuel cell. In this way, hydrogen functions much like a battery, but with an importantly different set of weaknesses and strengths compared to lithium and other batteries. Like lithium batteries, hydrogen fuel cells are quiet and easy to maintain.[43] However, fuel cells are significantly less efficient at converting the energy used to split water molecules back into electricity, although this technology is improving.[44] So hydrogen is not preferred over batteries where batteries are feasible.

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38. *See* discussion below in sections VI.B.2.a.(i)-(iii).

39. Camila Naschert, *Biofuel's thirst for green hydrogen opens new market for utilities*, S&P GLOBAL (Feb. 10, 2021), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/biofuel-s-thirst-for-green-hydrogen-opens-new-market-for-utilities-62406439. For instance, a planned green hydrogen project centered on the Piedras Pintas salt dome in Duval County, Texas ("Hydrogen City") seeks to supply hydrogen as a feedstock for sustainable aviation fuel, in addition to ammonia, rocket fuel, and hydrogen fuel for power plants. *See* GREEN HYDROGEN INT'L CORP., PROJECTS: HYDROGEN CITY, TEXAS, https://www.ghi-corp.com/projects/hydrogen-city.

40. CHRIS BATAILLE, OECD, LOW AND ZERO EMISSIONS IN THE STEEL AND CEMENT INDUSTRIES: BARRIERS, TECHNOLOGIES AND POLICIES 14 (2019).

41. *See* HYDROGEN COUNCIL & MCKINSEY, *supra* note 24, at 27.

42. *See* Steve Griffin, *Intermountain Power Project's switch from coal to hydrogen could power rural Utah job growth*, THE SALT LAKE TRIB. (Oct. 5, 2021), https://www.sltrib.com/news/environment/2021/10/05/intermountain-power/ *see also* https://www.ipautah.com/ipp-renewed/.

43. U.S. DEP'T OF ENERGY, DEPARTMENT OF ENERGY HYDROGEN PROGRAM PLAN 29 (2021).

44. COPENHAGEN CTR. OF ENERGY EFFICIENCY, ANALYSIS OF HYDROGEN FUEL CELL AND BATTERY EFFICIENCY 6 (2019).

But there are many carbon-intense sectors where batteries simply cannot be used because the weight of the required batteries proves prohibitive. Hydrogen—the lightest element there is—does not present this obstacle.[45] For instance, hydrogen is seen by many as the preferred long-term solution for decarbonizing aviation, maritime travel, long distance and heavy surface transportation, and heavy industrial applications such as powering construction and mining equipment.[46] While fuel cells do not generate their power directly from heat, they can generate a significant amount of heat which can even be sufficient to support cogeneration, making the system's efficiency more comparable to a lithium battery system.[47]

C. Clear Regulation Is Increasingly Needed for Pipelines Carrying Hydrogen and Other Renewable Commodities

Pipelines have become synonymous with fossil fuels and climate change.[48] However, pipelines will remain crucially relevant as the economy replaces fossil fuels with renewable energy commodities. Because not all sectors of the economy can be electrified, hydrogen or other 'green fuels' will be needed to replace carbon-intense fossil fuels.[49] And pipelines will remain the safest, cleanest, and most efficient means of transporting these liquid and gaseous commodities. Building a new pipeline, or converting an existing one, is a large and financially risky undertaking that must be backed by a degree of regulatory certainty. This article attempts to contribute as much certainty as it can, or at least begin the process of removing some uncertainty. First, this article describes how regulatory jurisdiction over pipelines is determined based on the commodity that pipeline carries. Second, this article provides an argument that FERC, the agency with the more relevant expertise and more developed body of pipeline precedent, can and should regulate hydrogen pipelines.

1. Increased Pipeline Demand for Green Hydrogen in All Scenarios

As hydrogen is increasingly derived from sources other than natural gas, dedicated hydrogen pipelines will increasingly become economically justified.[50] Even if biofuels are chosen over hydrogen fuel cells for every sector of the economy, refining these fuels will require much more hydrogen than we currently use to refine their fossil equivalents. And if this hydrogen is "green," dedicated pipelines will be the most efficient means of transporting it from sources of re-

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45. *Id.* at 1.

46. *See* HYDROGEN COUNCIL & MCKINSEY, *supra* note 24 at 28; U.S. DEP'T OF ENERGY, DEPARTMENT OF ENERGY HYDROGEN PROGRAM PLAN 28 (2021).

47. *See* Order No. 874, *Fuel Cell Thermal Energy Output*, 173 FERC ¶ 61,226 at PP 8-9 (2021); U.S. DEP'T OF ENERGY, FUEL CELL TECH. OFFICE, FUEL CELLS 1 (2015), https://www.energy.gov/sites/prod/files/2015/11/f27/fcto_fuel_cells_fact_sheet.pdf.

48. *See, e.g.*, ANDREAS MALM, HOW TO BLOW UP A PIPELINE (2021) which, despite its proactive title, is not limited to pipelines.

49. *See* NEAL KISSEL, QUAN LI, & DRAKE HERNANDEZ, CRA MARAKON HYDROGEN MARKET PRIMER 2, CHARLES RIVER ASSOC. (Jul. 22, 2021), available for download at https://www.crai.com/insights-events/publications/hydrogen-market-primer/.

50. *See* HYDROGEN COUNCIL & MCKINSEY, *supra* note 24, at 29.

newable electricity to refineries, industrial centers, and other end-users. Importantly, pipeline transportation would not burden the electrical grid. In one sense, virtually all hydrogen used today is already transported by pipeline in the form of natural gas, some of which is turned into hydrogen. Dedicated pipelines for carrying pure hydrogen currently only measure 1,600 miles, concentrated in the Gulf Coast refining centers.[51] Much more hydrogen pipeline infrastructure will be needed to combat climate change on all fronts.[52]

a. Hydrogen Can Utilize Existing Natural Gas Pipeline Infrastructure

Natural gas pipeline infrastructure presents a twofold opportunity for renewable hydrogen. First, the existing natural gas pipeline network could support blends of hydrogen with little to no modification.[53] By most accounts, the existing grid can safely accept a hydrogen blend of up to 20 percent.[54] This approach is seen as especially attractive in the near term, before demand justifies dedicated hydrogen infrastructure.[55] In fact, FERC recently endorsed a pipeline's estimate of climate impacts that "account[ed] for the limited, eventual penetration of hydrogen and renewable natural gas into the natural gas supply."[56] Second, the repurposing natural gas pipelines for hydrogen transportation is seen as an attractive alternative to building new pipelines from whole cloth.[57] Such conversions could cut costs in half or more compared to new construction.[58] This could also be an attractive option for natural gas and other pipeline owners who do not want to be stuck with a "stranded" asset after the economy moves on from fossil fuels.[59] As will be discussed further below, conversion of a natural gas pipeline to another use does not only require regulatory certainty, it requires regulatory permission in the form of FERC authorization to abandon its current purpose.

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51. PAUL W. PARFOMAK, CONG. RSCH. SERV., PIPELINE TRANSPORTATION OF HYDROGEN: REGULATION, RESEARCH, AND POLICY 6 (2021) [hereinafter CRS REPORT].

52. INT'L ENERGY AGENCY, GLOBAL HYDROGEN REVIEW 144 (2021), https://iea.blob.core.windows.net/assets/3a2ed84c-9ea0-458c-9421-d166a9510bc0/GlobalHydrogenReview2021.pdf.

53. *Id*. at 145-46; ENERGY FUTURES INITIATIVE, *supra* note 27, at 43 ("Blending hydrogen in natural gas pipelines is the most active area of investigation in the transport and storage value chain segment").

54. HYDROGEN COUNCIL & MCKINSEY, *supra* note 24, at 21; H2@SCALE, *supra* note 35, at 43-44; *see* M. W. MELAINA, O. ANTONIA, & M. PENEV, NAT'L RENEWABLE ENERGY LAB., BLENDING HYDROGEN INTO NATURAL GAS PIPELINE NETWORKS: A REVIEW OF KEY ISSUES 32 (2013), https://www.nrel.gov/docs/fy13osti/51995.pdf ("If less than 20% hydrogen is introduced into distribution system, the overall risk is not significant for both distribution mains and service lines, but the service lines are more impacted than mains because they are mostly in confined spaces."). Without significant modifications though, most natural gas pipelines cannot handle much more hydrogen without encountering issues such as steel embrittlement.

55. For an example of how businesses are actively pursuing this transportation method, *see, e.g.*, Molly Burgess, *Linde starts up 'world's first' plant for extracting hydrogen from natural gas pipelines*, GAS WORLD (Jan 20, 2022), https://www.gasworld.com/linde-starts-up-worlds-first-plant-for-extracting-hydrogen-from-natural-gas-pipelines/2022557.

56. *Iroquois Gas Transmission Sys., L.P.*, 178 FERC ¶ 61,200 at P 56 (2022).

57. INT'L ENERGY AGENCY, *supra* note 52, at 147-48; CRS REPORT, *supra* note 52, at 7-8.

58. CRS REPORT, *supra* note 51, at 8.

59. *Id.* (citing ENV'T DEF. FUND, MANAGING THE TRANSITION PROACTIVE SOLUTIONS FOR STRANDED GAS ASSET RISK IN CALIFORNIA (2019)).

The recent Infrastructure Act instructs the Secretary of Energy to support hydrogen "transmission by pipeline, including retrofitting the existing natural gas transportation infrastructure system to enable a transition to transport and deliver increasing levels of clean hydrogen, clean hydrogen blends, or clean hydrogen carriers."[60] The Secretary's national hydrogen strategy must also identify "opportunities to use, and barriers to using, existing infrastructure, including all components of the natural gas infrastructure system."[61] Even more recently, the Biden administration expressed an intent to leverage increased U.S. natural gas exports to Europe into a longer-term position for the U.S. as an exporter of hydrogen.[62] As part of its plan to supply Europe with natural gas, the White House committed to collaborating with the European Union on the uses of hydrogen and to work to build "clean and renewable *hydrogen-ready* infrastructure."[63]

2. Investment in Pipelines Requires Regulatory Certainty

Bringing hydrogen pipelines into operation, whether new or converted, requires significant investment. Lack of regulatory certainty has already been identified as a barrier dampening investment in hydrogen pipeline infrastructure.[64] This article seeks to help fix that misconception. It does this first by answering the question of how pipelines are regulated depending on the commodity they carry. This question does not appear to have been addressed in any systematic method before. No doubt there will be refinements as the transition from fossil fuels gathers momentum, but this article hopes to move the discussion forward.

The research shows that the federal system of pipeline regulation is—in terms of commodities other than water—comprehensive. Interstate pipelines carrying any commodity (other than water) are regulated under one of three legal authorities. Therefore, once a pipeline determines how this framework applies to the commodity it carries, it can move forward on regulatory terra firma. FERC has already addressed the jurisdictional status of biomethane and liquid biofuels, although some questions remain.

The article next seeks to place hydrogen within the existing regulatory regime. Because hydrogen is not natural gas (*i.e.* methane), it falls under the framework of the Hepburn Act, which regulates everything other than water and

60. Infrastructure Act § 40313, 135 Stat. at 1,007 (codified at 42 U.S.C. § 16161a(e)(6)(A)).

61. *Id.* § 40314, 135 Stat. at 1,010 (codified at 42 U.S.C. § 16161b(a)(2)(I)).

62. Jennifer A. Dlouhy & David R. Baker, *Biden Eyes Long-Term Hydrogen Breakthrough in Plan to Send Gas to EU*, BLOOMBERG (Mar. 25, 2022), https://www.bloomberg.com/news/articles/2022-03-25/biden-eyes-long-term-hydrogen-breakthrough-in-plan-for-gas-to-eu.

63. WHITE HOUSE, FACT SHEET: UNITED STATES AND EUROPEAN COMMISSION ANNOUNCE TASK FORCE TO REDUCE EUROPE'S DEPENDENCE ON RUSSIAN FOSSIL FUELS (Mar. 25, 2022), https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/25/fact-sheet-united-states-and-european-commission-announce-task-force-to-reduce-europes-dependence-on-russian-fossil-fuels/ (emphasis added).

64. ENERGY FUTURES INITIATIVE, *supra* note 27, at 41 (describing accounts from interviews with stakeholders that "[u]ncertain regulatory and market environments are deterring hydrogen pipeline investment" and that even "[s]ome companies are looking to hydrogen carriers and hydrogen-based alternative fuels to avoid regulatory issues for hydrogen pipelines"); James Bowe & William Rice, *Building the Hydrogen Sector Will Require New Laws, Regs*, LAW360 (January 13, 2021), https://www.law360.com/articles/1342390/building-the-hydrogen-sector-will-require-new-laws-regs.

gas under either ICCTA or the ICA. The two Hepburn Act statutes are largely similar in substance. Therefore, for hydrogen pipelines, the question is not *if*—or even really *how*—they are regulated at the federal level. The only serious question is *who* regulates them: FERC or the STB. The question of which agency governs, though, will likely be consequential to this emerging industry and clarity should be provided sooner rather than later.

3. FERC Can and Should Regulate Interstate Hydrogen Pipelines

Hydrogen is the only renewable pipelined commodity that is currently misplaced in the pipeline regulatory regime. Globally, hydrogen has been called a "jump ball," as it is uncertain which nations will gain the first mover advantage. At home, it is also a regulatory "jump ball" as the statute and precedent arguably empower either of two agencies—FERC or the STB—to regulate its transportation by pipeline. Hydrogen's myriad sources and applications make it a promising renewable fuel. This also makes the jurisdictional analysis for hydrogen pipelines more interesting, but answerable. The current understanding is that the handful of interstate hydrogen pipelines are regulated by the STB on the—mistaken—basis that hydrogen is a non-energy resource.[65] This interpretation might be permissible (if *Chevron* deference applies) but is ultimately unsound.

Hydrogen should be regulated by FERC under the ICA because it is used for energy purposes and derived from petroleum resources. This interpretation is consistent with FERC's articulation that because ammonia is made from hydrogen, ammonia pipelines would be subject to FERC's ICA jurisdiction if ammonia were used for energy purposes.[66] As described herein, hydrogen's current uses in refining are every bit as much of an energy source as the crude oil it is combined with. And hydrogen's future energy applications are myriad. FERC also exercises ICA jurisdiction over renewable substitutes for energy petrochemicals, so FERC would retain jurisdiction over renewable hydrogen not derived from fossil resources. And on a practical level, FERC is simply the better agency to regulate this emerging energy resource, especially with its experience overseeing the conversion of natural gas pipelines to ICA uses, as well as pipeline capacity leases. In this way, FERC asserting jurisdiction over hydrogen pipelines under the ICA would provide a greater degree of regulatory certainty for those interested in developing or using hydrogen pipelines.

III. DEVELOPMENT OF THE PIPELINE REGULATORY FRAMEWORK

To understand how hydrogen fits within the pipeline regulatory framework, we must begin with the framework's inception. Since this topic has not been ad-

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65. *See* CRS REPORT, *supra* note 51, at 10 ("Jurisdiction over rates for interstate hydrogen pipelines resides with the Surface Transportation Board (STB)."); *Statement Regarding a Coordinated Framework for Regul. of a Hydrogen Econ.*, 72 Fed. Reg. 609, 618 (U.S. Dep't of Transp., Jan. 5, 2007) [hereinafter Hydrogen Economy Statement] ("The statement recognizes that the Surface Transportation Board (STB), the Federal economic regulator of railroads, also regulates economic aspects of interstate hydrogen pipelines"); GOV'T ACCOUNTABILITY OFF., ISSUES ASSOCIATED WITH PIPELINE REGULATION BY THE SURFACE TRANSPORTATION BOARD, app. I (1998) [hereinafter GAO REPORT]; *see also* discussion below in section VI.

66. *See Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381 (1990); CF Indus., Inc. v. FERC, 925 F.2d 476, 478 (D.C. Cir. 1991). *See also* discussion below in sections III.C.2.a-b and VI.B.1-3.

dressed before, this article provides a thorough history. The regulatory framework grew over more than a century with little coordination between the numerous congresses, multiple presidents, four agencies (half of which don't exist anymore), and courts all interpreting relatively broad and general language. While its development may appear somewhat messy or unguided, its key elements have remained remarkably constant, and the resulting jurisdictional test is clear and manageable.

The statutory foundation and agency precedent provide guidance as to how this framework can and should be applied to emerging fuels. Most importantly, the statutes and precedent tell us the pipeline regulatory framework is virtually comprehensive, covering every commodity except water. There are three pipeline regulatory regimes, which can be better understood as two regulatory paradigms, one of which is split between two agencies. The Natural Gas Act (NGA) paradigm extensively regulates the more narrowly defined (but also more numerous) set of pipelines. The Hepburn Act common carrier paradigm governs all other pipelines, with the Federal Energy Regulatory Commission (FERC) administering petrochemical energy pipelines and the Surface Transportation Board (the STB) regulating all others.[67]

A. Statutory Foundation and Legislative History of the Federal Pipeline Regulatory Framework

The legislative history of the pipeline regulatory framework is crucial to understanding how it may be applied by agencies to hydrogen and other emerging renewable energy commodities. This history reveals two key facts about the federal pipeline regulatory regime. First, the regime is comprehensive. Since 1938, interstate pipelines transporting every commodity besides water have been regulated. Therefore, the question is how—not if—pipelines carrying new commodities will be regulated. The second fact is that Congress drew clear distinctions between these regulatory regimes. But those distinctions were all made against the backdrop of a fossil fuel economy, making it difficult to tell where one regime ends, and another takes its place, in a post-fossil fuel economy. Still, one regulatory regime must apply, and the statutes and Congressional intent are the first place to determine where those lines should be drawn.

Federal pipeline regulation began in 1906. In that year, driven by outrage at Standard Oil's monopoly, Congress passed the Hepburn Act, bringing oil pipelines under the jurisdiction of the Interstate Commerce Commission (the ICC) through the Interstate Commerce Act (the ICA). However, the Hepburn Act explicitly went beyond oil and regulated all pipelines besides those carrying water and artificial or natural gas. Congress put off regulating gas pipelines until 1938, when it passed the Natural Gas Act (NGA) and charged the Federal Power Commission (FPC) with regulating pipelines carrying natural gas and artificial

67. The STB sometimes refers to the pipelines subject to its jurisdiction as "non-energy" pipelines. *See* U.S. SURF. TRANSP. BD., ABOUT STB, https://prod.stb.gov/about-stb/. This article will not use that terminology because it would presuppose the analysis to be applied. Moreover, the distinction is not fully accurate because the STB has jurisdiction over coal-slurry pipelines because they compete with coal transported by rail. *See* section III.A.3, below.

gas if it was mixed with natural gas. In the 1970s, Congress reorganized the FPC into the Federal Energy Regulatory Commission (FERC) and gave FERC authority over the ICA's regulation of pipeline carrying "oil"—broadly defined as energy petrochemicals.[68] In 1995, Congress replaced the ICC with the Surface Transportation Board (STB) and the ICA was recodified (except as it applies to FERC's oil pipelines) as the Interstate Commerce Commission Termination Act (ICCTA), without any substantive change in jurisdictional scope.[69] At no point in any of this history was the scope of pipeline regulation narrowed regarding commodities transported.

1. The Hepburn Act of 1906

The history of federal pipeline regulation begins with Ida M. Tarbell. The quintessential "muckraker," Tarbell was a legendary journalist whose legacy is not limited to pipelines.[70] But for our purposes, she is credited with being the journalist who exposed the business practices of the Standard Oil monopoly.[71] From 1902 to 1904 she authored a series of investigative exposés, that were eventually republished together as *The History of the Standard Oil Company*.[72] The hugely influential work meticulously documented the market abuses of John D. Rockefeller and Standard Oil. Tarbell ended it with the following call to action:

> And what are we going to do about it? for it is our business. We, the people of the United States, and nobody else, must cure whatever is wrong in the industrial situation, typified by this narrative of the growth of the Standard Oil Company. *That our first task is to secure free and equal transportation privileges by rail, pipe and waterway is evident. It is not an easy matter. It is one which may require operations which will* seem severe; but the whole system of discrimination has been nothing but violence, and those who have profited by it cannot complain if the curing of the evils they have wrought bring hardship in turn on them. *At all events, until the transportation matter is settled, and settled right, the monopolistic trust will be with us, a leech on our pockets, a barrier to our free efforts.*[73]

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68. *See* discussion in sections III.A.2, III.A.3, and III.A.3(a).

69. *See* discussion in section III.A.4.

70. *See, e.g.*, Leigh v. Salazar, 677 F.3d 892, 897 (9th Cir. 2012) ("Open government has been a hallmark of our democracy since our nation's founding. As James Madison wrote in 1822, 'a popular Government, without popular information, or the means of acquiring it, is but a Prologue to a Farce or a Tragedy; or, perhaps both.' Indeed, this transparency has made possible the vital work of Ida Tarbell, . . . and the countless other investigative journalists who have strengthened our government by exposing its flaws.") (internal citations omitted).

71. When Tarbell was growing up in Pennsylvania, John D. Rockefeller ran her father out of business by using the sort of business practices that she later uncovered and exposed, making her consequential journalism one of history's more wholesome stories of revenge.

72. IDA M. TARBELL, THE HISTORY OF THE STANDARD OIL COMPANY (1904); *see also* Jeff D. Makholm & Laura T. W. Olive, *The Politics of U.S. Oil Pipelines: The First Born Struggles to Learn from the Clever Younger Sibling*, 37 ENERGY L.J. 409, 412 n.10 (2016).

73. *See* TARBELL, *supra* note 72, VOL. II at 292 (emphasis added). *See also Williams Pipe Line Co.,* 21 FERC ¶ 61,260, at p. 61,594 n.176 (1982), *rev'd sub nom.* Farmers Union Cent. Exch., Inc. v. FERC, 734 F.2d 1486, 1506 (D.C. Cir. 1984) (relying on the work of Ida Tarbell in interpreting the purpose of the Hepburn Act). This conclusion was in line with some contemporary academic commenters who proposed com-mon carrier law as a way to curb monopoly abuse. *See* Bruce Wyman, *The Law of the Public Callings as a Solution of the Trust Problem*, 17 HARV. L. REV. 156, 166 (1904) ("Wherever virtual monopoly is found the situation de-

Tarbell's call was heard and taken seriously by many, including President Theodore Roosevelt and the progressives in Congress. In February 1905, the House unanimously requested an investigation into the "unusually large margins between the price of crude oil or petroleum and the selling price of refined oil and its by-products" and whether legislation or legal action was warranted.[74] In May 1906, the Commissioner of Corporations prepared a nearly 500-page report to Congress that echoed Tarbell's conclusions.[75] In transmitting the report to Congress, President Roosevelt identified the report as "of capital importance" in evaluating the Hepburn Act.[76] Tarbell's journalism, which turned public opinion against Standard Oil, is properly credited with the regulation of interstate oil pipelines along the lines she proposed.[77] Ultimately, the following language was included in the Hepburn Amendment to the Interstate Commerce Act (ICA) (hereinafter "Hepburn Act"),[78] passed in June of 1906:

> SEC. 1. That the provisions of [the Interstate Commerce Act] shall apply to any corporation or any person or persons engaged in the transportation of oil or other commodity, except water and except natural or artificial gas, by means of pipe lines . . .[79]

The effect of this language was to make oil pipelines common carriers regulated by the Interstate Commerce Commission (ICC). The defining feature of a common carrier is an obligation to carry another's product upon reasonable request, at a reasonable rate, and without discrimination. The Hepburn Act thus closely followed the spirit of Tarbell's proposal.

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mands this law that all who apply shall be served, with adequate facilities, for reasonable compensation and without discrimination; otherwise in crucial instances of oppression, inconvenience, extortion and injustice there will be no legal remedies for these industrial wrongs.").

74. H.R. 499, 58th Cong. (1905); 39 CONG. REC. 2666 (Feb. 15, 1905).

75. DEP'T OF COM. & LAB., REPORT OF THE COMMISSIONER OF CORPORATIONS ON THE TRANSPORTATION OF PETROLEUM, H.R. Doc. No. 59-812, at 37 (1st Sess. 1906) ("The Standard Oil company has all but a monopoly of the pipe lines in the United States. Its control of them is one of the chief sources of its power. . . . The Federal Government has not yet exercised any control over the pipe lines engaged in interstate commerce. The result is that the charges made by the Standard for transporting oil through its pipe lines for outside concerns are altogether excessive, and in practice largely prohibitive.").

76. MESSAGE FROM THE PRESIDENT OF THE UNITED STATES TRANSMITTING A REPORT BY THE COMMISSIONER OF THE BUREAU OF CORPORATIONS IN THE DEPARTMENT OF COMMERCE AND LABOR ON THE SUBJECT OF TRANSPORTATION AND FREIGHT RATES IN CONNECTION WITH THE OIL INDUSTRY, S. DOC. NO. 59-428 (1st Sess. 1906).

77. George Bittlingmayer, *The Stock Market and Early Antitrust Enforcement*, 36 J.L. & ECON. 1, 7-8 (1993); Makholm & Olive, *supra* note 72, at 409, 412. *But see* Alexandra B. Klass & Danielle Meinhardt, *Transporting Oil and Gas: U.S. Infrastructure Challenges*, 100 IOWA L. REV. 947, 960 (2015) (attributing the Act's genesis to Kansas refineries complaining to Congress).

78. Pub. L. No. 59-337, 34 Stat. 584 (1906) [hereinafter Hepburn Act]. President Roosevelt directly campaigned for the passage of the Hepburn Act—which was a large bill with much broader implications—in one of the earliest examples of his use of the "bully pulpit." *See* LIBR. OF CONG., Theodore Roosevelt, Theodore Roosevelt Papers: Series 5: Speeches and Executive Orders, -1918; Subseries 5B: "White House Volumes," 1901 to 1909; Vol. 11, 1905, Mar. 4-June 22. Retrieved from the Library of Congress, www.loc.gov/item/mss382990708.

79. Hepburn Act, 34 Stat. at 584 (codified as amended at 49 U.S.C. app. § 1(1)(b) (1988)). Note that this provision was modified slightly by the Transportation Act of 1920, Pub. L. No. 66-152, 41 Stat. 474. However, this language change has been held to not effect a substantive change. Valvoline Oil Co. v. United States, 308 U.S. 141, 145 (1939); *Interstate Energy Co.*, 32 FERC ¶ 61,294, at p. 61,692 n.4 (1985).

The driving motivation behind this statute was clearly to regulate the transportation of *oil*.[80] It is therefore remarkable that the statute explicitly covers all other commodities not specifically exempted. The statute could have been drafted to simply apply to the "transportation of oil by means of pipe lines." The debates in Congress indicate a clear understanding that the scope was comprehensive unless exemption were made.[81] The record also reveals little knowledge as to what else would be covered.[82] The Senate considered and rejected an amendment that would have reigned in the Hepburn Act's "comprehensive" scope.[83] In the end, the Hepburn Act singled out four categories of commodities: (1) oil; (2) other commodities; (3) water; and (4) natural or artificial gas. These distinctions within the Hepburn Act presage the current pipeline regulatory framework. Pipelines carrying each of these commodities would eventually be given their own regulatory regime (or in the case of water pipelines, remained unregulated).[84]

Equally notable is the Hepburn Act's exclusion of "natural or artificial gas." This exemption has a straightforward and timeless explanation: a friendly legislator was looking out for the interests of the burgeoning gas pipeline industry. That legislator was Senator Joseph P. Foraker of Ohio.[85] Senator Foraker did not want the ICA's obligations to be imposed on Cincinnati's gas utility, whose pipelines partially crossed state lines.[86] Various amendments would have more narrowly tailored the proposed exemptions to Senator Foraker's concerns by only transportation for "municipal purposes."[87] However, these were rejected.[88]

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80. CONFERENCE REPORT TO ACCOMPANY H.R. 12987, S. DOC. NO. 59-476, at 1 (1st Sess. 1906) (Conf. Rep.) (house bill sent over to the Senate initially only covered "the transportation of oil by pipeline"). *See also* 40 CONG. REC. 6368 (May 4, 1906) (statement of Sen. Lodge) ("All I want to get at is the transportation of oil, for that is where the great abuse is."). Further, neither the HISTORY OF THE STANDARD OIL COMPANY nor the Commissioner of Corporations report have any discussion of natural gas or other piped commodities. Indeed, it is quite clear that the original target of the legislation was not only one commodity, but in fact one company: Standard Oil. 40 CONG. REC. 7000 (May 17, 1906) (statement of Sen. Lodge) ("My object, I state frankly, in this amendment is to bring the pipe lines of the Standard Oil Company within the jurisdiction of the Interstate Commerce Commission . . . I care little about the natural-gas feature of this amendment.") (partially quoted in *Williams Pipe Line Co.,* 21 FERC ¶ 61,260, at p. 61,596 n.196 (1982)).

81. 40 CONG. REC. 6369 (May 4, 1906) (Sen. Foraker) ("If I understand, the Senator from Montana has offered an amendment striking out the words 'or other commodity.' If that should be adopted, of course my amendment inserting the words 'except natural gas' would not be necessary. Therefore I am willing to withdraw my amendment for the present, if I may do so.").

82. 40 CONG. REC. at 6368 (May 4, 1906) (Sen. Carter) ("I should think that it would be better to have it apply to oil alone. I do not know, nor does anyone know, what the term 'other commodity' in that connection would include beyond gas and water.").

83. S. JOURNAL, 59th Cong., 1st Sess. 465-66 (1905-1906) (senate rejecting an amendment to strike the words "or other commodity" by a vote of 53 to 22). *See also* 40 CONG. REC. 6369-70 (senate debate of the amendment).

84. That is, unregulated in terms of economic practices. *See* note 4, *supra*.

85. Makholm & Olive, *supra* note 72, at 409, 415.

86. 40 CONG. REC. 6361-71 (May 4, 1906).

87. 40 CONG. REC. 7006 (May 17, 1906) (statements of Sens. Taliafero and Beverage). *See also* 40 CONG. REC. at 6999-7005.

88. S. JOURNAL, 59th Cong., 1st Sess. 505 (1905-1906).

The Senate eventually adopted an exemption in line with Senator Foraker's proposal exempting all natural and artificial gas transportation by pipeline.[89]

We therefore have a sense of the *purpose* of exempting natural and artificial gas from the Hepburn Act's scope: to protect the burgeoning gas utilities. But the Act did not provide a *definition* for either natural or artificial gas. We do have contemporary government and legislative documents that confirm that natural gas had the same meaning it does today: a fuel gas associated with oil reserves primarily composed of methane—which was then often called "marsh gas" because of its association with anaerobic plant decay.[90] And artificial gas was understood to be a substitute in competition with natural gas.[91]

Interestingly, the motivation to exempt water pipelines from the Hepburn Act does not appear to have been to protect local utilities from federal regulation.[92] Rather, the legislative debate reveals that the purpose of exempting water pipelines was to not regulate large Western irrigation projects.[93] The credit for

89. 40 CONG. REC. 6373 (May 4, 1906). Another commenter refers to this moment as "the day in history when U.S. oil and gas pipelines embarked on separate evolutionary paths." *See* Makholm & Olive, *supra* note 72, at 415.

90. U.S. GEOL. SURV., BULL. 300: ECONOMIC GEOLOGY OF AMITY QUADRANGLE, PA., H.R. DOC. NO. 59-53, at 66 (2d Sess. 1906) ("The chief constituent is methane (CH4), the lowest member of the paraffin series of hydrocarbons. Methane is one of the products of the destructive distillation of coal and consequently constitutes a large proportion of ordinary coal gas. It is also produced in association with hydrogen when plants decay at the bottom of rivers and swamps. The name 'marsh gas' is therefore sometimes applied to it . . . Occasionally a well yields this gas in a nearly pure condition. Generally, however, there is quite a proportion of impurities."); U.S. GEOL. SURV., BULL. 296: ECONOMIC GEOLOGY OF INDEPENDENCE QUADRANGLE, KANS., H.R. DOC. NO. 59-935, at 45 (1st Sess. 1906) ("Natural gas is principally composed of marsh gas, CH4."); *see also* U.S. GEOL. SURV., MINERAL RESOURCES OF THE UNITED STATES, H.R. DOC. NO. 59-21, at 807 (2d Sess. 1905) (table showing the "Composition of Natural and Manufactured Gas" with "Marsh gas, CH4" listed first).

91. U.S. GEOL. SURV., MINERAL RESOURCES OF THE UNITED STATES, H.R DOC. NO. 59-21, at 770 (2d Sess. 1905) ("It will be observed that prices for artificial gas are usually low in the States where it comes into competition with natural gas"). U.S. GEOL. SURV., MINERAL RESOURCES OF THE UNITED STATES, H.R. DOC. NO. 59-21, at 770 (2d Sess. 1905) ("It will be observed that prices for artificial gas are usually low in the States where it comes into competition with natural gas").

92. Although, there was some debate as to the meaning of the exemption when only transporting "for municipal purposes" was briefly considered. *See* 40 CONG. REC. 6371 (May 4, 1906) (Sen. Aldridge asking Sen. Lodge if such an exemption would "include water for drinking purposes . . . [and] bathing purposes.").

93. 40 CONG. REC. 6367 (May 4, 1906) (Sen. Carter and Sen. Lodge) ("The Senator very wisely seeks to remedy an evil from which the people of New England suffer and from which the people in all other sections of the country suffer, but will he, pray, tell us why, after dealing with the subject-matter which he seeks to remedy, does he use the broad and comprehensive term 'or other commodity' . . . I am not prepared to say that that will not Inject the Interstate Commerce Commission as a ruling factor in the management of the two large irrigation schemes partly in the State of Montana. One of them passes out of the jurisdiction of the United States into Canada, and the other crosses the line of the State of North Dakota from our State. Is the Senator from Massachusetts prepared to say, without further consideration, that this water, not for municipal purposes, because the Senator has guarded that— Mr. LODGE. Will the Senator allow me to interrupt him? Mr. CARTER. Yes. Mr. LODGE. If the Senator from Montana is disturbed about the Interstate Commerce Commission carrying water by pipe lines, I will say that I am perfectly willing to except water."); *see also* 40 CONG. REC. 6372 (May 4, 1906) (Sen. Carter) ("In reply to the inquiry of the Senator from Virginia, so far as it applies to the transportation of water, I desire to say that my special solicitude in that behalf is to leave our irrigation canals subject to the local jurisprudence which is especially applicable thereto. For instance, one large system or canals conducting water from Idaho into Utah utilizes pipe lines to the extent of several miles. Therefore, it would be unquestionably true, if this exception were not made, that the pipe lines and the canals thus constructed would be subject to the regulations of the Interstate Commerce Commission. The same would be true with ref-

this exemption appears to belong to Senator Carter of Montana.[94] While there does not appear to be any precedent interpreting this exemption, the sort of projects Congress had in mind in 1906 bear a striking similarity to the interstate water pipelines envisioned today as a possible response to climate change.

Ultimately, it was the Sherman Act, not the Hepburn Act, which defeated Standard Oil. In 1911, the Supreme Court upheld an order under that act to break up the company.[95] Until that time, the Hepburn Act had not been a meaningful check on Standard's monopoly because the company had adopted some transparent maneuvers to attempt to avoid jurisdiction.[96] In fact, it wasn't until June 1911—perhaps emboldened by the Supreme Court's *Standard Oil* decision the previous month—that the ICC instituted an investigation: *In the Matter of Pipe Lines*.[97] Ultimately, the ICC determined the pipelines were common carriers and ordered them to file tariffs containing their rates for transportation at the Commission.[98] The now defunct Commerce Court found this to work an unconstitutional "taking" of property without just compensation.[99] However, the Supreme Court reversed this decision in a short decision authored by Oliver Wendell Holmes.[100] Since that time, oil pipelines have been regulated as common carriers under the ICA.

2. The Natural Gas Act of 1938

Before the eventual passage of the Natural Gas Act, Congress repeatedly considered whether and how gas pipelines should be regulated. As described above, Congress declined to regulate natural gas pipelines as common carriers under the Hepburn Act in 1906. Less than a decade after passage of Hepburn Act, Congress considered the issue again. Senate Bill 3445 sought to make gas pipelines common carriers by adding "natural gas" to the list of commodities covered by the Hepburn Act provision discussed above.[101] The discussions in

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erence to a general scheme of irrigation involving flumes, pipes, canals extending across the line of North Dakota from the State of Montana."); *see also* 40 CONG. REC. 7002-03, 7006-07 (May 17, 1906).

94. *Id.*

95. Standard Oil Co. v. United States, 221 U.S. 1 (1911). Of note, Standard Oil's gas pipelines were not subject to this enforcement so all of Standard's gas infrastructure remained with Standard Oil (New Jersey); Klass & Meinhardt, *supra* note 77, at 947, 992 n.300.

96. *See* Klass & Meinhardt, *supra* note 77, at 960-961. *See also* The Pipe Line Cases, 234 U.S. 548, 559 (1914) ("the Standard Oil Company refused, through its subordinates, to carry any oil unless the same was sold to it or to them, and through them to it, on terms more or less dictated by itself.").

97. 24 I.C.C. 1 (1912), *vacated* Prairie Oil & Gas Co. v. United States, 204 F. 798, 800 (Comm. Ct. 1913), *rev'd in relevant part sub nom. The Pipe Line Cases*, 234 U.S. 548.

98. *Id.*

99. *Prairie Oil & Gas Co.*, 204 F. at 825.

100. *The Pipe Line Cases*, 234 U.S. at 560-61 ("The situation that we have described would make it illusory to deny the title of commerce to such transportation, beginning in purchase and ending in sale, for the same reasons that make it transportation within the act. . . . The whole case is that the appellees, if they carry, must do it in a way that they do not like. There is no taking and it does not become necessary to consider how far Congress could subject them to pecuniary loss without compensation in order to accomplish the end in view."). The specific facts of this decision also created a narrow exception for truly self-contained pipeline systems called the Uncle Sam exemption, discussed further below. *Id.* at 561-62.

101. S. 3345, 63d Cong., 1st Sess., 50 CONG. REC. 5847, 5847-49 (1913).

Congress corroborate the intuitive understanding that this bill was meant to remove gas from the exempted products, leaving only water unregulated.[102] Ultimately, the proposal died in the House after another vigorous defense by gas pipeline interests.[103] Again, the argument was that gas pipelines primarily operated as local utilities, whose service would be disrupted by common carriage obligations, and that state utility regulation was adequate to protect consumers.[104]

Then the Supreme Court issued three decisions that precluded state regulation of interstate gas pipelines, creating a regulatory gap.[105] Opponents of regulation could no longer point to state regulation as an adequate protector of consumer interests. Still, Congress took a while to settle on a solution to this problem.[106] Congress directed the Federal Trade Commission (FTC) to investigate natural gas transportation in 1928.[107] This massive and far-reaching report, "Report No. 84-A," was delivered to Congress on New Year's Eve 1935.[108] Each year between 1935 and 1937 a different version of the Natural Gas Act (NGA) was considered before the final version was passed in 1938.[109] Ultimately, the NGA gave the Federal Power Commission (FPC) jurisdiction over natural

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102. *See To Make Gas Pipelines Common Carriers: Hearings on Sen. Bill 3345 Before the H. Comm. On Interstate and Foreign Commerce*, 63d Cong. 21 (1914) (statements of Sen. Reed of Missouri) [hereinafter S.B. 3345 Hearings].

103. William A. Mogel & John P. Gregg, *Appropriateness of Imposing Common Carrier Status on Interstate Natural Gas Pipelines*, 25 ENERGY L.J. 21, 35-36 (2004). *See also* S.B. 3345 Hearings, *supra* note 102, at 73-156.

104. *See, e.g.*, S.B. 3345 Hearings, *supra* note 102, at 143-44 (statement of Eugene Mackey, General Counsel, Kansas Natural Gas Company); *id.* at 150 (statement of Samuel S. Wyer, Am. Inst. of Mining Eng'rs); *id.* at 9 (statement of Rep. Esch of Wisconsin) (noting that natural gas was more difficult to store than oil).

105. Missouri v. Kan. Nat. Gas Co., 265 U.S. 298 (1924); Public Utils. Comm'n of R.I. v. Attleboro Steam & Elec. Co., 273 U.S. 83 (1927); State Corp. Comm'n of Kansas v. Wichita Gas Co., 290 U.S. 561, 563 (1934); *see also* United Distrib. Cos. v. FERC, 88 F.3d 1105, 1122 (D.C. Cir. 1996) ("The NGA was intended to fill the regulatory gap left by a series of Supreme Court decisions that interpreted the dormant Commerce Clause to preclude state regulation . . . ."). *See also* Phillips Petroleum Co. v. Wisconsin, 347 U.S. 672, 682–83 (1954) ("There can be no dispute that the overriding congressional purpose was to plug the 'gap' in regulation of natural-gas companies resulting from judicial decisions prohibiting, on federal constitutional grounds, state regulation of many of the interstate commerce aspects of the natural-gas business."); Jim Rossi, *The Brave New Path of Energy Federalism*, 95 TEX. L. REV. 399 (2016) (describing the overriding purpose of the NGA was to close a regulatory gap but not discussing the Hepburn Act except as applied to railroads). This article takes the position that this gap was created first by the exemption of natural gas from Hepburn Act and then later by these dormant Commerce Clause orders from the Supreme Court.

106. *See generally* Donald J. Libert, *Legislative History of the Natural Gas* Act, 44 GEO. L. J. 695, 699 (1956); *see also* Associated Gas Distribs. v. FERC, 824 F.2d 981, 997 (D.C. Cir. 1987) ("The legislative history here consists entirely of congressional inaction.") (finding that Congress never elected to impose common carrier status on natural gas pipelines).

107. S. RES. NO. 83, 70th Cong. (1928); 69 CONG. REC. 3054 (Feb. 15, 1928). *See also* Libert, *supra* note 106, at 697-98. The House of Representatives also commissioned a report about this time which focused on oil and gasoline pipelines, but recommended regulation of interstate natural gas pipelines as well. *Id.* at 698 (discussing H.R. RES. NO. 72-59, CONG. REC. 2259, 2263 (1st Sess. 1932); REPORT ON PIPELINES, H.R. REP. NO. 72-2192 (2d Sess. 1933)).

108. FED. TRADE COMM'N, FINAL REPORT NO. 84-A, ECONOMIC, CORPORATE, OPERATING AND FINANCIAL PHASES OF THE NATURAL-GAS-PRODUCING, PIPELINE, AND UTILITY INDUSTRIES, WITH CONCLUSIONS AND RECOMMENDATIONS, S. DOC. NO. 70-92 (1st Sess. 1936) [hereinafter REPORT NO. 84-A].

109. Libert, *supra* note 106, at 696-97 (noting that the 1937 version was ultimately passed in 1938).

gas pipelines.[110] It included the following definition of "natural gas" which remains unchanged to this day,

> "Natural gas" means either natural gas unmixed, or any mixture of natural and artificial gas. [111]

This circular definition of natural gas is plainly unhelpful for our purposes. However, if the terms artificial gas and natural gas have the same meaning in the NGA as the Hepburn Act, then all commodities other than water were now regulated with the NGA's passage. In other words, any commodity must either be natural or artificial gas, and be regulated by the NGA,[112] or it must be something other than natural or artificial gas, and thus be regulated under the Hepburn Act. There is contemporary support for this understanding in the legislative record.[113] It appears that the NGA was understood to be closing the gap left by the Hepburn Act's exemption of natural and artificial gas as well as the Supreme Court decisions.[114]

Perhaps the best indication of what the term "natural gas" means comes from the comprehensive Report No. 84-A, which surveyed the entire gas industry, and which was the explicit basis for Congress' passing the NGA.[115] The report contains several definitions for natural gas that all match the common definition that has been consistent from the turn of the last century to today.[116] For

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110. 15 U.S.C § 717a(5). While in some parts modelled off the ICA and addressing a similar problem, the NGA regulated pipelines under a different, more comprehensive regulatory regime. *See* California v. Southland Royalty Co., 436 U.S. 519, 523 (1978) ("[t]he fundamental purpose of the Natural Gas Act is to assure an adequate and reliable supply of gas at reasonable prices."). A fulsome comparison of the substance of the NGA and Hepburn Act is beyond the scope of this article, but the different jurisdiction scopes are briefly discussed in section V, *infra*.

111. Natural Gas Act, Pub. L. No. 75-688, 52 Stat. 821, 822 (1938) (codified at 15 U.S.C. § 717a(5)) [hereinafter NGA].

112. Or potentially regulated, in the case of artificial gas.

113. *See Hearings Before the House Committee on Interstate and Foreign Commerce on House Bill 2008, To Regulate the Transportation and Sale of Natural Gas in Interstate Commerce and for Other Purposes*, 75th Congress 1st session (1937) [hereinafter NGA Hearings] (Statement of W.L. Dickey, Director of Law, National Association of Railroad and Utilities Commissioners) ("*Our present Federal laws exclude pipelines engaged in interstate commerce carrying gas from the jurisdiction of the Interstate Commerce Commission*. This is made specific in legislation or laws governing other utilities engaged in interstate commerce, and if they are not within the jurisdiction of State laws through which they operate, they are not subject to any regulation, either State or National. It is for these reasons that we are heartily in favor of the passage of [the NGA].") (emphasis added); *id.* at 97 (Dickey) ("And I might say here that the natural-gas companies, as far as I am able to discover, are the only utilities that were not included in national or State legislation for the purpose of regulating interstate commerce. I do not know how that happened, but, nevertheless, they were not regulated by the Interstate Commerce Commission. And we are attempting to regulate them in Ohio through the utilities commission, and that is why we are in the United States court").

114. *Id.*

115. NGA, , 52 Stat. at 822 (codified at 15 U.S.C. §717(a)) ("SECTION 1(a) As disclosed in reports of the Federal Trade Commission made pursuant to S. Res. 83 (Seventieth Congress, first session) and other reports made pursuant to the authority of Congress, it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with the public interest, and that Federal regulation in matters relating to the transportation of natural and gas and the sale thereof in interstate and foreign commerce is necessary in the public interest").

116. REPORT NO. 84-A, *supra* note 108, *see also* ENERGY INFO. ADMIN., NATURAL GAS EXPLAINED, https://www.eia.gov/energyexplained/natural-gas/ ("Natural gas contains many different compounds. The largest

instance, in discussing the "Origin, Occurrence, and Composition of Natural Gas," Report No. 84-A notes that:

> Natural gas normally consists principally of methane (marsh gas), together with varying quantities of other hydrocarbon gases, such as ethane, propane, butane, etc., and nitrogen, as the principal constituents of the mixtures occurring in most natural gases. In addition, natural gases from certain fields contain carbon dioxide (sometimes in important quantities) and small quantities of other gases.[117]

Other legislative sources buttress this understanding. During the years when it was considering how to regulate gas pipelines, Congress was provided a "Minerals Yearbook" by the Department of Interior.[118] In each of these yearbooks from 1935 to 1938, natural gas received its own section whereas other sections covered carbon dioxide, helium, and other naturally occurring gases.[119] This further confirms the understanding that natural gas had a specific understanding other than simply a gas that occurs naturally. These reports also discussed uses of hydrogen in various applications, primarily the generation of synthetic fuels, but never in the context of being natural gas.[120] An earlier edition of the Mineral Yearbook from 1929 identified that "[a]verage natural gas is mainly methane."[121]

The more confounding, and eventually more litigated, question is what constitutes "artificial gas" as opposed to "natural gas." By the terms of the statute, artificial gas unmixed with natural is not covered by the NGA. The most logical differentiation between these two is on the basis of origin rather than composi-

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component of natural gas is methane, Natural gas also contains smaller amounts of natural gas liquids (NGL, which are also hydrocarbon gas liquids), and nonhydrocarbon gases."). *See also* CHRISTOPHER J. CASTANEDA, INVISIBLE FUEL: MANUFACTURED AND NATURAL GAS IN AMERICA, 1800-2000 3 (1999) ("Natural gas is composed primarily of methane, a hydrocarbon that has the composition of one carbon atom and four hydrogen atoms, or CH_4. As a 'fossil fuel,' natural gas flowing from the earth is rarely pure. It is often associated with petroleum and may contain other hydrocarbon gases and liquids, including ethane, propane, and butane.").

117. REPORT NO. 84-A, *supra* note 108, at app. II at 3536. *See also id.* at 15-19 (discussing the "Origin, Occurrence, and Composition of Natural Gas" and noting that "Methane and ethane are the principal constituents of ordinary commercial natural gas, but such gases may also contain, in varying proportions other chemical compositions, such as propane and butane.").

118. U.S. DEP'T OF INTERIOR, MINERALS YEARBOOK 1938, H.R. DOC. NO. 75-411, at 907-44, 973-76, 1299-1301 (2d Sess. 1938) (discussing natural gas, helium, and carbon dioxide as a "minor non-metal"). *See also* U.S. DEP'T OF INTERIOR, MINERALS YEARBOOK 1937, H.R. DOC. NO. 75-320, at 1055-90, 1119-22 (1st Sess. 1937) (discussing natural gas and helium); U.S. DEP'T OF INTERIOR, MINERALS YEARBOOK 1936, H.R. DOC. NO. 75-42, at 724-48, 771-74 (1st Sess. 1937) (discussing natural gas and helium); U.S. DEP'T OF INTERIOR, MINERALS YEARBOOK 1935, H.R. DOC. NO. 74-352, at 795-819, 843-66, 867-70 (2d Sess. 1936) [hereinafter 1935 MINERALS YEARBOOK] (discussing natural gas, "miscellaneous commercial gases," and helium).

119. *Id.*

120. 1935 MINERALS YEARBOOK, *supra* note 118, at 857-60 (1936) (surveying hydrogen under "miscellaneous commercial gases"). At the time of the Hepburn Act, as with the NGA, Congress primarily understood hydrogen as a potential aerospace resource for lighter-than-air travel. *See* U.S. DEPT. OF AG., REPORT OF THE CHIEF OF THE WEATHER BUREAU, H.R. DOC. NO. 59-814, at XIII (2d Sess. 1906) (mentioning "electrolyzer for the manufacture of the hydrogen gas employed in the kite balloon and the small rubber balloons.").

121. U.S. DEP'T OF INTERIOR, MINERALS YEARBOOK 1929, H.R. DOC. NO. 71-538, at Vol. II pp. 53-54 (3d Sess. 1932). In addition, a 1920 geological survey identified that "[i]n all cases . . . methane is the preponderating constituent, the characteristic hydrocarbon of natural gas." *See* U.S. GEOL. SURV., BULL. 695: THE DATA OF GEOCHEMISTRY, H.R. DOC. NO. 66-402, at 723 (2d Sess. 1920).

tion, as has been confirmed by the courts.[122] The legislative history reveals little of what Congress had in mind for "artificial gas" besides that it was understood to be an inferior substitute for natural gas.[123] Artificial gas was generally understood at the time to be relatively hydrogen-rich and derived mainly from coal.[124] However, "hydrogen gas" itself was understood to be an entirely distinct resource with agricultural, industrial, chemical, and even aeronautical applications, as well as the (then) theoretical potential to make liquid fuels.[125]

Congress focused on "natural" gas because naturally occurring gas needs to be transported by pipelines, whereas artificial gas can be manufactured near where it is consumed. The legislative history provides a good deal of insight into this point.[126] It appears that by the time the NGA was passed, artificial gas—once the dominant source of gas in the country[127]—was now only relied upon by utilities as a holdover measure when the supply of natural gas by pipeline became constrained or disrupted.[128] The view in Congress was that pipeline transportation of artificial gas was not required because "manufactured gas [was] not

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122. *See* Henry v. FPC, 513 F.2d 398, 400 (D.C. Cir. 1975).

123. NGA Hearings, *supra* note 113, at 103 (statement of Floyd C. Brown, Vice President and General Manager of Natural Gas Pipeline Company of America, and Texoma Natural Gas Company) ("so far as the heating value is concerned, . . . [m]anufactured, or artificial gas as it is often termed, is much lower in heating value than natural gas.").

124. 1935 MINERALS YEARBOOK, *supra* note 118, at 756; U.S. GEOL. SURV., BULL, NO. 695, DATA OF GEOCHEMISTRY, H.R. DOC. NO. 66-402, at 723 (2d Sess. 1920) ("high figures for hydrogen are unusual [for natural gas] and a suggest a resemblance to coal gas"); *see also* CRS REPORT, *supra* note 51, at 6 ("Commonly referred to as 'town gas' or 'water gas,' it typically consisted of hydrogen, methane, carbon monoxide, and small amounts of carbon dioxide and nitrogen. The hydrogen content of town gas ranged from 10% to 50%. . . . Today, Hawaii Gas is the only natural gas utility in the United States distributing manufactured (synthetic) gas with a significant hydrogen concentration.").

125. 1935 MINERALS YEARBOOK, *supra* note 118, at 857-60 (noting the potential of "changing coal into oil by treatment with hydrogen under pressure").

126. *See, e.g.*, REPORT NO. 84-A, *supra* note 108, at 4 ("While the report deals generally with natural gas, it is necessary to give some attention to the manufactured-gas industry, particularly where these two kinds of gas are used in the form of mixed gas.").

127. *See* CASTANEDA, *supra* note 116, at 35, 1-65.

128. NGA Hearings, *supra* note 113, at 104 (statement of Col. William T. Chantland, Attorney in Charge of Legal Work, Fed. Trade Comm'n Utilities Investigation) (statement of Floyd C. Brown, Vice President and General Manager of Natural Gas Pipeline Company of America, and Texoma Natural Gas Company) ("Many of the gas plants are being worked over and converted so that they can make oil-gas as a substitute for natural gas and to help take off some of the peak loads when the pipe line is unable to supply the full requirement.") (quoted in Henry v. FPC, 513 F.2d 398, 400 (D.C. Cir. 1975)). *See also* REPORT NO. 84-A, *supra* note 108, at 574 ("The situation at Denver is analogous to most of the large cities distant from gas fields which are now supplied in whole or large part with natural gas from a single pipe line. The former artificial gas-making equipment is maintained ready to produce in case of shutoff of the natural gas supply, or it is operated in part all of the time and its output mixed with natural gas, the resulting mixture having a lower British-thermal-unit content than the straight natural gas. . . . The necessity of maintaining these safe-guarding investments is a primary reason why the final selling price of natural gas in communities so situated cannot be as low as the delivered cost of the natural gas alone might justify. Such stand-by equipment, however, is apt to be far cheaper than a second adequate pipeline supply brought in over a sufficiently different route to minimize damage to both lines by the same natural destructive force. Most of the large American cities now supplied with natural gas retain the manufactured-gas plants in reserve or for partial supply. . . . only those cities supplied by duplicate pipe lines from different sources of supply and relatively close to the gas fields can take the risk of going without local production facilities.").

transported" because it could not "be profitably transported."[129] This makes intuitive sense as artificial gas could be manufactured where needed,[130] whereas efficient transportation of, cheaper and superior, natural gas requires pipelines.[131] There was a concern in Congress, though, that pipelines might try to avoid jurisdiction by mixing in a nominal amount of artificial gas.[132] Therefore, the definition of natural gas was broadened to include both natural gas and mixtures of natural and artificial gas, while pure artificial gas remained unregulated until mixed with natural gas. Natural gas regulation has changed dramatically in the decades since 1938.[133] But this original definition of natural gas has remained constant.

a. Natural Gas Policy Act of 1978

Perhaps the most dramatic change in natural gas regulation since the passage of the NGA was the Natural Gas Policy Act of 1978 (NGPA).[134] Generally speaking, the NGPA began the messy process of moving away from comprehensive regulation of the natural gas industry, including regulation of production, towards regulation focused on pipeline transportation.[135] One thing that was *not*

129. 81 CONG. REC. 9315-16 (1937) (statement of Sen. Wheeler) (quoted in *Henry*, 513 F.2d at 401) (continuing, "[i]n other words, the gas produced in the city of Chicago cannot be profitably shipped out. The only kind of gas that can be profitably shipped in interstate commerce is natural gas.").

130. *See* REPORT NO. 84-A, *supra* note 108, at 4 ("Where manufactured gas is used it is almost always made from coal or oil at the local gas works by the distributing utility. Sometimes, however, gas may be purchased from 'byproduct' coke plants operating in the same locality, and in some cases from petroleum refineries. Normally, gas pipe lines are not required, except for local distribution."); *id.* at 360 ("There is no essential difference between a natural-gas distributing company and a manufactured-gas distributing company except that the latter usually has a plant in which to generate the manufactured gas."); *id.* at 592 ("Involved in these situations is the effect of cheap natural gas with higher heating value on the rate base and financial structure of companies distributing higher-priced manufactured gas. It is claimed that natural gas from Texas and Kansas can be produced, transported, and wholesaled at city gates in Illinois and Indiana for 30 cents or less, as against frequent domestic rates for manufactured gas (having approximately but half the heating value of natural gas) of 75 cents to $1, or even higher.").

131. *Id.* at 609-10 ("Only through pipe lines can natural-gas producers and consumers deal with each other.").

132. NGA Hearings, *supra* note 113, at 90 (Statement of John E. Benton, General Solicitor, National Association of Railroad and Utilities Commissioners) ("If the act is made applicable to natural gas only, as it now stands, utility lawyers are certain to take the position that it does not apply to a mixture of natural gas and artificial gas, and whether it applies or not, whether that proposition is frivolous or not, it can be resolved only by litigation through the courts to the United States Supreme Court. That litigation, as I said, is certain to arise if a loophole is left for the making of that contention. It can be rendered impossible by the very simple expedient of making this act apply to all wholesale interstate gas service, making the act applicable to such gas services whether it is natural gas, or artificial gas, or a mixture of both.").

133. One of the more important changes is that in 1977 Congress created the Federal Energy Regulatory Commission within the Department of Energy and transferred all the FPC's responsibilities, including the NGA, to that agency. *See* Department of Energy Organization Act § 402, Pub. L. No. 95-91, 91 Stat. 565, 583-585 (1977) (codified at 42 U.S.C. § 7172 (2022)) [hereinafter DOE Act].

134. Natural Gas Policy Act of 1978, Pub. L. No. 95-621, 92 Stat. 3350.

135. Richard J. Pierce Jr., *Reconstituting the Natural Gas Industry from Wellhead to Burnertip*, 25 ENERGY L.J. 57, 65-71 (2004); *see also* General Motors Corp. v. Tracy, 519 U.S. 278, 283 (1997) ("Congress took a first step toward increasing competition in the natural gas market by enacting the Natural Gas Policy Act of 1978, which was designed to phase out regulation of wellhead prices charged by producers of natural gas, and to promote gas transportation by interstate and intrastate pipelines for third parties.") (cleaned up).

changed by the NPGA was the definition of natural gas contained in the NGA of 1938. In fact, to ensure that fact was clear, the Joint Explanatory Statement of the NGPA Conference Committee included the following disclaimer:

> The definition of natural gas is identical to the definition of natural gas as provided in the Natural Gas Act. It is not intended to extend the provisions of the Act to facilities for the production of synthetic natural gas, or facilities for methane gas generated by the decomposition of organic waste.[136]

As will be discussed further below, this statement may have important consequences for FERC's ability to construe renewable natural gas and other forms of biomethane as "natural gas" rather than "artificial gas."

3. Department of Energy Organization Act of 1977

In 1977 Congress passed the Department of Energy Organization Act, creating FERC and transferring the FPC's regulatory responsibilities to it. In addition, as part of its stated purpose of "assuring coordinated and effective administration of Federal energy policy and programs,"[137] Congress transferred to FERC:

> such functions set forth in the Interstate Commerce Act and vested by law in the Interstate Commerce Commission or the Chairman and members thereof as relate to transportation of oil by pipeline.[138]

Previously, oil and "other commodities" had been regulated alike, so there was never any need to draw distinctions between the two. Now, this distinction would determine whether a pipeline carrying a non-gas commodity would be regulated by the newly created FERC or continue to be regulated by the ICC. Some guidance was provided in the House and the Senate Conference Reports, which each stated:

> 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.[139]

An earlier version of the bill would have also transferred coal slurry pipelines to FERC.[140] However, this measure was opposed by numerous organizations on the grounds that "coal slurry pipelines pose competitive threat to rail-

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136. H.R. REP. NO. 95-1752, at 69 (2d Sess. 1978) (Conf. Rep.) [hereinafter NGPA Conference Report].

137. DOE Act § 306, 91 Stat. at 581 (codified as amended at 42 U.S.C. 7112). *See also id.* § 101(4)-(5), 91 Stat. at 567 (codified at 42 U.S.C. § 7111) ("responsibility for energy policy, regulation, and research, development and demonstration is fragmented in many departments and agencies and thus does not allow for the comprehensive, centralized focus necessary for effective coordination of energy supply and conservation programs; and . . . formulation and implementation of a national energy program require the integration of major Federal energy functions into a single department in the executive branch.").

138. Technically, the DOE Act transferred the responsibilities to the Secretary of Energy, which were then delegated to FERC by executive order. *See* Exec. Order No. 12009, 42 Fed. Reg. 46,267 (September 13, 1977) (President Carter executing the transfer).

139. S. REP. NO. 95-367, at 69 (1st Sess. 1977) (Conf. Rep.); H.R. REP. NO. 95-539, at 69 (1st Sess. 1977) (Conf. Rep.) [together hereinafter DOE Act Conference Reports]. *See* CF Indus., Inc. v. FERC, 925 F.2d 476, 478 (D.C. Cir. 1991) ("Congress did not intend to transfer to FERC jurisdiction over pipeline-transported oil and leave the ICC with jurisdiction over pipeline-transported gasoline, kerosene, and diesel fuel").

140. DOE Act Conference Reports, *supra* note 139, at 35.

roads," which were regulated by the ICC, and therefore "the problem of coal slurry pipelines ought to be looked at from a transportation, not from an energy, point of view."[141] The legislative history reveals two clear statutory purposes. First, Congress wanted FERC to regulate energy pipelines. And second, FERC's jurisdiction over "oil" pipelines should be interpreted broadly but limited to commodities connected to petroleum.

a. ICA Statutory Housekeeping in the 1970s

Two other statutory developments bear on the ICA. These are largely non-substantive, but important to know to avoid confusion. First, soon after it transferred the regulation of oil pipelines to FERC, Congress froze the ICA in time—but only for oil pipelines—as the version in effect on October 1, 1977.[142] This version was published as an appendix of the U.S. code until 1988.[143]

Second, Congress recodified the normal ICA soon after the statutory ossification described above.[144] By the express terms of the Act, this change was not meant to work any substantive legal change on the ICA's regulatory regime.[145] But the new organization and wording has the effect of making FERC's oil pipeline authority seem archaic in comparison. Notably, Congress changed the wording of the (more modern) ICA's pipeline jurisdiction to exclude oil (now regulated by FERC under the 1977 ICA) and it truncated the exemption for natural and artificial gas into simply "gas."[146] The ICA then was read as conferring ICC jurisdiction over transportation:

> by pipeline . . . when transporting a commodity other than water, gas, or oil.[147]

4. The Interstate Commerce Commission Termination Act of 1995

The last change to the pipeline regulatory framework occurred in 1995. That year Congress passed the Interstate Commerce Commission Termination Act (ICCTA), which dissolved the ICC and replaced it with the Surface Transportation Board (STB).[148] It also generally moved towards more light-handed regulation of the industries now subject to STB jurisdiction. Under ICCTA, just as under the previous iteration of the ICA, the STB has:

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141. *Id.* at 16.

142. Act to Revise Without Substantive Change the ICA, Pub. L. No. 95-473, 92 Stat. 1337, 1470 (1978) [hereinafter 1978 ICA Revisions]. *See also* Farmers Union Cent. Exch., Inc. v. FERC, 734 F.2d 1486, 1493 n.18 (D.C. Cir. 1984) (describing how the ossified version of the statute applied to oil pipelines).

143. 49 U.S.C. app. §§ 1-27 (1988). *See also* Frontier Pipeline Co. v. FERC, 452 F.3d 774, 776 (D.C. Cir. 2006). Consequently, the statute by which oil pipelines are governed is no longer published in the US code or even available from major legal research services. Fortunately, FERC hosts a digital (mostly word-searchable) version on its website. *See* https://www.ferc.gov/sites/default/files/2020-06/ica.pdf.

144. 1978 ICA Revisions, 92 Stat. 1337.

145. *Id.* at 1337 ("without substantive change"); *see also*, *Cortez Pipeline Co.*, 45 Fed. Reg. 85177 (I.C.C. Dec. 24, 1980).

146. *See Cortez*, 45 Fed. Reg. at 85178 (noting that this truncation was simply the elimination of "surplusage").

147. 1978 ICA Revisions § 10501, Pub. L. No. 95-473, 92 Stat. at 1359.

148. Interstate Commerce Commission Termination Act of 1995, §§ 202, 301, 1162, 303(2), 305(a)(1), Pub. L. No. 104-88, 109 Stat. 803, 940, 943-44 [hereinafter ICCTA].

> jurisdiction over transportation by pipeline . . . when transporting a commodity other than water, gas, or oil.[149]

This jurisdiction over pipelines continues to be expressly comprehensive, covering all miscellaneous commodities. The legislative record confirms the use of the singular word "gas" (rather than "natural" and "artificial" gas) was *not* meant to exempt other gaseous commodities.[150] The bill's Conference Report expressed that Congress was "particularly concerned about the impact of regulations on the transportation of anhydrous ammonia," which is a gas.[151] And Congress requested the Government Accountability Office (GAO) to report back in three years on the impacts of competition on those pipelines subject to STB regulation.[152] The GAO submitted its report April 21, 1998.[153] In that report, it identified five commodities (three gases and two slurries) currently being transported by interstate pipelines subject to STB jurisdiction: anhydrous ammonia, carbon dioxide, coal slurry, hydrogen, and phosphate slurry.[154]

5. Conclusion: Three Pipeline Regulatory Regimes

That is the statutory foundation of our interstate pipeline regulatory regime. Since 1938, interstate pipelines carrying anything other than water have been regulated to some degree. Since 1977, we have had the current setup where two agencies administer three regimes, two of which are largely identical. The development of this framework over decades of shifting laws and agencies creates the potential for confusion. Especially when one regime is examined in isolation. Despite this convoluted statutory background, however, the agencies administering this paradigm have arrived at relatively consistent and clear jurisdictional delineations. And, with the current exception of hydrogen, these delineations have carried out the legislative intent described above.

B. The Significance of this Legislative History and Agency Precedent

Since the framework described above is comprehensive in scope, hydrogen and renewable fuels must fall somewhere within it. While clearly delineated against the backdrop of conventional fossil fuels, application of this framework to hydrogen and renewable fuels will require a degree of agency discretion, which has yet been subject to judicial scrutiny.[155] FERC and the STB have significant discretion to interpret the ambiguous provisions in administering these statutes. However, this deference may be precarious where FERC and the STB interpret the same statutory provision, especially if they do so differently.[156] Fur-

149. 49 U.S.C. § 15301(a).

150. *See* discussion in section III.C.3.a, *infra*.

151. H.R. REP. NO. 104-422, at 230 (1st Sess. 1995) (Conf. Rep.).

152. *Id.*

153. GAO REPORT, *supra* note 65, at 1.

154. *Id.* at app. I.

155. For instance, the proceedings discussed below where FERC asserted jurisdiction over renewable fuels under the ICA and the NGA were neither contested before the agency nor appealed to the Courts. *See* sections III.C.1.c and III.C.2c-d, *infra*.

156. CF Indus., Inc. v. FERC, 925 F.2d 476, 478-79 (D.C. Cir. 1991), and discussion *supra*.

ther, this authority is cabined by both (1) the clear intent of Congress expressed above in the legislative history, and (2) the agencies' obligation to either adhere to their own precedent or explain their departure from it.[157]

1. Agencies May Reasonably Interpret Ambiguous Statutes

FERC's and the STB's interpretations of the relevant statutes will be judged against the *Chevron* framework.[158] Under *Chevron*, courts will defer to an agency's reasonable interpretation of an ambiguous statute.[159] This deference extends to agencies interpreting the scope of their own jurisdiction.[160] The *Chevron* framework involves a two-step analysis.[161] First, the court must determine whether "Congress has directly spoken to the precise question at issue," and where "the intent of Congress is clear, that is the end of the matter."[162] Second, if "the statute is silent or ambiguous with respect to the specific issue," then the court must determine "whether the agency's answer is based on a permissible construction of the statute."[163]

While often generous, this deference has its limits. First, as the rule states, no deference is owed when Congress's intent is clear, that is, where the statute is not ambiguous.[164] Importantly, *Chevron* "step one" requires courts to "employ[] traditional tools of statutory construction" before concluding a statute is ambiguous.[165] Second, an agency is not entitled to deference when its interpretation of the statute is "unreasonable"—an analysis that can be conflated with ordinary arbitrary and capricious review.[166] At *Chevron* "step two," courts require that the agency provide a "reasonable explanation of how its interpretation serves the Act's objectives."[167]

Certain canons of construction are particularly relevant in interpreting the purpose of the NGA, the ICA, and ICCTA and in assessing whether each is am-

157. For our purposes, some further explanation is required to clarify which agency is actually bound to what precedent regulating pipelines. *See* section III.B.2, *infra*. S*ee generally* National Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. 967 (2005).

158. *See, e.g.*, Associated Gas Distribs. v. FERC, 824 F.2d 981, 1003 (D.C. Cir. 1987) (deferring to FERC's interpretation of the NGA and NGPA); BP W. Coast Prod., L.L.C. v. FERC, 374 F.3d 1263, 1273 (D.C. Cir. 2004) (deferring to FERC's interpretation of the ICA and the Energy Policy Act of 1992); Riffin v. STB, 733 F.3d 340, 344 (D.C. Cir. 2013) (deferring to STB's interpretation of ICCTA).

159. Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc., 467 U.S. 837 (1984).

160. City of Arlington v. FCC, 569 U.S. 290, 296-97 (2013). *See also* Tesoro Alaska Co. v. FERC, 778 F.3d 1034, 1039 (D.C. Cir. 2015) (deferring to FERC's scope of authority under the ICA to incidentally regulate *intra*state transportation); Reiter v. Cooper, 507 U.S. 258, 258 (1993) (applying *Chevron* to the ICC's determination that statute did not grant it "initial jurisdiction with respect to the award of reparations") (cleaned up).

161. *See* City of Clarksville v. FERC, 888 F.3d 477, 482 (D.C. Cir. 2018); Pub. Serv. Auth. v. FERC, 762 F.3d 41, 54 (D.C. Cir. 2014) (per curiam).

162. *Chevron*, 467 U.S. at 842.

163. *Id.* at 843.

164. Flint Hills Res. Alaska, LLC v. FERC, 631 F.3d 543, 545 (D.C. Cir. 2011).

165. *Chevron*, 467 U.S. at 843 n.9.

166. Pharmaceutical Research & Mfrs. of Am. v. FTC, 790 F.3d 198, 204 (D.C. Cir. 2015).

167. Mako Commc'ns, LLC v. FCC, 835 F.3d 146, 151 (D.C. Cir. 2016) (cleaned up) (quoting Northpoint Tech., Ltd. v. FCC, 412 F.3d 145, 151 (D.C. Cir. 2005)).

biguous as to their scope. The first such interpretive tool is the starting assumption that Congress meant for terms to have their ordinary meaning.[168] For our purposes, the D.C. Circuit has found that "natural gas" can be understood to have its ordinary meaning,[169] but "oil" cannot.[170] Another, somewhat controversial, canon is that exemptions to statutes should be read narrowly, at least for "remedial" statutes.[171] The actual sequence of statutory development described above is important in applying this canon. Specifically, the statutory categories of "natural gas" and "artificial gas" were not created by defining the scope of the NGA, but rather the terms were created by defining an exemption from the Hepburn Act. Therefore, these terms should be construed narrowly—as has been the case—against the backdrop of the Hepburn Act's otherwise comprehensive regulation.

In addition, the "major questions" doctrine states that agencies cannot interpret a statute to work a radical regulatory change that Congress would not have foreseen,[172] including a deregulatory change.[173] Finally, and relatedly, interpreta-

168. California Indep. Sys. Operator Corp. v. FERC, 372 F.3d 395, 400 (D.C. Cir. 2004).

169. Henry v. FPC, 513 F.2d 395, 399 (D.C. Cir. 1975) (finding that §2(5) was "clear and unambiguous language" at least as far as the distinction between natural and artificial gas); *see also* National Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. 967, 982 (2005) ("A court's prior judicial construction of a statute trumps an agency construction otherwise entitled to Chevron deference only if the prior court decision holds that its construction follows from the unambiguous terms of the statute and thus leaves no room for agency discretion.").

170. CF Indus., Inc v. FERC, 925 F.2d 476, 478 (D.C. Cir. 1991) ("Congress intended a broader meaning of 'oil' . . . The legislative history, moreover, confirms that 'oil' was not to be given a dictionary meaning").

171. William N. Eskridge, Jr. & Philip P. Frickey, *Foreword: Law As Equilibrium*, 108 HARV. L. REV. 26, 105 (1994) (describing as statute-based canon the "narrow interpretation of statutory exemptions"); *see* ExxonMobil Gas Mktg. Co. v. FERC, 297 F.3d 1071, 1076 (D.C. Cir. 2002) ("The Natural Gas Act does not define either 'transportation,' which falls within the Commission's jurisdiction, or 'gathering,' which is exempt from FERC authority under the Act. The Supreme Court has, however, held that exceptions to the primary grant of jurisdiction in the section are to be strictly construed. Thus, the Supreme Court has consistently held that 'production' and 'gathering' are terms narrowly confined to the physical acts of drawing the gas from the earth and preparing it for the first stages of distribution.") (cleaned up) (quoting Interstate Natural Gas Co. v. FPC, 331 U.S. 682, 690–91 (1947) (construing 15 U.S.C. § 717(b) (2021)) and Northern Nat'l Gas Co. v. State Corp. Comm'n, 372 U.S. 84, 90, 101 (1963)); Boynton v. Virginia, 364 U.S. 454, 457-58, 460, 469 (1960) (requiring a broad reading of the ICA's jurisdiction over transportation "facilities" in order to prevent racial discrimination against interstate bus passengers). *See also* A.H. Phillips, Inc. v. Walling, 324 U.S. 490, 493 (1945) ("Any exemption from such humanitarian and remedial legislation must be narrowly construed") (cleaned up); *see also* Corbett v. Transp. Sec. Admin., 19 F.4th 478, 487 (D.C. Cir. 2021) ("If there is any ambiguity in [an] expansive grant of authority to [the agency], there is 'a presumption that Congress . . . desired the agency (rather than the courts) to possess whatever degree of discretion the ambiguity allows.'") (quoting Smiley v. Citibank (S.D.), N.A., 517 U.S. 735, 740-41 (1996)) (upholding the TSA's mask mandate).

172. Cass Sunstein, *There Are Two "Major Questions" Doctrines*, 73 ADMIN. L. REV. 475 (2021) (arguing that there are two distinct versions of this doctrine—a "soft" and "hard" version). In addition, the Supreme Court recently invalidated the Biden administration's vaccine mandate under this theory. National Fed'n of Indep. Bus. v. OSHA, 142 S. Ct. 661, 665 (2022).

173. *See* Farmers Union Cent. Exch., Inc., v. FERC, 734 F.2d 1486, 1507 (D.C. Cir. 1984) (vacating FERC's interpretation of "just and reasonable" that amounted to "virtual deregulation of oil pipeline rates oversteps the proper bounds of agency discretion"). *See also* Hunter v. FERC, 711 F.3d 155, 160 (D.C. Cir. 2013) (recognizing the "strong presumption against implied repeals.").

tions that create regulatory gaps are disfavored.[174] Of course, the "need for regulation cannot, of its own force, expand the reach of [an agency's] jurisdiction" where the "claimed jurisdiction cannot be reconciled with the words of the statute as ordinarily used and as likely to have been understood by Congress."[175] Nonetheless these principles caution against second-guessing Congress's intent to comprehensively regulate all pipelines.

a. *Chevron* Deference May Not Apply When Two Agencies Interpret the Same Statutory Provision

There is one final wrinkle to *Chevron* deference that is somewhat particular to the subject of this article. In general, "deference may not apply to an agency's interpretation of a statute if Congress has entrusted more than one agency with administering the statute."[176] Here, two agencies, FERC and the STB, administer their pipeline regulatory regimes based on the scope of the DOE Act's transfer of some pipelines to FERC. In *Hunter v. FERC*, the D.C. Circuit held that deference is never owed "where two competing governmental entities assert *conflicting* jurisdictional claims."[177] Therefore, if FERC and the STB disagree on their respective authorities over pipelines carrying hydrogen, neither interpretation will be owed deference. However, in the *CF Industries* decision, discussed more thoroughly below, FERC and the ICC both *agreed* on the delineation between their respective jurisdiction over ammonia pipelines. Still, the D.C. Circuit noted that it might not be able to defer to these interpretations because both agencies were interpreting the same provision of the DOE Act.[178] The Court avoided the issue of deference by finding that the more natural reading of "oil" did not include anhydrous ammonia because it was not used as a fuel—consistent with the reasoning of both agencies.[179] Note that this holding implicitly deferred to the two agencies' factual determination that ammonia was not used as fuel. This wrinkle will remain a point of uncertainty going forward and may require a greater degree of statutory scrutiny—or perhaps coordination—from FERC and the STB. If the two agencies agree, but their interpretation is not what a court would consider the most natural reading, the court will have to confront the nov-

174. FPC v. La. Power & Light Co., 406 U.S. 621, 631 (1972) ("Although federal jurisdiction was not to be exclusive, FPC regulation was to be broadly complementary to that reserved to the States, so that there would be no 'gaps' for private interests to subvert the public welfare."); *see also* FERC v. Elec. Power Supply Ass'n, 577 U.S. 260, 262 (2016) (rejecting interpretation of FPA that would not allow any regulation of wholesale demand response).

175. Henry v. FPC, 513 F.2d 395, 402 (D.C. Cir. 1975).

176. CTIA-Wireless Ass'n v. FCC, 466 F.3d 105, 116 (D.C. Cir. 2006) (citing Association of Am. Phys. & Surgeons, Inc. v. Clinton, 997 F.2d 898, 913 (D.C. Cir. 1993)).

177. Hunter v. FERC, 711 F.3d 155, 157 (D.C. Cir. 2013) (emphasis added) (not deferring to FERC's interpretation of the relative scope of its jurisdiction under NGA and Commodities Futures Trading Commission's jurisdiction under the Commodities Exchange Act).

178. CF Indus., Inc. v. FERC, 925 F.2d 476, 479 n.1 (D.C. Cir. 1991).

179. *Id.* at 478 ("Because of these considerations, we will analyze the case as if deference were inappropriate. We think that the two agencies have the better reading of the statute—which, of course, makes unnecessary the resolution of the deference issue."). The Court was also troubled by the amount of deference owed to agency determinations of their own jurisdiction, which has since been resolved.

el question of whether deference is owed when two agencies agree on how to interpret an ambiguous statute.

2. Agencies Must Follow Their Precedent or Explain Any Changes

Another limit on deference to agencies' statutory interpretation is the requirement that an agency must acknowledge and explain policy changes.[180] In order for an agency to change its statutory interpretation, the new interpretation must be permissible under the statute, there must be good reasons for the change, and that the agency must believe the new interpretation to be better.[181] Agencies are even allowed to interpret statutory provisions differently than an earlier court, as long as that court did not find the provision to be unambiguous.[182] Prior agency holdings need not be explicit, either: an agency's "consistent practice, whether adopted expressly in a holding or established impliedly through repetition, sets the baseline from which future departures must be explained."[183]

For purposes of this article, a quick summary of pipeline agency "genealogy" may be helpful. As noted above, every pipeline regulatory regime—the NGA, the ICA, and ICCTA—has each been administered by a different pair of administrative agencies, each for different periods of time, and each involving an agency that no longer exists. In the interest of avoiding confusion and repeated explanations, the following maps out which pipeline regulatory precedent, during which eras, is currently binding on which agencies.

In interpreting the NGA, FERC is bound by the decisions of the FPC from 1938 until 1977 and from its own decisions since then.[184] In interpreting the ICA, FERC is bound by decisions of the ICC from 1887 to 1977 and by its own decision since then.[185] In interpreting ICCTA, the STB is bound by decisions of

180. Southwest Airlines Co. v. FERC, 926 F.3d 851, 856 (D.C. Cir. 2019) (the "agency need not demonstrate that the reasons for the new policy are better than the reasons for the old one, but it must at least acknowledge its seemingly inconsistent precedents and either offer a reason to distinguish them or explain its apparent rejection of their approach") (cleaned up) (citing FCC v. Fox Television Stations, Inc., 556 U.S. 502, 515 (2009); Tennessee Gas Pipeline Co. v. FERC, 867 F.2d 688, 692 (D.C. Cir. 1989)).

181. *FCC v. Fox*, 556 U.S. at 515. In addition, sometimes greater justification is required, for instance when the "new policy rests upon factual findings that contradict those which underlay its prior policy; or when its prior policy has engendered serious reliance interests that must be taken into account." *Id.* (citing Smiley v. Citibank (S.D.), N.A., 517 U.S. 735, 742 (1996)).

182. National Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. 967, 982 (2005); United States v. Home Concrete & Supply, LLC., 566 U.S. 478, 488-89 (2012).

183. *Southwest Airlines*, 926 F.3d at 858 (citing Atchison, Topeka & Santa Fe Ry. Co. v. Wichita Bd. of Trade, 412 U.S. 800, 807 (1973) (plurality opinion)).

184. DOE Act § 705(a), 91 Stat. at 606-07 (codified at 42 U.S.C. § 7295) (savings provision). *See also* Panhandle E. Pipe Line Co. v. FERC, 881 F.2d 1101, 1123 (D.C. Cir. 1989) (remanding order to FERC to consider consistency with FPC precedent); *see also* TransCanada PipeLines Ltd. v. FERC, 24 F.3d 305, 308, 311 (D.C. Cir. 1994) (remanding order to FERC to consider line of Commission precedent going back to the FPC). *See also* Office of Consumers' Couns. v. FERC, 655 F.2d 1132 (D.C. Cir. 1980) (treating FERC and FPC precedent interchangeably).

185. DOE Act § 705(a), 91 Stat. at 606-07 (codified at 42 U.S.C. § 7295) (savings provision). *See also* Frontier Pipeline Co. v. FERC, 452 F.3d 774, 776 (D.C. Cir. 2006) ("The parties agree that decisions of the ICC applying the ICA prior to the 1977 legislation are treated as if they were FERC decisions; *i.e.*, if FERC deviates from such a decision, it must at least justify the deviation as it would a deviation from a decision of its own") (citing Greater Boston Television Corp. v. FCC, 444 F.2d 841, 852 (D.C. Cir. 1970)).

the ICC from 1887 to 1995 and by its own decisions since then.[186] FERC and the STB must therefore be mindful of the following precedent when approaching the issue of which of them should regulate pipelines carrying hydrogen or any of the other emerging renewable commodities.

C. Precedent Delineating Jurisdiction Between the Three Pipeline Regulatory Regimes

As should be clear, the pipeline statutory and regulatory framework has been developed almost entirely against the backdrop of a fossil-fuel energy economy. Still, the precedent to date provides enough guidance to place established renewable fuels within this framework. Placing a commodity (other than water) within the pipeline regulatory framework involves two lines of inquiry. First, it must be determined "whether the commodity is natural (or artificial) gas and therefore exempt from the Hepburn Act but subject to the NGA." If a product is not natural or artificial gas, it is subject to the Hepburn Act so it must then be determined whether it is "oil." That is, did Congress intend to transfer its regulation to FERC in 1977 or was its regulation left with the ICC (not STB).

Under this framework "natural gas" has a narrow interpretation as naturally occurring methane, components included with it or added to it, including manufactured methane that has been mixed with it; "oil" has a broad interpretation as petrochemicals with energy uses and their non-petrochemical competitors; and every other commodity is regulated by the STB. There are no commodities (other than water and sometimes artificial gas) whose transportation by pipe is left unregulated.

1. The Scope of the NGA: What Is "Natural Gas" and "Artificial Gas"?

The scope of the NGA's jurisdiction can be visualized as the stream of methane flowing from naturally occurring reservoirs to their points of consumption.[187] This stream may include elements other than methane, and the entire stream is still "natural gas," but once those elements are pulled out of this stream, the NGA no longer applies to them. Likewise, once artificial methane or another commodity enters this stream it becomes subject to NGA jurisdiction, but not before. This rule carries out the intent of Congress recounted above, and it has been consistently applied in numerous contexts by FERC, and the FPC before it. The result is a much narrower jurisdictional scope compared to the Hepburn Act.

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186. ICCTA § 204(a)(1-2), 109 Stat. at 941 (codified at 49 U.S.C. § 1301) (providing that all ICC orders and regulations shall continue in effect until modified or revoked by the STB).

187. *See Deep S. Oil Co. of Tex.*, 14 F.P.C. 308, 324 (initial decision), *aff'd* Opinion No. 284, *Deep S. Oil Co. of Tex.*, 14 F.P.C. 83 (1955) (order on initial decision), *aff'd sub nom.* Deep S. Oil Co. of Tex. v. FPC, 247 F.2d 882 (5th Cir. 1957) ("Throughout all those changes the 'natural gas' flows continuously and without interruption, first with, and later without, those impurities and other components, through the interconnected pipe lines, including those which actually cross state boundaries, to the burner tips of the consumers thereof.").

a. Natural Gas Must be Primarily Methane

As described above, Congress had in mind methane-based fuel gases both when it exempted gas pipelines from regulation in 1906 and when it subjected them to regulation in 1938. FPC and FERC precedent confirm that the NGA is purely focused on methane. Three manifestations of this principle prove that to be the case. First, while pure methane and methane mixed with other elements is subject to the NGA, every single non-methane element found with natural gas is no longer subject to the NGA when it is extracted or isolated.[188] Second, naturally occurring gases that do not contain methane are not subject to the NGA.[189] And finally, the NGA continues to govern methane even if it is liquefied, that is, no longer a gas.[190]

Congress never provided a definitive chemical definition of natural gas.[191] However, regulatory focus on methane can be reached, among other ways, by process of elimination. NGA jurisdiction attaches with the presence of methane; it is also lost in its absence. When gas is extracted, it usually contains other elements. This raw gas is sometimes referred to as "casinghead" gas (referring to point at which it leaves the well) or "wet" gas (because it contains natural gas "liquids").[192] The NGA still applies to this gas notwithstanding the impurities and other gases.[193] And NGA jurisdiction is retained over the transportation of the methane gas as these other elements are removed from it.[194] However, there is no NGA jurisdiction over the transportation of any of these elements besides methane.[195] In fact, the non-methane elements included in a natural gas stream

188. *Id.* at 316, 325, 332.

189. *Id.* at 324.

190. *Id.* at 310.

191. *Id.* at 322-23 ("I am unable to see any rational basis for the conclusion that Congress intended that regulation under the Natural Gas Act be confined to fuel gas consisting 'almost entirely of methane and ethane'") (exercising jurisdiction over casinghead gas with other elements).

192. *Deep South Oil*, 14 F.P.C.at 324. Note that many of the natural gas "liquids" are actually gases at normal temperatures and ambient pressures.

193. Permian Basin Area Rate Cases, 390 U.S. 747, 761, 818 (1968).

194. *Deep South Oil*, 14 F.P.C. at 324 ("The extraction process to which the gas is subjected, both before and after delivery is made to the interstate pipe line, does not create, or add to the constituents of the casinghead gas, any amount of either of those components. Those processes merely extract and remove from the casinghead gas stream, by simple changes in their physical environment, impurities such as carbon dioxide, nitrogen, helium, compounds of sulphur and oxygen, water and water vapor, drilling mud, rust, sand, dirt and in addition liquid hydrocarbons. Throughout all those changes the 'natural gas' flows continuously and without interruption, first with, and later without, those impurities and other components, through the interconnected pipe lines, including those which actually cross state boundaries, to the burner tips of the consumers thereof.").

195. *See Northern Nat. Gas Co.*, 25 F.P.C. 1205, 1206 (1961) (denying petition of Mid-America Pipeline Company for FPC to assert jurisdiction over Northern Natural's proposed pipeline to transport propane and other NGLs); *Panhandle E. Pipe Line Co*., 30 F.P.C. 1260 (1963) ("the Commission has no jurisdiction over the transportation of hydrocarbons to be extracted, as liquids from the gas stream") (no jurisdiction over helium); *Southern Nat. Gas. Co.*, 50 F.P.C. 1286, 1289 (1973) ("The first question concerns our jurisdiction over the sale and transportation of the liquid hydrocarbon feedstocks. It matters not whether we speak of the light liquid hydrocarbons here involved, or the heavy condensates that will also be used. It is our view that we have no jurisdiction over the sale or transportation of either, and that both Commission and judicial precedents so hold.") (citing *Panhandle E. Pipe Line Co*., 12 F.P.C. 686 (1953)); *Texas E. Transmission Corp*., 17 F.P.C. 843 (1957); *Northern Nat. Gas Co*., 28 F.P.C. 1155 (1962); Mid-America Pipeline Co. v. FPC, 330 F. 2d 226 (D.C.

could even be sold separately in advance of commingled transportation without implicating the NGA's jurisdiction over sales of natural gas.[196]

Ethane is the second most common element of natural gas, yet pure ethane transportation by pipeline is not regulated by the NGA, unless mixed with methane.[197] Rather, pure ethane pipelines are subject to FERC's regulation under the ICA.[198] In fact, even when some methane is inadvertently included in these extracts, FERC has clarified there is "no necessity for the Commission to attempt to trace these stray molecules, much less regulate them."[199] The focus of the NGA is clearly methane.

There does not appear to be any instance where the NGA was applied to a pipeline that did not carry methane. When FERC was once confronted with this issue, it has disclaimed jurisdiction. In 1978, the Cortez carbon dioxide pipeline

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Cir. 1964); Mobil Oil Corp. v. FPC, 483 F. 2d 1238 (D.C. Cir. 1973); *Columbia LNG Corp.*, 50 F.P.C. 1943, 1944 (1973), *aff'd sub nom.* Public Serv. Comm'n v. FPC, 543 F.2d 392 (D.C. Cir. 1976) ("The feedstocks with which we are here dealing are not 'natural gas.' These feedstocks are natural gas liquids. Although they are derived from natural gas, natural gas liquids as such are not subject to our jurisdiction.").

196. *Panhandle E. Pipe Line Co*., 12 F.P.C. at 703 ("sale of ethane and the hydrocarbon gases heavier than ethane while in the gas stream is not a sale of natural gas as defined in the act, and is therefore not subject to the jurisdiction of the commission"). Note that ethane is the second-lightest hydrocarbon and methane is the lightest so "ethane and the hydrocarbon gases heavier than ethane" would include every non-methane hydrocarbon. *See also Dorchester Gas Producing Co.*, 58 F.P.C. 2765, 2767 (1977) ("It is often said in the decided cases that extraction of liquids is a non-jurisdictional activity and [producer] relies on such language to support its position that the extent of its extractions from the gas it sells to [the pipeline] is a private contractual matter between itself and [the pipeline]. The Commission agrees that extraction of liquids is a non-jurisdictional activity. To the extent it is provided for in the contract originally dedicating gas to interstate commerce, the hydrocarbons liquefied pursuant to the contract are considered as having been reserved from the interstate sale, and as not being dedicated to interstate commerce.") (citing *Phillips Petroleum Co.*, 24 F.P.C. 537 (1960)); *Mobil Oil Corp.*, 483 F.2d at 1241 ("The contractual aspects of natural gas production have evolved with due regard to these natural and economic phenomena. The producer and the pipeline frequently agree that the producer will sell the gas from the well but reserve title to all the liquids and liquefiables transported. The gas pipeline company transports, along with the gas it purchased, various quantities of liquids and liquefiables that are still owned by the producer."); *Distrigas Corp.*, 47 F.P.C. 752, 816 (1972) ("Those cases, cited by Shell, where the sale of heavier hydrocarbon from a gas stream in a liquid form were found not to be jurisdictional, was because the sales were not an incident in the sale of natural gas and did not turn on the fact that the heavier hydrocarbons were extracted in the liquid state."); *see also Trunkline Gas Co*., 14 FERC ¶ 61,222, at p. 61,417 (1981) (noting cost allocation is required to account for "removal of these [liquid and liquefiable] non-methane constituents from the gas stream").

197. *Columbia Gas Transmission Corp.*, 17 FERC ¶ 61,020, at p. 61,036 (1981) ("Although ethane is itself nonjurisdictional, the sale or transportation of vaporized ethane which is commingled with natural gas is subject to Commission jurisdiction."). *See also Paiute Pipeline Co.*, 52 FERC ¶ 61,311, at p. 62,253 (1990) ("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. When commingled as part of natural gas, propane would be part of the natural gas, the transportation of which is subject to the NGA. When it is separated, it is not natural gas as that term is used under the NGA.").

198. *Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 (2013).

199. *South Jersey Gas Co*., 47 FERC ¶ 61,031, at p. 61,095 (1989). *See also Northern Nat. Gas Co*., 28 F.P.C. at 1192 (approving tariff that would give gas pipeline the "right to process its gas for certain specified hydrocarbons such as sulpher compounds, helium, nitrogen, natural gasoline, carbon dioxide, ethane, butane, propane, and other hydrocarbons, including methane, the basic constitutent [sic] of natural gas, but only insofar as the latter was incidental to the extraction of any other component"). There does not appear to be an equivalent threshold consideration as to whether gas is natural gas or "artificial gas unmixed."

requested FERC disclaim NGA jurisdiction over its proposed pipeline.[200] In evaluating the question, FERC noted that the legislative history does not clarify the meaning of natural gas and that it was "likely that Congress used the common meaning of 'natural gas' of a mixture of gases, including a sufficient component of hydrocarbons to give it heating value."[201] After, "considering the source of the production, the use of the production, and the actual chemical composition of the production involved, in light of the goals of the NGA," FERC concluded that carbon dioxide pipelines should not be subject to NGA regulation because doing so "would advance no goal or purpose of the NGA."[202]

If there was any doubt that methane is the key concern of the NGA, NGA jurisdiction is not lost when the methane is liquified, *i.e.*, is no longer a "gas" in the literal sense.[203] Further, there is no NGA jurisdiction over the non-methane components of a gas stream once extracted, even if the sole purpose of removing those non-methane elements is to use them to manufacture methane that will be returned to the same jurisdictional gas stream.[204] More recently, FERC's policy on gas interchangeability notes that natural gas is "principally methane."[205] All of this shows that FERC and the FPC's "settled course of behavior embodies that agency's informed judgment that"[206] natural gas means naturally occurring methane, with or without other elements.

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200. *Cortez Pipeline Co.*, 7 FERC ¶ 61,024 (1979). Of note, Cortez did not ask FERC to disclaim jurisdiction under its ICA authority.

201. *Id.* at 61,041. *See also id.* at 61,042 ("From the statute itself, it appears that Congress was enacting legislation to regulate a burgeoning industry and was concerned with a salable commodity and its effect on the public.") (citing FPC v. La. Power & Light Co., 406 U.S. 621, 638 (1972)).

202. *Cortez*, 7 FERC ¶ 61,024 at 61,042. *See also Paiute Pipeline Co.*, 52 FERC ¶ 61,311, at 62,253 ("not every gas that occurs naturally is subject to the NGA. A 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, but not every hydrocarbon, which can exist as a gas when it occurs alone, is necessarily natural gas within the meaning of the NGA."); *Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381, at p. 62,166 (1990) ("In *Cortez Pipeline Co.*, this Commission issued a declaratory order stating that a proposed CO_2 pipeline was not subject to the Commission's jurisdiction under the NGA . . . the Commission concluded that Congress was referring to gas with sufficient hydrocarbons to have heating value since heating was the matter of statutory concern. The Commission therefore resolved this jurisdictional issue by applying the purpose of the NGA."). While FERC's phrasing by itself could imply that a gas with heating content could be categorized as natural gas even without methane, that has never occurred.

203. *Dynegy LNG Prod. Terminal, L.P.*, 97 FERC ¶ 61,231, at p. 62,055 (2001) (finding that FERC "retains its long-held authority to review LNG import facilities under section 3 of the NGA") (citing *Distrigas Corp.*, 47 F.P.C. 752 (1972)); *Distrigas*, 47 F.P.C. 752 (noting the dictionary definition of natural gas and LNG); *see also Kansas-Nebraska Nat. Gas Co., Inc.*, 22 FERC ¶ 61,176, at p. 61,307 & n.7 (1983) (citing *Distrigas*, 47 F.P.C. at 759) (natural gas "remains [jurisdictional] through ultimate consumption despite changes in pressure or storage."); *but see Air Prods. & Chems., Inc*., 58 FERC ¶ 61,199, at p. 61,619 (1992) (disclaiming jurisdiction over facility to liquify natural gas for purposes of fueling trains).

204. *Columbia LNG Corp.*, 50 F.P.C. 1252, 1944, *aff'd* 50 F.P.C. 1943 (1973), *aff'd sub nom.* Public Serv. Comm'n v. FP*C*, 543 F.2d 392 (D.C. Cir. 1976).

205. *Natural Gas Interchangeability*, 115 FERC ¶ 61,325 at P 4 & n.2 (2006). *Id.* at P 5 (noting that producers evaluate whether to extract the non-methane elements depends on the relative price of "natural gas over other hydrocarbons").

206. Southwest Airlines Co. v. FERC, 926 F.3d 851, 858 (D.C. Cir. 2019) (cleaned up) (citing Atchison, Topeka & Santa Fe Ry. Co. v. Wichita Bd. of Trade, 412 U.S. 800, 807 (1973) (plurality opinion)).

b. Natural Gas Must Not Be Manufactured

The other requirement of NGA jurisdiction is that the gas must be either "natural" gas "unmixed" or a "mixture of natural and artificial gas."[207] This has been the more thoroughly vetted issue, with several bright line determinations. Of note, courts have found Congress used "clear and unambiguous language" in this statutory provision.[208] Therefore, FERC has less discretion in interpreting this provision than perhaps others.[209] Interestingly, FERC has some conflicting precedent regarding how this limitation applies to renewable sources of methane.

The starting point for this analysis is that the terms "natural" and "artificial" are comprehensive and mutually exclusive.[210] The FPC has found that Congress "viewed gas as being of two kinds—natural gas and artificial gas [and] contemplated within the meaning of 'natural gas' all gas which was not artificial."[211] The FPC also reasoned that the meanings of "natural" and "artificial" were "mutually exclusive" and that "that which is artificial can never be natural, no matter how perfect the imitation of nature."[212] Therefore, "whether or not the gas is 'manufactured' is the jurisdictional test."[213] Since the NGA covers artificial gas when mixed with natural gas, all that is needed to establish NGA jurisdiction over a pipeline is for *some* gas transported by it to be "natural."[214]

Historically, the FPC and courts looked to whether there was a molecular level change to the gas to determine if it was manufactured. For instance, the removal of non-methane molecules from a gas stream is not the "manufacture" of a cleaner natural gas.[215] Rather, creating methane molecules from other mate-

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207. 15 U.S.C. § 717a(5).

208. Henry v. FPC, 513 F.2d, 513 F.2d 395, 399 (D.C. Cir. 1975).

209. *See, e.g.*, National Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. U.S. 967, 982 (2005) (noting that a court's prior holding that a statutory term is unambiguous is binding on an agency). *See also, e.g.*, Office of Consumers' Couns. v. FERC, 655 F.2d 1132, 1146 (D.C. Cir. 1980) (FERC cannot exercise corollary authority over synthetic gas production). Interestingly, the synthetic gas plant that was the subject of the *Office of Consumers' Counsel* appeal will soon be converted to a hydrogen production facility. James MacPherson, *North Dakota gas plant to be redeveloped for clean energy*, ASSOCIATED PRESS (Aug. 16, 2021), https://apnews.com/article/business-environment-and-nature-north-dakota-407b773f6891b0bf8cfc945f8e41c755.

210. This is also consistent with Congress's decision to change the Hepburn Act's exempting language from "except natural or artificial gas" to simply "other than . . . gas" without changing the substance.

211. *Deep S. Oil Co. of Tex.*, 14 F.P.C. 308, 323 (1955) (cited positively by *Distrigas Corp.*, 47 F.P.C. 752, 816-17 (1972)).

212. *Algonquin SNG, Inc*., 48 F.P.C. 1216, 1231-32 (1972) (rejecting jurisdiction over synthetic natural "principally methane" and "'physical indistinguishable' from gas formed in the earth.").

213. Public Serv. Comm'n v. FPC, 543 F.2d 392, 394 (D.C. Cir. 1976) (citing *Algonquin SNG*, 48 F.P.C. 1216; *Henry*, 513 F.2d 395).

214. *See, e.g.*, Office of Consumers' Counsel, 655 F.2d at 1146 ("No one in this litigation has questioned FERC's authority to assert full regulatory authority including the power of rate and tariff setting over the transportation and sale of Great Plains synthetic gas subsequent to its creation and commingling with natural gas"); *Transwestern Pipeline Co.*, 53 F.P.C. 1287 (1975) (no such thing as artificial gas mixed with natural gas: once the two are mixed, it is all natural gas).

215. Deep S. Oil Co. of Tex. v. FPC, 247 F.2d 882, 888 (5th Cir. 1957); *Deep S. Oil Co. of Tex.*, 14 F.P.C. 83 (1955) (citing Eureka Pipe Line Co. v. Hallanan, 257 U.S. 265 (1921); Michigan-Wisconsin Pipe Line Co. v. Calvert, 347 U.S. 157 (1954)).

rials is. The FPC addressed this issue in *Algonquin SNG*.[216] The FPC found that methane created from naphtha[217] was not natural gas because "naphtha does not contain methane, the principal component of natural gas" and "the process of transforming naphtha into methane involves what is essentially a manufacturing process wherein the molecular structure of the components of the feedstock are rearranged and transformed."[218] The D.C. Circuit later upheld a similar finding stating that "[i]n any event methane, the principal component of 'natural gas' is not present until the feedstock liquids have undergone a complex chemical transformation. The product resulting from this molecular rearrangement is manufactured gas."[219] Later, in *El Paso Natural Gas*, the FPC found that methane created by coal methanization was manufactured gas even though the coal contained "contains trace amounts of methane."[220] The reasoning of these cases reinforces the NGA's singular focus on methane, and also articulates a potentially consequential rule.

c. NGA Jurisdiction Over Pipelines Carrying Biomethane Turns on Whether Biomethane Can Be Considered "Natural"

The precedent described above sets up an interesting question as to whether renewable methane can ever be "natural" gas. FERC has conflicting precedent on this point. In *Natural Gas Pipeline Co.*, the FPC was faced with the issue of how to categorize methane that is produced through controlled digestion of animal waste.[221] The FPC concluded that such biomethane was "beyond the contemplation of what Congress intended to regulate" because it was "artificially created by the agency of man."[222] The agency reasoned that the waste itself was not gas and reasoned that

> even if the feedstocks contain elements of methane, the end product gas results primarily from a process which basically transforms the molecular structure of the feedstock, and in so doing creates a product of radically different form, physical description, chemical makeup, appearance, and application than the material from which the gas is derived.[223]

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216. *Algonquin SNG*, 48 F.P.C. 1216.

217. Naphtha is a liquid, intermediate product distilled from crude oil that is blended into finished gasoline. It should be noted that transportation of naphtha by pipeline is subject to the ICA. *See, e.g.*, *Mid-Am. Pipeline Co., LLC*, 136 FERC ¶ 61,087 (2011) (evaluating committed service proposal of pipeline carrying naphtha and other NGLs).

218. *Algonquin SNG*, 48 F.P.C. at 1221.

219. *Public Serv. Comm'n v. FPC*, 543 F.2d at 394 (citing *Algonquin SNG*, 48 F.P.C. 1216; *Henry*, 513 F.2d 395).

220. *El Paso Nat. Gas. Co.*, 50 F.P.C. 651, 658-60 (1973); *see also id.* at 660 (noting that the naturally occurring methane "plays no part in the chemical process, nor is the presence or absence of any methane in the coal a factor relevant to the gasification process nor is it the objective of the gasification process to capture it; instead, the gasification process synthesizes methane through a chemical process in virtual disregard of the natural methane remaining.").

221. *Natural Gas Pipeline Co. of Am.*, 53 F.P.C. 802 (1975).

222. *Id.* at 804.

223. *Id.*

Later, after transfer of NGA oversight to FERC and the passage of the NGPA,[224] FERC was faced with the issue of how to characterize methane that appeared spontaneously in landfills.[225] In that case "organic waste ha[d] been collected, compacted, and covered with earth at a landfill site" and after which the "decomposition methane gases [were] available for extraction."[226] FERC was heavily influenced by the NGPA Conference Committee Report which indicated Congress did not wish to expand jurisdiction over methane created from decomposition of waste.[227] FERC reasoned that the only difference between the digester gas and the landfill gas was that "in the first situation the human activity was purposely directed to the production of methane" while in the latter "the production of methane is a serendipitous by-product of human activity directed to another purpose."[228] Finding that this was not a meaningful distinction for purposes of the NGA, FERC disclaimed jurisdiction.[229]

Very recently, however, FERC quietly asserted NGA jurisdiction over pipeline transportation of landfill gas without much controversy.[230] In *Dominion Energy Transmission, Inc.*, FERC was faced with the issue of tariff changes to facilitate transportation of both "renewable natural gas" and "biogas."[231] Renewable Natural Gas (RNG) would have been defined as methane and other elements sourced from "decomposing waste at dairies, feedlots, landfills, publicly owned treatment works, sewage treatment plants, and wastewater plants."[232] "Biogas" would have been defined as RNG with non-methane elements removed sufficiently to meet gas quality standards.[233] Though the jurisdictional status of the biomethane does not seem to have been put in issue by any participant, FERC still found that "for jurisdictional purposes, both terms fall under the broader category of natural gas, which section 2(5) of the Natural Gas Act (NGA) defines as 'either natural gas unmixed, or any mixture of natural and artificial gas.'"[234] FERC did not acknowledge that it had previously addressed the issue or cite any authority besides the wording of the statute.

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224. *See* section III.A.2.a, *supra*.

225. *Natural Gas Pipeline Co. of Am.*, 13 FERC ¶ 61,165 (1980).

226. *Id.* at 61,352.

227. *Id.* (discussing NGPA Conference Committee Report, *supra* note 136, at 69).

228. *Id.*

229. *Id.*

230. *See, e.g.*, *Eastern Shore Nat. Gas Co.*, 172 FERC ¶ 61,148 (2020) (letter order accepting unopposed tariff provision to facilitate lateral service for renewable natural gas (undefined)); *Southwest Gas Corp.*, 172 FERC ¶ 62,106 (2020) (approving request of Hinshaw pipeline and local distribution company to transport renewable natural gas from production facilities to interstate pipelines). *See also Dominion Energy Transmission, Inc.*, 173 FERC ¶ 61,188 at P 15 (2020) (suspension order) ("we recognize that the issues pertaining to RNG and its transportation on FERC-jurisdictional pipelines are unique, new, and worthy of further consideration by the Commission.").

231. *Dominion Energy Transmission, Inc.*, 175 FERC ¶ 61,091 (2021). FERC has also faced this issue in *Paiute Pipeline Co.*, 176 FERC ¶ 61,134 (2021), but that tariff was rejected without prejudice on procedural grounds without discussing jurisdiction.

232. *Dominion*, 175 FERC ¶ 61,091 at P 2.

233. *Id.*

234. *Id.* at P 2 n.5 (citing only 15 § U.S.C. 717a(5)).

It is unclear from this phrasing whether FERC's *Dominion* order meant to assert jurisdiction over biomethane as artificial gas that had been mixed with natural gas or as "unmixed" natural gas in its own right. The latter would contradict its prior 1980 decision, but the former meaning would not make sense in context. This holding has dubious force going forward as it addressed an uncontested issue without acknowledging apparently contradictory precedent.[235] However, it still may telegraph FERC's motivation going forward. If FERC revisits this issue, it may have a valid argument that jurisdiction over naturally occurring methane from landfills is not as unsound as the young agency seemed to believe. After all, the NGA legislative record indicates that the primary reason for exempting artificial gas was that artificial gas could be produced where consumed whereas natural gas, found underground, could not. Similarly, while waste digesters can be located where methane is needed, landfill methane must be transported, likely by pipe. The NGPA Conference Committee Report may cut against this being a permissible interpretation, even under the *Chevron* framework.[236]

Of course, the distinction between natural and artificial gas would be academic where biomethane is mixed with fossil natural gas, because the transportation would still be jurisdictional. Even so, it seems the economics might already support the transport of unmixed biomethane.[237] And at least one major gas distributor has announced plans to go carbon-neutral by replacing all its natural gas with biomethane and hydrogen.[238] So the question may not remain academic for long. In it order setting Dominion's RNG tariff for a technical conference, FERC noted that it considered these issues "worthy of further consideration."[239] If biomethane production grows as much as should be hoped, the finer points of this distinction should become clearer.

2. The Scope of the ICA: What Is "Oil"?

FERC's jurisdictional scope over "oil" pipelines is determined by section 302 the DOE Act passed in 1977.[240] In passing that law, Congress was clear the purpose was to centralize energy regulation with FERC.[241] After an uncertain

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235. *See generally* Christopher A. Shrock, Note, *The Limits of Intra-Agency Precedent in Arbitrary-And-Capricious Review*, 42 ENERGY L. J. 399 (2021).

236. It should be noted though that the NGPA Conference Report only referred to expanding jurisdiction over "facilities for methane gas generated by the decomposition of organic waste," and, at that time, the FPC had only faced the issue of jurisdiction over methane made in digesters, not underground in landfills. So, FERC's reversal on this point would not necessarily contradict Congress' intent expressed in the Report. *See* NGPA Conference Committee Report, *supra* note 136, at 69; *Natural Gas Pipeline Co. of Am.*, 53 F.P.C. 802 (1975).

237. *See Southwest Gas Corp.*, 172 FERC ¶ 62,106 at P 3 (2020) ("Southwest Gas states that it has received several requests to provide transportation service for RNG *from potential production facilities* located in Arizona *to an interstate pipeline* for delivery into California") (emphasis added).

238. Ethan Howland, *Xcel first utility to adopt net zero carbon target across gas and electric operations, CEO says*, UTILITY DIVE (Nov. 1, 2021), https://www.utilitydive.com/news/xcel-natural-gas-zero-carbon-greenhouse-emissions-goal-/609211/.

239. *Dominion Energy Transmission, Inc.*, 173 FERC ¶ 61,188 at P 15 (2020).

240. CF Indus., Inc. v. FERC, 925 F.2d 476, 478 (D.C. Cir, 1991).

241. *See* discussion of legislative history above.

start, FERC has settled on a relatively clear approach to delineating its commodity-based jurisdiction under the ICA. There are still some remaining questions, but this article proposes a simple test based on a synthesis of the recent opinions applying different tests to different commodities. FERC has jurisdiction under the ICA over two categories of products: (1) petrochemicals with potential energy applications and (2) non-petrochemicals that directly compete with energy petrochemicals. Pipelines carrying petrochemicals without potential energy applications remain regulated by the STB under ICCTA.

a. The ICA Covers Petrochemicals with Potential Energy Applications, Including Natural Gas Derivatives

FERC's ICA jurisdiction over "oil" broadly applies to all non-methane petrochemicals with potential energy uses.[242] This interpretation is consistent with Congress's broad intent for FERC to regulate energy transportation and its directive that this should include pipelines carrying "*crude and refined petroleum and petroleum by-products, derivatives or petrochemicals*."[243] In contrast to the NGA framework, the ICA's scope over petrochemicals is much less selective. Many of the disputes over NGA jurisdiction discussed above would not have materialized in the context of FERC's jurisdiction over "oil." In particular, the ICA does not make any distinction between synthetic or naturally occurring commodities, and it also covers natural gas derivatives the same as "oil" derivatives. In fact, FERC has yet to implement a limiting definition of the word "petrochemical" in this context. It has only ever limited its jurisdiction over commodities when it focused on whether the commodity was used for energy purposes.

The ICA's jurisdiction over petrochemicals has always been understood to include natural gas derivatives. Even before it was split between FERC and the ICC, the ICA was known to cover the non-methane natural gas elements (such as ethane, propane, and butane).[244] These are called natural gas "liquids" (NGLs)—even though many are gases at room temperature. This is consistent with the lack of NGA jurisdiction over these products, discussed above. When FERC took over oil pipeline responsibilities from the ICC, it also took over NGL pipe-

242. *Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 (2013); *Texaco Petrochemical Pipeline LLC*, 107 FERC ¶ 61,151 at P 3 (2004) ("The Department of Energy Organization Act transferred regulatory authority over the pipeline transportation of oil and gas related products from the former Interstate Commerce Commission to the Department. That authority was then delegated to the Commission.") (internal citations omitted).

243. DOE Act Conference Reports, *supra* note 139, at 69.

244. *See Pipeline Demurrage & Minimum Shipment Rule on Propane*, 315 I.C.C. 443, 444 (1962) ("Propane, isobutane, and other liquefied petroleum gas, (LPG) such as normal butane and natural gasoline are extracted in processing natural gas or refining petroleum. To maintain them in a liquid condition pressure or refrigeration is required."); *id.* at 446 n.1 (describing how Mid-America Pipeline Company drew a distinction between the gas-derivatives used for fuel versus used for chemical manufacture); Mid-Am. Pipeline Co. v. FPC, 330 F.2d 226, 227 (D.C. Cir. 1964) ("Mid-America is exclusively an interstate common carrier of natural gas liquids . . . It is subject to regulation only by the Interstate Commerce Commission."). *See also Black Lake Pipe Line Co.*, 342 I.C.C. 399 (1971) (pipeline transporting a mix of crude oil and ethane added as a diluent).

lines. There never appears to have been any controversy over this, rather it was simply taken as given.[245]

The ICA does not distinguish between naturally occurring or synthetic petrochemicals. The archetypical "oil" pipeline carries crude oil, a feedstock which must be refined before it can be consumed.[246] But the ICA also covers refined petroleum products.[247] In addition, the ICA covers synthetic crude oil,[248] which is made by upgrading particularly heavy crude oils at the molecular level in order to facilitate transportation.[249] The ICA likewise covers "diluents," which are transported upstream to be mixed with heavy crude to facilitate transportation.[250] In short, unlike the NGA, the ICA covers petrochemicals that have undergone significant chemical changes, and just as importantly, the ICA covers petrochemicals that will undergo significant chemical changes before they can be used for energy purposes.

The issue becomes more complex when pushing the limit of what qualifies as a "petrochemical" for purposes of the DOE Act. This dilemma is illustrated by FERC and the ICC's dialogue over ammonia pipelines. After FERC was given authority over oil pipelines, it originally took the position that ammonia was covered by the ICA because it is derived from natural gas[251] and was therefore a petrochemical.[252] However, it was later asked to disclaim jurisdiction over ammonia pipelines because the commodity was not used for energy purposes. In trying to determine the scope of its authority over "petrochemicals,"[253] FERC employed dueling dictionary definitions and concluded that "there is sufficient ambiguity in the term 'petrochemical' that [FERC's] jurisdiction is more appro-

245. *See, e.g.*, *Powder River Corp.*, 6 FERC ¶ 62,151 (1979); *Powder River Corp*, 14 FERC ¶ 62,080, at p. 63,123 (1981); and *Dome Pipeline Corp.*, 15 FERC ¶ 62,054, at p. 63,077 (1981) through to *Targa NGL Pipeline Co. LLC*, 173 FERC ¶ 61,001 (2020) (approving committed service); and *Roaring Fork Midstream, LLC*, 173 FERC ¶ 61,276 (2020) (approving waiver of reporting requirements). *See also* 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.").

246. *See* discussion of hydrocracking and hydrotreating below in sections VI.B.2.a(i)-(ii).

247. *See Epsilon Trading, LLC v. Colonial Pipeline Co.*, 164 FERC ¶ 61,202 (2018) (setting for hearing rates for "transportation of refined petroleum products, including gasoline, jet fuel, and diesel fuel") (case remains ongoing).

248. *See, e.g.*, *Tesoro Refin. & Mktg. Co. v. Frontier Pipeline Co.*, 105 FERC ¶ 61,227 (2003), *Big W. Oil, LLC v. Express Pipeline LLC*, 100 FERC ¶ 61,171 (2002).

249. *See, e.g.*, *Northwest Pipeline Corp.*, 23 FERC ¶ 61,163, at p. 61,358 (1983) (noting that one use of natural gas is to produce hydrogen to be used for upgrading heavy crude into synthetic crude).

250. *See Enbridge Pipelines, LLC*, 144 FERC ¶ 61,044 (2013).

251. More specifically, ammonia is made by combining hydrogen (which is derived from natural gas) with nitrogen (which is not).

252. *See Gulf Cent. Pipeline Co.*, 5 FERC ¶ 62,075 (1978) (oil pipeline board instituting investigation into ammonia pipeline rate increases); *Gulf Cent. Pipeline Co.*, 8 FERC ¶ 63,015, at p. 65,181 n.2 (administrative law judge approving settlement and finding the intent of Congress to be "abundantly clear"), *aff'd* 8 FERC ¶ 61,305 (1979).

253. At this point, FERC does not seem to have put much emphasis on the word "derivatives" that was used in the Conference Report. *See Palmetto Prods. Pipe Line LLC*, 151 FERC ¶ 61,090 at P 30 (2015) ("[a]nhydrous ammonia is an agricultural fertilizer *derived from natural gas or petroleum refinery gas*.").

priately determined by examining the overall purposes of the DOE Act."[254] As discussed below, this analysis turned on whether the commodity being transported was used for energy. The ICC agreed with FERC's view,[255] and the D.C. Circuit confirmed that FERC was not required to regulate ammonia pipelines despite the agency's past practice and ammonia's petroleum derivative status.[256] FERC has yet to disclaim ICA jurisdiction over a commodity because it is not a petrochemical.[257]

b. The ICA Does Not Cover Products That Are Not Used for Energy Purposes, Even If They are Petrochemicals

The crux of FERC's ICA jurisdiction over a commodity is whether that commodity is used for energy purposes. This principle first emerged during the debate over which agency—FERC or the ICC (now STB)—should regulate pipelines carrying anhydrous ammonia. In this inquiry, unlike the definition of "petrochemical," FERC has provided some guidance and issued several limiting interpretations. What exactly qualifies as an energy purpose has not been conclusively defined. We do know, though, that it is sufficient that a commodity could be combusted on its own or blended with other fuels.

FERC regulated ammonia pipelines under the ICA from the agency's inception through the 1980s. In fact, FERC and the ICC formalized the transfer of these pipelines to FERC by both moving to substitute FERC for the ICC in a Seventh Circuit appeal regarding an ammonia pipeline order.[258] That changed in 1989, when an ammonia pipeline's shipper filed a complaint at FERC under the ICA, which FERC dismissed in spring 1990.[259] In dismissing the case, FERC differentiated anhydrous ammonia from typical "oil."[260] As discussed above, FERC found that it was ambiguous whether anhydrous ammonia was a petrochemical.[261] Therefore, FERC elected to determine its jurisdiction "by examining the overall purposes of the DOE Act and acting in a manner that facilitates the purposes of that Act."[262] To that end, FERC identified that "the purpose of

254. *Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381, at p. 62,165 (1990).

255. *Gulf Cent. Pipeline Co.*, 7 I.C.C.2d 52, 56 (1990) (describing FERC's conclusions that "a hypertechnical analysis of an ambiguous term is not likely to lead to rational public administration").

256. CF Indus., Inc. v. FERC, 925 F.2d 476, 477 (D.C. Cir. 1991).

257. *See Palmetto*, 151 FERC ¶ 61,090 (exercising jurisdiction over denatured fuel ethanol without acknowledging that ethanol is not a petrochemical).

258. *CF Indus., Inc. v. FERC*, 925 F.2d at 477 (discussing CF Indus., Inc. v. United States, No. 77-2150, 1978 BL 2094 (7th Cir. Aug. 29, 1978)).

259. *Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381 (1990).

260. *Id.* at 62,164 ("Oil pipelines transporting organic, hydrocarbon based products state all volumes, including those for petrochemicals, in barrels, while the volumes of anhydrous ammonia pipelines are stated in tons. Anhydrous ammonia pipelines also operate within substantially different pressure and heat ranges and use electric compressors because, unlike oil and gas pipelines, the commodity itself cannot be used for compressor fuel. In other words, whatever ambiguity there may be about the regulatory status of anhydrous ammonia pipelines and those that are oil pipelines in the conventional sense of the term, this ambiguity is not reflected in the engineering aspects of their operations.").

261. *Id.* (noting that "[a]s a matter of common usage within the petrochemical industry, anhydrous ammonia is considered a petrochemical because it is derived from petroleum refinery gas or from natural gas.").

262. *Id.* at 62,165.

the Act was to provide more coordinated and systematic regulation of energy resources."[263] FERC noted that Congress declined to transfer coal pipelines to FERC because coal did not compete with gas or oil, and reasoned that oil was transferred to FERC because it more closely competes with natural gas.[264] FERC found that it should not regulate anhydrous ammonia pipelines because: (1) pipeline transportation of ammonia doesn't impact the energy markets; (2) ammonia does not compete with gas or oil for heating uses or pipeline facilities; and (3) ammonia has no heating value compared to fuel hydrocarbons.[265] Taking this into consideration, FERC concluded that "regulation of [ammonia's] transportation has no practical implication for energy matters."[266] The D.C. Circuit affirmed this decision in all regards.[267]

FERC's decisions since then have elaborated on the requirement that ICA commodities have energy applications and in so doing made clear that if a commodity is not used for energy, it does not matter if it is a petrochemical or not. In 2004, FERC disclaimed jurisdiction over an ethylene pipeline despite the fact that it "is unquestionably a hydrocarbon product."[268] FERC did so because the record in that proceeding demonstrated that ethylene was "not used for energy purposes."[269] Also in 2004, FERC likewise disclaimed jurisdiction over a pipeline carrying "Polymer Grade Propylene" for the same reasons.[270] And again in 2005.[271] In each of these orders, FERC noted that the commodities could not be used for energy purposes or even travel on the same pipelines for fear of contamination.[272] These subsequent holdings also strongly imply that anhydrous ammonia is a petrochemical or derivative that would be subject to ICA regulation if it had energy applications.[273] In fact, FERC later acknowledged in dicta that anhydrous ammonia was "derived from natural gas or petroleum refinery gas."[274]

Importantly, though, ICA jurisdiction only requires that a commodity have potential, not actual, energy uses. In 2013, a pipeline carrying ethane sought a waiver similar to the ethylene and propylene pipelines'.[275] The pipeline in question represented that it was configured such that the ethane would only be delivered to ethylene manufacturers.[276] Therefore, it argued that the "ethane to be

263. *Id.*

264. *Id.* at 62,165-66.

265. *Id.* at 62,166-67.

266. *Id.*

267. CF Indus., Inc. v. FERC, 925 F.2d 476, 477 (D.C. Cir. 1991).

268. *Texaco Petrochemical Pipeline L.L.C.*, 107 FERC ¶ 61,151 at P 5 (2004).

269. *Id.*

270. *Sabine Propylene Pipeline L.P.*, 109 FERC ¶ 61,025 (2004)

271. *Enterprise Lou-Tex Propylene Pipeline L.P.*, 111 FERC ¶ 61,068 (2005).

272. *Id.* at PP 10-11; *Sabine Propylene*, 109 FERC ¶ 61,025 at PP 8-9; *Texaco Petrochemical*, 107 FERC ¶ 61,151 at P 3.

273. *See Texaco Petrochemical*, 107 FERC ¶ 61,151 at P 5 ("*Gulf Central*, *supra*, *holds* that if a hydrocarbon product shipped by an oil pipeline is not used for energy purposes, the Commission lacks jurisdiction over the transportation of that product") (emphasis added). If ammonia were not a petroleum product, this would be dicta, rather than the *holding* of *Gulf Central*.

274. *Palmetto Prods. Pipe Line LLC*, 151 FERC ¶ 61,090 at P 30 (2015).

275. *Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 (2013).

276. *Id*. at P 5.

transported" on its pipeline would not serve any "fuel or energy purposes."[277] Despite the fact that the petition was unopposed, FERC denied it. FERC provided the following, clarified, jurisdictional test:

> 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.[278]

FERC emphasized that it "considers both existing and potential energy uses" when answering this question.[279] FERC recounted numerous energy applications of ethane, that include burning for heat and blending with natural gas.[280] FERC also stated it will not "disclaim jurisdiction over interstate ethane transportation based on an applicant's assertion of the intended end-use" of the products transported.[281] In other words, if a product is ever covered by the ICA, FERC will assert jurisdiction over all pipelines carrying it.

FERC has yet to conclusively define what energy uses qualify for purposes of determining ICA jurisdiction. FERC clearly had combustion in mind when articulating this rule, but it's unclear if anything else could qualify. For instance, FERC asserted jurisdiction over ethane because it has "thermal heat content *and* current and future uses of ethane as a fuel."[282] Similarly, it noted that propylene is hazardous to burn, when finding it was not a fuel.[283] FERC has also referred to analyzing whether a product is "used as a fuel *or* energy source."[284] Therefore, thermal energy is a sufficient condition to finding energy purposes in evaluating ICA jurisdiction, but it is unclear if it is a necessary condition.

c. The ICA Covers Pipelines Carrying Non-Petrochemicals That Directly Compete with Energy Petrochemicals

FERC has also asserted ICA jurisdiction over non-petrochemical energy products that compete for pipeline space with energy petrochemicals. In 2015, the Palmetto Products Pipe Line (Palmetto) applied to FERC for approval of the terms for committed service on new pipeline capacity.[285] What made Palmetto unique is that one of the commodities it planned to transport was denatured fuel

277. *Id.* at P 7.

278. *Id.* at P 15. Note that this appears to be the first time FERC has used the words "naturally-occurring" as part of this discussion—which, in the context of exercising jurisdiction over an ethane pipeline because of its potential energy uses, should be seen as dicta. As described above, FERC routinely exercises jurisdiction over manufactured hydrocarbons under the ICA. The exact mechanics of how these hydrocarbon molecules are manufactured is described below in section below in sections VI.B.2.a(i) regarding hydrocracking.

279. *Id.* at P 16.

280. *Id.* at PP 17-21. *Id.* at P 20 ("it is unquestionable that ethane has a thermal heat content and has the capability of being burned and used for fuel and energy purposes").

281. *Id.* at P 23.

282. *Id.* at P 22.

283. *Sabine Propylene Pipeline L.P.*, 109 FERC ¶ 61,025 at P 8 (2004) ("the product could be dangerous for use as a fuel, and it could have undesirable environmental effects so there are strict emission standards relating to its release"); *Enterprise Lou-Tex Propylene Pipeline L.P.*, 111 FERC ¶ 61,068 at P 10 (same).

284. *Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381, at p. 62,166 (1990).

285. *Palmetto Prods. Pipe Line LLC*, 151 FERC ¶ 61,090 (2015).

ethanol.[286] Palmetto acknowledged in its application that "pure ethanol likely does not meet the technical or dictionary definition of the term 'oil' or 'petrochemical.'"[287] However, in its order grating the application, FERC did not address the ethanol's origins. It simply characterized the test from *Central Gulf*, as follows: "(1) whether the commodity is a fuel source in that it has heating value and is used for energy-related purposes; (2) whether the cost of transportation will have an impact on energy markets; and (3) whether the commodity will compete with oil or other refined products for capacity in the pipeline."[288]

FERC applied this test and found it had ICA jurisdiction over the transportation of ethanol. In finding ethanol was a fuel, FERC was informed by public policy. It noted that "federal law requires ethanol to be blended with transportation fuels" and that the Energy Information Administration "recognized that ethanol has its own energy content and has classified it as a fuel source."[289] FERC also found the cost of transporting ethanol would impact energy markets because ethanol made up 10 percent of gasoline sold.[290] And finally, FERC reasoned that ethanol competes for pipeline capacity with other FERC-regulated regulated commodities.[291] It should be noted that Palmetto's application was unopposed and there has yet been any adversarial determination at FERC regarding this extension of jurisdiction over biofuels, let alone judicial review.

Finally, it should be noted that the exact relationship between the different tests articulated in *Williams Olefins* and *Palmetto* has not yet been addressed by FERC. *Palmetto* was issued shortly after *Williams Olefins* and although it articulates a different test, it does not acknowledge the preceding order. This article proposes the following distinction: the *Williams Olefins* test is for petroleum derivatives (such as ethane or ethylene) and the *Palmetto* test is for non-petroleum-derivatives (such as ethanol). Some distinction is logically required: FERC's ICA jurisdiction cannot always be contingent on a commodity competing with another regulated commodity—some commodities must be jurisdictional in their own right. Against this backdrop, and the legislative history, the most logical reading is that *Williams Olefins* holds that energy petrochemicals are intrinsically subject to ICA jurisdiction, and the *Gulf Central* test as applied by *Palmetto* determines whether commodities that are not petrochemicals should still be subject to ICA jurisdiction based on their close nexus to regulated energy petrochemicals.

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286. *Id.*

287. Petition for Declaratory Order at 33, *Palmetto Prods. Pipe Line LLC*, Docket No. OR15-13-000 (Jan. 23, 2015).

288. *Palmetto*, 151 FERC ¶ 61,090 at P 30.

289. *Id.* at P 31.

290. *Id.* (also theorizing that increased demand for pipeline transportation of ethanol would drive up the cost of transporting other products). The author notes that FERC's conclusion seems misplaced because ICA-regulated pipelines are not supposed to be able to increase their prices in response to scarcity. It also ignores the fact that because ethanol should mostly displace gasoline volumes.

291. *Id.* (noting that the ethanol would be transported in "batches" in the same manner as other products on refined products).

d. ICA Jurisdiction Over Drop-In Biofuels May Depend on the Degree they Compete with Their Petroleum Counterparts

If the logic of FERC's *Palmetto* order is applied going forward, nearly all known drop-in biofuels would be subject to the ICA. Ethanol competes the least directly with fossil fuels for customers and for pipeline space. Ethanol is not a hydrocarbon and cannot be used directly in most vehicles. The degree to which it can compete with conventional gasoline is limited by the so-called "blend-wall"—the percentage of ethanol that gasoline can have and still run in a typical car.[292] Ethanol is also problematic to transport by pipeline because it tends to corrode most pipes.[293] In contrast, the defining characteristic of more advanced "drop-in" fuels such as renewable diesel, sustainable aviation fuel, and renewable gasoline is that they match the chemical specifications of their fossil counterparts.[294] These nearly indistinguishable renewable hydrocarbons can be transported through existing pipelines.[295] They compete with their fossil equivalent for pipeline space and for customers. Therefore, if ethanol is covered by the ICA, we can safely assume that most other renewable liquid fuels would be.[296] As new products emerge, FERC may draw sharper points of division. But for now, we can expect all existing, proven biofuels to be covered by the ICA.

Regulation of drop-in biofuel transportation under the ICA common carrier regime will have interesting implications as the emerging fuels begin to displace their fossil models. For one thing, the ICA obligates all pipelines, as common carriers, to provide transportation "upon reasonable request."[297] It also prohibits discrimination between shippers.[298] For instance, pipelines must justify changes made to the product specifications in their tariffs.[299] A pipeline's product specifications must be clear, and the pipeline must transport any product that meets

292. *See, e.g.*, Marc Chupka et al., *Peeking Over the Blendwall: An Analysis of the Proposed 2017 Renewable Volume Obli*gations, THE BRATTLE GRP. (July 11, 2016), https://www.brattle.com/wp-content/uploads/2017/10/7178_peeking_over_the_blendwall_-_an_analysis_of_the_proposed_2017_renewable_volume_obligations.pdf.

293. *See* U.S. DEP'T OF TRANSPORTATION, PHMSA, ETHANOL, https://primis.phmsa.dot.gov/comm/ethanol.htm.

294. U.S. DEP'T OF ENERGY, ALTERNATIVE FUELS DATA CENTER, RENEWABLE HYDROCARBON BIOFUELS, https://afdc.energy.gov/fuels/emerging_hydrocarbon.html.

295. *See Renewable Fuel Standard Program: Standards for 2014, 2015, and 2016 and Biomass-Based Diesel Volume for 2017*, 80 Fed. Reg. 77,420, 77,471-73 (2015) (describing fewer issues with distributing and consuming renewable diesel because of its similarity to petroleum based diesel as opposed to biodiesel, which is more different).

296. This was actually the case in the *Palmetto* docket, where the pipeline also carrier biodiesel and renewable diesel blends. Petition for Declaratory Order at 4, *Palmetto Prods. Pipe Line LLC*, Docket No. OR15-13-000 (Jan. 23, 2015).

297. 49 U.S.C. app. § 1(4) (1988).

298. *Id.* at § 3(1) (prohibiting discrimination against any "person, company, firm, corporation, association, locality, port, port district, gateway, transit point, region, district territory, or any particular description of traffic.").

299. *Colonial Pipeline Co.*, 160 FERC ¶ 61,051 at PP 14-15 (2017).

those specifications.[300] It is not hard to imagine the sort of disputes that may emerge under this common carrier framework regarding the transportation of renewable products.[301] For instance, shippers of drop-in renewable fuels may try to use the ICA to gain access to fossil pipeline infrastructure that pipeline operators, or incumbent shippers, may not want to give them.

3. The Scope of ICCTA: Is Any Commodity Left Unregulated?

The STB's catch-all jurisdiction over non-oil Hepburn Act pipelines is conterminous with FERC's jurisdiction over "oil" pipelines. As the ICC articulated in its ammonia ruling, discussed above, "[t]here is no question that the transportation of [non-gas commodities] is subject to regulation. Rather, the issue is whether regulation was transferred to FERC by the section 302 DOE Act. If not, it continues to reside with [the ICC]."[302] FERC has a similar understanding of the two agencies' domains.[303] The combined jurisdiction of the two agencies' is comprehensive over all commodities (other than water) not regulated by the NGA. The scope of the exemption as to "gas," however, has been the source of some unnecessary confusion, warranting a quick correction here.

a. ICCTA Gives the STB Jurisdiction Over Pipelines Carrying Commodities Not Covered by the ICA or NGA, Including Gaseous Ones

Under ICCTA's current iteration of the Hepburn Act, the STB jurisdiction has jurisdiction "over transportation by pipeline . . . when transporting a commodity other than water, gas, or oil."[304] The legislative record shows that "gas" was simply meant as a shortened wording for "natural gas and artificial gas."[305] This history, and the concurring agency precedent, also shows us that gas has a narrow meaning, first as a limit on the Hepburn Act's jurisdiction and then, later, as defining the scope of the NGA's jurisdiction. Nevertheless, much confusion has been caused by a cursory, uncontested—and explicitly disclaimed—decision of the ICC: *Cortez Pipeline*.[306] In that order, the ICC curtly agreed it could not regulate carbon dioxide pipelines because the commodity is gaseous.[307] However, the STB has since disclaimed the logic of *Cortez*, so all agencies are once again aligned in their understanding that the pipeline regulatory framework comprehensively covers all commodities other than water.

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300. *Colonial Pipeline Co.*, 114 FERC ¶ 61,276 at P 9 (2006) ("a common carrier pipeline holding itself out to move [reformulated gasoline] containing [methyl tertiary butyl ether] must do so upon reasonable request in a not unduly discriminatory manner.").

301. Some disputes have already arisen. *See Colonial Pipeline Co.*, 162 FERC ¶ 61,158 (2018) (order on dispute over pipeline tariff provisions regarding biodiesel blending following a technical conference on the subject).

302. *Gulf Cent. Pipeline Co.*, 7 I.C.C.2d 52, 55 (1990).

303. *Sabine Propylene Pipeline L.P.*, 109 FERC ¶ 61,025, at P 11 (2004) (concluding that polymer grade propylene is not subject to FERC jurisdiction and therefore resides with STB).

304. 49 U.S.C. § 15301(a).

305. 1978 ICA Revisions, 92 Stat. at 1470.

306. *Cortez Pipeline Co.*, 45 Fed. Reg. 85,177 (I.C.C. Dec. 24, 1980).

307. *Id.*

i. The *Cortez* Aberration

In 1980, Cortez sought a declaratory order from the ICC that its pipeline was not subject to that agency's jurisdiction because the carbon dioxide it carried was a naturally occurring "gas" for purposes of the Hepburn Act.[308] This was the same pipeline that had just received a related declaration from FERC, discussed above, that the carbon dioxide it carried was "[*not*] 'natural gas' within the meaning of Section 2(5) of the NGA."[309] The ICC characterized the issue as "whether Congress intended to exclude from our jurisdiction all gas types regardless of origin or source."[310] The ICC issued notice in the Federal Register on December 24, 1980, describing its "tentative conclusion" that it lacked jurisdiction over carbon dioxide pipelines.[311] The ICC gave several reasons for this, none of which hold up to much scrutiny.

First, despite explicitly acknowledging that the words "natural or artificial" in the Hepburn Act were understood by Congress to be "surplusage," the ICC relied heavily on the distinction between natural and artificial gas in the Natural Gas Act.[312] The ICC noted that the distinction between natural and artificial gas in the NGA was "based on its origin and not its physical characteristics of heat value or methane content."[313] While true, this does not concern the provision (or even statute) that the ICC was asked to rule on. Second, and most curiously, the ICC reasoned that, even though "[t]he opinion of a sister agency should be given weight, if possible, so that related statutes can be coordinated," that was not necessary because FERC's *Cortez* disclaimer did "not construe or interpret the terms natural and artificial gas."[314] Rather, the ICC somehow found that FERC disclaimed jurisdiction solely because it would not serve the NGA's purpose of preventing exploitation by "natural gas companies."[315] Aside from implicitly acknowledging that carbon dioxide is not natural gas, this was a clear misreading of FERC's *Cortez* order, which explicitly turned on its interpretation of that term.[316] Nevertheless, after receiving no critical comments, the ICC confirmed its tentative conclusion.[317]

Even when it was issued, the *Cortez* order was irreconcilable with present practice. Most obviously, FERC had just found that the carbon dioxide Cortez carries was not natural gas or artificial gas whereas the ICC's *Cortez* decision then found the exact same pipeline was exempt from its jurisdiction because it was carrying natural gas. But it is also worth noting, as described above, that

308. *Id.*

309. *Cortez Pipeline Co.*, 7 FERC ¶ 61,024, at p. 61,041 (1979) (emphasis added).

310. *Cortez*, 45 Fed. Reg. at 85,178.

311. *Id.*

312. *Id.*

313. *Id.* (citing Henry v. FPC, 513 F. 2d 395, 399 (D.C. Cir., 1975)).

314. *Cortez*, 45 Fed. Reg. at 85,178.

315. *Id.* at 85,177-78.

316. *Cortez Pipeline Co.*, 7 FERC ¶ 61,024, at p. 61,041 (1979) ("It seems likely that Congress used the common meaning of 'natural gas' of a mixture of gases, including a sufficient component of hydrocarbons to give it heating value.").

317. *Cortez Pipeline Co.*, 46 Fed. Reg. 18805 (I.C.C. Mar. 26, 1981).

FERC was, at this time, actively regulating pipelines carrying—gaseous—anhydrous ammonia under statutory authority identical to the ICC's authority over Cortez. In fact, the month before the ICC issued its Notice of Filing for Cortez, FERC had issued an ammonia pipeline order.[318]

ii. *Cortez* Disclaimed

The ICC's *Cortez* order continued to become marginalized after the ICC reassumed jurisdiction over ammonia pipelines. As described above, Congress expressed a particular interest in ammonia pipelines when passing ICCTA and the GAO subsequently concluded that carbon dioxide pipelines were also covered by that statute.[319] Finally, in 2000, the STB faced this inconsistency directly. In Docket No. 41685, the STB was handling a complaint against the Koch (formerly Gulf Central) ammonia pipeline. In that case, Koch argued that the ICC's holding in *Cortez* meant that because "[anhydrous ammonia] is a gas" it was "thus beyond the [STB's] oversight."[320] The STB rejected this argument, noting that "the jurisdictional dividing line has been clarified since the *Cortez* case."[321] On appeal, the pipeline did not press the jurisdictional issue.[322] And the D.C. Circuit again noted without analysis that the STB's pipeline jurisdiction "includes anhydrous ammonia pipelines."[323] While this holding is limited to ammonia, the ICC has clearly cast aside the central rationale in *Cortez*, that is, that it lacked jurisdiction over "all gas types regardless of origin or source."[324]

The *Cortez* order has still caused confusion for apparently every analysis that addresses ICC or STB jurisdiction over carbon dioxide pipelines. Some authors simply conclude that carbon dioxide pipelines are unregulated,[325] and oth-

318. *Gulf Cent. Pipeline Co.*, 13 FERC ¶ 62,184, at p. 63,235 (1980).

319. H.R. REP. NO. 104-422, at 230 (1st Sess. 1995) (Conf. Rep.); GAO REPORT, *supra* note 65, at Appendix I. Other government publications reached this conclusion as well. CRS REPORT, *supra* note 51, at 10 ("Jurisdiction over rates for interstate hydrogen pipelines resides with the Surface Transportation Board (STB)."); Hydrogen Economy Statement, *supra* note 65, at 618 ("The statement recognizes that the Surface Transportation Board (STB), the Federal economic regulator of railroads, also regulates economic aspects of interstate hydrogen pipelines.").

320. *CF Indus., Inc. v. Koch Pipeline Co., L.P.*, 4 S.T.B. 637, 640 n.11 (2000). The STB no longer appears to have its copy of Koch's filing containing this argument, so the author is relying on the Board's published characterization. *Id.*

321. *Id.* (continuing: "and our jurisdiction over [anhydrous ammonia] is now settled.") (citing *Gulf Cent. Pipeline Co.*, 7 I.C.C.2d 52, 56-58 (1990); CF Indus., Inc. v. FERC, 925 F.2d 476 (D.C. Cir. 1991); H.R. REP. NO. 104-422, at 230 (1st Sess. 1995) (Conf. Rep.)).

322. *See* Brief for Petitioner Koch Pipeline Co. L.P., *CF Indus., Inc. v. STB*, Case Nos. 00-1209, 00-1213, 00-1248, 2001 WL 36039073 at *6 n.1 (D.C. Cir. Mar. 9, 2001) (noting that "[STB] has jurisdiction over the pipeline transportation of commodities 'other than water, gas, or oil.' Even though [anhydrous ammonia] is a gas in its natural state, the ICC, predecessor to the Board, determined that it, not FERC, had jurisdiction over [anhydrous ammonia] pipelines because [anhydrous ammonia] is not energy-related.") (citing 49 U.S.C. § 15301(a); *Gulf Central*, 7 I.C.C.2d at 56-58) (current Supreme Court Chief Justice John Roberts briefed and argued the case for the pipeline petitioner).

323. CF Indus., Inc. v. STB, 255 F.3d 816, 818 (D.C. Cir. 2001) (citing *CF Indus., Inc. v. FERC*, 255 F.3d at 478).

324. *Cortez Pipeline Co.*, 45 Fed. Reg. 85,177, at 85,178 (I.C.C. Dec. 24, 1980).

325. Jada F. Garofalo & Madeleine Lewis, *Sources to Sinks: Expanding a National CO2 Pipeline Network*, 50 ENVT'L L. REP. 10057, 10062 (2020); Wendy B. Jacobs & Michael Craig, *Legal Pathways to Wide-*

ers note inconsistencies with *Cortez* and later government publications that assume STB jurisdiction over carbon dioxide pipelines.[326] None appear to have noted this particular STB decision that disclaims the logic of the *Cortez* decision. This explicit rejection of the *Cortez* logic in a fully litigated proceeding should be a sound basis to conclude that, as soon as the STB faces the issue, carbon dioxide pipelines will be found to be regulated and that no gap exists between any of the NGA, the ICA, or ICCTA regulatory regimes.

b. Carbon Dioxide Pipelines Will Likely be Found Subject to ICCTA Regulation When the STB Next Addresses the Issue

The *Cortez* holding has not been specifically overruled regarding carbon dioxide pipelines.[327] However, as described above, the logic behind its disclaimer—that the ICC (now STB) lacks jurisdiction over "all gas types regardless of origin or source"[328]—has been directly abandoned. It therefore seems most likely that carbon dioxide pipelines will be found jurisdictional when the issue next arises. As new pipelines come online to transport captured carbon dioxide to points of sequestration or utilization, the STB will likely face the question of jurisdiction again.[329] There are many ways this issue could arise. A carbon diox-

spread Carbon Capture and Sequestration, 47 ENVT'L L. REP. News & Analysis 11022, 11039 (2017); Philip M. Marston & Patricia A. Moore, *From EOR to CCS: The Evolving Legal and Regulatory Framework for Carbon Capture and Storage*, 29 ENERGY L.J. 421, 453 (2008) (concluding that "it seems clear under current law that the interstate transportation of supercritical CO2 by pipeline is not subject to STB regulation under the ICA" despite the fact that the GAO had found otherwise); Harry L. Reed, *The New Carbon Dioxide Pipelines: Revival of the Common Carrier at Common Law*, 12 OKLA. CITY U. L. REV. 103 (1987) (arguing that the *Cortez* disclaimer returned carbon dioxide pipelines to being common carriers at common law).

326. CHARLES F. CALDWELL & CARLY L. KIDNER, CARBON DIOXIDE PIPELINES: REGULATORY AND COMMERCIAL ISSUES IN CARBON CAPTURE, UTILIZATION, AND SEQUESTRATION, CALDWELL BOUDREAUX LEFLER PLLC 10-11 (2021), https://www.cblpipelinelaw.com/news/articles/Carbon-Dioxide-Pipelines-Regulatory-Commercial=Issues-Carbon-Capture-Utilization-Sequestration.pdf; MATTHEW WALLACE ET AL., A REVIEW OF THE CO2 PIPELINE INFRASTRUCTURE IN THE U.S. 31-32 (2015), U.S. DEP'T OF ENERGY, https://www.energy.gov/sites/prod/files/2015/04/f22/QER%20Analysis%20%20A%20Review%20of%20the%20CO2%20Pipeline%20Infrastructure%20in%20the%20U.S_0.pdfl; Jonas J. Monast et al., *A Cooperative Federalism Framework for CCS Regulation*, 7 ENV'T & ENERGY L. & POL'Y J. 1, 24 (2012); ADAM VANN ET AL., CONG. RSCH. SERV, LEGAL ISSUES ASSOCIATED WITH THE DEVELOPMENT OF CARBON DIOXIDE SEQUESTRATION TECHNOLOGY 4-5 (2008); Robert R. Nordhaus & Emily Pitlick, *Carbon Dioxide Pipeline Regulation*, 30 ENERGY L.J. 85, 90-95 (2009); ADAM VANN & PAUL W. PARFOMAK, CONG. RSCH. SERV., REGULATION OF CARBON DIOXIDE (CO_2) SEQUESTRATION PIPELINES: JURISDICTIONAL ISSUES 4-5 (2008); *see also id.* 6 n.29 (noting the inconsistencies between the GAO Report at *Cortez* and relaying a communication from STB Public Affairs indicating knowledge of this conflict but stating the STB "likely not act to resolve this conflict unless a CO_2 pipeline dispute comes before it."). *See also* Tara K. Righetti, *Siting Carbon Dioxide Pipelines*, 3 ONE J 907, 929-30, 970-71 (2017) (imputing the ICC's *Cortez* order to FERC's ICA authority and discussing whether STB would disclaim authority over carbon dioxide pipeline rates rates).

327. *See* VANN & PARFOMAK, *supra* note 326, at 6 n.29 (noting the inconsistencies between the GAO Report and *Cortez* Order and relaying a communication from STB Public Affairs indicating knowledge of this conflict but stating the STB "likely not act to resolve this conflict unless a CO_2 pipeline dispute comes before it.").

328. 45 Fed. Reg. at 85,178.

329. For instance, there are two interstate pipelines centered on Iowa being developed to carry captured carbon dioxide for sequestration or utilization. Press Release, *Public Informational Meetings on the Proposed Summit Carbon Pipeline*, IOWA UTILS. BD. (Oct. 15, 2021), https://iub.iowa.gov/press-release/2021-10-15/public-informational-meetings-proposed-summit-carbon-pipeline; Press Release, *Public Informational*

ide pipeline's shipper could file a complaint at the STB challenging the rates or practices as discriminatory or unreasonable.[330] In particular, a shipper with few options may have entered into a contract with a pipeline that includes unreasonable rates, or unequal terms with other shippers, and may seek to have the contract altered or rescinded. Or, just as likely, a would-be shipper could file a complaint if a pipeline refuses to provide it with transportation services.[331] In addition, carbon dioxide pipelines could file a petition at the STB, requesting exemption from certain requirements of ICCTA.[332] Conclusively establishing jurisdiction will help resolve any regulatory uncertainty still associated with this increasingly important infrastructure. Of particular importance, contracts for transportation on common carriers are disfavored and, when permitted, subject to scrutiny.[333] Obtaining such clarity sooner may be especially important because, unlike with FERC's oil pipeline regime, it is unclear what, if any, contracts for ICCTA pipeline transportation service are legal.[334]

D. Conclusion: All Interstate Pipelines Are Regulated

The pipeline regulatory framework was developed over a century by four agencies, numerous presidents and Congresses, and the appellate courts. The result, in line with legislative intent, is a comprehensive regulatory framework with three conterminous regulatory regimes. The delineation between these regimes had clear and ready meaning when set against the backdrop of a fossil fuel-based economy. As renewable fuels matured economically, this delineation proved more complex. But ultimately, the agencies handled this complexity to reach relatively clear rules. The current precedent can be distilled to a short test of a few questions to categorize any product, including biomethane, renewable liquid fuels, carbon dioxide, and hydrogen.

This analysis may also provide insight into the regulation of yet-to-be-developed energy commodities. Renewable fuels are being pursued with appro-

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Meetings Continue for Proposed Navigator Pipeline, IOWA UTILS. BD. (Jan. 6, 2022), https://iub.iowa.gov/press-release/2021-10-27/iub-sets-37-public-informational-meetings-proposed-navigator-pipeline.

330. 49 U.S.C. §§ 15501(a), 15505.

331. 49 U.S.C. § 15701(a); 49 C.F.R. § 1305.3 (2019). One of the key differences between the FERC and STB regimes is that pipelines regulated by STB are not required to file tariffs. However, ICCTA and the STB's implementing regulations provide shippers relatively detailed rights to have a pipeline's rates for transportation provided and established upon request, including where the pipeline does not yet provide certain services. *See* 49 U.S.C. § 15701(a); 49 C.F.R. § 1305.3. *See also* William G. Bolgiano & Matthew Field, *Federal Regulation of Interstate Hydrogen Pipelines,* VENABLE (May 6, 2021), https://www.venable.com/-/media/files/publications/2021/05/whitepaper_hydrogen_pipelines.pdf.

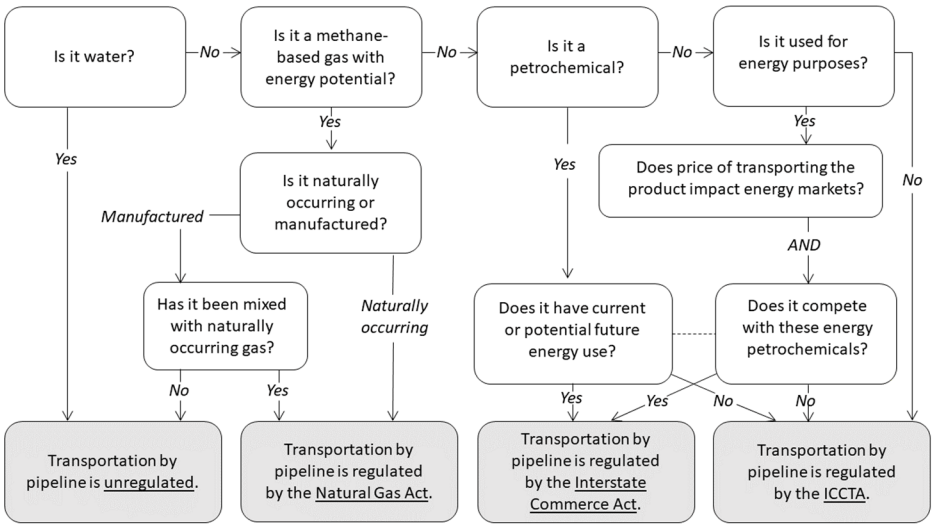
332. 49 U.S.C. § 15302(a)-(a)(1).

333. *See, e.g.*, Sea-Land Serv., Inc. v. ICC, 738 F.2d 1311, 1316 (D.C. Cir. 1984) (noting that contracts were once considered inherently discriminatory but had been permitted by the ICC "provided that the carrier offering them makes them available to all similarly situated shippers of like commodities."). *See also ONEOK Elk Creek Pipeline L.L.C.*, 167 FERC 61,277 (2019) (Glick, Comm'r, concurring) (current FERC Chair stating oil pipeline contracts are "meant to be the exception" and urging FERC to reexamine its policies for approving them).

334. *See Dyno Nobel, Inc. v. NuStar Pipeline Operation P'ship, L.P.*, Docket No. NOR 42147, 2017 WL 1104830, at *4 n.7 (S.T.B. Mar. 24, 2017) (noting the ICCTA pipeline statute does not provide for contract as it does for other regulated industries); *see also Mapco Ammonia Pipeline Inc.*, No. 41582, 1995 WL 434276 (I.C.C. July 18, 1995) (declining to issue declaratory order regarding contract rate structure).

priate urgency, and this article cannot address all the new candidates. However, the framework articulated here can inform the new jurisdictional discussions as they emerge. For instance, carbon dioxide can be combined with hydrogen and turned into hydrocarbon fuels through the Fischer-Tropsch process.[335] If that technology becomes economical, will carbon dioxide be considered an energy commodity? Further, ammonia, the quintessential *non*-energy pipelined product, is now increasingly seen as a promising renewable fuel, especially for maritime transportation.[336] Would seaward ammonia pipelines be regulated by FERC with inland ones regulated by the STB? Such questions will be addressed as the technologies mature, but the test presented in this article should provide a starting point for that analysis.

IV. THE PIPELINE COMMODITY JURISDICTIONAL TEST



For any commodity, only a handful of questions need to be answered to determine how interstate pipelines carrying that commodity are regulated. The first question to ask is whether the commodity is water. This article devotes little discussion to interstate water pipelines because little analysis is required—they are all exempt from federal economic regulation. That is not to suggest they are unimportant. Long distance water pipelines may play an important role in adapting

335. *Fisher-Tropsch Synthesis*, NAT'L ENERGY TECH. LAB'Y, https://www.netl.doe.gov/research/coal/energy-systems/gasification/gasifipedia/ftsynthesis.

336. *See* Nils Rokke, *Ammonia A Sustainable Option For Shipping*, FORBES (Oct. 5, 2021), https://www.forbes.com/sites/nilsrokke/2021/10/05/ammonia-a-sustainable-fuel-option-for-shipping/?sh=529588c67c00; Maria Gallucci, *Why the Shipping Industry Is Betting on Ammonia*, ICCE.org,https://spectrum.ieee.org/why-the-shipping-industry-is-betting-big-on-ammonia; ALL ABOARD: HOW THE BIDEN HARRIS ADMINISTRATION CAN HELP SHIPS KICK FOSSIL FUELS, OCEAN CONSERVANCY 23 (2021), https://oceanconservancy.org/wp-content/uploads/2021/04/All-Aboard-US-Policy-Zero-Emissions-Report_FINAL.pdf (recommending hydrogen and ammonia over other fuels for long range maritime shipping).

to climate change.[337] While there has been no precedent applying this exemption to the Hepburn Act, it appears safe to assume it should be read narrowly not to include mixtures of water and other materials. For instance, we know that pipelines carrying slurries of coal and water are regulated by the STB under ICCTA because Congress chose not to transfer them to FERC in the DOE Act.[338]

If the product is not water, the next question to answer is whether it is a methane-based gas. If it is, we next need to know whether the methane component occurs naturally or is manufactured. If the methane occurs naturally, then pipelines carrying the commodity are subject to regulation under the NGA. Conventional natural gas extracted from reservoirs is the archetypical, and perhaps only, example of this. We need to be mindful that this gas may include other commodities mixed with the methane, such as butane or carbon dioxide. If any of those elements are isolated and removed from this methane gas stream, this analysis begins again.

If the methane in the gas is manufactured, the next question to answer is whether that artificial gas has been mixed with naturally occurring methane. If it has been mixed, then the mixed gases are subject to NGA regulation. If not, pipelines carrying the unmixed, manufactured methane are unregulated. Coal gas is the archetypical manufactured gas. Renewable sources of methane, such as methane made in controlled anaerobic digestion would likely be considered manufactured as well. The status of landfill gas remains uncertain.

If the commodity carried by the pipeline is not water and does not contain significant amounts of methane, it will be subject to one of the two iterations of the Hepburn Act—FERC's ICA or the STB's ICCTA. To place the product in one regime or the other, we next need to determine whether the commodity is a petrochemical or derivative. If it is, the next question is whether it has potential energy applications. If the product is a petrochemical derivative and it has energy applications, its transportation is regulated by FERC under the ICA. Crude oil and finished products such as gasoline, diesel, and jet fuel are the archetypical energy petrochemicals subject to the ICA. If the petrochemical derivative does not have potential energy applications, the commodity is subject to ICCTA's similar regulatory regime.[339] The typical ICCTA petrochemical is a feedstock resource, such as propylene, that has been processed past the point of having practical or safe energy uses.

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337. *See, e.g.*, DENISE FORT, BARRY NELSON, NAT'L RES. DEF. COUNCIL, PIPE DREAMS: WATER SUPPLY PIPELINE PROJECTS IN THE WEST (2012), https://www.nrdc.org/sites/default/files/Water-Pipelines-report.pdf. Interstate water pipelines, as discussed above, have been around since before any pipeline regulation and they remain relevant today. For instance, Utah is actively pursuing a project called the "Lake Powell Pipeline," a 120-mile pipeline that would cross the border with Arizona in three places. *Id.* at 31.

338. *See Gulf Cent. Pipeline Co*, 7 I.C.C.2d 52, 58 (1990); *Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381, at pp. 62,165-66 (1990).

339. One open question is whether non-energy petrochemicals would be jurisdictional if they share pipeline space with energy petrochemicals. FERC has so far only disclaimed jurisdiction over non-energy petrochemicals that do not use the same pipelines as energy products. *See Enterprise Lou-Tex Propylene Pipeline L.P.*, 111 FERC ¶ 61,068 at P 11 (2005); *Sabine Propylene Pipeline L.P.*, 109 FERC ¶ 61,025 at P 9 (2004); *Texaco Petrochemical Pipeline LLC*, 107 FERC ¶ 61,151 at P 3 (2004).

Finally, pipelines carrying any remaining non-water, non-methane, non-petrochemical products are likely subject to ICCTA's catch-all jurisdiction. For instance, fertilizer pipelines carrying ammonia or phosphates are regulated by the STB. However, there is an important exception. If the commodity is used for energy *and* it directly competes with one of the energy petrochemicals regulated by FERC, then FERC will regulate it as "oil" notwithstanding its renewable origins. This principle has so far only been applied to ethanol. If a commodity is used for energy purposes but does not compete with petrochemical fuels, for instance coal slurry, then the transportation of that commodity by pipeline is subject to ICCTA and not the ICA.

A. Case Study: The Ethane Molecule

These shifting jurisdictional determinations can be illustrated by the journey of the typical ethane molecule, which is subject to each pipeline regulatory regime as it moves from its home underground on its way to be sold as plastic to consumers. Ethane is a gas at room temperature and, after methane, is the second most prominent component of natural gas. When natural gas is extracted it includes many non-methane elements (so-called "natural gas liquids"), including ethane. Pipelines carrying this "wet" natural gas are still subject to the NGA because the gas contains significant amounts of naturally occurring methane.[340] Some ethane remains in the natural gas stream through to combustion. But most of the ethane is pulled out of the gas stream as soon as it is economical to do so. That ethane is now no longer subject to the NGA because it is no longer commingled with methane. Most of this ethane will eventually be turned into plastics. However, it still *might* be used as fuel (it's a slightly more potent fuel than methane).[341] For that reason, and because it comes from a petroleum source, it is subject to FERC's ICA jurisdiction.[342] After this ethane is piped by itself to a refinery, most of it will be converted to ethylene, the next step on its way to becoming polyethylene, the ubiquitous plastic. However, unlike ethane, ethylene has no practical energy applications and can only really be turned into plastic. Thus, at this point in its journey, the transportation of ethylene by pipeline becomes subject to the STB's regulation under ICCTA.[343]

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340. *See Columbia Gas Transmission Corp.*, 17 FERC ¶ 61,020, at p. 61,036 (1981) ("Although ethane is itself nonjurisdictional, the sale or transportation of vaporized ethane which is commingled with natural gas is subject to Commission jurisdiction.").

341. *Id.* at 61,035. Because of this the main fuel use of ethane is to blend it into a natural gas stream to increase its heat content. When this is done, the ethane in that gas stream becomes subject to the NGA once again.

342. *Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 at P 23 (2013) ("the Commission concludes that it has [ICA] jurisdiction over the interstate transportation of purity ethane. It is unquestionably a naturally-occurring hydrocarbon that is used for current energy purposes and will be used for future purposes.").

343. *Texaco Petrochemical*, 107 FERC ¶ 61,151 at P 5 ("if a hydrocarbon product shipped by an oil pipeline is not used for energy purposes, the Commission lacks jurisdiction over the transportation of that product. Based on the more detailed information provided here, the Commission concludes it lacks jurisdiction over the transportation of ethylene by interstate oil pipeline and authority over such transportation rests with the [Surface Transportation] Board.").

The example of ethane provides a model for the analysis of hydrogen's jurisdictional status. Hydrogen is primarily a fossil-derivative and will remain so in large part for the foreseeable future. Hydrogen can be found with natural gas and blended into methane pipeline streams, which would be subject to the NGA. Once hydrogen is isolated it is still used primarily for energy purposes (explained below), so dedicated hydrogen-only pipelines should then be subject to the ICA. Finally, some hydrogen will be turned into another product, such as ammonia, that has no current energy applications. Only after this transformation would the pipelines carrying this new commodity be regulated by the STB under the ICCTA's catch-all jurisdiction.

V. IMPLICATIONS OF REGULATION UNDER THE DIFFERENT REGIMES

This article is focused on the question of how regulatory jurisdiction is determined based on the commodity being shipped. Still, a quick summary of the more substantive differences between the three (really two) regulatory regimes is warranted. Both Hepburn Act cognates (the ICA and ICCTA) are virtually identical in terms of statutory substance and jurisdictional scope.[344] So, unless stated otherwise, this section compares the NGA against the general Hepburn Act common carrier regime.

A. Similarities Between the Two Regulatory Paradigms

While the NGA and Hepburn regimes are very distinct, they do have some similarities. As described above in sections III.A.1 and III.A.2, both statutes were meant to remedy a similar problem. To that end, both regimes prohibit discrimination by pipelines.[345] Similarly, both regimes require pipelines to charge reasonable rates.[346] Hepburn Act pipelines are also required to operate as "common carriers" which means they must provide transportation services to any shipper upon reasonable request.[347] Natural gas pipelines, in contrast, are "con-

344. *See, e.g.*, CF Indus., Inc. v. FERC, 925 F.2d 476, 477 (D.C. Cir. 1991) ("At oral argument we gained the impression that petitioner CF Industries (unlike its competitor Farmland, which did not petition for review) wished FERC, rather than the ICC, to assert jurisdiction over Gulf Central Pipeline's transportation of anhydrous ammonia merely because FERC was perceived in some undefined way as the more 'hard-nosed' regulator."). *See* Bolgiano & Field, *supra* note 331, for a more granular comparison of the (mostly procedural) differences between the STB and FERC common carrier pipeline regimes.

345. 15 U.S.C. § 717c(b); 49 U.S.C app. § 3(1); 49 U.S.C. § 15505.

346. 15 U.S.C. § 717c(a); 49 U.S.C app. § 1(5); 49 U.S.C. § 15501(a).

347. *See* 49 U.S.C. app. § 1(4) ("It shall be the duty of every common carrier subject to this chapter to provide and furnish transportation upon reasonable request therefor"); *see also Colonial Pipeline Co.*, 156 FERC ¶ 61,001 (2016) (rejecting tariff provision that appeared to exclude new shippers); 49 U.S.C. § 15701(a). *See also* Makholm & Olive, *supra* note 72 (comparing NGA and ICA carrier obligations); Christopher J. Barr, *Unfinished Business: FERC's Evolving Standard for Capacity Rights on Oil Pipelines*, 32 ENERGY L.J. 563 (2011) (same).

tract carriers,"[348] although for the last few decades, FERC's regulation of natural gas pipelines has focused on encouraging open transportation.[349]

This article is focused on the reach of pipeline regulation to the transportation of emerging commodities. So, the focus of this comparison will be on their different jurisdictional reaches under the different regimes as well as FERC's regulation of siting of pipelines and, in particular, its experience facilitating the conversion of pipelines from one regime to the other.

B. Different Scopes of Jurisdiction

In addition to the transportation of certain commodities, jurisdiction is also contingent on the physical layout and operation of the pipelines as well as the economic arrangements of the transportation. In general, the NGA has broader jurisdictional scope than the ICA on these points. However, there are some pipeline arrangements that would fall under the jurisdiction of the Hepburn Act without falling under the jurisdiction of the NGA, were they carrying natural gas.

Pipelines located entirely within one state may still be found to be jurisdictional under the NGA and Hepburn Act frameworks, but under different circumstances. In the Hepburn Act framework, whether transportation is interstate (or international) turns on the essential character of the commerce from the perspective of the shipper.[350] In contrast, under the NGA, pipelines that receive gas from an interstate pipeline are engaged in interstate commerce for purposes of the NGA unless they fall within the Hinshaw Amendment exception, which covers the transportation of "natural gas received by such person from another person within or at the boundary of a State if all the natural gas so received is ultimately consumed within such State."[351] The NGA also does not cover pipelines that are engaged in international (but not interstate) transportation.[352]

The NGA and Hepburn Act frameworks also have different exceptions to jurisdiction for pipelines that cross state lines. For Hepburn Act pipelines, *The Pipe Line Cases* created a narrow exception called the "Uncle Sam" rule.[353] This principle is named for the Uncle Sam Oil Company, whose pipeline crossed state

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348. CRS REPORT, *supra* note 51, at 9. *See* Makholm & Olive, *supra* note 72, at 419 (citing Order No. 636, *Pipeline Serv. Obligations & Revisions to Reguls. Under Pt. 284; Regul. of Nat. Gas Pipelines After Partial Wellhead Decontrol*, 59 FERC ¶ 61,030 (1992); Order No. 637, *Regulation of Short-Term Nat. Gas Transp. Serv., & Regul. of Interstate Nat. Gas Transp. Servs.*, 90 FERC ¶ 61,109 (2000)).

349. JEFF D. MAKHOLM, THE POLITICAL ECONOMY OF PIPELINES: A CENTURY OF COMPARATIVE INSTITUTIONAL DEVELOPMENT 140-49 (2012) (describing the shift to regulation focused on transportation).

350. *Aircraft Serv. Int'l Grp. v. Cent. Fl. Pipeline LLC*, 169 FERC ¶ 61,119 at P 145 (2019), *aff'd sub nom.* Aircraft Serv. Int'l, Inc. v. FERC, 985 F.3d 1013, 1020 (D.C. Cir. 2021). The test is derived from Supreme Court and ICC precedent that predates the DOE Act. The STB has yet to apply this test regarding its pipelines, but undertakes a similar analysis in determining whether rail movements are interstate or intrastate. *See Texas Cent. R.R. & Infrastructure, Inc*, slip. op. at 7, Docket No. FD 36025 (S.T.B. Jul. 16, 2020).

351. 15 U.S.C. § 717(c).

352. *Nexus Gas Transmission, LLC*, 172 FERC ¶ 61,199 at P 15 n.32 (2020) ("in limited scenarios, gas could be exported directly from a production area in a border state without ever entering interstate commerce.") (citing Border Pipe Line Co. v. FPC, 171 F.2d 149, 151 (D.C. Cir. 1948); *Trans-Pecos Pipeline, LLC*, 155 FERC ¶ 61,140 at P 31 (2016)). *See also* Big Bend Conservation All. v. FERC, 896 F.3d 418, 421 (D.C. Cir. 2018).

353. The Pipe Line Cases, 234 U.S. 548, 561-62 (1914).

lines but only transported crude oil from the Uncle Sam well to the Uncle Sam refinery. Writing for the Court, Justice Holmes compared extending jurisdiction over such a pipeline to saying that a "man was engaged in the transportation of water whenever he pumped a pail of water from his well to his house."[354] This narrow exception is rarely invoked successfully.[355] For NGA pipelines, section 311 of the NGPA[356] allows FERC to exempt local distribution companies from NGA regulation even if their pipelines cross state boundaries.[357] There is no such exemption for Hepburn Act common carriers.[358]

C. Different Siting Authority and Preemption

Perhaps the biggest difference between the NGA and Hepburn Act regimes is the federal government's role in pipeline siting and construction. Siting, construction, and abandonment of NGA pipelines is comprehensively regulated. Under the NGA, gas pipelines must seek a certificate from FERC for their construction which, if granted, comes with eminent domain authority.[359] Further, NGA pipelines cannot commence or abandon their transportation services (including through a lease) without FERC approval.[360] In contrast, FERC has no authority over oil pipelines' entry or exit from the market, or their construc-

354. *Id.* at 562. There is an interesting and short concurrence by Chief Justice White arguing that this exemption is not actually contained in the statute but is required by the Constitution's Takings Clause. *Id.* at 562-63 (White, J., concurring).

355. Valvoline Oil Co. v. United States, 308 U.S. 141, 146-47 (1939); *Hunt Refin. Co.*, 70 FERC ¶ 61,035, at p. 61,111 (1995) (finding Uncle Sam exception did not apply where oil wells owned by other producers could access applicant pipeline); *Nobel Energy, Inc.*, 150 FERC ¶ 61,073 at P 13 (2015) (denying pipeline's request for a related but less onerous temporary waiver of tariff filing requirements where the pipeline "failed to demonstrate unambiguously that it will own 100 percent of the production to be transported"); *Ashley Creek Phosphate Co. v. Chevron Pipe Line Co.*, Docket No. 40131, 1988 WL 226402, at *32-33 (I.C.C. May 31, 1988), *rev'd* 5 I.C.C.2d 303, *clarified* 5 I.C.C.2d 1064 (1989) (administrative law judge saying the argument was "sensibly abandoned" and applies only "where it is known in advance that no other shipper will want or need to ship" on the pipeline); *id.* at *33 ("It is not for owner-shippers, however, to arrogate such exceptions to themselves. They must make application therefor to the regulatory agency, upon a showing that no other potential shipper could or would desire service.").

356. 15 U.S.C. § 717f(f).

357. *See, e.g.*, *CenterPoint Energy Res. Corp.*, 168 FERC ¶ 62,011 at P 18 (2019), *modified* 176 FERC ¶ 62,157 (2021).

358. *Valvoline Oil Co.*, 308 U.S. at 146-47 ("it is the purchase from many sources and subsequent carriage that determine the applicability of the statute . . . . The smallness of the operation is immaterial.").

359. 15 U.S.C. § 717f(h).

360. 15 U.S.C. § 717f(b).

tion.[361] The only federal control over oil pipeline siting at all is the rare requirement for a presidential permit to commence service on a cross-border pipeline.[362]

This lack of federal siting authority has not been an insurmountable barrier to construction of Hepburn Act pipelines. Some commenters have expressed concern that hydrogen pipelines would need or benefit from NGA-style siting authority in order to achieve the necessary proliferation.[363] However, as demonstrated by the extensive non-gas pipeline network, federal siting authority is not crucial, though it could be beneficial.[364] While FERC has no siting authority for oil pipelines, it does grant pipelines preliminary approval of (otherwise legally suspect) committed contract rate structures for new capacity, on the theory that new infrastructure might not be developed but for these contracts.[365] FERC's practice of approving contracts for oil transportation has not yet been subject to judicial review.[366] Nevertheless, this policy has influenced oil pipeline infrastructure development for decades.[367]

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361. *See, e.g.*, *SFPP, L.P.*, 140 FERC ¶ 61,220 at P 50 n.72 (2012) ("Under section 7(c) of the [NGA] a natural gas pipeline must obtain a certificate of public convenience and necessity prior to construction or expansion; and the Commission has conditioned its finding of 'public convenience and necessity' . . . However, under the [ICA], there is no similar obligation for an oil pipeline to seek Commission certification prior to construction or expansion."); *see also Rocky Mountain Pipeline Sys. LLC*, 126 FERC ¶ 61,301 at P 9 (2009); *Plantation Pipe Line Co.*, 104 FERC ¶ 61,271 (2003); *Mid-America Pipeline Co.*, 131 FERC ¶ 61,012 at P 11 (2010). One oil pipeline, the Trans Alaska Pipeline System, was authorized by a specific act of Congress. Trans-Alaska Pipeline Authorization Act§ 202, Pub. L. 93-153, 87 Stat. 576, 584 (1973) (codified as amended at 43 U.S.C. § 1651 (2022)).

362. *See generally* Valerie L. Chartier-Hogancamp, *Fairness and Justice: Discrepancies in Eminent Domain for Oil and Natural Gas Pipelines*, 49 TEX. ENV'T L.J. 67 (2019).

363. Bowe & Rice, *supra* note 64 ("It might be logical to develop a federal process for approval of interstate hydrogen pipelines that would be analogous to the NGA certification process"); *see also* K&L GATES LLP, THE H2 HANDBOOK 59-60 (2020), https://www.klgates.com/epubs/h2-handbook/index.html (noting the advantages of a federal certificate for pipeline construction) [hereinafter THE H2 HANDBOOK].

364. Klass & Meinhardt, *supra* note 77, at 1026 (concluding that while the "one-stop shopping with FERC for natural gas pipelines has allowed extensive new construction of natural gas pipelines on the east coast and in Texas to accommodate new sources of shale gas. . . . the state-centered process for siting oil pipelines also appears to accommodate sufficient construction of oil pipelines to meet new demand. Most states do not have very onerous siting or eminent domain procedures for oil pipelines, and the high price of oil has led to very favorable market conditions for building those pipelines to transport oil to markets."). In another sector of national importance—electric transmission—the federal government also lacks siting authority. While the grid has been built without federal permits, the lack of siting authority has been controversial, and is viewed as a contributing factor to reliability issues, as well as a barrier to renewable energy transmission. *See, e.g.*, Alexandra B. Klass & Jim Rossi, *Reconstituting the Federalism Battle in Energy Transportation*, 41 HARV. ENV'T L. REV. 423 (2017); Luke Franz, *Electric Transmission Lines as a Gateway to Renewable Energy: The Power Rests with the States*, 33 NOTRE DAME J.L. ETHICS & PUB. POL'Y 471 (2019); Alexandra B. Klass, *Expanding the U.S. Electric Transmission and Distribution Grid to Meet Deep Decarbonization Goals*, 47 ENV'T L. REP. News & Analysis 10749 (2017).

365. *See Express Pipeline P'ship*, 75 FERC ¶ 61,303, *aff'd* 76 FERC ¶ 61,245 (1996). *See also Colonial Pipeline Co.*, 146 FERC ¶ 61,206 at P 38 (2014); *North Dakota Pipeline Co. LLC*, 147 FERC ¶ 61,121 at P 22 (2014); Daniel S. Arthur & Michael R. Tolleth, *FERC's Policies Are Incentivizing the Exercise of Market Power through under-Development of Oil and Natural Gas Liquids Pipeline Capacity*, 42 ENERGY L.J. 149 (2021).

366. Though not subject to judicial review directly, FERC's oil pipeline contract regime was influenced by a D.C. Circuit opinion holding that contract rates were not *per se* unlawful. *Express Pipeline P'ship*, 76 FERC ¶ 61,245 at 62,254 (quoting Sea-Land Serv., Inc. v. ICC, 738 F.2d 1311, 1316 (D.C. Cir. 1984)). In the event its contract policy is ever reviewed by a court, FERC may face some interesting questions—for instance, why can contracts for committed service on an oil pipeline be higher than the cost-of-service, without a show-

VI. FERC'S AUTHORITY TO REGULATE HYDROGEN PIPELINES

Applying the jurisdictional test to hydrogen involves many facets of the test but could ultimately prove straightforward. In this analysis, we should begin with the present sources and applications of hydrogen while being mindful of changing balance of sources and uses moving toward a net-zero landscape. The diversity of hydrogen's sources and applications could potentially implicate all three pipeline regulatory regimes. Ultimately, hydrogen can be understood to be much like the ethane molecule, discussed above. It is presently derived from fossil fuels and will likely remain so in large part for the foreseeable future. It could be transported mixed with methane in pipelines subject to the NGA, but it is not subject to that act when transported alone. When transported by itself, it should be considered subject to the ICA because of its fossil origins and energy applications. Renewable (non-fossil) hydrogen would still be subject to FERC's jurisdiction because it competes directly with fossil energy commodities.[368] Only when hydrogen is transformed beyond an energy use (for instance, into ammonia) should its transportation be regulated under ICCTA.

This proposal reflects a departure from the current majority view, which is that hydrogen is regulated by the STB under ICCTA.[369] However, this view appears to be based on a misconception about hydrogen's uses. As described below, hydrogen's fundamental use is for energy. Most hydrogen made today is put into oil refineries and most of that hydrogen becomes—at the molecular level—a part of the refineries' finished products and is ultimately burned to power our internal combustion and jet engines. And as a powerfully needed renewable fuel, hydrogen's energy applications will only grow. Further, government policy, including the recent infrastructure bill, recognizes that hydrogen is an important energy resource. Therefore, FERC is the more appropriate regulator of hydrogen pipelines.

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ing that the pipeline lacks market power. *See ONEOK Elk Creek Pipeline L.L.C.*, 167 FERC ¶ 61,277 at P 6 (Glick, Comm'r, concurring) (expressing concern that "a pipeline which has market power can establish a higher rate through 'negotiation.'") (citations omitted). FERC may also be asked why it does not consider the environmental impacts of these new pipelines even though its rationale for endorsing these contracts hinges on FERC's approval of them being the but-for causation of new pipeline development. *See, e.g.*, *TransCanada Keystone Pipeline, LP*, 125 FERC ¶ 61,025 at P 18 (2008) (approving certain contract terms because "Keystone and its shippers need assurances through the Commission's declaratory order process to justify the significant financial commitments necessary to complete the project."); *Transcontinental Gas Pipe Line Co., LLC*, 164 FERC ¶ 61,101 (2018) (Glick, Comm'r, dissenting in part) (dissenting from FERC approval of gas pipeline to extent it did not consider the project's upstream and downstream greenhouse gas impacts).

367. *See generally* Arthur & Tolleth, *supra* note 365.

368. *See* section VI.B.3 below.

369. CRS REPORT, *supra* note 51, at 10 ("Jurisdiction over rates for interstate hydrogen pipelines resides with the Surface Transportation Board (STB)."); Hydrogen Economy Statement, *supra* note 65, at 618 ("The statement recognizes that the Surface Transportation Board (STB), the Federal economic regulator of railroads, also regulates economic aspects of interstate hydrogen pipelines."); GAO REPORT, *supra* note 65, at app. I.

A. Hydrogen is Not Subject to the NGA, Unless It Is Blended with Natural Gas

Many who speculate about how to regulate hydrogen pipelines invoke the NGA.[370] Most acknowledge that hydrogen would not itself be subject to the NGA, but the transportation of hydrogen mixed with natural gas would be. This seems the most reasonable conclusion for the first step of the analysis. In fact, this opinion was recently expressed by FERC's Chair.[371] In this way, hydrogen's jurisdictional analysis is much like ethane's.

1. Hydrogen Pipelines Are Not Subject to the NGA Because Hydrogen is Not a Methane-Based Gas

Hydrogen is one of the two components of methane (CH_4). Pure hydrogen (H_2), of course, does not contain any methane. As detailed above in, the lack of any methane is dispositive of NGA jurisdiction.[372] Most hydrogen made today is derived from natural gas, *i.e.*, methane. However, the NGA does not extend to methane derivatives or other elements isolated from the gas stream.[373] Many other commodities that are gathered with natural gas are extracted as soon as practical and not subject to the NGA after that point. Further, the legislative history of the NGA makes clear that hydrogen is its own distinct commodity and was not associated with artificial or natural gas.[374] In addition, the recent Infrastructure Act repeatedly treats hydrogen as distinct from natural gas.[375] Hydrogen should therefore not be understood to be either natural or artificial gas under the NGA.

Because dedicated hydrogen pipelines are not regulated by the NGA, they must be regulated under one of the two current Hepburn Act cognate statutes—the ICA as administered by FERC, or ICCTA administered by the STB. This has many consequences for hydrogen pipelines and a full exploration is beyond the scope of this article. But two are worth mentioning. First, is that construc-

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370. *See, e.g.*, Bowe & Rice, *supra* note 64 ("It might be logical to develop a federal process for approval of interstate hydrogen pipelines that would be analogous to the NGA certification process."); VINSON & ELKINS LLP, *Federal Hydrogen Regulation in the United States: Where We Are and Where We Might be Going* (Dec. 9, 2020), https://www.velaw.com/insights/federal-hydrogen-regulation-in-the-united-states-where-we-are-and-where-we-might-be-going/; MORGAN LEWIS & BOCKIUS LLP, *Considerations For Transporting A Blended Hydrogen Stream In Interstate Natural Gas Pipelines* (Jun. 11, 2021), https://www.morganlewis.com/pubs/2021/06/considerations-for-transporting-a-blended-hydrogen-stream-in-interstate-natural-gas-pipelines.

371. *See* Letter from Richard Glick, FERC Chairman to Sen. Martin Heinrich 1 (Oct. 26, 2021) [FERC accession number 20211027-4000].

372. *See* section III.C.1.a.

373. *Id.*

374. *See* sections III.A.1 and III.A.3, *supra*, and section VI.C, *infra*.

375. *See, e.g.*, Infrastructure Act § 11401, 135 Stat. at 544 (codified at 23 U.S.C. § 151(a)) (describing "hydrogen fueling infrastructure, . . . *or* natural gas fueling infrastructure") (emphasis added). *See also* United States v. Woods, 571 U.S. 31, 45 (2013) (operative terms connected by the conjunction or are "almost always . . . to be given separate meanings") (quoting Reiter v. Sonotone Corp., 442 U.S. 330, 339 (1979)); *see also* Infrastructure Act § 40502, 135 Stat. at 1,053 (codified at 42 U.S.C. § 18792(e)(2)(A)(iii)) (listing "natural gas and hydrogen") (emphasis added); *id.* § 71101, 135 Stat. at 1,321 (codified at 42 U.S.C § 16091(a)(2)) (defining "alternative fuel" as "liquefied natural gas, compressed natural gas, hydrogen, propane, or biofuels.") (emphasis added); *id.* § 71102, 135 Stat. at 1,325 (listing natural gas and hydrogen separately as alternative fuels for ferries).

tion, siting, and market entry of hydrogen pipelines are all unregulated at the federal level. This lack of regulation cuts both ways for hydrogen pipeline developers. On the one hand, they do not need permission to construct a hydrogen pipeline and begin transportation. On the other hand, they have no federal certificate authority that could preempt burdensome state regulation.[376] Another important distinction is that the Hepburn Act framework has no exemption for local utility pipelines.[377] Therefore, if a gas utility operating under an exemption pursuant to section 311 of the NGPA converted entirely to providing hydrogen, it may well be subjected to common carriage obligations that are incompatible with its local service obligations.

2. Pipelines Transporting a Blend of Hydrogen and Natural Gas Would Be Subject to the NGA

While the NGA does not apply to hydrogen pipelines, FERC's regulation of NGA pipelines may still implicate hydrogen transportation. Blending hydrogen into natural gas is seen as an attractive short-term solution before more dedicated infrastructure is built.[378] FERC would have jurisdiction over the transportation of this mixture of hydrogen and natural gas.[379] FERC has broad jurisdiction over natural gas quality specifications and would therefore oversee the introduction of hydrogen into NGA jurisdictional pipelines.[380] Just as ethane is added to increase natural gas's energy content,[381] hydrogen could be added to increase its environmental attributes.[382] In addition, previously, the FPC has explicitly factored the need for hydrogen production in its assessment of public need for natural gas transportation.[383] This suggests that FERC may have the authority to consider the need for hydrogen delivery when regulating mixed hydrogen-methane pipelines, including their siting. Of course, dedicated pipelines carrying

376. Although, as discussed below, this has not been a tremendous obstacle for non-NGA pipelines.

377. *See* Valvoline Oil Co. v. United States, 308 U.S. 141, 146-47 (1939) ("The smallness of the operation is immaterial.") (applying the rule of *The Pipe Line Cases*).

378. *See* discussion in section II.C.1.a.

379. *See Columbia Gas Transmission Corp.*, 17 FERC ¶ 61,020, at p. 61,036 (1981).

380. *Natural Gas Interchangeability*, 115 FERC ¶ 61,325 (2006).

381. *Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 at P 17 (2013).

382. The complex interaction between this policy objective and the NGA's statutory authority is beyond the scope of the article.

383. Opinion No. 789, *Tenneco Oil Co.*, 57 F.P.C. 1306, 1323 (1977) ("The ALJ found that the proposed uses of this gas for the manufacture of chemicals, ammonia, fertilizer and liquid hydrogen [by NASA] are in the public interest, and indeed the record supports no other conclusion"); *see also Tenneco Oil Co.*, 57 F.P.C. 1340, 1396 n.15 (1977) (initial decision) ("The Presiding Judge suspects that if a very small percentage of the research and development effort and expense devoted to NASA's spectacular accomplishments had been directed to the manufacture of hydrogen from seawater and the fixation of atmospheric nitrogen, using tidal, wind or solar power, we could have all the hydrogen and nitrogen fertilizer we need without using natural gas or other irreplaceable assets. This speculation is outside the scope of this proceeding, however; the Commission can fight only a sort of rear-guard action until the nation is convinced of the need for a comprehensive, all-out energy program.").

pure hydrogen would still not be subject to the NGA even if their sole purpose was to deliver that hydrogen to a natural gas pipeline.[384]

This view is consistent with the tentative position expressed by previous commenters.[385] In addition, FERC Chairman Glick recently expressed a similar opinion in response to a recent letter from Senator Martin Heinrich of New Mexico. In that letter, Senator Heinrich asked how FERC "views its role in the regulation of interstate hydrogen transportation and storage."[386] In response, Chairman Glick considered sections 4, 5, and 7 of the NGA.[387] He opined that FERC "would maintain its jurisdiction over an interstate natural gas pipeline if that pipeline were to blend some amount of hydrogen into the gas stream."[388] Although this issue has not been addressed, Chairman Glick stated that a gas pipeline's proposal to accommodate hydrogen would be governed by FERC's Policy Statement on Gas Quality and Interchangeability and considered on a case-by-case basis.[389] The Chairman also noted that FERC would consider the transportation of hydrogen in its review of natural gas pipeline permitting, if relevant.[390] While this letter is not binding FERC precedent, it certainly could indicate how the agency's leadership would approach these issues as they arise.

3. Capacity Leases Could Facilitate Transporting Hydrogen Within a Natural Gas Pipeline

There is an important caveat regarding how far FERC's NGA jurisdiction over blended hydrogen and methane should extend. Specifically, one strategy that is being considered is a situation where an NGA-regulated pipeline allows hydrogen to be injected into the pipe at an origin (and thereby blended with natural gas) only so the hydrogen can be isolated and removed from the natural gas at its destination.[391] Depending on the specific facts, the actual service provided by that pipeline could most accurately be described as *the transportation of a commodity other than gas*—which would be covered by the Hepburn Act. FERC does not appear to have addressed any analogous situation previously.

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384. *See* Opinion No. 284, *Deep S. Oil Co. of Tex.*, 14 F.P.C. 83 (1955), *aff'd sub nom.* Deep S. Oil Co. of Tex. v. FPC, 247 F.2d 882 (5th Cir. 1957).

385. *See, e.g.*, VINSON & ELKINS LLP, *supra* note 370; MORGAN LEWIS, *supra* note 370; THE H2 HANDBOOK, *supra* note 363, at 56-58. *See also* CRS REPORT, *supra* note 51, at 9-10 (noting that FERC can regulate hydrogen content of natural gas pipelines).

386. *See* Letter from Richard Glick, *supra* note 371, at 1.

387. *Id.*

388. *Id.* at 2.

389. *Id.* at 2-3 (citing *Natural Gas Interchangeability*, 115 FERC ¶ 61,325 (2006)); *see also id.* at 4 ("This individual approach recognizes the unique issues associated with each pipeline, including configuration and location, access to processing, gas pressure and temperature, the requirements of the end users, and the needs of interconnecting facilities.").

390. *Id.* at 4 ("To the extent that a natural gas pipeline proposal includes the transportation of hydrogen, the Commission's National Environmental Policy Act review would include the reasonable, foreseeable environmental impacts caused by the project's transportation of hydrogen.").

391. *See* section II.C.1.a, *supra*, discussing how this approach is being actively researched and pursued. *See also* NAT'L RENEWABLE ENERGY LAB'Y, GOLDEN, CO, BLENDING HYDROGEN INTO NATURAL GAS PIPELINE NETWORKS: A REVIEW OF KEY ISSUES, NREL/TP-5600-51995, 21-30 (discussing technological options and associated costs for downstream hydrogen extraction).

However, attempting to regulate this sort of arrangement under the NGA would likely prove unwieldly, if not impossible. For one thing, transporting natural gas *and* hydrogen (as opposed to a uniform mixture) would require pipelines to implement at least two sets of entirely different specifications in their tariffs—one for natural gas and one for hydrogen. This would be unprecedented and likely difficult to justify.[392] For another thing, existing natural gas shippers could rightfully scrutinize this arrangement for numerous cost-of-service or discrimination issues.[393] More fundamentally, though, interstate shippers of hydrogen are entitled to common carriage treatment that is distinct from the NGA's regulatory regime.[394]

It may be premature to speculate as to how such an arrangement could practically fit within the existing regulatory regime. After all, no specific plans have been announced and it remains to be seen what arrangements will ultimately be economically, technologically, and logistically feasible. However, there may be a simple solution that could make regulating such arrangements remarkably straightforward. FERC has extensive experience regulating pipeline capacity leases under both the NGA and the ICA.[395] This includes leases to "virtual"

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392. *See Dominion Energy Transmission, Inc.*, 175 FERC ¶ 61,091 (2021) (rejecting tariff containing different standards for renewable natural gas and other natural gas as unjustified on the record following a technical conference). *See also* Tom DiChristopher, *Hydrogen blending could lead to 'lengthy, contested' proceedings at US FERC*, S&P GLOBAL (Apr. 20, 2022), https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/042022-hydrogen-blending-could-lead-to-lengthy-contested-proceedings-at-us-ferc.

393. *See Alliance Pipeline L.P.*, 157 FERC ¶ 61,204 at PP 20-54 (2016) (establishing a hearing under the NGA regarding gas processing issues on a pipeline that transported gas rich in NGLs, which its affiliate had the sole and exclusive right to extract; shipper alleged that this "structure [was] intended to mask the true nature of the bundled service and limit regulatory oversight"), *reh'g denied* 162 FERC ¶ 61,114 at P 10 (2018) ("We decline to clarify that the extraction agreements . . . cannot be explored at hearing due to jurisdictional issues. If the gas processing arrangements affect jurisdictional service, then such matters are within the Commission's purview."). This matter was eventually settled. *Alliance Pipeline L.P.*, 163 FERC ¶ 61,226 (2018), *as amended* 170 FERC ¶ 61,292 (2020).

394. *Cf. Jayhawk Pipeline, L.L.C.*, 151 FERC ¶ 61,020 at P 16 (2015) (finding a pipeline affiliate's proposal to transport crude oil using a portion of its affiliates' capacity (via a lease) was inconsistent with the "the tariff obligations associated with the interstate movements of crude oil . . . [and] common carrier oil pipeline obligations").

395. *See National Fuel Gas Supply Corp.*, 172 FERC ¶ 61,039 at PP 42-44 (2020), *amended* 177 FERC ¶ 62,103 (2021) (describing the Commission's general test for analyzing abandonments by capacity lease under the NGA); *Sabine Pipe Line LLC Bridgeline Holdings, L.P.*, 171 FERC ¶ 61,147 at P 31 (2020) (FERC "looks closely at [lease] proposals that would create dual jurisdiction facilities"). ICA pipelines do not need FERC authorization to lease their capacity. *See Western Refin. Sw., Inc.*, 127 FERC ¶ 61,288 at P 25 (2009). However, FERC still oversees the ratemaking implications of capacity leases in the ICA context. *See Navigator Borger Express LLC*, 175 FERC ¶ 61,133 at P 28 (2021) (approving terms of transportation service agreement offered using leased capacity); *Medallion Pipeline Co.*, 169 FERC ¶ 61,202 at P 20 (2019); *Buckeye Pipe Line Transportation, LLC*, 154 FERC ¶ 61,130 at P 18 (2016); *NORCO Pipe Line Co., LLC*, 152 FERC ¶ 61,170 at P 22 (2015); *Palmetto Prods. Pipe Line LLC*, 151 FERC ¶ 61,090 at PP 32-34 (2015) (analyzing "whether Palmetto can use the leased and underutilized capacity on Plantation to provide firm transportation services under the [transportation service agreement]"); *Guttman Energy, Inc. v. Buckeye Pipe Line Co.*, 147 FERC ¶ 61,088 at PP 27-30 (2014) (dismissing complaint against intrastate pipeline that leased capacity through which its affiliate offered regulated interstate service); *but see* Western Refin. Sw., Inc. v. FERC, 636 F.3d 719, 724 (5th Cir. 2011) (FERC has no jurisdiction over the relationship between lessee and lessor of pipeline capacity under ICA, only jurisdiction over the provision of transportation), *aff'g Western Refining*, 127 FERC ¶ 61,288.

pipelines that may not own any separate pipeline assets.[396] FERC could allow natural gas pipelines to lease the required portion of their capacity to separate entities that transports hydrogen. The lessor natural gas pipeline would need permission from FERC to "abandon" that capacity by a lease.[397] The lessee hydrogen "pipeline" could then operate as a common carrier under its own tariff.[398] This arrangement could provide a simple and proven solution, especially in the short term before new dedicated hydrogen pipelines are economically justified. Given the novel nature of this problem and any potential solution, stakeholders will benefit from regulatory clarification from FERC.

B. Hydrogen Pipelines Should be Regulated by FERC Under the ICA

Having ruled out NGA regulation for dedicated hydrogen pipelines, we must next determine which of the Hepburn Act regimes—the ICA or ICCTA—applies. The substantive legal requirements of common carriage are markedly similar in each regime: a mandate to provide open, affordable, and equal transportation. For most issues, the differences between one regime and the other are procedural, bordering on academic.[399] However, FERC is the agency with energy expertise and has a much better developed, understood, and predictable pipeline regulatory regime. It is therefore consistent with sound policy and Congressional intent for FERC to assume jurisdiction over hydrogen pipelines under the ICA.

1. Conventional Hydrogen is a Petrochemical Derivative

Nearly all hydrogen used today is made from fossil resources.[400] Hydrogen is therefore most naturally understood as a petrochemical or petroleum derivative, as contemplated by Congress in 1977. FERC's precedent makes clear this is a reasonable construction. In fact, with hydrogen, this is confirmed by the precedent finding that anhydrous ammonia could be considered a petrochemical

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396. Order No. 637, *Regulation of Short-Term Nat. Gas Transp. Serv., & Regul. of Interstate Nat. Gas Transp. Servs.*, FERC Stats. & Regs., ¶ 31,091, at 31,255 (2000) ("The use of released capacity has made possible the development of virtual pipelines. A virtual pipeline can be created when a marketer or other shipper acquires capacity on interconnecting pipelines and can schedule gas supplies across the interconnect, creating in effect a new pipeline between receipt and delivery points that are not physically connected under a single pipeline management."); *see also Marketlink, LLC*, 144 FERC ¶ 61,086 (2013) (FERC approving contract terms for a new "pipeline" which would lease all its capacity from its affiliate and only owned ancillary facilities such as tanks and meters).

397. The Lessee of such capacity "generally needs to be a natural gas company under the NGA." *National Fuel Gas Supply Corp.*, 172 FERC ¶ 61,039 at P 42. However, it need not always be. *See Dome Pipeline Corp.*, 22 FERC ¶ 61,277, at p. 61,497 (1983) (explaining that the FERC's "primary concern was whether the facility would escape regulation. To the extent that the Commission has jurisdiction over either the owners or the operators, the Commission is assured that it will be able to exercise its regulatory responsibilities. What is essential, then, is that there must be a recipient of regulatory responsibility."); *Transcontinental Gas Pipe Line Co., LLC*, 158 FERC ¶ 61,125 at P 65 (2017) ("Commission jurisdiction over the operator of [leased] facilities is sufficient to ensure the Commission's ability to exercise its regulatory responsibilities.") (citing *Dome Pipeline Corp.*, 22 FERC ¶ 61,277; *El Paso Nat. Gas Co.*, 47 F.P.C. 1527, 1532 (1972)).

398. As discussed next, this tariff should be overseen by FERC under its ICA authority. However, capacity leases could still provide clarity even if the common carrier entity were regulated by the STB.

399. *See generally* Bolgiano & Field, *supra* note 331.

400. The jurisdictional status of non-fossil renewable hydrogen is addressed below in section VI.B.3.

specifically because it is made with hydrogen. To the extent ammonia could reasonably be classified as a petroleum derivative, it must be at least as reasonable to classify hydrogen that way.

As described above, Congress intended to entrust FERC with regulating those Hepburn Act pipelines that carry "petroleum by-products, derivatives or petrochemicals."[401] The D.C. Circuit has found that "Congress intended a broader meaning of 'oil' . . . [and] [t]he legislative history, moreover, confirms that 'oil' was not to be given a dictionary meaning."[402] In *Gulf Central*, FERC made clear that classifying ammonia as a petrochemical (or derivative) was at least a permissible interpretation.[403] In examining whether ammonia was a petrochemical, FERC relied on Congress's broad phrasing in the Conference Committee Report and noted that "within the petrochemical industry, anhydrous ammonia is considered a petrochemical because it is derived from petroleum refinery gas or from natural gas."[404] Of course, ammonia is actually made with hydrogen, which is derived derived from those fossil sources, *i.e.* natural gas. FERC ultimately found that there was "sufficient ambiguity" that FERC's "jurisdiction is more appropriately determined by examining the overall purposes of the DOE Act."[405] The D.C. Circuit affirmed this approach.[406]

Hydrogen is still overwhelmingly a petrochemical derived from fossil fuels, as it was in the time of the ammonia cases.[407] And FERC's later orders heavily imply that anhydrous ammonia is a petrochemical and was therefore not subject to FERC's ICA jurisdiction only because it was not used for energy purposes. In *Texaco Petrochemical Pipeline LLC*, FERC stated that *Gulf Central* "*holds* that if a hydrocarbon product shipped by an oil pipeline is not used for energy purposes, the Commission lacks jurisdiction over the transportation of that product."[408] If ammonia were not a petroleum product, this would be dicta, rather than the *holding* of *Gulf Central*. Because anhydrous ammonia *could* be considered a petrochemical, then it necessarily follows that hydrogen—its sole petrochemical component—could also be considered a petrochemical. FERC therefore certainly has the discretion to interpret hydrogen as a "petrochemical or derivative." FERC's ICA jurisdiction over hydrogen pipelines would then turn on whether hydrogen has "current energy uses" or "future undeveloped energy uses."[409] That is certainly the case.

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401. DOE Act Conference Reports, *supra* note 139, at 69.

402. CF Indus., Inc. v. FERC, 925 F.2d 476, 478 (D.C. Cir. 1991).

403. *Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381, at p. 62,165 (1990).

404. *Id.* at 62,164-65 ("There is also some conflict in the authorities. For example, the McGraw-Hill *Petroleum Products Handbook* lists carbon, hydrogen, and sulphur as petrochemicals.").

405. *Id.* at 62,165.

406. *CF Indus., Inc. v. FERC*, 925 F.2d at 480.

407. *Palmetto Prods. Pipe Line LLC*, 151 FERC ¶ 61,090 at P 30 (2015) (acknowledged that anhydrous ammonia is "derived from natural gas or petroleum refinery gas.").

408. *Texaco Petrochemical Pipeline LLC*, 107 FERC ¶ 61,151 at P 5 (2004) (emphasis added).

409. *See Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 at P 16 (2003). Note that in *Williams Olefins* FERC described ethane as a "naturally-occurring hydrocarbon product." *Id.* However, FERC has ICA jurisdiction over many commodities that are not naturally occurring, such as refined products and syn-

2. Hydrogen Is Primarily Used for Energy Today and it Has Myriad Future Uses

Hydrogen clearly has exciting potential as a renewable fuel, especially for hard-to-abate industries. Further, government policy reflects this understanding that hydrogen is primarily an energy commodity. More importantly though, hydrogen is already used primarily as a component of fuel for its energy characteristics through petroleum refining. In fact, this is the dominant use of hydrogen, and biofuel refining requires hydrogen in even greater quantities. In addition, hydrogen gas is often burned to power refineries. Hydrogen therefore "has current energy uses and future undeveloped energy uses" for purposes of the ICA's jurisdictional analysis.[410]

a. Refinery Applications of Hydrogen

Petroleum refineries are the largest consumers of hydrogen nationally.[411] And hydrogen is very important to their operation. Fundamentally, refineries are set up to take heavier, dirtier crude oil and turn it into lighter, cleaner finished products. Refineries use hydrogen to make the products both lighter and cleaner. This happens at the molecular level through hydrocracking and hydrotreating.[412] In both processes, the hydrogen used by the refinery becomes part of the hydrocarbon molecules that are eventually burned as fuel. In addition, refineries often use the excess hydrogen from these operations by directly burning it as fuel. And because biofuels have more impurities and require more upgrading, refining demand for hydrogen should rise along with biofuel consumption.

i. Hydrocracking

Shorter chain hydrocarbons are generally better fuels than very long chain hydrocarbons. They are less viscous, more volatile, boil more readily, more flammable, and burn cleaner. "Cracking" refers to the process of breaking long hydrocarbon molecules into shorter ones.[413] In hydrocracking, hydrogen is added during this process.[414] For instance, during hydrocracking a molecule of decane ($C_{10}H_{22}$) would crack and, in the presence of a molecule of hydrogen (H_2), would become one molecule of butane (C_4H_{10}) and one molecule of hexane

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thetic crude, which involve changing the molecular structure of the hydrocarbons, as described above in section III.C.2.a, *supra*.

410. *Id.* at P 18.

411. H2@SCALE, *supra* note 35, at xii.

412. JAMES H. GARY, GLENN E. HANDWERK, ET AL., PETROLEUM REFINING: TECHNOLOGY AND ECONOMICS (5th ed. 2007) [hereinafter GARY & HANDWERK].

413. *Id.* at 162.

414. *Id.* at 161-180 (*Catalytic Hydrocracking*), 181-193 (*Hydroprocessing and Resid Processing*). *See id.* at 163 (defining hydroprocessing as hydrocracking that focuses on upgrading residual materials); *id.* at 162 ("Although there are hundreds of simultaneous chemical reactions occurring in hydrocracking, it is the general opinion that the mechanism of hydrocracking is that of catalytic cracking with *hydrogenation* superimposed. Catalytic cracking is the scission of a carbon-carbon single bond, and *hydrogenation is the addition of hydrogen to a carbon-carbon double bond*.") (emphasis added).

(C_4H_{14}).[415] In addition, heavy, sludgy products such as residual fuel (a refining byproduct that resembles asphalt) can be upgraded this way.[416]

Another important measure of a hydrocarbon's quality is the hydrogen-to-carbon (H:C) ratio.[417] As a rule of thumb, finished petroleum fuels have an H:C ratio of about two-to-one.[418] Meaning that for every carbon atom in the fuel there should be two of hydrogen on average. Crude oil has an H:C ratio of about 1.6, which may be lower in poor quality feedstocks such as tar sand bitumen.[419] Hydrocracking and other processes that increase the hydrogen content of (hydrocarbon) fuels necessarily increase the products' H:C ratio.[420] The hydrogen added to fuel via hydrocracking therefore improves the products' energy attributes.

In overly simple terms, hydrogen can be thought of as a leavening agent in the production of gasoline, jet fuel, and diesel. It allows refiners to produce lighter, more valuable products from heavier, less valuable inputs. Demand for hydrogen to upgrade products is driven by the quality of a refinery's raw materials and the products needed to be produced.[421] According to at least one estimate, the majority of hydrogen used by refineries is used for upgrading applications.[422] All the hydrogen that a refinery uses in hydrocracking is intended to become part of the fuel it produces.[423] In this way, hydrogen used by a refinery to upgrade products is not fundamentally different than any of its other raw petroleum materials, such as crude oil. Its purpose is to become a part of the fuels that power our cars, trucks, and jets.

ii. Hydrotreating

The other major use for hydrogen in refineries is to remove impurities through "hydrotreating."[424] Like hydrocracking, the removal of "heteroatom,"

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415. *Id.* at 200.

416. *Id.* at 162 (describing that the upgrading of heavier oils via hydrocracking requires different equipment and is referred to as *hydroprocessing*). *See also id.* at 181-193.

417. *See, e.g.*, A. G. Olugbenga & E. N. Arua, *Modification of Outlet Stream of the Atmospheric Distillation to Improve Products from Heavy Crude Oil Using Aspen Simulations*, 14 J. SCI., TECH., MATHEMATICS & EDUC. 70 (2018) ("Hydrogen to carbon ratios affects the physical properties of crude oil. As the hydrogen to carbon ratio decreases, the gravity and boiling point of the hydrocarbon compounds increases. The higher the hydrogen to carbon ratio of the feedstock, the higher its value to the refinery because less hydrogen is required.") (citations omitted). The H/C ratio of a fuel also corresponds to what share of its emissions are carbon dioxide (CO_2) versus water (H_2O).

418. James G. Speight, *Feedstock Composition*, in HANDBOOK OF PETROLEUM REFINING 102 (2016), h ttps://www.routledgehandbooks.com/doi/10.1201/9781315374079-5.

419. *Id.* at 102-03.

420. HAROLD H. KUNG, NAT'L ACAD. OF SCIS., *Increasing Efficiencies for Hydrocarbon Activation*, CARBON MANAGEMENT: IMPLICATIONS FOR R&D IN THE CHEMICAL SCIENCES AND TECHNOLOGY: A WORKSHOP REPORT TO THE CHEMICAL SCIENCES ROUNDTABLE 161 (2001) ("The hydrogen-to-carbon ratio in most petrochemicals is higher than in crude oil. Therefore, hydrogen must be added in their production.").

421. H2@SCALE, *supra* note 35, at 5-10.

422. *Id.* at 5, fig. 2.1 (citing Elgowainy et al., *Energy Efficiency and Greenhouse Gas Emission Intensity of Petroleum Products at U.S. Refineries*, 48 ENV'T SCI. TECH. 7614, 7619 fig. 6 (2014) (fluid catalytic cracking unit (FCCU) and hydrotreater (HDT) uses combined with Hydrocracking applications account for more than 50% of average refinery hydrogen demand)).

423. *See* GARY & HANDWERK, *supra* note 412, at 163 & fig. 7.1.

424. *Id.* at 195-205 (*Hydrotreating*).

impurities such as sulfur, occurs at the molecular level.[425] There is a bit of a misconception that this is the only use for hydrogen at a refinery.[426] As noted above, more hydrogen is used in upgrading fuels than treating them. Further, the chemical reactions all occur simultaneously so the difference between hydrotreating and hydrocracking often boils down to purpose.[427] Therefore, even when a refinery uses hydrogen to remove impurities, a good deal of that hydrogen also becomes part of the fuels that are eventually consumed for energy.

In addition, many hydrotreating reactions also increase the hydrogen content of the products. For instance, in order to desulphurize thiopene (C_4H_4S), hydrogen (H_2) would be added, along with heat, pressure, and a catalyst. The thiopene molecule would be cracked and would combine with four of the hydrogen molecules. The result would be one molecule of butane (C_4H_{10}) and one molecule of hydrogen sulfide (H_2S), which would be removed.[428] Because the butane molecule has more hydrogen atoms than the thiopene, much of the hydrogen employed in this process becomes part of the fuel that will ultimately be combusted for energy by end-consumers. Therefore, even in hydrotreating, where the primary intent is to remove an element from the fuels, much of the hydrogen used by the refinery ultimately makes its way into the fuels that power internal combustion engines everywhere.

iii. Renewable Fuels

As with conventional oil refining, the hydrogen required to refine renewable fuels becomes an integral part of the fuel and is combusted by its consumers. In fact, refining biomass into renewable fuels requires more hydrogen than refining petroleum.[429] Hydrogenated vegetable oil (HVO) is actually the starting point for developing a host of biofuels, including sustainable aviation fuel and

425. *Id.* at 195.

426. *Hydrogen Explained: Use of Hydrogen*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/hydrogen/use-of-hydrogen.php ("U.S. petroleum refineries use hydrogen to lower the sulfur content of fuels."). The author of this article was also guilty of this misconception until a client very kindly educated him. *See* Bolgiano & Field, *supra* note 331, at 2 (saying hydrogen was "used by refiners to lower the sulfur content of fuels.").

427. GARY & HANDWERK, *supra* note 412, at 195 ("The terms *hydrotreating*, *hydroprocessing*, *hydrocracking*, and *hydrodesulfurization* are used rather loosely in the industry because, in the hydrodesulfurization and hydrocracking processes, cracking and desulfurization occur simultaneously, and it is relative as to which predominates.").

428. *Id.* at 199.

429. U.S. DEP'T OF ENERGY, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, SUSTAINABLE AVIATION FUEL: REVIEW OF TECHNICAL PATHWAYS 48 (2020), https://www.energy.gov/sites/prod/files/2020/09/f78/beto-sust-aviation-fuel-sep-2020.pdf ("Hydrogen demand is high for all biofuels and unusually high for [sustainable aviation fuel]"); SUSAN VAN DYKE ET AL., 'DROP-IN' BIOFUELS: THE KEY ROLE THAT CO-PROCESSING WILL PLAY IN ITS PRODUCTION 1 (2019), IEA BIOENERGY, https://www.ieabioenergy.com/wp-content/uploads/2019/09/Task-39-Drop-in-Biofuels-Full-Report-January-2019.pdf ("The important role of hydrogen in upgrading biological feedstocks was emphasised as a key challenge for the future development of drop-in biofuels. This is even more pertinent now, particularly finding cheap and renewable sources of hydrogen.").

renewable diesel.[430] Renewable hydrocarbons made from biomass must mimic their fossil counterparts, including their two-to-one H:C ratio.[431] In addition to carbon and hydrogen, biomass also contains significant amounts of oxygen. On average, for each atom of carbon, a biomass molecule contains 1.44 atoms of hydrogen and also 0.66 molecules of oxygen.[432] Therefore, hydrogen is needed both to upgrade biomass feedstocks through hydrogenation,[433] and to remove oxygen and other impurities.[434] Therefore, hydrogen will continue to be an energy commodity used for refining well after the transition from fossil fuels.

b. Other Thermal Energy Applications

Hydrogen by itself also "has a thermal heat content that has the capability of being burned and used for fuel and energy purposes," which FERC found sufficient to establish ICA jurisdiction over ethane.[435] As discussed above, renewable hydrogen has future potential uses in decarbonizing heat-intensive industry and potentially displacing or replacing methane in our gas distribution networks. While not quite as powerful as methane, hydrogen is still a potent fuel and burns very clean: producing only steam and some nitrogen oxides. Moreover, conventional hydrogen is already burned in refineries as fuel. The excess hydrogen that is not consumed in upgrading and treating crude oil is recovered and mixed into

430. J.H. Van Gerpen & B.B. He, *Biodiesel and renewable diesel production methods*, in ADVANCES IN BIOREFINERIES, BIOMASS AND WASTE SUPPLY CHAIN EXPLOITATION 427 (Keith Waldron, ed., et al., 2014) ("The basic process to produce renewable diesel starts with hydrogenation. . . .").

431. SUSAN VAN DYK ET AL, POTENTIAL SYNERGIES OF DROP-IN BIOFUEL PRODUCTION WITH FURTHER CO-PROCESSING AT OIL REFINERIES, BIOFUELS, BIOPRODUCTS BIOREFINING 760, 762 fig.1 (2019); https://www.nrel.gov/docs/fy19osti/73115.pdf; *see also* C.W. Forsberg et al., *Replacing liquid fossil fuels and hydrocarbon chemical feedstocks with liquid biofuels from large-scale nuclear biorefineries*, 298 APPLIED ENERGY 117225, 4 (2021) ("The more hydrogen that is added, the more hydrocarbon fuel that is produced.").

432. Forsberg et al., *supra* note 431; *see also* Xianhui Zhao et al., *Review of Heterogeneous Catalysts for Catalytically Upgrading Vegetable Oils into Hydrocarbon Biofuels*, 3 CATALYSTS 83 (2017), https://www.mdpi.com/2073-4344/7/3/83/htm ("The H/C molar ratio of petroleum product is 2.0, which is in the range of the H/C molar ratio of vegetable oils (between 1.64 and 2.37). However, the H/C molar ratio of bio-oil was ranging from 0.92 to 1.53. The oxygen content of vegetable oils was between 10.5% and 14.5%, which was much lower than that of bio-oil (28%–40%.)").

433. J.H. Van Gerpen & B.B. He, *supra* note 430, at 441-475 ("The basic process to produce renewable diesel starts with hydrogenation which saturates the double bonds and removes the oxygen, either as H2O or CO2 depending on the availability of hydrogen, from the fatty acid chains of the triacylglyceride. Hydrogenation and decarboxylation are two of the basic reactions that occur during the production of renewable diesel"); HANDBOOK OF BIOFUELS PRODUCTION: PROCESSES AND TECHNOLOGIES 381 (Rafael Luque, ed., 2d ed. 2016) ("a great number of the approaches reported in this chapter need a high amount of hydrogen in order to remove the oxygen and yield high-energy-density biofuels.") *See also id.* at 19.2.2 ("Two-stage HT of bio-oil has been the accepted practice for bio-oil upgrading for the last 25 years") (citing Elliott D.C., *Historical developments in hydroprocessing bio-oils*, ENERGY & FUELS. 2007, 21:1792–1815 web publication, May 2, 2007).

434. ALAIN A. VERTES ET AL., GREEN ENERGY TO SUSTAINABILITY: STRATEGIES FOR GLOBAL INDUSTRIES, at 5.2.1 (Driving Force of Growing Biojet Fuel Opportunities) ("[T]he oxygen element in biomass is much more than that of crude oil, which requires more energy input to effectively remove excess oxygen and produce hydrocarbons consisting of only carbon and hydrogen atoms. This is one of the reasons why hydrogen hydrotreating is needed in nearly all biojet fuel conversion pathways, and the cost and availability of these industrial processes are considered a risk in the research and development of biojet fuel.").

435. *Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 at P 17 (2013).

the refinery fuel gas stream, along with methane and other light hydrocarbons.[436] The percentage of hydrogen in a refinery's fuel gas stream ranges from 10 to 60 percent.[437]

c. Chemical Energy

Hydrogen can also serve as a fuel without combustion.[438] A hydrogen fuel cell generates electric power by harnessing the power of the chemical reaction of pure hydrogen with oxygen found in ambient air. This reaction generates water, electricity, and heat (which can also be utilized). This form of chemical energy is seen as the best hope to convert numerous energy-intense industries where batteries cannot—literally—stack up against diesel or other fuels. Because hydrogen is so light, a fuel cell could power electric motors on planes, ships, and heavy machinery where batteries would weigh down the apparatus to the point of frustration.

FERC's pipeline regime was developed against the backdrop of conventional fossil fuels. It is therefore unclear how important it is that energy be generated by a commodity's combustion. As described above, combustion for heat is clearly sufficient to qualify as "fuel" or "energy" for purposes of FERC's analysis. Whether chemical energy such as from a fuel cell would be a sufficient condition to qualify as "fuel" is unclear. Fortunately, this distinction is academic because hydrogen does have thermal energy potential and continues to be burned for energy, either in pure form or as a component of other finished hydrocarbon products.

d. Hydrogen Is an Energy Commodity as a Matter of Public Policy

Public policy shows hydrogen to be an energy commodity that should be subject to FERC's regulation. In finding that ethanol was subject to its ICA jurisdiction, FERC considered the government's role in promoting the renewable fuel and the fact that "the Energy Information Administration has recognized that ethanol has its own energy content and has classified it as a fuel source."[439] While it is not clear how important this factor was to FERC's analysis, hydrogen

436. *See, e.g.*, 40 C.F.R. § 63.641 ("[Fuel gas] can contain a mixture of methane, light hydrocarbons, hydrogen and other miscellaneous species.").

437. ROBERT G. KUNZ, ENVIRONMENTAL CALCULATIONS: A MULTIMEDIA APPROACH 285 (app. L) (2009) ("Hydrogen in RFG may vary from 10% up to about 60%, if not separated for use in hydrotreating operations") (citations omitted). *See also* Elgowainy et al., *supra* note 422, at 7614-15 ("In 2012, 37% of the direct processing energy use at U.S. refineries was refinery fuel gas (FG), 25% NG, 13% captive (i.e., produced internally) and merchant (i.e., purchased) hydrogen, 14% refinery catalytic coke, 6% purchased steam, 4% purchased electricity, and 1% other fuels.").

438. Hydrogen would also be the fuel for nuclear fusion, which fuses hydrogen atoms together in the same reaction that powers our sun. IRENA CHATZIS & MATTEO BARBARINO, WHAT IS FUSION AND WHY IS IT SO DIFFICULT TO ACHIEVE? 4, INT'L ATOMIC ENERGY AGENCY (2021), https://www.iaea.org/fusion-energy/what-is-fusion-and-why-is-it-so-difficult-to-achieve. While exciting developments have occurred recently, this technology remains speculative and, even if proven, the demand for hydrogen would likely be small given that fusion reactors have the revolutionary potential to create tremendous energy from insignificant amounts of fuel. Thomas Overton, *Fusion Energy Is Coming, and Maybe Sooner Than You Think*, POWER MAG (2020), https://www.powermag.com/fusion-energy-is-coming-and-maybe-sooner-than-you-think/.

439. *Palmetto Prods. Pipe Line LLC*, 151 FERC ¶ 61,090 at P 31 (2015).

certainly meets this criterion. The EIA describes hydrogen as an "energy carrier" and a "fuel."[440] Further, the Department of Energy's Alternative Fuels Data Center calls hydrogen "a zero tailpipe emissions alternative fuel" and has compiled significant data on the production, vehicles, and fueling infrastructure.[441] The Department of Energy has a "Hydrogen Program Plan."[442] Lowering the cost of renewable hydrogen was the first of the Department's "Earthshots."[443] In 2020, FERC classified hydrogen as a "useful thermal energy output," encouraging its production.[444] And finally, the recent Infrastructure Act confirms that hydrogen is an energy commodity. The bill instructs the Secretary of Energy to take numerous steps to advance hydrogen, including the development of a "national strategy and roadmap to facilitate widescale production, processing, delivery, storage, and use of clean hydrogen."[445] Perhaps most importantly, Congress instructed the Secretary of Energy, not Transportation, to promote hydrogen "transmission by pipeline."[446] All of these factors lean in favor of FERC regulating hydrogen pipelines, rather than the STB.

e. Other, Non-Energy Uses Do Not Compromise FERC's Jurisdiction

The fact that hydrogen has energy potential should end this part of the analysis. It does not matter that hydrogen still has other non-energy applications, even if they are significant. FERC made clear in *Williams Olefins*, that so long as a petrochemical has potential energy uses, FERC has jurisdiction over pipelines transporting it.[447] Hydrogen will continue to serve an irreplaceable non-energy role in a host of important industries after the transition from fossil fuels. But none of the myriad non-energy applications of hydrogen would undercut FERC's prerogative to regulate energy petrochemicals and their non-petrochemical substitutes.

3. Renewable Hydrogen Is Not a Petrochemical but Competes with Other FERC-Regulated Commodities and Impacts Energy Markets

While conventional hydrogen is best understood as a petrochemical or derivative, renewable hydrogen derived from water or biomass is not. FERC can

440. U.S. ENERGY INFO. ADMIN., HYDROGEN EXPLAINED, https://www.eia.gov/energyexplained/hydrogen/ (last updated Jan. 20, 2022) ("Hydrogen has the highest energy content of any common fuel by weight (about three times more than gasoline), but it has the lowest energy content by volume (about four times less than gasoline).").

441. U.S. DEP'T OF ENERGY, ALT. FUELS DATA CTR., HYDROGEN, https://afdc.energy.gov/fuels/hydrogen.html.

442. U.S. DEP'T OF ENERGY, DEPARTMENT OF ENERGY HYDROGEN PROGRAM PLAN (2021).

443. U.S. DEP'T OF ENERGY, OFF. OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, HYDROGEN SHOT, https://www.energy.gov/eere/fuelcells/hydrogen-shot.

444. Order No. 874, *Fuel Cell Thermal Energy Output*, 173 FERC ¶ 61,226 at P 15 (2021).

445. Infrastructure Act § 40314, 135 Stat. at 1,009 (codified at 42 U.S.C. § 16161b(1)).

446. *Id.* § 40313, 135 Stat. at 1,007 (codified at 42 U.S.C. § 16154(e)(6)(A)).

447. *Williams Olefins Feedstock Pipelines, L.L.C.*, 145 FERC ¶ 61,303 at P 16 (2013) ("the Commission's jurisdiction cannot be based on an applicant's assertion of a product's end use in the case of a product that has potential fuel and energy uses. Rather, the Commission considers both existing and potential energy uses.").

still assert jurisdiction over such hydrogen, however. In *Palmetto*, FERC set forth the following test for establishing jurisdiction over ethanol as "oil":

> (1) whether the commodity is a fuel source in that it has heating value and is used for energy-related purposes; (2) whether the cost of transportation will have an impact on energy markets; and (3) whether the commodity will compete with oil or other refined products for capacity in the pipeline. [448]

Renewable hydrogen meets this test.

First, as described above, hydrogen indisputably has heating value and it is currently used for energy-related purposes. It is primarily used for energy purposes today, and interest in renewable hydrogen is also primarily as a fuel. Second, the cost for transporting hydrogen would impact energy markets. In *Palmetto*, FERC found this to be the case because "ethanol accounts for ten percent of the total volume of motor gasoline" and "[a]s ethanol consumption increases, more pipeline capacity will be required causing the cost to transport other liquids to change."[449] As described above, hydrogen is an integral part of making conventional and renewable fuels, and it is becoming an important fuel in its own right. Further, natural gas pipelines are considering blends of hydrogen in excess of 10 ten percent. A net-zero economy will need to move tremendous amounts of green hydrogen from renewable electricity sources to airports, factories, mines, marine ports, biofuel refineries, power plants, utilities, and unforeseen future consumers. If this cannot be done on open, equal, and affordable terms, it will impact the energy markets and risk stifling the transition to renewables.

Finally, renewable hydrogen would compete with "oil" for pipeline space because, as discussed above, conventional hydrogen should be considered "oil" for purposes of the ICA. If it is not considered oil for purposes of the ICA, the analysis is more complicated. Hydrogen requires different pipelines than oil and finished products, so does not directly compete with those products for pipeline space. However, it can—and likely will—compete with natural gas for pipeline space, since gas pipelines may carry a mix of hydrogen and natural gas.[450] In *Gulf Central*, FERC articulated that ammonia should not be regulated by FERC because it did not "compete with oil *or gas* for capacity in the same pipeline facilities."[451] Beyond physical pipeline space, hydrogen competes with fossil fuels in many ways both currently and potentially. Right now, hydrogen allows refineries to produce greater volumes of products from lower quality crude oils. In that way, hydrogen indirectly competes against higher quality crude oils because cheaper hydrogen would make lower quality crude more attractive. In the future, the use of hydrogen to power fuel cells is also seen as a competitor to displace

448. *Palmetto Prods. Pipe Line LLC*, 151 FERC ¶ 61,090 at P 30 (2015).

449. *Id.* at P 31.

450. HYDROGEN COUNCIL & MCKINSEY, *supra* note 24, at 41; H2@SCALE, *supra* note 25, 43-44; MELAINA ET AL., *supra* note 54, at 21. *See also* discussion in section II.C.1.a.

451. *Gulf Cent. Pipeline Co.*, 50 FERC ¶ 61,381, at p. 62,166 (1990).

diesel, jet, and bunker fuel. And of course, when burned, hydrogen is in direct competition with natural gas.[452]

4. FERC Is Better Suited to Regulate Hydrogen Pipelines than the STB

Whether FERC or the STB should regulate pipelines carrying a commodity boils down, in large part, to Congress's decision to have FERC regulate the energy markets—a decision that is based on sound policy. FERC's expertise and experience make it much better equipped to regulate hydrogen pipelines than the STB. Commissioner Glick confirmed this in his letter to Senator Heinrich, saying that FERC's "experience with issues relating to the siting of linear infrastructure, and with regulating the rates, terms, and conditions of transportation service on interstate natural gas pipelines as described above, may be analogous to the expertise needed for the regulation of hydrogen pipelines."[453] And more recently, Congress instructed the Secretary of Energy to promote hydrogen "transmission by pipeline."[454] Asserting jurisdiction over hydrogen pipelines under the ICA could be one of FERC's first step in furthering this statutory objective.

To provide one specific example, FERC's experience overseeing the abandonment of gas pipelines and their conversion to ICA uses could directly facilitate hydrogen pipeline development. As described above, there is promising potential to repurpose natural gas pipelines to carry hydrogen.[455] Converting a pipeline from (or to) carrying natural gas requires FERC approval.[456] Fortunately, FERC already has experience overseeing conversion of pipelines from one regulatory regime to another. In fact, it's been doing that since day one.[457] More recently, FERC facilitated the "Pony Express Pipeline Conversion Project" by approving the abandonment of a natural gas pipeline,[458] as well as proving advance approval of the pipeline's contract and rate structure for new crude oil shippers.[459] FERC also has experience with converting ICA pipelines to carry natural gas.[460] In addition, a natural gas pipeline could also partially convert to carrying hydrogen, through an abandonment by lease that would need FERC approval under the NGA. Having one agency oversee these conversions would provide the sort of centralized coordination that goes to the heart of the DOE Act's purpose.

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452. *See id.* at 62,165-66 (recounting that Congress chose FERC to regulate oil pipelines because oil competed more with natural gas, also regulated by FERC than it did with coal, regulated by the ICC (now STB)).

453. Letter from Richard Glick, *supra* note 371, at 3.

454. Infrastructure Act § 40313, 135 Stat. at 1,007 (codified at 42 U.S.C. § 16154(e)(6)(A)).

455. CRS REPORT, *supra* note 51, at 7-8; HYDROGEN COUNCIL & MCKINSEY, *supra* note 24, at 20.

456. 15 U.S.C. § 717f(b).

457. *El Paso Nat. Gas Co.*, 1 FERC ¶ 61,108 (1977) (approving abandonment of natural gas pipeline that would be converted to carry crude oil).

458. *Tallgrass Interstate Gas Transmission, LLC*, 144 FERC ¶ 61,197 at P 1 (2013)*; Tallgrass Interstate Gas Transmission, LLC*, 148 FERC ¶ 61,003 (2014).

459. *Kinder Morgan Pony Express Pipeline, LLC*, 141 FERC ¶ 61,249 at P 1 (2012).

460. *Missouri Interstate Gas, LLC*, 142 FERC ¶ 61,195 at PP 59-64 (2013) (application of *Longhorn* rule to determine whether new ratepayers may be charged acquisition premium when converting from one regulated service to another). *See Longhorn Partners Pipeline*, 73 FERC ¶ 61,355 (1995)).

C. Hydrogen Is Not "Artificial Gas" for Purposes of the Hepburn Act, or Otherwise Exempt from Regulation

Finally, hydrogen is not otherwise exempted from regulation. As discussed above, the STB precedent has made clear that the Hepburn Act's exemption of natural and artificial gas should be read narrowly.[461] One might attempt to argue that hydrogen could have been included in the category of "artificial gases" exempted in 1906. After all, at the time the Hepburn Act was enacted, the typical artificial gas was often composed of significant amounts of hydrogen, sometimes as much as half.[462] But this argument is ultimately unavailing. At that time artificial gas had a particular meaning and purpose, as the legislative history makes clear. Even though artificial gas contained significant amounts of hydrogen, pure hydrogen was not used as a fuel gas at that time. Nor could it have been: at that time cities and homes relied on artificial gas for lighting,[463] where hydrogen would be useless.[464] Further, at the time of the Hepburn Act, hydrogen was understood to be its own distinct resource with aeronautical applications—where its combustibility was a distinct disadvantage.[465] The canon of reading exemptions narrowly cautions against reading the Hepburn Act as exempting hydrogen, especially when Congress opted for a comprehensive scope of jurisdiction. Congress chose to regulate everything except water and natural or artificial gas when it passed the Hepburn Act, and it is untenable to argue hydrogen was meant to be encompassed in that exemption. Hydrogen pipelines must therefore be subject to some form of economic regulation.

VII. CONCLUSION

The pipeline regulatory framework already covers all potential uses and sources of hydrogen. When mixed with methane, that blended gas is covered by the NGA. When transported by itself, hydrogen is covered by the Hepburn Act. The question of which manifestation of the Hepburn Act (ICCTA or the ICA) applies, depends on which agency (the STB or FERC) is the better regulator. Agency precedent and Congressional purpose all point to the conclusion that FERC can and should regulate hydrogen pipelines. Hydrogen has a unique diversity of sources and applications: fossil and renewable, energy and chemical. These sources and applications that inform the jurisdictional analysis are changing fast. The trend towards renewable sources of hydrogen and towards a more central role for it in the energy sector makes FERC's regulation of hydrogen

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461. *CF Indus., Inc. v. Koch Pipeline Co., L.P.*, 4 S.T.B. 637, 640 n.11 (2000) (abrogating *Cortez Pipeline Co*., 46 Fed. Reg. 18805 (I.C.C. Mar. 26, 1981)).

462. CRS REPORT, *supra* note 51, at 6; CASTANEDA, *supra* note 116, at 4.

463. *See* CASTANEDA, *supra* note 116, at 6-36, 59-62; CRS REPORT, *supra* note 51, at 6-7.

464. Hydrogen burns clear and produces virtually no light. For instance, Japan—which is perhaps the strongest government supporter of hydrogen—powered the 2020 Olympic torch using the fuel. But they needed to add sodium carbonate so spectators could see the flame. *See* Peter Lyon, *Tokyo's Olympic Flame Boasts First Ever Hydrogen-Powered Cauldron*, FORBES (Jul. 28, 2021, 11:28 AM), https://www.forbes.com/sites/peterlyon/2021/07/28/tokyos-olympic-flame-boasts-first-ever-hydrogen-powered-cauldron/?sh=35398a913da5.

465. *See* U.S. DEPT. OF AG., REPORT OF THE CHIEF OF THE WEATHER BUREAU, H.R. DOC. NO. 59-814, at XIII (2d Sess. 1906) (discussing an "electrolyzer for the manufacture of the hydrogen gas employed in the kite balloon and the small rubber balloons.").

pipelines even more important. FERC's ICA regime would provide regulatory certainty needed to support investment in a hydrogen pipeline network while keeping the infrastructure open and accessible to foster hydrogen's widespread adoption and protect consumer interests.

The transition from fossil fuels is an unprecedented undertaking. It will require massive financial investments and large, complex physical transformations completed as quickly as possible. Wherever we can, we should employ existing infrastructure, assets, and institutions. Hydrogen pipelines will undoubtedly play a role in decarbonizing numerous sectors of the economy. We are very fortunate to have this regulatory framework already in place. America's comprehensive pipeline regulatory framework provides us the tools to govern the transportation of hydrogen as well as other renewable commodities. We should use this authority now to start building the open, affordable, and fair renewable pipeline network the energy transition will soon urgently need.