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Jurisdiction Adrift: Outlining the Regulatory Boundaries of Floating LNG

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INTRODUCTION

In the United States, natural gas is one of the most important domestically-produced natural resources.[1] Americans use natural gas in a variety of processes, such as cooking, heating, transportation, and electricity generation.[2] Due in large part to cost-effective drilling methods and significant domestic gas reserves, the price of natural gas remains comparatively low.[3] As the electricity generation market continues to favor low, marginal cost power generators like combined-cycle natural gas plants and renewable resources, struggling coal and nuclear power plants go offline.[4] In the United States, there is a formidable push toward exports of super-cooled liquefied natural gas (LNG).[5] Although pipelines are the most common transportation method for natural gas products, the only feasible way to transport natural gas to overseas markets is on a specialized purpose-built marine LNG carrier. However, the regulatory framework for marine transportation of LNG exports is nebulous, lengthy, and rife with redundancies.[6]

Though the traditional licensing process is cumbersome, advances in LNG transportation technology are outpacing the law, giving way to jurisdictional loopholes in favor of moving the LNG "value chain"[7] from

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1. Natural gas is a naturally occurring mixture of hydrocarbon and non-hydrocarbon gases beneath the surface, the principal component of which (50–90%) is methane. U.S. DEP'T OF ENERGY, OFF. OF FOSSIL ENERGY, SHALE GAS GLOSSARY (2013), https://www.energy.gov/sites/prod/files/2013/04/f0/shale_gas_glossary.pdf [https://perma.cc/UNT4-T3HU].

2. *Use of Natural Gas*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php [https://perma.cc/Z2D5-AYTB] (last visited Sept. 28, 2019).

3. Jonas J. Monast, *Electricity Competition and the Public Good: Rethinking Markets and Monopolies*, 90 U. COLO. L. REV. 667, 670 (2019).

4. *Id.*

5. "LNG is mostly methane [85%–95%] plus a few percent ethane, even less propane and butane, and trace amounts of nitrogen [5%–15%]." U.S. DEP'T OF ENERGY, OFF. OF FOSSIL ENERGY, LIQUIFIED NATURAL GAS: UNDERSTANDING THE BASIC FACTS 3 (2005), https://www.energy.gov/sites/prod/files/2013/04/f0/LNG_primerupd.pdf [https://perma.cc/B42K-2KZD].

6. *See id.* at 16 (more than "100 permits and approvals" may be required for an onshore LNG export terminal).

7. *See id.* at 8 (components of the LNG "value-chain" are: (1) Exploration and Production, (2) Liquefaction, (3) Shipping, and (4) Storage and Regasification).

waterfront to waterborne.[8] This may be due in part to the two major U.S. statutory laws governing LNG terminal and port licenses, which expressly exempt marine vessels from their definitions.[9]

The LNG vessel fleet has been historically small. As of 2017, the LNG carrier fleet totaled just above 500 vessels.[10] To put that in perspective, there are more than 50,000 international merchant trading vessels, including more than 7,000 crude oil and petrochemical tankers.[11] However, the benefits of floating LNG vessels are being noticed, and the fleet is growing. In 2017 alone, energy companies placed orders to construct 12 new Floating Storage and Regasification Units (FSRUs).[12] In 2017, the first floating natural gas liquefaction vessel (FLNG) went into service, completing the floating LNG value chain.[13] Now, natural gas can be produced, liquefied, stored, transported, and re-gasified entirely by waterborne vessels. Furthermore, companies can use these vessels in conjunction to replicate the traditional activities of onshore LNG facilities.[14]

Due to the nuanced nature of this waterborne LNG value chain, the current federal regulatory framework provides piecemeal jurisdiction amongst a myriad of entities, with agency responsibilities frequently overlapping. Determining the scope of authority exercised by these regulatory entities over LNG operations is critical to a well-functioning

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8. *See id.*

9. *See* 33 U.S.C. § 1502(9)(a) (2012) (Deepwater ports include "any . . . floating . . . structure *other than a vessel.*") (emphasis added); *see also* 15 U.S.C. § 717a(11) (2012) ("'LNG Terminal' . . . *does not include* . . . *waterborne vessels used to deliver natural gas to or from any such facility.*") (emphasis added).

10. *See* INT'L GRP. OF LIQUEFIED NAT. GAS IMPORTERS (GIIGNL), THE LNG INDUSTRY, GIIGNL ANNUAL REPORT 14 (2018), https://giignl.org/sites/default/files/PUBLIC_AREA/Publications/rapportannuel-2018pdf.pdf [https://perma.cc/6WY7-A4W2] [hereinafter GIIGNL].

11. *Shipping and World Trade*, INT'L CHAMBER OF SHIPPING, http://www.ics-shipping.org/shipping-facts/shipping-and-world-trade [https://perma.cc/L6XQ-K5XT] (last visited Sept. 28, 2019); Institute of Shipping Economics and Logistics, Shipping Statistics and Market Review 2017, Vol. 61, No. 3, at 4 (Mar. 2017).

12. *See* GIIGNL, *supra* note 10, at 20; INT'L GAS UNION, 2017 WORLD LNG REPORT 36 (2017), https://www.igu.org/sites/default/files/node-document-field_file/103419-World_IGU_Report_FINAL_LR.pdf [https://perma.cc/XG9N-2ASN] (FSRUs are described as "[t]he one bright spot in the LNG shipping sector.").

13. Jenny Mandel, *2017: A Year of Firsts for Global LNG*, E&E NEWS (May 29, 2018), https://www.eenews.net/energywire/stories/1060082825 [https://perma.cc/7ZA9-3CY7].

14. *See Floating Liquefaction (FLNG)*, EXCELERATE ENERGY, http://excelerateenergy.com/flng/ [https://perma.cc/7SAQ-H8FC] (last visited Sept. 28, 2019).

LNG export system. In lieu of complying with the multitude of agency regulations, companies may be turning to floating LNG projects as a workaround to the current regulatory complexity. This Comment identifies the primary agencies involved in LNG exports and the relevant statutory laws governing marine LNG exports. Additionally, this Comment identifies some of the many agency actions and approvals that are required for the operation of an FSRU and related floating LNG vessels in U.S. territorial waters. Finally, this Comment analyzes the regulatory benefits of utilizing a floating LNG value chain and the future of the LNG export framework.

I. BACKGROUND

Properly understanding how "floating LNG" fits (or does not fit) into the current regulatory framework requires a broad view of the domestic and global natural gas industry, administrative law, energy regulation, and even maritime law. This Part will generally address these topics.

A. Natural Gas and LNG

Between 2006 and 2016, the United States experienced nothing short of a domestic energy revolution, particularly in natural gas production.[15] Advances in hydraulic fracturing and horizontal directional drilling (HDD) enabled natural gas and oil previously trapped in unconventional gas formations[16] to be efficiently extracted.[17] Driven by these advances, domestic oil and natural gas production boomed, with natural gas production alone increasing roughly 42% between 2006 and 2016.[18] In the era of climate change, global concern over atmospheric carbon dioxide (CO_2) concentrations are at the political forefront and natural gas is often championed as a source of clean fossil fuel energy.[19] On average, a new

15. John M. Golden & Hannah J. Wiseman, *The Fracking Revolution: Shale Gas as a Case Study in Innovation Policy*, 64 EMORY L.J. 955, 964 (2015).

16. Unconventional gas formations include coal bed methane, shale or tight gas, where the natural gas does not flow naturally to the well, but instead requires some form of extensive stimulation to generate economic flow rates. U.S. DEP'T OF ENERGY, *supra* note 1.

17. KINDER MORGAN, U.S. LIQUEFIED NATURAL GAS: OPPORTUNITY BECOMING REALITY 1 (2017), https://www.kindermorgan.com/content/docs/LNG_Exports.pdf [https://perma.cc/JQ3W-DRCT].

18. *Id.*

19. Mark Green, *Natural Gas and Leading the World in Reducing CO2*, ENERGY API (July 18, 2018), https://www.api.org/news-policy-and-issues/blog/

natural gas power plant emits 66% less CO_2 than existing coal power plants.[20] Additionally, technical innovations and an abundant supply keeps natural gas prices low, making it a favorite of the energy industry and its regulators, as well as politicians.[21] Based on current estimates by the U.S. Energy Information Administration (EIA), the United States has about 200 trillion cubic feet (tcf) of proven natural gas reserves[22] and nearly 623 tcf of additional unproven technically recoverable shale gas reserves.[23]

Natural gas differs from traditional fossil fuels, such as oil and coal, with regards to transportation. In its gaseous state, the only cost-effective method of transportation is by pipeline, severely limiting the available export markets. However, when natural gas is cooled to a liquid, its original volume is reduced by more than 600 times, making it possible to store and transport large quantities.[24] Where natural gas pipelines are not feasible or do not exist, liquefied natural gas (LNG) can be used to move "stranded"[25] natural gas from producing regions to markets. Most LNG is transported by large ocean-going vessels[26] called LNG carriers (or tankers). These vessels are equipped with onboard, super-cooled cryogenic tanks that transport the LNG at a temperature of −260°F (−162°C).[27] The availability of LNG in large quantities in the world market provides many coastal nations with

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2018/07/18/natural-gas-and-leading-the-world-in-reducing-co2 [https://perma.cc/74GC-GP4D].

20. Zeke Hausfather, *Is Natural Gas a Bridge Fuel?*, YALE CLIMATE CONNECTIONS (Aug. 23, 2016), https://www.yaleclimateconnections.org/2016/08/is-natural-gas-a-bridge-fuel/ [https://perma.cc/72TA-XYWX].

21. *See* Jenny Mandel, *Officials Push Strategic Power of Gas Exports*, E&E News (Sept. 28, 2019), https://www.eenews.net/energywire/stories/1060096983/ [https://perma.cc/XFB2-AQFB] (comments of Secretary of Energy Perry).

22. *U.S. Crude Oil and Natural Gas Proved Reserves*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/naturalgas/crudeoilreserves/archive/2016/ [https://perma.cc/B3FM-LP5B] (last visited Sept. 29, 2019).

23. U.S. ENERGY INFO. ADMIN., ASSUMPTIONS TO THE ANNUAL ENERGY OUTLOOK 2018: OIL AND GAS SUPPLY MODULE (2018).

24. *Natural Gas Explained, Liquified Natural Gas*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/natural-gas/liquefied-natural-gas.php [https://perma.cc/HK8T-KCBL] (updated June 4, 2019).

25. Stranded in this context refers to a resource that is wasted because it cannot be used locally, cannot be transported, and does not meet pipeline standards.

26. Congress has defined "vessel" as "every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water." 1 U.S.C. § 3 (2018).

27. *Natural Gas Explained, Liquified Natural Gas, supra* note 24.

access to a cost-effective, low-pollution energy source.[28] These factors make U.S. natural gas a desirable product for export.

B. LNG Exports

Due to the domestic natural gas production boom, annual LNG imports declined more than 85% in one decade.[29] As a result, newly licensed and constructed LNG import terminals shifted gears and began applying for permits to convert or construct export terminals.[30] In March of 2016, the first shipment of U.S. LNG was exported from the Sabine Pass LNG terminal in Cameron Parish, Louisiana, to the Guanabara Bay LNG terminal near Rio de Janeiro, Brazil.[31] Since 2016, six LNG export projects—Sabine, Louisiana; Cove Point, Maryland; Kenai, Alaska; Corpus Christi, Texas; Hackberry, Louisiana; and Elba Island, Georgia—have come online, increasing the United States' LNG export capacity to over 6.6 billion cubic feet per day (Bcf/d).[32] In 2017, the United States exported 1.94 bcf/d of LNG and was a net exporter of natural gas for the first time in 60 years.[33] As export demand increased, shipments went to more destinations, and U.S. LNG ultimately reached over 25 countries in 2017.[34] Studies by the International Energy Agency estimate that by 2022,

28. DNV GL, Gas Carrier Update, 2018, at 12.

29. KINDER MORGAN, *supra* note 17, at 1.

30. MICHAEL RATNER, PAUL W. PARFOMAK, LINDA LUTHER & IAN F. FERGUSSON, CONG. RESEARCH SERV., R42074, U.S. NATURAL GAS EXPORTS: NEW OPPORTUNITIES, UNCERTAIN OUTCOMES 3 (2015), https://fas.org/sgp/crs/misc/R42074.pdf [https://perma.cc/P788-HXDS].

31. *Asia Vision Docks at Petrobras' LNG Terminal to Discharge First Sabine Pass Export Cargo*, LNG WORLD NEWS (Mar. 15, 2016), http://www.lngworldnews.com/asia-vision-docks-at-petrobras-lng-terminal-to-discharge-first-sabine-pass-export-cargo/ [https://perma.cc/2RSY-WSWC].

32. FED. ENERGY REG. COMM'N, NORTH AMERICAN LNG EXPORT TERMINALS EXISTING (2019), https://www.ferc.gov/industries/gas/indus-act/lng/lng-existing-export.pdf [https://perma.cc/U3GR-WQK5].

33. *U.S. Liquefied Natural Gas Exports Quadrupled in 2017*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/todayinenergy/detail.php?id=35512 [https://perma.cc/T2F2-6BJX] (last visited Sept. 29, 2019); *see also* Naureen S. Malik, *U.S. Becomes a Net Gas Exporter for the First Time in 60 Years*, BLOOMBERG (Jan. 10, 2018, 3:09 PM), https://www.bloomberg.com/news/articles/2018-01-10/u-s-became-a-net-gas-exporter-for-the-first-time-in-60-years [https://perma.cc/47HS-K69F].

34. *U.S. Liquefied Natural Gas Exports Quadrupled in 2017*, *supra* note 33.

the United States will be the second largest LNG exporter in the world, accounting for "40% of the world's extra gas production."[35]

Despite the large increase in projected LNG exports for the coming years, it is estimated that the United States will still only export 10%–12% of its total domestic natural gas production.[36] The United States is widely perceived as one of the lowest-cost sources of LNG on a long-term basis due to the brownfield nature of many developments and its abundance of natural gas reserves.[37] In 2017, global LNG trade reached 38.2 bcf/day, a 10% increase from 2016 and the largest annual volume increase since 2010.[38] In 2017, the United States exported a total of 708 bcf of LNG to 28 countries, more than in any previous year.[39] The top five importers of U.S. LNG by share were Mexico (20%), South Korea (18%), China (15%), Japan (8%), and Jordan (5%).[40]

Coinciding with an increase in the number of LNG-importing nations is a strong domestic energy policy aimed at increasing LNG exports. In 2017, the U.S. Trade and Development Agency launched the U.S. Gas Infrastructure Exports Initiative, which partnered with the LNG industry to promote the development of LNG-import infrastructure in target markets such as Asia.[41] Later that year, U.S. and Chinese companies announced a series of business deals during a visit by U.S. President Donald Trump.[42] These deals included: an agreement between Cheniere (owner of the Sabine Pass LNG export terminal) and the China National Petroleum Corporation for "long-term sale and purchase cooperation;" a deal between Delfin Midstream and China Gas Holdings tied to Delfin's proposal for a floating LNG export terminal off the Louisiana coast; and a joint development agreement for the Alaska LNG Project between the

35. *IEA Sees Global Gas Demand Rising to 2022 as US Drives Market Transformation,* INT'L ENERGY AGENCY, (July 13, 2017), https://www.iea.org/newsroom/news/2017/july/iea-sees-global-gas-demand-rising-to-2022-as-us-drives-market-transformation.html [https://perma.cc/8VD4-48KX].

36. KINDER MORGAN, *supra* note 17, at 1.

37. INT'L GAS UNION, WORLD LNG REPORT 2017 EDITION 30 (2017).

38. *Global LNG Trade Continues to Grow, Especially from Australia and the United States*, U.S ENERGY INFO. ADMIN (June 11, 2018), https://www.eia.gov/todayinenergy/detail.php?id=36452 [https://perma.cc/D9BH-4KVD].

39. *Natural Gas Explained, Liquified Natural Gas, supra* note 24.

40. *Id.*

41. Jenny Mandel, *U.S. Trade Agency Launches LNG Push*, E&E NEWS (Nov. 17, 2017), https://www.eenews.net/energywire/stories/1060066825 [https://perma.cc/5LPH-4THJ].

42. *Id.*

China Petrochemical Corporation (Sinopec), China Investment Corporation, and the Bank of China.[43]

Although Japan and South Korea have long been the two biggest markets for LNG, China has recently emerged as a primary destination for LNG exports.[44] China's LNG imports grew 37% in 2016 and 42% in 2017.[45] By the end of 2017, China held the second-largest share of global LNG imports, surpassing South Korea.[46] Historically, coal accounted for most of China's electric power generation, but as the air quality impacts of coal became problematic, the Chinese government set aggressive policies to drive natural gas growth.[47] For several years, aggressive greenhouse gas (GHG) reduction policies have put China and India in their own category as future mega-markets for LNG.[48]

U.S. economic policy generally favors higher levels of LNG exports. The construction of a typical LNG liquefaction terminal will provide an economic stimulus to the surrounding area as materials and services are often purchased locally, many jobs are filled with local employees, and the facilities can generate significant tax revenues for state and local governments.[49] One study found an average net job growth of 73,000 to 452,000 nationwide between 2016 and 2035, depending on global natural gas prices and demand.[50] In 2017, a study found that the seven proposed LNG export facilities in Texas alone would generate an estimated 70,000 jobs in-state (within a total 136,000 jobs nationwide), as well as generate more than $145 billion in economic activity across the country.[51]

United States LNG exports provide political benefits as well as economic benefits. "[DOE] Secretary Perry has stated that every molecule of energy that the United States exports is exporting freedom to the world."[52] Many foreign countries, particularly European countries, are dependent on Russia for natural gas imports.[53] The Russian state-owned natural gas company, Gazprom, is Europe's largest supplier of natural gas, and 13 European countries import more than 75% of their natural gas from

43. *Id.*
44. Mandel, *supra* note 13.
45. *Id.*
46. *Id.*
47. *Id.*
48. *Id.*
49. KINDER MORGAN, *supra* note 17, at 6.
50. *Id.*
51. *Id.*
52. Mandel, *supra* note 13.
53. KINDER MORGAN, *supra* note 17, at 5.

Russia.[54] As a result, these countries are subject to Russian market manipulation and political influence. In 2009, Russia cut off natural gas supplies to Ukraine for two weeks during a political conflict between the two countries.[55] In 2017, Poland—a country that previously imported more than 60% of its natural gas from Russia—received its first shipment of U.S. LNG.[56] The Polish Prime Minister praised the delivery stating, "[t]oday, Poland can say that it is a safe and sovereign country."[57]

C. Floating LNG

The LNG export business continues to fuel rapid scientific and technological advances in marine vessel technology. As a result, the traditional LNG value chain (production, liquefaction, transportation, storage and regasification)—and even power generation—can be completed entirely by waterborne vessels. Although there are multiple types of vessel configurations, this Comment focuses primarily on vessels used for liquefaction, regasification and storage, which are the activities typically conducted at a U.S. LNG export terminal and subject to federal agencies.

1. Floating Storage and Regasification Unit (FSRU)

The frenzy to enter the global LNG market significantly affected the maritime tanker industry. Over a period of 20 years, the global fleet of LNG carriers increased five-fold from 97 vessels in 1997[58] to 511 at the end of 2017.[59] Of these 511 vessels, 28 were classified as Floating Storage and Regasification Units (FSRUs).[60] The FSRU business began in 2001 when Excelerate Energy, a U.S. corporation headquartered in Texas, built the first FSRU vessel for the Gulf Gateway Project.[61] The modern FSRU is a double-hulled ship designed using normal shipbuilding blueprints and

54. *Id.*
55. *Id.*
56. *Id.*
57. *Id.*
58. Henry J. Linser, Jr., et al., *LNG Fleet Increases in Size and Capabilities*, OIL & GAS J. (June 2, 1997), https://www.ogj.com/articles/print/volume-95/issue-22/in-this-issue/general-interest/lng-fleet-increases-in-size-and-capabilities.html [https://perma.cc/GF5F-X26Y].
59. GIIGNL, *supra* note 10, at 14.
60. *Id.*
61. BRIAN SONGHURST, OXFORD INST. FOR ENERGY STUDIES, THE OUTLOOK FOR FLOATING STORAGE AND REGASIFICATION UNITS (FSRUS) 1 (2017).

standards and can be constructed in conventional shipyards worldwide.[62] It is estimated that close to 50 FSRUs could be in operation by 2025 with the capacity to import close to 200 million tons per annum (mtpa).[63] Nations tend to pursue FSRU systems when looking for solutions to energy shortages, diversifying energy inputs, compensating for declines in domestic gas production, or powering an economic boom.[64]

These vessels provide unique advantages but pose challenging questions regarding federal agency authority. The global LNG business is described as a "value chain" containing four components: (1) Exploration and Production; (2) Liquefaction; (3) Transportation; and (4) Storage and Regasification, ultimately providing natural gas for delivery to "end users."[65] By providing three separate LNG-related functions—transport, storage and regasification—FSRUs offer exceptional versatility and convenience. In recent years, FSRUs proved ideal for countries that experienced stagnant or dwindling domestic gas production or looked to switch from more carbon-intensive fuels to natural gas in a relatively short period of time, with limited capital expenditures.[66]

In the United States, FSRUs can provide multiple cost-benefits and efficiencies. The cost differential between FSRUs and onshore regasification terminals is significant. Although the price of a new-build FSRU may be in excess of $250 million, the cost of developing a land-based terminal of comparable size is likely to exceed $1 billion.[67] Additionally, some FSRUs are up and running as much as "six times faster than onshore regasification terminals."[68] This is attributed to the independence that FSRUs enjoy from space availability on land as well

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62. MICHELLE FOSS, CTR. FOR ENERGY ECONS., OFFSHORE LNG RECEIVING TERMINALS, A BRIEFING PAPER FROM THE GUIDE TO COMMERCIAL FRAMEWORKS FOR LNG IN NORTH AMERICA 37 (2006), http://www.beg.utexas.edu/files/energyecon/global-gas-and-lng/CEE_offshore_LNG.pdf [https://perma.cc/MX9K-NYLD].

63. *Id.*

64. David Iaconangelo, *12 Nations That Aren't China or European Lead LNG Import Growth*, E&E NEWS (Nov. 27, 2017), https://www.eenews.net/energywire/stories/1060067297 [https://perma.cc/7BKB-XZL2].

65. U.S. DEP'T OF ENERGY, *supra* note 5, at 8.

66. INT'L GAS UNION, WORLD LNG REPORT 2017 EDITION 36 (2017).

67. Philip R. Weems et. al, *FSRUs: Looking back at the Evolution of the FSRU Market*, KING & SPALDING (Dec. 8, 2015), https://kslawemail.com/77/512/pages/article2.asp?sid=44ee303f-b7ea-4aa2-a9c7-3b8bb3db0d2c [https://perma.cc/E4BM-3J2H].

68. Anna Shiryaevskaya, *The Hottest Commodity Asset Right Now is a 35,000-Ton Steel Ship*, BLOOMBERG, (Sept. 16, 2015, 6:01 PM), www.bloomberg.com/news/articles/2015-09-15/the-hottest-commodity-asset-right-now-is-a-35-000-ton-steel-ship [https://perma.cc/C6RC-2D8W].

the associated permitting and regulatory procedures.[69] In addition to lower costs and a faster build schedule, the FSRU provides commercial flexibility with the ability to relocate to a different market. The benefits of moving regasification and storage offshore have not gone unnoticed by the industry. In 2017 alone, LNG companies ordered 12 new construction FSRUs.[70] With the lack of coherent regulatory schemes, and demand surging ever higher, FSRUs present a challenge—or an opportunity—for the already-stressed regulatory framework governing U.S. LNG facilities.

Although designs may vary, FSRUs have four essential features: (1) storage tanks (using either a membrane or spherical Moss tank); (2) a regasification unit; (3) unloading arms or cryogenic hoses; and (4) a heating medium (which generally uses seawater as a heat source for vaporization).[71] FSRUs can be classified either as ships or as offshore terminals.[72] The majority of FSRU vessels deployed operate as terminals and only a few as LNG tankers.[73] Ship design is based on normal worldwide LNG trading operation with regular dry docking and international marine safety standards. Most FSRUs are classified as ships to provide the flexibility to operate either as an FSRU or LNG tanker.[74]

Marine LNG projects are custom-built vessels; thus, different processes can be incorporated into the floating facility. If storage is not required for the facility, then the resulting vessel is referred to as a Floating Regasification Unit (FRU).[75] In addition to FRUs, there are currently five Floating storage vessels (FSUs) in operation, one each in Malta, Bali, and Bahrain, and two in Malaysia.[76]

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69. *See* DNV GL MARITIME COMMUNICATIONS, GAS CARRIER UPDATE 12 (2018) ("FSRUs promise independence from international pipelines and are less likely to meet with popular opposition or be subject to bureaucratic delays.").

70. INT'L GRP. OF LNG IMPS. (GIIGNL), THE LNG INDUSTRY, ANNUAL REPORT 2018 EDITION 20 (2018).

71. Anish Wankhede, *What is a Floating Storage Regasification Unit (FSRU)?*, MARINE INSIGHT, https://www.marineinsight.com/types-of-ships/what-is-floating-storage-regasification-unit-fsru/ [https://perma.cc/F349-DUKS] (last updated Apr. 10, 2019).

72. SONGHURST, *supra* note 61, at 4.

73. *Id.*

74. *Id.*

75. FOSS, *supra* note 62, at 36–37.

76. SONGHURST, *supra* note 61.

2. Floating Liquefaction (FLNG)

Onshore LNG plants have long been extremely expensive because they are custom-built facilities tailored for their particular site.[77] Engineering advances have enabled the construction of floating plants that house the equipment to supercool and liquefy natural gas within the confines of a massive ship.[78] In 2017, the first floating liquefaction facility (or "FLNG") filled its tanks from an offshore natural gas field off the coast of Borneo.[79] This innovation allows storage and liquefaction to benefit from cost savings of standardized shipyard production and the potential to move from site to site if the natural gas resource is removed from development.[80] The FLNG technology is not only applicable to stranded or smaller reserves that might not otherwise be developed by conventional means, but, given its cost-competitiveness, it is also a viable alternative to conventional onshore facilities.[81]

Thanks to the evolution of FLNG vessels, companies like Excelerate Energy—whose fleet consists of both FSRU and liquefaction vessels (FLSO)[82]—can combine the capabilities of its floating LNG facilities to provide the full-services of an LNG onshore terminal without being permanently attached to any one market. "The FLSO is an autonomous floating structure that does not rely on any shore-based utilities to function. It is able to tap directly into a natural gas source, liquefy the gas and subsequently offload the LNG to either a traditional LNG carrier or FSRU vessel."[83] Excelerate's FLSO is built in a shipyard which allows parties to avoid "complex and costly onshore civil construction works, associated environmental impact studies, and provides quicker time-to-market at a fraction of the cost."[84]

3. Other Floating LNG Configurations

The ultimate end use of LNG is "gas to power" and the majority of the current FSRU projects and prospects are linked to smaller onshore power

77. Mandel, *supra* note 13.
78. *Id.*
79. *Id.*
80. *Id.*
81. *Floating Liquefaction (FLNG), supra* note 14.
82. FLSO is a trademark of Excelerate Energy and stands for Floating Liquefaction Storage and Offloading. *See id.*
83. *Id.*
84. *Id.*

plants typically in the range of 100–500 megawatts (MW).[85] The expanding gas to power business is seen in smaller, independent power companies wishing to serve developing markets by offering a clean and efficient source of fuel.[86] Interest in gas to power has encouraged several FSRU companies to study the feasibility of offering a complete package with power generation installed on the FSRU or on an adjacent barge.[87] This new concept, referred to as Floating Power Generation Units (FPGU), would provide a one-stop-shop solution for smaller, independent companies and nations without modern natural gas infrastructure.[88]

Golar LNG Energy, a company that provides shore-side LNG services, developed concepts for an FPGU that could deliver 100 MW–300 MW of electricity.[89] This arrangement would not require gas arms because the power would be generated onboard and with power lines connected directly to an onshore substation.[90] Although these concepts are still in their early stages, the global LNG market will continue to drive innovation at a break-neck pace, and regulators need to be paying attention.

II. REGULATION

LNG vessels and terminals are complex structures that are unique in their ability to bundle multiple services traditionally associated with land-based activities. Thus, jurisdiction is shared by multiple federal agencies, including the Federal Energy Regulatory Commission (FERC), the Department of Energy (DOE), the Maritime Administration (MARAD), the United States Coast Guard (USCG), and the Department of Transportation (DOT), and can be supplemented by state agencies as well.

Although U.S. policy supports LNG exports, the regulatory process is bewilderingly cumbersome. The list of applicable statutes, regulations, and executive orders is extensive.[91] As a result, jurisdiction among federal agencies with LNG oversight responsibilities is historically contentious and multiple memoranda of understanding (or "MOU") exist to coordinate

85. SONGHURST, *supra* note 61, at 40.

86. *See* Aguirre Offshore GasPort, LLC, 155 F.E.R.C. ¶ 61,139 (2016) (Puerto Rico Electric Power Authority (PREPA) is the sole provider of electricity for Puerto Rico's 1.5 million customers. PREPA contracted with Excelerate to use an FSRU to provide Natural Gas to PREPA's power plant. Prior to this use, P.R. generated the bulk of its electricity from oil burning plants.).

87. SONGHURST, *supra* note 61, at 40.

88. *Id.*

89. *Id.*

90. *Id.*

91. FOSS, *supra* note 62.

respective agency roles.[92] Efforts by federal agencies to clarify authority over such facilities are contained in a slew of MOUs and Interagency Agreements (or "IA") ranging from 1985 to 2018.[93]

Despite numerous attempts to establish a cohesive structure, as many as "*100 permits and approvals* may be required from federal, state, and local government agencies for a new onshore LNG terminal."[94] Through a rigorous filing process, these agencies thoroughly examine the proposed project, considering factors such as facility design, location, safety, security, and environmental impacts.[95] Even without significant delays, bringing a new onshore LNG terminal online can take up to seven years, including up to three years for permitting.[96] Although facilities operating offshore fall under the licensing authority of MARAD, numerous state and federal agency approvals are still required.[97]

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92. *Id.*

93. *See* Notice of Agreement Regarding Liquefied Natural Gas, 31 FERC § 61232 (May 9, 1985), 1985 WL 64807 (MOU between the DOT and FERC regarding Liquefied Natural Gas facilities); *Memorandum of Understanding Between the U.S. Coast Guard and the Research and Special Programs Admin. for Regulation of Waterfront Liquefied Nat. Gas Facilities*, (May 9, 1986) https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/1986_RSPA_USCG.pdf [https://perma.cc/JE4R-TKVQ] (MOU between the USCG and RSPA for regulation of waterfront liquefied natural gas facilities); *Memorandum of Understanding Between the Dep't. of Transp. and the Fed. Energy Regulatory Comm'n Regarding Liquefied Nat. Gas Trans. Facilities* (Aug. 31, 2018), https://www.ferc.gov/legal/mou/2018/FERC-PHMSA-MOU.pdf [https://perma.cc/NWZ3-9YDF].

94. U.S. DEP'T OF ENERGY, *supra* note 5, at 16 (emphasis added).

95. *Id.*

96. *Id.*

97. *See* FOSS, *supra* note 62, at 17. (the list of federal agencies includes the U.S. Environmental Protection Agency (EPA) under the Clean Air Act and the Clean Water Act; Federal Energy Regulatory Commission (FERC) under the Natural Gas Act; US Department of Energy (DOE) for imports & exports of natural gas under the Natural Gas Act as amended; US Department of Transportation's Pipeline and Hazardous Materials Administration (PHMSA); US Department of the Interior (DOI) Minerals Management Service (MMS); National Oceanic and Atmospheric Administration (NOAA); US Fish and Wildlife Service (FWS) or NOAA's National Marine Fisheries Service (NFMS) under the Endangered Species Act of 1973; US Army Corps of Engineers (Corps) under the River and Harbor Act of 1899 and Section 404 of the Clean Water Act.).

A. LNG as a Commodity

Although production of natural gas from shale formations is typically an issue unique to state mineral law, the sale and transmission of natural gas and LNG in interstate or foreign commerce is within the exclusive authority of the federal government.[98]

1. U.S. Department of Energy (DOE)

The DOE is a Cabinet-level department of the Federal Government. Section 3(a) of the Natural Gas Act (NGA) bars exportation of any natural gas from the United States to a foreign country without "first having secured an order . . . authorizing [a party] to do so."[99] In 1977, Congress transferred the regulatory functions of Section 3 to the DOE which, subsequently, delegated to FERC the "authority to approve or deny an application for the siting, construction, expansion, or operation of an LNG terminal," while retaining exclusive authority over the export of natural gas as a commodity.[100] Therefore, anyone seeking to import or export natural gas across U.S. borders must receive an authorization from the DOE. Section 3 authorizes the export of natural gas from the United States unless the DOE finds that doing so "will not be consistent with the public interest."[101] The DOE monitors LNG shipments to ensure the integrity of U.S. energy supplies through this certification process.

The DOE's Office of Fossil Energy (OFE) coordinates across federal agencies that have regulatory and policy authority for LNG.[102] In addition, the OFE and the National Energy Technology Laboratory (NETL) fund LNG technology research and work to eliminate or minimize potential impediments to LNG facility siting and operations.[103]

2. Federal Energy Regulatory Commission (FERC)–Part I

Under the NGA, the Federal Energy Regulatory Commission (FERC) exercises jurisdiction over:

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98. *See* U.S. DEP'T OF ENERGY, *supra* note 5; 15 U.S.C. § 717(b) (2005).

99. EarthReports, Inc. v. Fed. Energy Regulatory Comm'n, 828 F.3d 949, 952 (D.C. Cir. 2016); 15 U.S.C. § 717b(a) (2005).

100. *EarthReports, Inc*., 828 F.3d at 952; *see also* Dep't of Energy, Delegation Order No. 00-004.00A (effective May 16, 2006).

101. 15 U.S.C. § 717(a) (2005).

102. U.S. DEP'T OF ENERGY, *supra* note 5, at 16.

103. *Id.*

> [T]he transportation of natural gas in interstate commerce, to the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or any other use, and to natural-gas companies engaged in such transportation or sale, and to the importation or exportation of natural gas in foreign commerce and to persons engaged in such importation or exportation . . . .[104]

FERC issues certificates of public convenience and necessity for LNG and other facilities used for the sale for resale or the transportation of natural gas in interstate commerce under Section 7 of the NGA.[105] FERC also serves as the lead federal agency for satisfying compliance with the National Environmental Policy Act (NEPA)[106] for LNG facilities subject to its jurisdiction.[107] FERC has established pre-filing procedures for LNG Project applicants which involves agencies working together to develop a single NEPA document to address each agency's requirements.[108] Despite the broad grant of authority to the Commission, FERC can only exercise jurisdiction over stationary LNG components and has no jurisdiction over ocean-going LNG tanker ships.

B. LNG Ports & Terminals

There are two types of approval mechanisms for marine transportation of LNG. Either through an offshore "Deepwater Port," licensed by the Department of Transportation's MARAD under the Deepwater Port Act (DWPA),[109] or from an onshore terminal, licensed by FERC under the NGA.[110]

1. Federal Energy Regulatory Commission (FERC)–Part II

Section 3 of the Natural Gas Act provides FERC with exclusive authority to approve or deny an application for the siting, construction, expansion, or operation of an LNG terminal.[111] FERC implements its

104. 15 U.S.C. § 717b (2005).
105. 15 U.S.C. § 717f.
106. 42 U.S.C. §§ 4321–4370m-12 (1970).
107. 15 U.S.C. § 717n(b) (2005).
108. U.S. ENVT'L PROT. AGENCY, EPA-203-B-06-001, EPA'S LIQUEFIED NATURAL GAS REGULATORY ROADMAP 5 (2006).
109. The Deepwater Port Act of 1974, Pub. L. No. 93-627; 33 U.S.C. §§ 1501–1524 (2002).
110. Natural Gas Act of 1938, Pub. L. No. 75-688; 15 U.S.C. §§ 717–717z (2005).
111. 15 U.S.C. § 717b(e) (2005).

authority over onshore LNG terminals through the agency's regulations at 18 C.F.R. Parts 153 and 157.[112] FERC regulations are detailed and include site engineering and design information, evidence that a facility will safely receive or deliver LNG, and delineation of a facility's proposed location.[113] Facilities to be constructed at the Canadian or Mexican borders for import or export of natural gas also require a Presidential Permit. According to FERC, applications under section 3 regulations are also sufficient for Presidential Permit purposes.[114]

LNG terminals are complicated facilities that utilize technology that is regulated by multiple agencies. FERC, as the lead agency for LNG terminals, occasionally attempts to resolve jurisdictional conflicts and coordinate regulatory requirements by way of interagency agreements. Many of these arrangements are not explicitly established under the relevant federal statutes and regulations, most of which do not clearly define the roles of the agencies with respect to one another.[115]

Although FERC requires compliance with siting and safety regulations promulgated by the Department of Transportation (DOT), jurisdiction among the federal agencies with LNG oversight responsibilities has been a point of contention.[116] Despite provisions in the Pipeline Safety Act, which might appear to give DOT full control of natural gas safety regulation (including LNG siting authority),[117] congressional committee reports indicated an intention to preserve FERC jurisdiction over LNG.[118] Accordingly, FERC orders hold that the Pipeline Safety Act does not completely remove its jurisdiction under the NGA to regulate LNG safety issues.[119] In 1985, FERC and DOT executed an MOU expressly acknowledging DOT's exclusive authority to promulgate federal safety standards for LNG facilities but recognized FERC's ability

112. *See* 18 C.F.R. §§ 153.1–153.23; PAUL W. PARFOMAK & AARON M. FLYNN, CONG. RESEARCH SERV., RL32205, LIQUEFIED NATURAL GAS (LNG) IMPORT TERMINALS: SITING, SAFETY AND REGULATION 13 (2004).

113. *See* sources cited *supra* note 112; *see also* 18 C.F.R. § 153.8.

114. 18 C.F.R. §§ 153.15–153.17.

115. PARFOMAK & FLYNN, *supra* note 112, at 10.

116. *Id.*

117. *See* 49 U.S.C. § 60104(d)(2) ("In a proceeding under section 3 or 7 of the Natural Gas Act . . . each applicant . . . shall certify that it will design, install, inspect, test, construct, operate, replace, and maintain a gas pipeline facility under . . . this title. The certification is binding on the Secretary of Energy and the Commission . . . .").

118. PARFOMAK & FLYNN, *supra* note 112, at 10; *see* H.R. REP. NO. 1390 (1968).

119. Chatanooga Gas Co., 51 F.P.C. ¶ 1278, 1279 (1974).

to issue more stringent safety requirements for LNG facilities if needed.[120] In 2004, FERC attempted to streamline the LNG siting approval process through an agreement with the USCG and the DOT to coordinate review of LNG terminal safety and security.[121] "Under the agreement, FERC is the lead agency in authorizing LNG facilities and in preparing a proposed facility's Environmental Impact Statement (EIS)."[122]

2. U.S. Maritime Administration (MARAD)

Under the Deepwater Port Act of 1974 (DWPA), MARAD is responsible for processing and approving applications from private energy companies to own, construct, and operate offshore LNG receiving facilities.[123] The DWPA directs the Secretary of the DOT to "authorize and regulate the location, ownership, construction, and operation of deepwater ports."[124] DOT subsequently delegated this authority to the Maritime Administration (MARAD) within the Department of Transportation, and the United States Coast Guard (USCG) (then part of the DOT) within the Department of Homeland Security.[125]

As amended, deepwater ports are defined as "any fixed or floating man made structure *other than a vessel* . . . located beyond State seaward boundaries . . . intended for use as a port or terminal for the transportation, storage, or further handling of oil or natural gas for transportation to any State . . . ."[126] Although the USCG administers the licensing processes, substantive decision making is delegated to MARAD, which issues the actual deepwater port license.[127] The term "Deepwater Port" includes all associated components and equipment, including "pipelines, pumping stations, service platforms, mooring buoys and similar features or

120. Notice of Agreement Regarding Liquefied Natural Gas, 31 F.E.R.C. ¶ 61232 (May 9, 1985) (MOU between the DOT and FERC regarding Liquefied Natural Gas facilities).

121. *See* Interagency Agreement Among the Federal Energy Regulatory Commission, United States Coast Guard and Research and Special Programs Administration for the Safety and Security Review of Waterfront Import/Export Liquefied Natural Gas Facilities, (Feb. 11, 2004).

122. City of Fall River v. Fed. Energy Reg. Comm'n, 507 F.3d 1, 3–4 (1st Cir. 2007).

123. Deepwater Port Act of 1974, Pub. L. No. 93-627; 33 U.S.C. § 1504.

124. 33 U.S.C. §§ 1501(a), 1503.

125. FOSS, *supra* note 62, at 10 ("The USCG was then part of the Department of Transportation and is now part of the Department of Homeland Security.").

126. 33 U.S.C. § 1502(9)(a).

127. U.S. ENVT'L PROT. AGENCY, EPA-203-B-06-001, EPA'S LIQUEFIED NATURAL GAS REGULATORY ROADMAP 5 (2006).

equipment to the extent they are located seaward of the high-water mark."[128]

DWPA established a detailed process for offshore facility siting applications. The act authorizes regulations addressing potential threats to the environment or human welfare posed by development of offshore LNG facilities.[129] DWPA also requires regulations for the designation of safety zones around deepwater ports.[130] MARAD determines the financial capability of the potential licensees, verifies citizenship, prepares the project record of decision, and has the ultimate authority to issue or deny the license.[131] The Coast Guard must conduct public hearings in each Adjacent Coastal State[132] within 240 days of publishing the notice of receipt for any deepwater port application.[133] Within 90 days after the final public hearing, MARAD must issue a Record of Decision (ROD) approving or denying a license application.[134] After this period lapses, MARAD can only issue a license with approval (either absolute or conditional) from the governors of all Adjacent Coastal States.[135]

In 2012, Congress passed the Fiscal Year 2014 Coast Guard Authorization Act, which amended the DWPA to expand MARAD's authority to license the construction and operation of new offshore facilities to export oil and LNG.[136] The process for licensing deepwater ports has been pursued very few times. To date, MARAD has received 26 applications to construct and operate deepwater ports; however, most applications were withdrawn, and only four deepwater ports were ever placed into operation.[137] With such a small sample size combined with the lack of a fixed set of explicit requirements for applications, regulatory uncertainty continues to evolve.[138] Although MARAD has approved few

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128. *Deepwater Port Licensing Program, Frequently Asked Questions*, U.S. DEP'T OF TRANSP., MAR. ADMIN., https://www.maritime.dot.gov/ports/deepwater-ports-and-licensing/frequently-asked-questions [https://perma.cc/JNB4-9MN5] (last visited Oct. 15, 2019).

129. 33 U.S.C. §§ 1504, 1508; 33 C.F.R. Part 148.

130. 33 U.S.C. § 1509(d).

131. FOSS, *supra* note 62, at 15–16; 33 C.F.R. § 148.3(b).

132. The process for designating a state as an "Adjacent Coastal State" under the DWPA are found at 33 C.F.R. § 148.217.

133. 33 C.F.R. § 148.276(b).

134. 33 C.F.R. § 148.276(c).

135. FOSS, *supra* note 62; *see also infra* note 156.

136. FOSS, *supra* note 62, at 15–16.

137. *Deepwater Ports Map*, U.S. DEPT. OF TRANSP., MAR. ADMIN., https://www.maritime.dot.gov/ports/deepwater-ports-and-licensing/deepwater-ports-map [https://perma.cc/C9B5-4FHL] (last visited Oct. 15, 2019).

138. Foss, *supra* note 62 at 17.

port applications due to the sharp decline in LNG imports, the uptick in U.S. LNG exports and increased use of floating LNG could lead to an increase in deepwater port licenses.

3. United States Coast Guard (USCG)–Part I

The USCG has primary jurisdiction over LNG shipping and marine transfer facilities.[139] The USCG is responsible for assuring the safety of marine operations within U.S. coastal waters under provisions of the Ports and Waterways Safety Act of 1972 and the Maritime Transportation Security Act of 2002 (MTSA).[140] MTSA amended portions of the DWPA to include offshore natural gas facilities.[141] Under DWPA, the USCG implements the application process designed to yield a decision within one year of receipt of an application for construction of an offshore LNG terminal.[142] The USCG also regulates the design, construction, and operation of LNG vessels and the duties of LNG ship officers and crews.[143] The USCG's regulations regarding LNG facilities are codified throughout Title 33 of the Code of Federal Regulations, with its most major provisions in part 127.[144]

By statute, the USCG must "make a recommendation, after considering recommendations made by the states, to [FERC] as to whether [a] proposed waterside liquefied natural gas facility is suitable or unsuitable for the marine traffic associated with such a facility."[145] Unlike onshore facilities, the USCG generally does not require applicable exclusion zones for offshore facilities, but relies instead on case-by-case designation of safety zones.[146] Additional USCG regulations include agency oversight of emergency procedures, security, fire protection, design, and construction standards.[147]

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139. *Id.*
140. Ports and Waterways Safety Act of 1972, Pub. L. 92-340, 86 Stat. 424.
141. PARFOMAK & FLYNN, *supra* note 112, at 15–16.
142. *Id.* at 23.
143. *See generally* 33 C.F.R. §§ 149.1–150.940 (2019).
144. *See generally* 33 C.F.R. §§ 127.001–127.1605 (2019).
145. Columbia Riverkeeper v. U.S. Coast Guard, 761 F.3d 1084, 1088 (9th Cir. 2014) (citing Coast Guard Authorization Act of 2010, H.R. 3619, 111th Cong. § 813 (2nd Sess. 2010)); *see* 33 C.F.R. § 127.007 (Letter of intent and waterway suitability assessment).
146. PARFOMAK & FLYNN, *supra* note 112, at 25.
147. *Id.* at 26; *see* 33 C.F.R. §§ 127.109, 127.701–127.711, 127.601–127.617, 127.1101–127.1113, 149.205 (2019).

Although the federal licensing authority under the DWPA is MARAD, the USCG is the lead agency for carrying out the responsibilities articulated in the National Environmental Policy Act (NEPA) and implements the regulatory processes in general.[148] USCG regulations require project operators to submit the information required to obtain a permit for placement of structures and the discharge of dredged or fill material with their deepwater port license application.[149]

4. Pipeline and Hazardous Materials Safety Administration (PHMSA)

The Department of Transportation (DOT) is responsible for setting safety standards for onshore LNG facilities. The authority originally stemmed from the Natural Gas Pipeline Safety Act of 1968 and the Hazardous Liquids Pipeline Safety Act of 1979, which were subsequently combined and codified as the Pipeline Safety Act of 1994 and amended again in 2002 by the Pipeline Safety Improvement Act.[150] Under the resulting statutory scheme, DOT issues minimum safety standards for the siting, design, construction, and operation of LNG facilities, including LNG peak-shaving plants.[151] DOT delegated this authority to the Pipeline and Hazardous Materials Safety Administration (PHMSA).[152] PHMSA exercises authority under the Pipeline Safety Act to prescribe rules for safety standards governing the location, design, construction, operation, and maintenance of LNG facilities in or affecting interstate or foreign commerce.[153]

PHMSA regulates pipeline facilities and the transportation of natural gas without regard to who owns the gas; a sale of the gas is not required.[154] Therefore, gas can be in transportation even if it is produced, transported,

148. FOSS, *supra* note 62, at 10.

149. *See* U.S. ENVT'L PROT. AGENCY, EPA-203-B-06-001, EPA'S LIQUEFIED NATURAL GAS REGULATORY ROADMAP 17 (2006); 33 C.F.R. § 148.105(aa) (2019).

150. PARFOMAK & FLYNN, *supra* note 112, at 7; *see* Natural Gas Pipeline Safety Improvement Act of 1994, H.R. 4616, 103rd Cong. (2nd Sess. 1994); *see also* Pipeline Safety Improvement Act of 2002, H.R. 3609, 107th Cong. (2002).

151. PARFOMAK & FLYNN, *supra* note 112, at 7.

152. Fed. Energy Reg. Comm'n, Memorandum of Understanding Between the Department of Transportation and the Federal Energy Regulatory Commission Regarding Liquified Natural Gas Transportation Facilities, 1–2 (2018), https://www.ferc.gov/legal/mou/2018/FERC-PHMSA-MOU.pdf [https://perma.cc/K7EG-QGZJ].

153. 49 U.S.C. §§ 60101–60141 (2019).

154. 49 C.F.R. § 192 (2019).

and consumed by the same entity and remains subject to PHMSA jurisdiction. These regulations are intended to ensure adequate protection for the public from natural gas pipeline failures and specify material selection and qualification, minimum design and construction requirements, and protection from internal, external, and atmospheric corrosion.[155]

In 2018, PHMSA and FERC entered into an MOU with the purpose of improving coordination throughout the LNG permit application process for FERC jurisdictional LNG facilities.[156] This MOU superseded a 1985 MOU between FERC and the Research and Special Programs Administration, a predecessor agency to PHMSA.[157] The MOU provides that PHMSA will issue a Letter of Determination (LOD), "upon which FERC will rely, to determine whether a proposed LNG facility will be capable of complying with Department of Transportation safety standards."[158] In addition to the LOD, PHMSA has continuing authority and responsibility over compliance during construction and future operation of the facility.[159]

5. State and Other Jurisdictional Entities

Although the regulation of LNG facilities by states varies from comprehensive to fragmented, many states strive to address the evolving interest in LNG. Multiple state agencies, such as state public utility commissions, govern intrastate commerce and trade. Other state regulatory agencies (for example, state departments of environmental protection), together with the United States EPA, grant permits for specific activities to minimize environmental impacts. State and local government agencies are also involved in zoning, construction, operation, and maintenance of LNG terminals.[160] For example, Massachusetts mandates that LNG import terminals are a minimum distance of 5,000 feet from the center of the LNG tank to certain residential buildings.[161] Additionally, LNG tankers are required to have a 1,500 foot clearance along the shore,

155. *Id*.

156. Fed. Energy Reg. Comm'n, Memorandum of Understanding Between the Department of Transportation and the Federal Energy Regulatory Commission Regarding Liquified Natural Gas Transportation Facilities, at 1 (2018), https://www.ferc.gov/legal/mou/2018/FERC-PHMSA-MOU.pdf [https://perma.cc/E7Z6-VNYS].

157. *Id.* at 3.

158. *Id.* at 1.

159. *See* 49 C.F.R. § 193 (2019).

160. U.S. DEP'T OF ENERGY, *supra* note 5, at 18.

161. MASS. GEN. LAWS ch. 21E § 20 ("Distance of LNG import terminal from certain establishments.").

as it travels through any Massachusetts waterway, "from the hull to the nearest residential home, elderly housing complexes, schools, hospitals, health care facilities, businesses or developments."[162]

Under the DWPA, coastal states have certain rights and responsibilities allowing them to participate in the review process.[163] Pursuant to the DWPA, the Governor of the Adjacent Coastal State or States must approve the issuance of a deepwater port license.[164] Silence on this issue denotes approval.[165] Further, the DWPA grants to Adjacent Coastal States, acting through their governors, a veto power over all deepwater port projects.[166] Under the DWPA, a governor's veto cannot be appealed.[167]

Additionally, states must demonstrate compliance with the federal Coastal Zone Management Act (CZMA).[168] Under the CZMA, coastal states are "required to submit their coastal management plans to the Secretary of Commerce for review and approval."[169] States must determine that the offshore LNG facility will be consistent with state coastal zone management plans made under the CZMA; issue leases for any use of state submerged lands for natural gas pipeline purposes; approve any new intrastate natural gas pipelines that must be developed; and be involved through their state environmental agencies in the Endangered Species Act (ESA) consultation process.[170]

Federal and state government agencies occasionally experience jurisdictional conflicts related to the siting of new LNG terminals.[171] In 2004, the California Public Utilities Commission (CPUC) challenged FERC's jurisdiction over the siting of a proposed LNG terminal in Long Beach because, in the CPUC's opinion, the terminal "would be not be involved in interstate sales or transportation and therefore would not come

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162. *Id.* § 21 ("Distance of LNG tankers traveling by waterway from certain establishments.").

163. FOSS, *supra* note 62, at 17.

164. 33 U.S.C. § 1508; *Deepwater Port Licensing Program, Licensing Process and Requirements*, U.S. DEP'T OF TRANSP., MAR. ADMIN., https://www.maritime.dot.gov/ports/deepwater-ports-and-licensing/licensing-process [https://perma.cc/U2CR-7TQ9] (last visited Sept. 30, 2019).

165. 33 U.S.C. § 1508(b)(1).

166. *Deepwater Port Licensing Program, Licensing Process and Requirements, supra* note 164.

167. FOSS, *supra* note 62, at 10.

168. *Id.*

169. New Jersey v. Delaware, 552 U.S. 597, 620 (2008).

170. FOSS, *supra* note 62, at 17.

171. PARFOMAK & FLYNN, *supra* note 112, at 13.

under the Natural Gas Act."[172] FERC rejected the CPUC's arguments and asserted exclusive regulatory authority for all LNG import terminal siting and construction.[173] Although the CPUC appealed to the United States. Ninth Circuit Court of Appeals, the litigation was withdrawn following the passage of the Energy Policy Act of 2005.[174] Ultimately, state government officials decided to abandon the Long Beach LNG terminal project in 2007.[175]

C. LNG Vessels

Since an FSRU is part ship, part storage tank, and part regasification unit, three separate design standards, guidance, and regulations must be satisfied.[176] The vessel portion of the FSRU is subject to marine codes, the LNG storage tanks are subject to LNG storage and transfer rules, and LNG regasification is subject to process standards and codes.[177] Utilities and systems associated with FSRU operations include electric power generation and distribution, instrumentation and controls, and fire and safety systems.[178] Floating structures with storage capacity generally require an anchoring system and sufficient water depth (generally deeper than 160 ft) to accommodate a flexible pipeline connection between the unit and the seafloor pipeline.[179] Since FSRUs, as well as other LNG carriers, are typically connected to a gas export system using hoses or subsea pipelines, the connecting pipelines are subject to the technical requirements established by PHMSA regulations.[180]

The matter of jurisdiction over FSRUs was further complicated by a 2016 FERC Order Denying Rehearing over whether the FERC's jurisdiction extended to an FSRU.[181] In *Aguirre Offshore Gasport, LLC*,

172. Harvey Y. Morris, *Notice of Intervention and Protest of the Public Utilities Commission of the State of California*, Sound Energy Solutions FERC, Docket No. CP04-58-000, p. 6 (Feb. 23, 2004).

173. William Wan, *State Seeks Rehearing on LNG Projects*, L.A. TIMES (Apr. 28, 2004, 12:00 AM), http://articles.latimes.com/2004/apr/28/local/me-lng28 [https://perma.cc/K6ZM-7PJC].

174. Pub.L. 109-58, 119 Stat. 594 (2005).

175. Gary Polakovic, *Long Beach Energy Project Halted*, L.A. TIMES (Jan. 23, 2007, 12:00 AM), https://www.latimes.com/archives/la-xpm-2007-jan-23-me-lng23-story.html [https://perma.cc/FMW6-DSZ9].

176. FOSS, s*upra* note 62, at 36, 37.

177. *Id.*

178. *Id.*

179. *Id.*

180. Aguirre Offshore GasPort, LLC, 155 F.E.R.C. ¶ 61,139, at P 6 (2016).

181. *Id.*

FERC concluded that FSRUs are "not subject to Commission jurisdiction" if they can be classified as "a waterborne vessel capable of ocean travel and will be used to deliver natural gas to or form an LNG Terminal."[182] FERC reviewed the definition of "LNG Terminal" in Section 2 of the Natural Gas Act and found that the exception placed the FSRU outside of the Commission's jurisdiction.[183] Thus, although FSRUs and other floating facilities can provide services identical to land-based LNG terminals, their status as a vessel excludes them from certain aspects of FERC's authority.

1. United States Coast Guard (USCG)–Part II

In addition to FERC's onshore operations requirements, LNG marine operations must adhere to LNG vessel management procedures and emergency plans developed by the regional USCG's marine safety unit.[184] These procedures contain requirements for pre-arrival notification, harbor transit, dock operations, cargo transfer, inspection, monitoring and emergency operations.[185] Due to the volatile nature of LNG, the USCG maritime security regulations mandate that LNG vessels with product aboard have "moving security zones" and harbor escorts under USCG to mitigate the possibility of an accident or attack.[186]

The USCG also co-regulates ballast water[187] discharges under authority of the Nonindigenous Aquatic Nuisance Prevention Control Act (NANPCA) and the National Invasive Species Act (NISA).[188] Although regulatory authority is shared with the EPA, commercial shipping interests push for the USCG, in part because of the agency's general familiarity with the industry, and also because their enabling statute does not provide for citizen suits.[189]

182. *Id.* at P 20.

183. *Id.* at P 22 (2016); 15 U.S.C. § 717a(11).

184. PARFOMAK & FLYNN, *supra* note 112, at 24.

185. *Id.*

186. *Id.*; SECTOR SAN JUAN, PREVENTION DEP'T U.S. COAST GUARD, VESSEL AGENT'S HANDBOOK 44 (2009).

187. Ballast water means any water and suspended matter taken on board a vessel to control or maintain, trim, draught, stability, or stresses of the vessel, regardless of how it is carried. 33 C.F.R. § 151.1504.

188. Peter R. Knight & Tavo True-Alcalá, *Regulatory Complexity and Ballast Water Management: Ratification Heightens Concerns Over U.S. Regulations*, MAR. EXECUTIVE (Sept. 19, 2016, 2:20 PM), https://www.maritime-executive.com/editorials/regulatory-complexity-and-ballast-water-management [https://perma.cc/6N7B-U4BA].

189. *Id.*

As a result of litigation, all non-recreational, non-military vessels must have an NPDES permit such as the Vessel General Permit (VGP)[190] before they can legally discharge (and operate) in U.S. waters.[191] Failure to have NPDES permit coverage may result in severe civil and criminal penalties.[192] The VGP requires that vessel owners and operators meet certain requirements, including: seeking coverage for most vessels, assuring their discharges meet effluent limits and related requirements, corrective action process for fixing permit violations, and requirements for inspections, monitoring, recordkeeping, and reporting.[193] Additionally, the Clean Water Act allows states to provide different, more stringent requirements for discharges into their state's waters. These requirements can be found in the VGP and should be consulted prior to entering any state's waters.[194]

2. U.S. Environmental Protection Agency

The United States Environmental Protection Agency (EPA) regulates the discharge of pollutants, including ballast water, from point sources into waters of the United States under authority of the Clean Water Act (CWA).[195] The EPA and the USCG act "as co-regulators of ballast water discharges."[196] The EPA has jurisdictional authority to regulate ballast water, as well as 26 other incidental discharges, through the Vessel General Permit (VGP) issued under the CWA.[197] The EPA and USCG have recognized their overlapping jurisdiction and have made some effort to coordinate, as evidenced by an EPA guidance on enforcement of

190. SECTOR SAN JUAN, *supra* note 186, at 58. ("The Vessel General Permit applies to discharges incidental to the normal operation of all non-recreational, non-military vessels of 79 feet or greater in length which discharge in waters of the United States.").

191. Nw. Envtl. Advocates v. Envtl. Prot. Agency, 537 F.3d 1006, 2008 A.M.C. 2459 (9th Cir. 2008).

192. 33 C.F.R. §§ 151.1518, 151.2080.

193. SECTOR SAN JUAN, *supra* note 186, at 58.

194. *Id.*

195. *Id.*

196. *Envt'l Prot. Agency, Enforcement Response Policy for EPA's 2013 Vessel General Permit: Ballast Water Discharges and U.S. Coast Guard Extensions under 33 C.F.R. Part 151*, at 2 (Dec. 27, 2013).

197. Knight & True-Alcalá, *supra* note 188.

discharges for ships that are not in compliance with EPA requirements but that have received extensions from the USCG.[198]

Additionally, the USCG and MARAD forward deepwater port license applications to the EPA Regional Office for consideration under laws administered by the EPA, including the Clean Air Act (CAA), the Clean Water Act (CWA), and the Marine Protection, Research, and Sanctuaries Act (MPRSA).[199] If the EPA determines that the application is not complete for its purposes, MARAD suspends the review period.[200]

3. Army Corps of Engineers

The Army Corps of Engineers (Corps) is responsible for the administration of laws for the protection and preservation of waters of the United States, including wetlands, pursuant to section 10 of the Rivers and Harbors Act of 1899 (RHA)[201] and Section 404 of the Clean Water Act (CWA).[202]

Section 10 of the RHA established a program to regulate activities affecting navigation in all domestic waters, including wetlands.[203] The RHA requires a permit for any work or structure, including construction, excavation, or deposition of materials, in or affecting the course, condition, location, or capacity of "navigable waters of the United States"[204] and artificial islands, installations, or other devices in the subsoil or on the seabed of the outer continental shelf. Activities requiring RHA section 10 permits include structures (e.g., piers, wharfs, breakwaters, bulkheads, jetties, weirs, transmission lines) and work, such as dredging or disposal of dredged material, or excavation, filling, or other modifications to the navigable waters of the United States.

Section 10 permits are issued by the Corps, often in conjunction with a CWA section 404 permit.[205] The EPA can comment on RHA section 10

198. *See U.S. Envt'l Prot. Agency*, *Enforcement Response Policy for EPA's 2013 Vessel General Permit: Ballast Water Discharges and U.S. Coast Guard Extensions under 33 C.F.R. Part 151* (Dec. 27, 2013).

199. U.S. ENVT'L PROT. AGENCY, EPA-203-B-06-001, EPA'S LIQUEFIED NATURAL GAS REGULATORY ROADMAP 5 (2006).

200. *Id.* at 8.

201. 33 U.S.C. § 403.

202. 33 U.S.C. § 1344.

203. 33 C.F.R. § 322.3.

204. 33 C.F.R. § 322.2(a) (those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce).

205. C.F.R. § 322.3(c).

permits as part of the Corps' public interest review process (in response to the Public Notice for a permit application).[206]

III. THE AGUIRRE OFFSHORE GASPORT

Jurisdiction over floating LNG (specifically a waterborne-FSRU vessel) has only been reviewed by FERC once. Prior to 2014, the Puerto Rico Electric Power Authority (PREPA)[207] contracted with Excelerate Energy to provide natural gas for electricity generation on the island.[208] PREPA is responsible for generating 70.1% of the island's electric energy demands.[209] Unlike continental state power grids, the electric system in Puerto Rico is an isolated one. Before the Aguirre Project, 70% of the electric power generated in Puerto Rico derived from oil.[210] As a result, the cost of electricity on the island "rank[ed] among the highest and most volatile in comparison with other jurisdictions."[211]

The Aguirre Project consisted of: (1) a FERC-jurisdictional LNG import terminal comprised of an offshore berthing platform and a short subsea interconnecting pipeline; and (2) a non-jurisdictional vessel operating as a FSRU for the Project, as well as certain minor non-jurisdictional on-shore natural gas interconnection and receiving facilities.[212] FERC ultimately authorized the construction of the Aguirre plant following a rigorous environmental review process.[213] The Commission found that, because the FSRU is a non-jurisdictional facility, the use of alternative vaporization methods were out of the scope of this

206. U.S. ENVT'L PROT. AGENCY, EPA-203-B-06-001, EPA'S LIQUEFIED NATURAL GAS REGULATORY ROADMAP 17 (2006).

207. PREPA is a public corporation created by Puerto Rico Law No. 83 of 1941.

208. Letter from Juan Flores, Executive Director, Puerto Rico Electric Power Authority, to the Fed. Energy Reg. Comm'n, Docket No. CP 13-193-000, Aguirre Offshore GasPort Project, at *2 (May 22, 2014).

209. *Id.*

210. *See* FED. RES. BANK OF N.Y., REPORT ON THE COMPETITIVENESS OF PUERTO RICO'S ECONOMY 12 (2012) https://www.newyorkfed.org/media library/media/regional/PuertoRico/report.pdf [https://perma.cc/G3UJ-4S93] ("By comparison, only 1 percent of U.S. generation relies on oil.").

211. The 2010 Public Policy on Energy Diversification by Means of Sustainable and Alternative Renewable Energy in Puerto Rico Act, S.B. 1519, Act No. 82 (July 19, 2010) (Statement of Motives), http://www.oslpr.org/ download/en/2010/A-0082-2010.pdf [https://perma.cc/YF3Q-WFCU].

212. Aguirre Offshore GasPort, LLC, 155 F.E.R.C. ¶ 61,139 (2016).

213. Aguirre Offshore GasPort, LLC, 152 F.E.R.C. ¶ 61,071 (2015).

EIS and could not be required for impact mitigation.[214] Additionally, the EIS stated that emissions from the FSRU fell under multiple exemptions to the Clean Air Act.[215]

Comité Diálogo Ambiental (or "intervenor"), an environmental advocacy group, intervened and requested rehearing, challenging these aspects of the Environmental Impact Statement as well as the Commission's jurisdictional determination.[216] On rehearing, FERC reviewed the definition of "LNG Terminal" in section 2 of the Natural Gas Act and found that the statute's exception placed the FSRU outside of the Commission's jurisdiction.[217] FERC concluded that FSRUs are "not subject to Commission jurisdiction" if they can be classified as "a waterborne vessel capable of ocean travel and will be used to deliver natural gas to or form an LNG Terminal."[218] Thus, although FSRUs and other floating facilities can provide services identical to land-based LNG terminals, their status as a vessel excludes them from certain aspects of FERC's authority, such as siting, licensing, and mitigating during environmental assessments.

IV. BARRIERS TO THE OFFSHORE SOLUTION

This discussion begs the question of whether floating LNG vessels are a problem created by statutory pitfalls or are rather the inevitable solution to a regulatory framework that is buckling under the global demand for LNG. The reality is that both premises are simultaneously true. The benefits of LNG—economically, politically, and environmentally—are significant, and despite obvious loopholes for waterborne vessels, federal agencies see no need for alarm.[219] The Aguirre Project illustrated an important legal exception for floating LNG projects and an opportunity to

214. Fed. Energy Reg. Comm'n, Aguirre Offshore Gasport Project, *Final Environmental Impact Statement*, Docket Nos. CP13-193-000 and PF12-4-000, at 3-39 (February 20, 2015).

215. *Id.* at 4-127 to 4-130.

216. Aguirre Offshore GasPort, LLC, 155 F.E.R.C. ¶ 61,139 (2016).

217. Aguirre Offshore GasPort, LLC, 155 F.E.R.C. ¶ 61,139, at P 22 (2016); 15 U.S.C. § 717(a)(11).

218. Aguirre Offshore GasPort, LLC, 155 F.E.R.C. ¶ 61,139, at P 20 (2016); *see also* 15 U.S.C. § 717(a)(11) ("LNG Terminal . . . *does not include* . . . *waterborne vessels used to deliver natural gas to or from any such facility.*").

219. *See* Aguirre Offshore GasPort, LLC, 155 F.E.R.C. ¶ 61,139, at P 22 (2016). FERC seemed to indicate the use of Execelerate's non-jurisdictional FSRU was of little concern in Aguirre, since the project inevitably would be subject to some agency oversight–USCG and PHMSA–and because FERC retained jurisdiction over other aspects of the project.

transport natural gas to coastal and island markets (such as Puerto Rico, Hawaii, and Guam) within the United States.

The above discussion—which hopefully highlighted the cost benefits, regulatory benefits, and policy benefits of floating LNG—begs the question: why not use FLNG for interstate sales? Would it not be strategic to have FSRU's for domestic use for coastal natural gas markets? For example, during the "polar vortex," the lack of natural gas pipeline capacity left New England with an insufficient supply of gas and large price spikes.[220] Additionally, after Hurricane Maria it took Puerto Rico nearly a year to fully restore electric power to the island.[221]

If the market is demanding these vessels for LNG imports and exports, why not transport our own natural gas reserves on FSRUs throughout the United States? The answer is a World War I-era shipping law, the Merchant Marine Act of 1920, better known as "The Jones Act" (or "Act").[222] The relevant portions of the Act require that goods shipped between two or more U.S. ports must be transported on ships built, owned, and operated by United States citizens or permanent residents.[223] Unfortunately, nearly all FSRU new-builds are constructed in Asian countries, including Japan, South Korea, and Singapore.[224]

The Jones Act has been criticized for restricting trade conduct with Puerto Rico, Alaska, and Hawaii, and has been cited as a contributing factor of Puerto Rico's economic and budgetary troubles. A 2012 study by the New York Federal Reserve Bank found that the cost of transporting a shipping container to Puerto Rico from the continental United States was twice as high as shipping the same freight from a foreign port.[225] Opponents of the Jones Act want it repealed, hoping that this will result in

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220. Julia Edwards, *Analysis: Arctic Chill Exposes Weakness of U.S. NaturalGasSystem*, REUTERS (Jan. 8, 2014, 4:25 AM), https://www.reuters.com/article/us-natgas-pipelines-chill-analysis/analysis-arctic-chill-exposes-weakness-of-u-s-natural-gas-system-idUSBREA0700H20140108?feedType=RSS&feedName=topNews&utm_source=dlvr.it&utm_medium=twitter&dlvrit=992637 **[**https://perma.cc/LMC8-3PTH].

221. Emily Sullivan, *Nearly A Year After Maria, Puerto Rico Officials Claim Power Is Totally Restored,* NPR (Aug. 15, 2018, 2:22 AM), https://www.npr.org/2018/08/15/638739819/nearly-a-year-after-maria-puerto-rico-officials-claim-power-totally-restored [https://perma.cc/E96M-E9Q6].

222. 46 U.S.C. § 55102.

223. *See id.*

224. Huihui Chen, *Asian Shipyards Target Small to Mid-scale FSRU Orders,* RIVIERA NEWSDESK (Oct. 9, 2015), https://www.rivieramm.com/opinion/asian-shipyards-target-small-to-mid-scale-fsru-orders-35542 [https://perma.cc/9CLX-TR3B].

225. FED. RES. BANK N.Y., *supra* note 210.

decreased shipping costs, lower prices, and less strain on government budgets.[226] Proponents of the Act include states with owners of navy yards, defense firms, and shipping industries, as well as the longshoremen and other personnel who work in ports.[227]

Although an amendment to the Jones Act's coastal trade prohibitions would reduce the number of U.S. maritime jobs, such an action would significantly reduce shipping costs and could create more jobs in the booming U.S. natural gas industry. This ultimately could allow for the use of FSRU's (and other waterborne LNG vessels) in interstate commerce for U.S. coastal states. For example, gas-rich states like Alaska could ship domestic LNG on an FSRU, not only to the lower 48 states, but to distant markets including Hawaii and Puerto Rico. This undoubtedly would be considered an interstate sale (and transportation) of natural gas, triggering FERC's jurisdiction under the Natural Gas Act.[228] Thus, a change to the Jones Act has the ability to increase the use of waterborne LNG vessels and cure federal jurisdictional loopholes without having to amend major provisions in U.S. energy laws.

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226. Beverly Creamer, *Jones Act: Pro and Con*, HAWAII BUS. MAG. (Sept. 3, 2019), https://www.hawaiibusiness.com/jones-act-pro-and-con/ [https://perma.cc/B3K2-GUKS].

227. *Id.*

228. 15 U.S.C. § 717(b).

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