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Offshore Wind: Lessons From Abroad

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INTRODUCTION

Grimsby, a small city on Northern England's east coast, was once the largest fishing port in the world.[1] But as the United Kingdom's fishing industry collapsed, so did Grimsby's economy.[2] *Skint*, a documentary series about unemployed and impoverished Brits, filmed its second season in Grimsby; the city was also lampooned in Sacha Baron Cohen's 2016 comedy, *The Brothers Grimsby*. However, as offshore wind farms have sprung up off the city's coast over the past decade, its economy has boomed.[3] Seven offshore wind farms currently sit off the coast of Grimsby, generating over 1 gigawatt (GW) of energy, and what is projected to be the largest wind farm in the world is under construction. The wind farms, initially feared as the final blow for the city's struggling fish industry, have become an economic savior.[4] The once-desolate port now bustles with construction vessels and smaller ships transporting technicians out to the farms.[5] Ørsted, the largest offshore wind developer in the world, is building a new offshore wind manufacturing facility that will bring a slew of new jobs to the area and likely give Grimsby a new title: the largest offshore wind maintenance and operations hub in the world.[6]

Offshore wind could be a boon for America's coastal states as well, as the U.S. stands to harness not just copious amounts of renewable energy but also offshore wind's economic potential. The Department of Energy (DOE) estimates that the industry could support 34,000 jobs by 2020 and up to 181,000 by 2050.[7] Approximately 2,058 GWs could be captured with current technology, but the DOE estimates up to 10,800 GWs could be generated "within the 200 nautical miles Exclusive Economic Zone (EEZ)"—nearly double the national consumption rate.[8] However, with

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1. Alan Middleton, *Grimsby's fishing heritage*, LINCOLNSHIRE LIFE (Jan. 2013), https://perma.cc/WBC5-BKXY.
2. Chris Bentley, *For A Vision of Offshore Wind in New England, Look to the U.K.*, WBUR (Jan. 16, 2018), https://perma.cc/7825-BUY7.
3. Chris Bentley, *Offshore wind projects breathe life into struggling UK ports,* PRI'S THE WORLD (Feb. 14, 2018, 1:30 pm), https://perma.cc/GC4K-2Y7H.
4. Bentley, *supra* note 2.
5. Bentley, *supra* note 3.
6. *Id.*
7. U.S. DEP'T OF ENERGY, NATIONAL OFFSHORE WIND STRATEGY 22 (2016).
8. BUREAU OF OCEAN ENERGY MANAGEMENT, A CITIZEN'S GUIDE TO THE BUREAU OF OCEAN ENERGY MANAGEMENT'S RENEWABLE ENERGY AUTHORIZATION PROCESS 2 (2016).

only one operating farm nation-wide, offshore wind development in the U.S. has been widely considered a missed opportunity.[9]

The U.K., on the other hand, is the world leader in offshore wind production.[10] The country generates 6.84 GW of offshore wind capacity (out of 18.81 GW capacity worldwide, or just over 36% of global capacity)[11] and constructed 53% of Europe's new capacity in 2017.[12] Its offshore wind prices are at a record low, with contracts for 2022-23 awarded for £57.50 ($75.86) per megawatt hour (MWh). The industry employs over 230,000 people, has a yearly turnover of £43 billion, and is expected to bring another £17.5 billion in investments to the country as prices continue to drop.[13]

How has the U.K. become so successful, and what lessons could the U.S. learn from its approach? This Article aims to answers this question by first looking at the current U.S. offshore market and the current federal and state policies. It will then discuss the U.K.'s policy framework and analyze what approaches have made its offshore wind market thrive. Lastly, the two frameworks will be compared, and lessons will be gleaned from the U.K.'s success.

I. THE U.S. POLICY FRAMEWORK

A. Leasing and Regulation

The U.S. framework for offshore wind development is largely governed by the Energy Policy Act (EPAct) of 2005.[14] Entitled "Alternative Energy-Related Uses on the Outer Continental Shelf," Section 388 of the EPAct provides the Secretary of the Interior ("the Secretary") the power to grant "a lease, easement, or right-of-way on the Outer Continental Shelf" for offshore wind projects.[15] The Secretary has a bevy of obligations that come with this power, including obligations to:

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9. Jeremy Firestone, *Legal Framework to Develop Offshore Wind Power in United States,* THE DEVELOPMENT OF A COMPREHENSIVE LEGAL FRAMEWORK FOR THE PROMOTION OF OFFSHORE WIND POWER 145, (Anton Ming-Zhi Gao & Chien-Te Fan eds., 2017).

10. GLOBAL WIND ENERGY COUNCIL, GLOBAL WIND STATISTICS 2017 4 (2018).

11. *Id.* at 3.

12. Adam Vaughn, *UK build half of Europe's offshore wind power in 2017*, THE GUARDIAN (Feb. 6, 2018), https://perma.cc/ET7V-6ED4.

13. Jillian Ambrose, *Offshore wind to power £17.5bn investment boom as costs halve,* THE TELEGRAPH (Sept. 11, 2017, 8:04 AM), https://perma.cc/U7W3-8AAJ.

14. Energy Policy Act of 2005, 42 U.S.C. § 388 (2005).

15. Energy Policy Act of 2005, Pub. L. No. 109-58, sec. 338(a), § 1337(p)(1), 119 Stat. 594, 744.

- ensure the project properly plans for safety and environmental concerns (including environmental protection, waste prevention, and conservation of natural resources);[16]
- coordinate with "relevant Federal agencies" and interests (including "national security interests," the Secretary of the Coast Guard, the Secretary of Defense, the Secretary of Commerce, and "heads of other relevant departments and agencies");[17]
- coordinate with the public and states (including providing public notice and comment, respecting "correlative rights" and other "reasonable uses" of the seabed and the lease area, and coordinating with any state or local governments affected by the process);[18]
- provide "oversight, inspection, research, monitoring, and enforcement";[19] and
- ensure "a fair return" for the U.S. through the establishment of "royalties, fees, rentals, bonuses, or other payments."[20]

The Secretary has delegated the implementation of offshore wind leasing and construction to the Bureau of Ocean Energy Management (BOEM).[21] The BOEM manages 1.7 billion acres of federal submerged lands, starting three nautical miles from the coast in most cases and stretching to the EEZ.[22]

Under the Renewable Energy Program regulations finalized in 2009,[23] the BOEM has a four-stage process for commercial offshore wind leasing: (1) Planning and Analysis (~two years), (2) Leasing (~one to two years), (3) Site Assessment (up to five years), and (4) Construction and Operations (~two years plus the lease term).[24] In the Planning and Analysis

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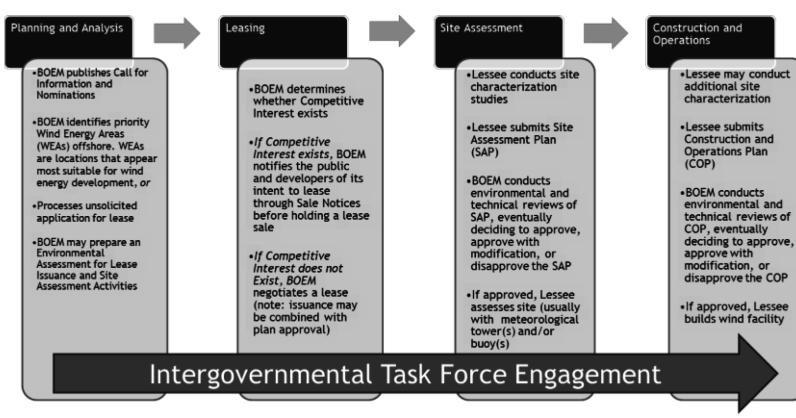
16. Energy Policy Act of 2005, Pub. L. No. 109-58, sec. 388(a), § 1337(p)(4), 119 Stat. 594, 745.
17. *Id.*
18. *Id.*
19. *Id.*
20. Energy Policy Act of 2005, Pub. L. No. 109-58, sec. 338(a), § 1337(p)(2)(A), 119 Stat. 594, 745.
21. Firestone, *supra* note 9, at 147.
22. *A Citizen's Guide, supra* note 8, at 3; *Federal Offshore Lands*, BUREAU OF OCEAN ENERGY MANAGEMENT, https://perma.cc/9WJS-J44X (last visited May 9, 2018). The EEZ is the offshore area up to 200 nautical miles from U.S. territories, claimed by the U.S. as prescribed by UN Convention on the Law of the Sea.
23. Firestone, *supra* note 9, at 154.
24. *Fact Sheet: Wind Energy Commercial Leasing Process,* BUREAU OF OCEAN ENERGY MANAGEMENT 1-2 (Jan. 24, 2017), https://perma.cc/2LCS-2U3G;

phase, the BOEM identifies potential project sites, engages stakeholders, consults relevant agencies and governments, and conducts an environmental compliance review.[25] In the Leasing phase, the BOEM determines whether it will issue the lease through a competitive or non-competitive process and ultimately grants a lease providing the exclusive right to assess the site and later seek BOEM approval for development.[26] Once granted, the Site Assessment phase begins—the lessee creates a Site Assessment Plan (SAP) and submits it to the BOEM, who decides if the plan is technically and environmentally sound.[27] If approved, the lessee conducts the SAP, as well as any "site characterization surveys and studies (e.g., avian, marine mammal, archeological)."[28] Lastly, in the Construction and Operations phase, the lessee submits a detailed Construction and Operations Plan to the BOEM for approval.[29] If approved, lessees finally begin construction. In this phase, the BOEM also requires the submission of a decommissioning plan before the end of the lease term.[30] Throughout the entire process, the BOEM consults with the Intergovernmental Renewable Energy Task Force of any affected state, which are state-level organizations that provide a state voice in the offshore leasing process.[31]

Figure 1.1 The BOEM's Four-Phase Wind Energy Commercial Leasing Process[32]



Regulatory Roadmap, BUREAU OF OCEAN ENERGY MANAGEMENT, https://perma.cc/26KL-GLLS (last visited May 12, 2018). *See* Figure 1.1.

25. *Id*.

26. *Id*.

27. *Id*.

28. *Id*.

29. *Id*.

30. *Fact Sheet, supra* note 24, at 2.

31. *Id*. at 1. Fourteen states have Task Forces: California, Delaware, Florida, Hawaii, Maine, Maryland, Massachusetts, New Jersey, New York, North Carolina, Oregon, Rhode Island, South Carolina, and Virginia. *Id.*

32. *Id.*

A web of other agencies are involved in the development of an offshore wind project and handle either regulatory or research-oriented pieces of the puzzle.[33] The physical process of offshore construction and navigation implicates the Coast Guard, which controls "commercial shipping fairways and traffic separation schemes;" the Army Corps of Engineers, which handles "obstructions to navigation, dredging and filing, and sand mining;" as well as the Navy, which controls "training and testing" and is charged with protecting submarine cables.[34] Wildlife concerns are addressed by both the National Oceanic and Atmospheric Administration (NOAA), which is charged with protecting "marine mammals, endangered species, sea turtles, commercial and recreational fisheries, [and] marine aquaculture," and the Fish and Wildlife Service, which protects "migratory birds, marine mammals, endangered species, [and] sea turtles."[35] The Environmental Protection Agency (EPA), which monitors "air discharge from service vehicles" and the climate generally, is also implicated by offshore projects.[36]

Offshore wind projects may also trigger, less directly, the Federal Energy Regulatory Commission (FERC), the Federal Aviation Administration (if the project will obstruct aircraft), and the National Park Service (NPS) (if the project will conflict with the NPS's "mandate to conserve the scenery").[37] The National Environmental Policy Act of 1969 (NEPA), which governs environmental impact statements, requires federal agencies—such as those involved in the offshore wind project approval process—to consider environmental impacts before taking action.[38] NEPA doesn't require a specific outcome, but it is designed to facilitate communication between federal agencies throughout the process.[39]

B. Incentives and Industry Development

While the BOEM regulates federal offshore leases, it does not have to promote offshore wind—that role belongs to the DOE.[40] Since 2011, the DOE has funneled "over $200 million to offshore wind research and development projects for technology development and market barrier

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33. Firestone, *supra* note 9, at 148.
34. *Id.* (internal citations omitted).
35. *Id.* (internal citations omitted).
36. *Id.* (internal citations omitted).
37. *Id.* (internal quotations and citations omitted).
38. Firestone, *supra* note 9, at 155.
39. *Id.*
40. Firestone, *supra* note 9, at 147.

removal, as well as advanced technology demonstration."[41] The market barriers the DOE has tackled thus far include limiting offshore wind's environmental impact, linking offshore turbines to the national grid, analyzing the nation's ability to support an offshore supply chain, and gathering offshore wind resource data.[42]

Federal incentives for wind energy development mainly consist of the production tax credit (PTC), measured per kilowatt hour (KWh), and the incentive tax credit (ITC), which is "based on a percentage of capital cost expenditures."[43] Congress has authorized both incentives intermittently, but only for one-to-two year periods before they require re-authorization.[44] They have often lapsed during this wait time, although Congress has made them retroactive.[45] Given an offshore wind project's five-to-seven-year timeline, this uncertainty has been counter-productive to incentivizing growth.[46] In 2015, Congress enacted a "five-year wind power PTC with a phasedown in recognition of the increasing cost parity of land-based wind."[47] Projects must commence construction by December 31, 2019 in order to qualify for either tax credit.[48] The federal government also offers loan guarantees, but these have been under-utilized.[49]

There were concerns that offshore wind, and renewables generally, would suffer under the Trump administration. Trump had previously claimed climate change was a Chinese hoax meant to destabilize U.S. manufacturing,[50] pulled out of the Paris Agreement, and pandered to coal groups throughout his campaign.[51] He also waged a long-time battle against a planned offshore wind farm near his Scottish golf course, mainly based on aesthetic grounds.[52] The conflict resulted in a series of tweets on offshore wind, where Trump called wind turbines an "environmental [and]

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41. U.S. DEP'T OF ENERGY WIND ENERGY TECHNOLOGIES OFFICE, OFFSHORE WIND INITIATIVES AT THE U.S. DEP'T OF ENERGY 1 (2017).
42. *Id.*
43. Firestone, *supra* note 9, at 152.
44. *Id.*
45. *Id.*
46. *Id.*
47. *Id.* at 153.
48. U.S. DEP'T OF ENERGY, ADVANCING THE GROWTH OF THE U.S. WIND INDUSTRY: FEDERAL INCENTIVES, FUNDING, AND PARTNERSHIP OPPORTUNITIES 1-2 (2017).
49. Firestone, *supra* note 9, at 153.
50. @realDonaldTrump, TWITTER (Nov. 6, 2012, 1:15 PM), https://perma.cc/HGH7-HC49 ("The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.").
51. Michael Reilly, *Trump Once Railed Against Offshore Wind but Is Now Embracing It*, MIT TECHNOLOGY REVIEW (Apr. 10, 2017), https://perma.cc/CL5Y-6X74.
52. *Id.*

aesthetic disaster," blamed them for killing bald eagles,[53] and stated that if "Obama keeps pushing wind turbines[,] our country will go down the tubes economically, environmentally[, and] aesthetically."[54] He continued to push the issue after his election, urging U.K. politician Nigel Farage to oppose offshore wind during their first meeting.[55]

These fears have been assuaged, beginning with a late-2017 announcement that the DOE would push an additional $18.5 million toward "an offshore wind research and development consortium" with the mission of decreasing costs through "technology advancement, resource and physical site characterization[,] . . . and supply chain technology solutions," along with $2 million for further research at the DOE's existing labs.[56] Secretary of Interior Ryan Zinke spoke at the International Offshore Wind Partnering Forum in April 2018, calling for "increased offshore wind development along the U.S. Atlantic coast"[57] and stating that the Trump administration "supports an all-of-the-above energy policy and using every tool available to achieve American energy dominance."[58] As the BOEM's energy policy counselor stated, "the outlook for offshore wind is bright."[59]

II. THE STATE OF THE U.S. OFFSHORE MARKET

The U.S. offshore wind industry, after decades of little development, appears to be gaining traction, with federal support supplementing a surge in activity by Northeast states. The BOEM has awarded thirteen offshore leases on the Atlantic coast, and it announced two new proposed lease sales off Massachusetts in April 2018.[60] It is also seeking lease

53. @realDonaldTrump, TWITTER (Aug. 24, 2012, 4:55 PM), https://perma.cc/FVN8-EEDF ("It's Friday. How many bald eagles did wind turbines kill today? They are an environmental & aesthetic disaster.").

54. @realDonaldTrump, TWITTER (Oct. 17, 2012, 12:53 PM), https://perma.cc/KSU5-J3UA.

55. Reilly, *supra* note 51.

56. *Secretary of Energy Rick Perry Announces $18.5 Million for Offshore Wind Research,* DEP'T OF ENERGY (Dec. 12, 2017), https://perma.cc/Z6Q6-WNCM (last visited May 10, 2018).

57. Raya B. Treiser et al., *Infrastructure Series: Momentum Builds for Offshore Wind Energy Development in the United States*, WILMER HALE (Apr. 19, 2018), https://perma.cc/784V-X2LG.

58. Jason Deign, *The US Wind Sector Toasts Trump's New Love of Offshore*, GREEN TECH MEDIA (Apr. 11, 2018), https://perma.cc/FGK3-YYWW.

59. *Id.*

60. *Id.; see also Lease and Grant Information*, BOEM, https://perma.cc/F4VR-STLK (last visited May 10, 2018), (listing leases issued off the coasts of Rhode Island, Massachusetts, Virginia, Maryland, New Jersey, New York, North Carolina, Delaware, and Florida).

nominations for the New York Bight, a shallow area between Long Island and the New Jersey coast.[61]

United States' projects currently in development would generate 13 GW of power.[62] One notable development is "Constitution Wind," a recently-announced project off the coast of Connecticut proposed by Bay State Wind (a joint venture between the New England-based provider Eversource and the Danish-based producer Ørsted).[63] The Constitution Wind project, with a 200 MW capacity, will share the same federal lease as the venture's existing Bay State Wind project, which has a planned 800 MW capacity—bringing the venture's total lease production to 1 GW.[64] Other active leases span the Atlantic coast, including areas off Virginia, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and North Carolina.[65]

A decline in the cost of offshore wind production has partly contributed to this surge, and prices are forecasted to continue dropping.[66] One recent study estimated that offshore wind energy could be sold for as little as $100-110 per MWh in the Northeast United States, which is close to the total cost of constructing an offshore farm in the area, based on prices awarded in recent auctions.[67] Block Island's production was sold for $244 per MWh in 2016, Skipjack and Ocean City dropped to $137 per MWh in 2017,[68] and Maryland paid $132 per MWh in 2017 for 386 MWs scheduled to come online in 2020.[69] Projections estimate that prices will drop to $80 per MWh in some regions—bringing the price for offshore wind closer to the $50 per MWh wholesale energy price forecasted for the Northeast.[70]

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61. Deign, *supra* note 58.
62. Tom Johnson, *Moody's likes the look of NJ, other Northeastern states, for offshore wind*, NJ SPOTLIGHT (Apr. 2, 2018), https://perma.cc/P73D-6PE4.
63. Joshua S. Hill, *Ørsted & Eversource Announce 200 Megawatt Connecticut Offshore Wind Farm*, CLEAN TECHNICA (Apr. 3, 2018), https://perma.cc/7KRR-A5MZ.
64. *Id.*
65. *Lease and Grant Information,* BOEM, https://perma.cc/8SH8-DJML (last visited May 12, 2018).
66. David Foxwell, *Offshore wind 'poised to take off' in the US northeast*, OFFSHORE WIND JOURNAL (Apr. 3, 2018), https://perma.cc/53PY-CLSR.
67. Mike O'Boyle, *Is Offshore Wind About to Hit Competitiveness in New York and New England?*, FORBES (May 2, 2018, 7:55 AM), https://perma.cc/SY3X-GUGW.
68. Foxwell, *supra* note 66.
69. O'Boyle, *supra* note 67.
70. Foxwell, *supra* note 66.

III. U.S. STATE-LEVEL ACTION

Most of the push for offshore wind thus far has originated at the state level.[71] Some states have passed legislation requiring or encouraging the development of offshore wind: A Massachusetts law requiring 1,600 MW to be drawn from offshore wind is ramping up,[72] and New York's Offshore Wind Master Plan aims to have "2.4 GWs of capacity by 2030, which the state expects will deliver 5,000 jobs."[73]

State-level policies, or obstructions, have played a key role in offshore wind development. The U.S. has had two high-profile offshore projects over the past two decades: Cape Wind, an embattled project sited in the Nantucket Sound that never materialized, and Block Island, the first operational offshore wind farm in the United States. While Cape Wind is a cautionary tale, Block Island illustrates the power of state policies to make offshore wind farms in the U.S. a reality.

A. Cape Wind

While Block Island holds the title of the first offshore wind farm in the U.S., Cape Wind may be the most notorious. The project was the brainchild of Jim Gordon, the president of Energy Management Inc., who entered the renewable energy market with a desire to combat U.S. dependency on foreign oil.[74] Cape Wind was initially planned to have 130 turbines in a 25-square-mile area of the Nantucket Sound, which would produce enough electricity to power 200,000 homes.[75] Gordon once envisioned Cape Wind kicking off a surge of offshore wind farms on the East Coast, but after investing $100 million of his own money and sixteen years of time, the project finally relinquished its lease to the BOEM in December 2017.[76]

Cape Wind faced broad, relentless, and deep-pocketed opposition. Siting was the central issue—the lease was bordered by Cape Cod,

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71. Deign, *supra* note 58.

72. Brady Dennis, *The nation's first offshore wind farm is ready to go, despite critics' blowback*, THE WASHINGTON POST (Aug. 27, 2016), https://perma.cc/FB2H-7CD4.

73. Deign, *supra* note 58.

74. Katharine Q. Seelye, *After 16 Years, Hopes for Cape Cod Wind Farm Float Away*, THE NEW YORK TIMES (Dec. 19, 2017), https://perma.cc/E9RD-MZBX.

75. Brian Eckhouse & Joe Ryan, *What Was Once Hailed as First U.S. Offshore Wind Farm Is No More*, BLOOMBERG (Dec. 2, 2017, 4:00 AM), https://www.bloomberg.com/news/articles/2017-12-01/cape-wind-developer-terminates-project-opposed-by-kennedys-koch.

76. Seelye, *supra* note 74.

Nantucket, and Martha's Vineyard, making it visible to wealthy landowners including the Kennedys; William I. Koch, a fossil-fuel made billionaire; and "Rachel Lambert Mellon, the heiress and philanthropist [known] as Bunny."[77] Aesthetics were not the only problem—"local officials, business owners, fisherman, Indian tribes, and residents cited the high cost of offshore wind power, navigational hazards and threats to the environment" as concerns.[78] The Alliance to Protect Nantucket Sound, led by Mr. Koch, claimed the project was a land grab by a private developer and vowed to stop the project in its tracks.[79] His efforts may have made Cape Wind the most litigated wind project in the world.[80] Koch's Alliance spent over $40 million delaying the project through the court system.[81] Administrative hearings and contentious litigation frustrated permitting attempts and repeatedly stalled the project.[82] The lawsuits focused on a plethora of factors, including the project's environmental impact study, "construction permit, historic preservation, endangered species, and impacts on aircraft."[83]

Litigation is not the only reason for Cape Wind's failure. The project commenced prior to the EPAct, and thus was not conceived under the current U.S. framework.[84] Army Corps of Engineers initially oversaw the permitting process, but the Department of the Interior transferred this duty to the Minerals Management Service (MMS) after the passage of the EPAct in 2005.[85] After the MMS conducted extensive environmental studies, Cape Wind received the U.S.'s first offshore wind development lease in 2010.[86] Therefore, Cape Wind did not go through the BOEM's siting and leasing process that likely would have avoided conflicts with rich landowners entirely. Also, Cape Wind's site was unique in that it sat in federal waters located in a sound surrounded by state waters and islands.[87] It was also in one of the few federally-controlled waters where the federal fish population is managed by the state.[88] This location complicated the permitting process, giving opposition groups more opportunities to frustrate the project.

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77. *Id.*
78. *Id.*
79. *Id.*
80. Firestone, *supra* note 9, at 156.
81. Seelye, *supra* note 74.
82. ERNEST E. SMITH ET AL., WIND LAW § 9.03 (2017).
83. Firestone, *supra* note 9, at 156.
84. SMITH ET AL., *supra* note 82.
85. *Id.*
86. *Id.*
87. Firestone, *supra* note 9, at 156.
88. *Id.*

Ultimately, securing a market for the wind energy proved to be the project's downfall. Although it survived the legal onslaught, in 2015, several local utilities cancelled their power purchasing agreements (PPAs) with Energy Management Inc. due to the developer's inability to meet contractual deadlines.[89] Gordon could not obtain permission to construct a transmission line to transmit the wind power to land and was excluded from a Massachusetts program that required state utilities to contract for offshore wind energy.[90] The Cape Wind saga illustrates the dangers of poor siting and the importance of engaging stakeholders early and often, but the key lesson for other developers is to avoid building "within sight of shore."[91]

B. Block Island

Block Island, off the coast of Rhode Island, is the site of the nation's first offshore wind farm.[92] The project provides 30 MWs to New England's grid, estimated to power 17,000 homes.[93] Providence-based Deepwater Wind was the first to clear the many hurdles involved in an offshore wind project, but Rhode Island's policy framework was instrumental in making Block Island a reality.[94] Three specific policies were key to Block Island's success:

> the Renewable Energy Standard (RES), which established clean energy use requirements; the Ocean Special Area Management Plan (SAMP), which produced a comprehensive ocean plan protecting existing resources and uses of the ocean areas under the state's jurisdiction; and the Long-Term Contracting Standard for Renewable Energy, which mandates [PPAs] with clean energy developers and creates specific mechanisms for offshore wind.[95]

The RES mandates that the state's electricity mix must contain 38.5% renewable-generated electricity by 2035 and sets a goal for annual incremental increases.[96] The state quickly realized that, to meet this goal,

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89. Eckhouse & Ryan, *supra* note 75.
90. Seelye, *supra* note 74.
91. Eckhouse & Ryan, *supra* note 75.
92. Dennis, *supra* note 72.
93. *Id.*
94. *Id.*
95. Shiva Polefka, *State Policies Can Unleash U.S. Commercial Offshore Wind Development*, CENTER FOR AMERICAN PROGRESS (Sept. 18, 2017, 1:01 PM), https://perma.cc/UX9M-F9JP.
96. *Id.*

it would need offshore wind capacity.[97] Block Island's site emerged as a strong option for a pilot project, as it was the most cost-effective per MWh, large enough to meet the RES goal, and capable of providing much-needed power to Block Island, which is not connected to the state's grid and previously relied on diesel generators.[98]

Once the project took form, the Rhode Island Coastal Resources Management Council engaged in a marine spatial planning process under the authority of the Coastal Zone Management Action (CZMA) to ensure that offshore wind would have a place in the existing myriad uses of the state's waters.[99] The resulting Ocean Special Area Management Plan (SAMP) was carefully crafted to comply with state, federal, and tribal regulations, as well as account for stakeholders as diverse as "conservationists, fishermen, shippers, coastal-property owners, and the Narragansett Indian Tribe."[100] The two-year process engaged this wide array of interests and settled on the project's current site because of its reliable winds and minimal conflicts with existing ocean uses.[101] The data compiled by the SAMP sped up Deepwater's progress on the project, assisting with clearing the regulations of no less than "10 distinct state and federal agencies" and easing potential friction with stakeholders.[102]

As the SAMP process occurred, the state legislature adopted the Long-Term Contracting Standard for Renewable Energy.[103] It promulgated three key provisions providing stability for the Block Island project and the state's future offshore wind market: "[F]irst, it required that electric power distributors solicit 10-to-15 year contracts for renewable energy proposals annually until at least 90 MW of clean energy generation were locked in under long-term contract." Second, it mandated the state's main retail electricity utility to enter a PPA for Block Island and assist with laying the cables to connect the project, and the Island itself, to the state's grid. Lastly, it granted the state utilities commission the power to mandate long-term contracts, up to fifteen years, between future offshore wind projects and the state's electricity distributors, if it determines such arrangements would be in the best interest of citizens.[104] These provisions reflect not only the legislature's understanding that long-term stability is key for offshore projects but also the state's commitment to developing an offshore wind industry.

97. *Id.*
98. *Id.*
99. *Id.*
100. *Id.*
101. Polefka, *supra* note 95.
102. *Id.*
103. *Id.*
104. *Id.*

The project was contentious. Residents were divided on the project, and a federal lawsuit filed by a multitude of plaintiffs unsuccessfully attempted to stop it.[105] A common complaint in Rhode Island—as in many places where wind turbines are erected, both off- and on-shore—was the aesthetic alteration of the landscape.[106] Local critics also raised concerns about the project's funding. Deepwater Wind has a twenty-year contract with the regional utility provider National Grid to receive 24 cents per KWh, an amount that is not only scheduled to increase over time but that is already nearly double the average nation-wide price of 12.3 cents—meaning that Rhode Islanders are paying more for wind energy.[107] Despite these complaints, Block Island's local government, the state government, and the Obama administration supported the project.[108] Many Block Islanders did as well; supporters cited the positive impact of growing offshore wind projects on climate change and welcomed a more reliable source of energy than the Island's generators.[109]

C. State-Level Policies

As the stories of Block Island and Cape Wind illustrate, state policy plays a large role in the regulatory framework for developing offshore projects. States generally have full control of the first three nautical miles off their coasts and have broad authority to control that area under the CZMA.[110] Thus, states have authority to determine whether to develop their nautical area for wind energy production.[111] Regardless of states' decisions about offshore wind, projects in federal waters must run cables through states' submerged lands to reach the shore.[112] This implicates the state's obligation under the Public Trust Doctrine to "ensure that any cabling will not impair the public trust."[113] States that have adopted coastal management plans under the CZMA also have the right to determine if a "federal authorization," such as an offshore wind lease, is consistent with their plans—therefore, states that have prohibited offshore wind could argue that a federally-leased project adjacent to their waters is inconsistent.[114]

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105. Dennis, *supra* note 72.
106. *Id.*
107. *Id.*
108. *Id.*
109. *Id.*
110. Firestone, *supra* note 9, at 149.
111. *Id.*
112. *Id.*
113. *Id.* The Public Trust Doctrine is the principle that states must protect certain natural resources for public use.
114. *Id.* at 149-50.

State policy also impacts whether the energy has a market to reach. PPAs between developers and utility companies are typically "subject to approval by the state . . . through a public utility commission."[115] State Renewable Portfolio Standards, which mandate the makeup of a state's electricity sources, also impact the demand for offshore wind energy.[116] New York, for example, mandated that 50% of the state's electricity come from renewable sources by 2030, and the state plans to use 2.4 GW of offshore wind energy to meet that ambitious goal.[117]

States can also provide the renewable energy incentives and obligations needed to advance offshore development. While the Trump administration has formally withdrawn from the Paris Agreement,[118] non-federal groups have emerged to uphold the U.S.'s former commitment to decreasing carbon emissions by 26% to 28% percent below 2005 levels by 2025.[119] Fifteen states, as well as Puerto Rico and Washington D.C., have joined the United States Climate Alliance, which is a commitment to uphold the Paris Agreement's standards and demonstrate state-level action toward addressing climate change.[120] Many of these states are coastal, so offshore wind could become an important part of their strategies—and the policies these states craft will determine if the offshore wind industry is able to thrive in the U.S.[121]

IV. THE U.K. OFFSHORE MARKET AND POLICY FRAMEWORK

While the U.S. offshore industry is in its infancy, the U.K. is the current world leader in offshore wind production, boasting 6.84 GW of total offshore wind capacity, comprising just over 36% of global output.[122] The industry is booming, creating 53% of Europe's new capacity in 2017.[123] The U.K. has both regulatory and geographical advantages that make such domination possible.[124] The North Sea is shallow, calm, and

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115. *Id.* at 150.
116. *Id.* at 150.
117. NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, NEW YORK STATE OFFSHORE WIND MASTER PLAN 9 (2018).
118. Valerie Volcovici, *U.S. Submits Formal Notice of Withdrawal from Paris Climate Pact*, REUTERS (Aug. 4, 2017, 4:25 PM), https://perma.cc/S3PL-AWMA.
119. Polefka, *supra* note 95.
120. UNITED STATES CLIMATE ALLIANCE, https://perma.cc/HQ7C-DKFL (last visited May 5, 2018).
121. Polefka, *supra* note 95.
122. GLOBAL WIND ENERGY COUNCIL, *supra* note 10, at 3.
123. Vaughn, *supra* note 12.
124. Navraj Singh Ghaleigh, *Legal Framework to Develop Offshore Wind Power in United Kingdom*, *in* THE DEVELOPMENT OF A COMPREHENSIVE LEGAL FRAMEWORK FOR THE PROMOTION OF OFFSHORE WIND POWER 33 (Anton Ming-Zhi Gao & Chien-Te Fan eds., 2017).

has wind conditions compatible with current technology. It is also close to ports and urban centers, which simplifies construction and makes the energy easy to market.[125] As for regulation, the U.K.'s stable and predictable policy regime makes it a leading country for offshore wind investment.[126] It also has firm emission-reduction targets as a result of both domestic legislation, such as the Climate Change Act of 2008, as well as international agreements, such as the Paris Agreement.[127]

This section will first discuss the U.K.'s policy framework, including how siting decisions are made, the nation's support for technology and supply chain development, and the development of their offshore wind incentive schemes. It will then look at the impact of the recent Electricity Market Reforms on the offshore wind market, with a particular focus on the U.K.'s record-low offshore wind prices. Lastly, the impact of other factors on the U.K. market, including technological advances, a strong supply chain, and industry expertise, will be discussed.

A. The U.K. Policy Framework

The Department for Business, Energy & Industrial Strategy (BEIS), which is the central authority for offshore wind policy and law, is the primary regulator of the U.K. offshore wind industry.[128] The BEIS considers larger offshore projects (those over 100 MWs) "nationally significant infrastructure projects" which require a "development consent order from the Secretary of State for Communities and Local Government."[129] Smaller projects (100 MWs or less) require consent from the Marine Management Organization (MMO).[130]

While the BEIS controls policy, the Crown Estate[131] owns the 12 nautical mile territorial limit off the coast of the U.K. and is responsible for licensing offshore wind use of the Renewable Energy Zone (REZ), which extends out 200 nautical miles.[132] This coincides with the Crown

125. *Id.* at 34.
126. *Id.*
127. *Id.* at 34-35.
128. *Id.* at 38.
129. *Id.* at 39 (internal citations and quotations omitted).
130. Ghaleigh, *supra* note 124, at 39.
131. The Crown Estate is an independent, statutorily-created business that manages the reigning British monarch's collection of public property; the monarch does not have private property rights to the Crown Estate's holdings, nor can they profit from the Crown Estate's activities. While the government does not own the Crown Estate either, the Treasury receives surplus revenue from the estate. The Crown Estate traces its roots back to a 1760 agreement between George III and the Government. *FAQs*, THE CROWN ESTATE, https://perma.cc/89NU-236L (last visited May 10, 2018).
132. Ghaleigh, *supra* note 124, at 40.

Estate's commercial obligation to realize a return on the Marine Estate per the Crown Estate Act 1961 and its management purview of electricity generation on the continental shelf per the Energy Act 2004.[133] The Crown Estate has a four-step process for granting rights for an offshore wind farm. First, it grants the developer a lease option that is conditioned on the securing of all mandatory statutory consents.[134] Second, the developer goes about meeting the conditions by: conducting "technical and environmental studies," assessing the impact of the project, and consulting relevant stakeholders.[135] The developer can also perform any additional surveys and tests it may wish to conduct related to the viability of the lease in this stage.[136] Third, after securing the proper consents, the Crown Estate grants a lease.[137] Lastly, construction and operation of the project commence.[138]

This collection of government agencies (the BEIS, the Crown Estate, the MMO, and the Secretary of State for Communities and Local Government) is responsible for executing the U.K.'s offshore wind policy framework. The following subsections will discuss the U.K. government's policies regarding siting offshore wind projects, supporting technology research and development, growing a strong offshore wind supply chain, and incentivizing investment in the industry.

1. Project Siting

Choosing an appropriate site is critical to building a profitable offshore wind farm (as Cape Wind and Jim Gordon proved).[139] Factors such as wind speed, ocean depth, and distance from shore impact the cost of production and the return on investment.[140] In the U.K., the government determines "zones" that developers may utilize for wind farms, in which developers select appropriate sites within those areas for the project.[141] The government leases the zones in rounds to developers.[142] This approach helps developers avoid contentious negotiations with other users of the

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133. *Id.*
134. THE CROWN ESTATE, THE CROWN ESTATE'S ROLE IN THE DEVELOPMENT OF OFFSHORE RENEWABLE ENERGY 1 (2016).
135. *Id.* at 2.
136. *Id.* at 1.
137. *Id.*
138. *Id.*
139. *See supra* Section III(A).
140. JEFF BEYER, OFFSHORE WIND IN CHINA: SHARING THE UK'S POLICY EXPERIENCE 28 (2014).
141. *Id.* at 28.
142. *Id.* at 29.

offshore area.[143] Essentially, the government compresses a portion of the regulatory process utilizing its own ocean planning and wind data, which shortens the time for developers from obtaining a lease to having an operational offshore wind farm in place.[144]

The Round 3 zone leasing process (the most recent) is illustrative of the approach. The Crown Estate conducted an assessment of the habitats in the Round 3 zones parallel to the competitive bidding process and in compliance with the "U.K. Habitats Regulation."[145] The developers who won leases then conducted (or are in the process of conducting) the surveys and studies necessary to determine the best location to place their project within the lease, accounting for "engineering, economics, and environmental factors."[146] When they reach a conclusion, they will conduct an environmental impact assessment and then submit an application to the National Infrastructure Directorate (NID); the NID will then, with stakeholder input, weigh the benefits of the farm against the discovered environmental impact and make a recommendation to the Department of Energy and Climate Change, which has the ultimate decision-making authority.[147] Therefore, while the U.K. government established "dedicated, pre-authorized development zones," developers still bear some burden of navigating bureaucracy to get the farm built.[148] However, this does relax the constraints on the ocean space opened for development and lowers costs for developers.[149]

Because the Crown Estate established zones for development, the developers do not have to engage with agencies—such as the Ministry of Defence, the Department of Environment, Food and Rural Affairs, and the Department of Transport's Maritime and Coastguard Agency, among others—the approvals process has already been completed for them.[150] However, determining appropriate zones requires capturing wind speed data offshore, which can be expensive and time consuming to procure.[151] Having such data is critical, as it can determine factors such as the stress turbines will endure, "the optimum altitude of the nacelle," and the overall success of a zone—knowledge that contributes to both developer and investor confidence in a project, which can drop the price of capital.[152]

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143. *Id.* at 30.
144. *Id.*
145. *Id.* at 33.
146. BEYER, *supra* note 140, at 33.
147. *Id.*
148. *Id.* at 33-34.
149. *Id.* at 34.
150. *Id.*
151. *Id.* at 35.
152. BEYER, *supra* note 140, at 35.

2. Technology and Supply Chain Development

The U.K. invested in both technology research and development, as well as supply chain growth, to lower the cost of offshore wind and make the market more competitive.[153] Developing the investment and infrastructure of a strong supply chain requires long-term certainty, as these investments have long lifespans and require significant upfront capital that may not create a strong return for years.[154] The Government provides this support not just through a stable regulatory regime, but also through building relationships, courting investors, and funding technology and supply chain development.

The Carbon Trust's Offshore Wind Accelerator program and the Offshore Renewable Energy (ORE) Catapult both aim to incubate new technologies in the industry.[155] The Offshore Wind Accelerator program works with nine of the industry's leading developers, all of whom pool talent to create solutions in five key areas: "access systems, cable installation, electrical systems, foundations, and wake effects and wind resource."[156] The Carbon Trust manages the research of these expert teams, secures funding, and engages with the offshore industry.[157] The ORE Catapult conducts similar work but engages a broader range of stakeholders, supporting small-and-medium-sized enterprises, and it is not solely offshore-wind focused.[158] Recent projects include studying the effects of rain erosion on offshore installations, testing a new cable that would double transmission capabilities, and developing a lighter, longer, yet more durable blade.[159]

The U.K.'s supply chain has grown as the country has maintained offshore wind targets, but uncertainty causes growth to falter at times.[160] The Government addressed this issue in part by investing in an array of programs and organizations that aim to build relationships within the industry, attract investment, and directly fund expansion. Centres for Offshore Renewable Engineering are located in prime offshore wind markets in the U.K. and serve two purposes: to connect industry players

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153. *Id.* at 40.
154. *Id.* at 41.
155. *Id.* at 40.
156. *The Offshore Wind Accelerator*, CARBON TRUST, https://perma.cc/3CDC-EU4J (last visited May 11, 2018).
157. *Id.*
158. OFFSHORE RENEWABLE ENERGY CATAPULT, IMPACT REPORT 2016/17 6-7 (2017).
159. *Id.*
160. BEYER, *supra* note 140, at 41.

throughout the nation and to attract foreign investment in the sector.[161] GROW:Offshore Wind has nearly £20 million in funding to assist small and medium-sized enterprises entering the supply chain by providing individualized support and investment opportunities.[162] The Offshore Wind Investment Organization is a subdivision of the U.K's trade and investment body that focuses specifically on expanding the supply chain by supporting companies that have "significant potential" to create jobs in the industry.[163] These organizations, along with a network of other efforts, contribute to technology advances and significantly strengthen the nation's offshore supply chain.

3. Incentives

The U.K. has had three main incentive mechanisms for offshore wind throughout the years: capital grants, renewables obligations, and contracts for difference.[164] The government provided capital grants in order to generate project proposals and provide a data set that could inform future incentives and forecast cost levels.[165] Renewables obligations replaced the grant system's financial support for renewable energy and mandated utilities to incorporate renewables, like offshore wind, into their portfolio—providing the offshore wind energy a steady market.[166] Contracts for difference (CfDs), discussed below in Section V(A)(3), have been phased in as renewables obligations have been phased out, in order to provide developers a consistent, long-term financial foundation for their projects.[167] This mix of incentives provides the U.K. offshore industry with "richer data, longer term certainty, lower risk, and more investible offshore wind development opportunities."[168]

a. Capital Grants

Capital grants for offshore wind were the U.K.'s first approach to incentivizing growth in the industry.[169] The grants could cover up to 40% of eligible costs, with 75% of the award disbursed upon construction and commission of the project and the remainder delivered over a three-year

161. GOVERNMENT OF THE UNITED KINGDOM, OVERVIEW OF SUPPORT FOR THE OFFSHORE WIND INDUSTRY 3-4 (2014).
162. *Id.* at 4-5.
163. *Id.* at 8.
164. BEYER, *supra* note 140, at 10.
165. *Id.*
166. *Id.*
167. *Id.*
168. *Id.*
169. *Id.* at 11-12.

period.[170] The program had several goals: to incubate the offshore wind industry and develop supply chains; to gather data for the government about the costs of offshore projects, in order to better craft future incentives programs; to meet national renewables commitments through offshore wind generation; and, as always, to realize a return on the government's investment. [171] The U.K.'s ultimate vision was an industry that generated carbon-free energy and would not require direct government subsidization of projects.[172]

The scheme selected projects that would not only reflect a diverse set of supply chains and technical approaches but would also commit to coming online as soon as possible and providing the U.K. electricity for at least ten years.[173] Projects had to: have at least 20 MW of capacity; already possess, or be in negotiations to obtain, a lease from the Crown Estate; plan to connect to "a local distribution network or the National Grid;" be commissioned within three years; have an independent consultant review the project and determine its feasibility; and comply with all relevant government statutes.[174] Projects were also required to commit to sharing information with the government; the U.K. sought to determine "project costs, wind speed information, technical barriers and opportunities, different commercial arrangements, the effectiveness of consortia building, and expected project timelines" in order to determine what a "suitable feed-in tariff" would entail.[175]

In all, the capital grants program made £107 million available to producers between 2002 and 2012.[176] While experts have widely considered this program a success, some criticized it for not being ambitious or wide-scale enough and argued it could have spurred growth quicker and more broadly throughout the industry.[177]

b. Renewables Obligations

The U.K. replaced the capital grants program with a Renewables Obligation program in 2002.[178] Projects that received grants had to pay back the capital, plus interest, in order to take advantage of the new incentive, resulting in nearly £50 million being returned to the

170. BEYER, *supra* note 140, at 11-13.
171. *Id.* at 11-12.
172. *Id.*
173. *Id.* at 13.
174. *Id.* at 14.
175. *Id.*
176. BEYER, *supra* note 140, at 12-13.
177. *Id.* at 15.
178. *Id.* at 15-16.

government.[179] The program has three functions: to incentivize producers and to simultaneously obligate and incentivize utilities to use more renewable energy.[180] This scheme obligates energy utilities to generate a percentage of their portfolio from renewables, starting at 3% in 2002.[181] The government increases the percentage each year, most recently settling at 46.8% for 2018-19.[182] The government awards Renewable Obligation Certificates, or "ROCs," to producers per MWh of renewable energy generated; the ROCs can be bought and sold, and may be used to satisfy a utility's annual renewables obligation.[183] The ROCs are "essentially . . . a price support mechanism" that intends to pass on the benefit to producers, who can directly sell or auction the ROCs.[184] Utilities that cannot cover their amount pay into a "buy-out fund," which is distributed annually to all utilities reflective of the percentage of total ROCs they contributed that year—so if a utility submits 5% of that year's ROCs, they would receive 5% of the fund.[185] Thus, the buy-out price equals the price of an ROC for that period, which is also set by the government yearly.[186]

As ROC prices have increased over time, utilities have benefitted financially from providing more renewable energy.[187] However, the 2002 version of the program effectively limited investment in less-developed industries, such as offshore wind, due to their higher cost.[188] To account for this, in 2009 the U.K. altered the program to provide more support to less-established technologies, including designating offshore wind to receive two ROCs per MWh (compared to one and a half for technologies like "dedicated biomass," and one ROC for onshore wind).[189] The program is periodically adjusted to account for further nuanced bands of technologies and to reflect developments in different markets.[190]

The renewables obligation has not been a resounding success for the U.K. Renewable production has only reached about "two-thirds of targeted levels," suggesting the scheme has failed to adequately incentivize renewable energy.[191] The system has also failed to be

179. *Id.* at 15.
180. *Id.* at 16.
181. *Id.*
182. *See Renewables Obligation (RO) buy-out price and mutualisation ceilings for 2018-19 RO Year*, OFGEM, https://perma.cc/A9ZZ-6A6P (last visited May 11, 2018).
183. BEYER, *supra* note 140, at 16.
184. *Id.* at 17.
185. *Id.* at 16.
186. *Id.*
187. *Id.*
188. *Id.* at 17.
189. BEYER, *supra* note 140, at 17-18.
190. *Id.* at 18.
191. *Id.* at 19-20.

predictable. Because both the ROC benefit and the wholesale price of electricity fluctuate due to market forces, there is always uncertainty about what the bottom line for producers will be per MWh.[192] Policy makers anticipated that utilities, who in the U.K. are often producers as well, would best predict future electricity prices; but, fears of market volatility due to external factors, like shale gas depressing the wholesale electricity price, made renewable projects risky investments.[193] Also, because utilities, and not producers, redeem the ROCs, utilities have used their bargaining power to force non-utility producers to accept discounted energy prices—resulting in "as little as 70% of the ROC value" being passed to the producers.[194] Ultimately, the ROC system has not provided predictability and certainty to investors, and thus failed to substantially lower the cost of capital for offshore projects.[195] In March 2017, the contracts for difference feed-in tariff began to phase in, while the ROC scheme began to phase out.[196] While the program runs until 2037 under statutory obligation, no new renewables projects may take part in the scheme, and government support will essentially remain as-is until completely shut down.[197]

B. Electricity Market Reforms and the U.K. Price Drop

In 2013, the U.K. enacted the Electricity Market Reform (EMR), a set of energy policies aimed at lowering costs, increasing energy independence, driving investment, and meeting climate change goals.[198] The reforms had four "pillars:" contracts for difference (CfD), a carbon price floor, an emissions performance standard, and a capacity mechanism.[199] The carbon price floor and the emissions performance standard functioned primarily to drive the U.K.'s carbon emissions goals and clearly established that the nation no longer supported growth in the coal industry.[200]

While the EMR had impacts in both the renewable and non-renewable sector, addressing non-renewable energy costs was a primary function of

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192. *Id.* at 20.
193. *Id.*
194. *Id.* at 21.
195. BEYER, *supra* note 140, at 21.
196. *Id.* at 16.
197. *About the RO*, OFGEM, https://perma.cc/M4TW-J6RU (last visited May 10, 2018).
198. *About the RO*, OFGEM, https://perma.cc/M4TW-J6RU (last visited May 10, 2018); MICHAEL GRUBB & DAVID NEWBERY, UK ELECTRICITY MARKET REFORM AND THE ENERGY TRANSITION: EMERGING LESSONS (2018).
199. *Id.* at 17-21.
200. *Id.* at 18-19.

the reforms.[201] The U.K. government recognized that fuel costs heavily influence non-renewable energy costs, and that the "electricity market was designed to operate under the assumption that each MWh of electricity has a fuel cost"—which effectively means that fuel costs overwhelmingly impact the price of electricity.[202] Renewables, on the other hand, require a significant amount of capital upfront but have no on-going fuel costs.[203] Because of this, renewable electricity prices are not driven by fuel costs.[204] Investors thus need some form of mechanism to judge their return on a renewable investment, both in the short and long term.[205]

The CfD model intends to stabilize the renewable energy prices in the long term, thus reducing the risk of investment and ensuring an electricity price that makes investment in technology like offshore wind attractive.[206] Producers bid on fifteen-year contracts by proposing a "strike price" per MWh. If the strike price is above the reference wholesale electricity price, the government covers the difference, and if lower, the producer feeds those profits back to the government.[207] The program also aims to protect consumers by limiting the opportunity for financial windfall without the public receiving a payback.[208] The "money for . . . CfD top-up[s] is sourced from a levy on consumers' electricity bills, which is pooled by [the U.K.] government and used to fund various low carbon electricity support mechanisms."[209] The program also includes a "Levy Control Framework," which is designed to control costs by capping spending on the program.[210] While some predicted such a cap would lead to less deployment of renewable energy sources than would occur without such a limit, it was necessary from a political perspective to stop the cost from being passed on to consumers through energy price hikes.[211]

The CfD model did not initially produce lower-cost offshore projects. The first administered contracts included an offshore wind project priced at £140 per MWh—nearly three times the cost of combined cycle gas turbine energy at the time.[212] Opinions at the time were split, with the auction results stoking arguments that offshore wind is too expensive as a

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201. BEYER, *supra* note 140, at 22.
202. *Id.*
203. *Id.*
204. *Id.*
205. *Id.*
206. BEYER, *supra* note 140, at 17.
207. *Id.* at 23.
208. *I*d. at 22.
209. *Id.* at 24.
210. *Id.*
211. *Id.* at 25.
212. GRUBB & NEWBERY, *supra* note 198, at 22.

zero-carbon alternative.[213] However, the program was a success—renewable production surged, and, in the second round of CfD auctions in September 2017, the government secured a record low of £57.50 ($75.86) per MWh for projects slated to come online in 2022-23.[214] This price represents 57% more offshore output for 44% less subsidy than the initial round.[215] Fifty percent of the supply chain value is expected to go to U.K. businesses, which was another big win for the government.[216] As costs continue dropping, offshore wind is increasingly within striking distance of the U.K.'s average £47 per MWh wholesale energy rate.[217]

However, there are concerns that recent price drops might be more of a mirage than a reality. The contracts are based on the costs of turbines and other components dropping at an anticipated rate, and those decreases could potentially not materialize.[218] Brexit could also cause the pound to drop, increasing the cost of importing components.[219] These costs, particularly for offshore farms the size of those that recently won contracts, would be huge, and may not be able to offset the government subsidies to bring these projects into the black.[220] The gap in the energy supply from such large projects not materializing would be equally huge.[221] There are also concerns that a few large developers who have achieved the necessary economies of scale and pushed out smaller developers could result in government subsidies going to a small pool, increasing chances of collusion or abuse of the system.[222]

C. Other Factors Impacting U.K. Price Drop

The EMR heavily influenced the low price of the recent CfD contracts, but the U.K.'s other policies had a noticeable impact on creating an environment that would support such low prices. The three projects—

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213. *Id.*
214. Anmar Frangoul, *In big boost for renewables, offshore wind prices in UK tumble,* CNBC (Sept. 11, 2017, 7:46 AM), https://perma.cc/F6V4-WP8W.
215. GRUBB & NEWBERY, *supra* note 198, at 25-26.
216. *Id.* at 26.
217. Anna Hirtenstein, *Offshore Wind Costs Fall Below New Nuclear Plants in U.K.*, BLOOMBERG MARKETS (Sept. 11, 2017, 2:12 AM), https://www.bloomberg.com/news/articles/2017-09-11/u-k-offshore-wind-costs-fall-to-record-in-latest-auction.
218. Bridget Woodman, *Wind farms: Britain's offshore boom is concentrating power in the hands of a few very large developers*, THE INDEPENDENT (Sept. 20, 2017, 12:20 BST), https://perma.cc/F3Y9-7UJX.
219. *Id.*
220. *Id.*
221. *Id.*
222. *Id.*

Triton Knoll, Hornsea Two, and Moray[223]—will benefit from technological advances, a stronger supply chain, and the industry's learned expertise.[224] These factors are likely to assist prices in continuing to drop.

The projects are likely to use larger turbines, as have recent U.K. projects, that could generate up to 8 MW per turbine.[225] Turbine capacity is predicted to continue to grow, with estimates in the 13 to 15 MW range by 2024.[226] The larger a turbine is, the more power is generated from each installation, resulting in more MW produced per installation and per dollar spent.[227] Since 2007, turbine capacity has nearly doubled, and is predicted to double again by 2020.[228]

The projects are also slated to be huge, which will result in further economies of scale—Moray will have 950 MW of capacity, Triton Knoll will have 860 MW, and Hornsea Two will have 1,386 MW, which very well may be the largest offshore project in the world when it goes online.[229] Ørsted claims the ideal size for a cost-effective offshore farm is "800 to 1,500 MW."[230] As projects get bigger, "supply chain efficiencies, greater purchasing power," and operations and maintenance savings increase as well.[231] As the supply chain in the U.K. has grown, competition has grown as well, lowering costs further.[232] The increased demand from offshore producers provides them with more bargaining power with their suppliers as well.[233]

The projects will also benefit from experience. There are existing industry supports and infrastructure for offshore wind in the U.K. to support the construction and maintenance efforts, and investors are experienced (and thus comfortable with) making offshore wind investments.[234] The project sites' close proximity to skilled labor, products, and services that can be easily deployed have "cost saving

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223. *Three Offshore Wind Projects Secure Contracts for Difference as Strike Prices Go Down*, OFFSHOREWIND.BIZ (Sept. 11, 2017), https://perma.cc/R35T-DCN4.

224. *See* John Rogers, *Why Does the Cost of Offshore Wind Keep Dropping?*, UNION OF CONCERNED SCIENTISTS BLOG (Sept. 14, 2017, 4:32 PM), https://perma.cc/5SME-PJAP.

225. *Id.*

226. *See* David Appleyard, *Falling offshore prices reveal UK supply chain, grid build savings*, NEWENERGYUPDATE.COM, https://perma.cc/RK5X-4PYY (last visited Oct. 4, 2017).

227. Rogers, *supra* note 224.

228. Hirtenstein, *supra* note 217.

229. Rogers, *supra* note 224.

230. Appleyard, *supra* note 226 (internal quotations omitted).

231. *Id.*

232. *See Id.*

233. *Id.*

234. Rogers, *supra* note 224.

implications."[235] This experience also helps projects come online quicker. The most recent contracts, which should be producing within five years, will have less down time and more production per investment dollar (or pound) for the project.[236] As producers gain more experience in building offshore wind farms in the U.K., they naturally better understand the risks of certain areas and are better equipped to address those risks by making wiser technology choices suited for the geographic region.[237]

Even some of the downsides to these projects have silver linings. The project sites are farther out, as much of the optimal, near-shore lease areas are already occupied.[238] Being farther out comes with costs: running farther transmission lines, longer travel times between the shore and the project site, and dealing with deeper waters.[239] However, being farther from shore is likely to provide stronger and more steady winds, which will benefit production.[240]

V. COMPARISON: WHAT LESSONS COULD THE U.S. LEARN?

The U.K. has successfully grown what was once a niche energy market into an economic engine. Its policies have hit on a few key areas: a reliable incentive and policy framework, a strong supply chain, and a streamlined permitting process.[241] On the other hand, the U.S. has an offshore industry frequently described as "nascent."[242] The U.S.'s policy framework has yet to produce an offshore wind farm in federal waters due to a variety of obstacles.[243] The federal regulatory framework creates long lead times for development and provides unstable incentives; the market lacks economies of scale and a strong supply chain.[244] These factors increase the price of a project and delay a return on investment.[245] The U.S.'s offshore wind market also has to compete with plentiful, low-cost natural gas resources, as well as other low-cost renewables such as on-

235. Appleyard, *supra* note 226 (internal quotations omitted).
236. Rogers, *supra* note 224.
237. Appleyard, *supra* note 226.
238. Rogers, *supra* note 224.
239. *Id.*
240. *Id.*
241. *See supra* Section IV.
242. *See, e.g.*, Daniel J. McGraw, *A New Green Future Is Building on Lake Erie*, NEXT CITY (Nov. 7, 2017), https://perma.cc/MZ9P-5W76. *See also* Roger Drouin, *After an Uncertain Start, U.S. Offshore Wind Is Powering Up*, YALE ENVIRONMENT 360 (Jan. 11, 2018), https://perma.cc/W78D-F3YD.
243. *See supra* Section III(A)-(B). Cape Wind was planned to be sited in federal waters, but did not reach the construction phase. Block Island, the nation's only offshore wind farm, is located in waters controlled by Rhode Island.
244. Firestone, *supra* note 9, at 161.
245. *Id.*

shore wind, in an energy market that is not structured to value the "climate, health, [or] ecological" costs of energy production.[246]

The U.K.'s approach, and its trial and error, could inform the U.S.'s potential policy moves as part of the administration's "all-of-the-above energy policy," or the states' approach to developing an offshore wind industry.[247] The policy options laid out below will consider implementation options on both the federal and state level, as the political landscapes, and thus the chances of implementation, are vastly different. First, creating reliable incentives through direct investment, renewables obligations, and contracts for difference will be discussed, followed by supply chain development policies, and lastly, ideas for streamlining the permitting process.

A. Reliable Incentives

The U.S.'s offshore wind policy framework lacks stable incentives. Congress has implemented federal tax incentives sporadically, and the current iteration of the PTC and ITC[248] are both winding down as their December 31, 2019 termination approaches. At this point, no offshore wind farms are under construction that will benefit from the incentive, although several are in the pipeline and likely seeking to break ground before the deadline.[249] The government offers loan guarantees, but developers have underutilized them (making the incentive unsuccessful); grants are available, though the programs typically are not aimed specifically at wind production or only apply to small segments of the market (such as rural areas).[250] The results of U.S. incentives speak for themselves.

The U.K. has learned, through trial and error, that incentive and policy regimes need to provide "reasonable certainty over a 10-15 year period" in order to properly motivate developers.[251] The U.K. has taken a few approaches to incentive programs, beginning with capital grants when the industry was in its infancy, shifting to renewables obligations to build a more renewable-dependent energy market, and most recently settling on the CfD model in order to provide much-needed stability. The U.S. and

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246. *Id.*
247. Deign, *supra* note 58.
248. *See supra* Section I.
249. *See* Jim Efstathiou Jr., *U.S. Wind Farm Construction Poised to Boom as Tax Credit Wanes*, BLOOMBERG (May 11, 2018, 11:15 AM), https://www.bloomberg.com/news/articles/2018-05-11/u-s-wind-farm-construction-poised-to-boom-as-tax-credit-wanes.
250. U.S. DEP'T OF ENERGY, *supra* note 48, at 1-2.
251. THE CROWN ESTATE, OFFSHORE WIND COST REDUCTION PATHWAYS STUDY 54 (2012).

state governments should take a similar long-term view of incentive policies and should implement a direct investment program, mandate renewable energy consumption, and possibly implement CfDs to better incorporate state markets in the offshore leasing process.

1. Direct Investment

A broad direct investment program would be the most powerful incentive, as shown by the success of the U.K.'s capital grants scheme. The capital grants scheme was criticized, in hindsight, for not being broad enough. The U.S. should learn from this lesson, and broaden the existing grant programs to include a wider array of business sizes, development approaches, and industry roles (including developers, manufacturers, and technology producers). Such an investment would likely recoup itself, if at least partially, through lower-cost projects, increased energy output, and a stronger supply chain.[252] Such a program does not feel realistic for the federal government (although Congress should alternatively approve the PTC and ITC for a fifteen-year minimum period). On the state level, particularly in climate-conscious states, such a program could drive strong growth in the offshore wind industry.

2. Renewables Obligations

A renewables obligation would help create a larger market for offshore wind energy but is extremely unlikely to materialize at the federal level under the current administration. The U.K. also did not find much success with this approach, as their market-based system was not predictable enough for the long lead times of offshore wind.[253] The system was also flawed in that utilities, not developers or producers, redeemed the ROCs; utilities were able to exert their superior bargaining position to obtain the ROCs below cost, passing less of the financial benefit on to those carrying the financial burden of an offshore project.

States are already moving to implement similar obligations. Most states have a renewable portfolio standard, such as Rhode Island's RES,[254] that mandates a portion of the state's energy come from renewable sources.[255] Rhode Island stands apart, however, for mandating that utilities

252. BEYER, *supra* note 140, at 15.
253. *See supra* Section IV(A)(3)(b).
254. *See supra* Section III(B).
255. Jocelyn Durkay, *State Renewable Portfolio Standards and Goals*, NATIONAL CONFERENCE OF STATE LEGISLATURES (Aug. 1, 2017), https://perma.cc/PD4R-E3Q4 (Every state on the West Coast and along the Great Lakes has such a standard, as does every state on the East Coast, besides Georgia and

purchase offshore wind to meet these goals. While this requirement stabilizes the market, it would be overly ambitious to suggest every state adopt similar regulations given the "host of challenges" associated with bringing an offshore farm to reality.[256] Maryland and New Jersey are in the process of implementing a market-based system identical to the U.K.'s program:[257] offshore wind renewable energy certificates (ORECs) would be earned by developers per KWh, and bought by utilities to meet their renewables obligation.[258] These states should be wary of avoiding the U.K. system's pitfalls, although the smaller pool of developers and utilities within the individual states may decrease bargaining power issues, allowing developers to reap the financial benefits. They should also focus on stabilizing the price for an OREC, so that the program does not suffer from the instability of market swings as the U.K. program did.

3. Contracts for Difference

The U.K.'s CfD model appears ripe for replication, as it provides a long-term incentive to developers, protections for consumers, and could result in no-subsidy contracts in the near future. If not on the national level, states could implement similar programs and award contracts that developers could peddle to the BOEM as part of their offshore lease bids.[259] This would solve a huge gap in the U.S.'s current system, which partly originates from the replication of offshore oil and gas leasing policies. The two energy sources are quite different—unlike offshore oil and gas, which enters a globalized market, offshore-generated electricity enters localized state markets.[260] States, however, are not involved in vetting developers or their bids for federal offshore wind leases.[261] The result is that leases are awarded to developers who can provide the highest return for the federal government, without considering what the price will

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Florida. Texas is the only state along the Gulf Coast to mandate renewable energy use).

256. Polefka, *supra* note 95.

257. Saqib Rahim, *How N.J. lost its lead on offshore wind*, E&E NEWS (June 9, 2017), https://perma.cc/M5YH-AAJF.

258. Jim Pierobon, *Offshore Renewable Energy Credits—ORECs—The Key to Wind Power Along U.S. East Coast?*, THE ENERGY FIX (Nov. 3, 2011), https://perma.cc/Z883-GEJB.

259. The BOEM currently considers non-monetary factors in its leasing, such as the bidder's possession of "an enforceable off-take agreement (such as a PPA or OREC)." BUREAU OF OCEAN ENERGY MANAGEMENT, RESPONSE TO COMMENTS AND EXPLANATION OF CHANGES FROM THE RHODE ISLAND AND MASSACHUSETTS PROPOSED SALE NOTICE TO THE FINAL SALE NOTICE 1-2 (2013).

260. Firestone, *supra* note 9, at 161.

261. *Id.*

be for consumers or whether developers will be able to play nice with state utilities.[262]

A replication of the CfD scheme could ease some of this friction by involving the state utilities in the bidding process and partly shifting the focus to the price consumers will pay for the energy. States could set up government-owned corporations to play the middle-man between developers and utilities. These corporations would enter the CfD with a developer, gather payments from utilities for the top-up pool, make payments to developers when the market price in the state falls below the strike price, and recoup money from developers when the strike price is exceeded. The states could run auctions as the U.K. does when offering leases in their own waters.

Incorporating the BOEM could possibly present issues, but would still be doable. One potential method could allow states that are markets for a federal offshore wind lease to hold a bidding process parallel to the BOEM's own auction. Interested developers would first submit proposals to the BOEM, who would then determine what developers may participate in a parallel state CfD auction. The BOEM-vetted developers would make strike price bids to the state corporations, who would award the CfDs to the lowest bidder. The winner could then use the CfD as part of their BOEM lease proposal, with the BOEM ultimately leasing to the state bid winner (absent extreme extenuating circumstances). This way, the BOEM could consider the price to consumers in its process, ensure the lease-holder has a market for their energy, and ultimately retain control over the leasing decision.

Unfortunately, CfDs may violate federal law, although the legality of their use for the above-described purpose is unclear. The Securities and Exchange Commission places restrictions on "over-the-counter financial instruments," which prohibits the trading of CfDs.[263] Therefore, if the CfDs created as described are not traded, they may not violate federal law. However, if they were found to violate current law, the Trump administration may be open to rolling back the rule given its focus on de-regulation. Many countries allow CfDs to be traded—they are not unique to the U.K., or renewable energy sources, although the U.K. has utilized them for that purpose.[264] Their use in the U.S. to provide long-term, reliable incentives for renewable energy could be a huge win for the offshore wind industry.

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262. *Id.*
263. Jon Matonis, *Another Market Not Available to U.S. Citizens*, FORBES (Apr. 9, 2012, 7:50 AM), https://perma.cc/L7YB-BRUP.
264. *Id.*

B. Supply Chain Development

The U.K. has built a strong supply chain by deliberately courting investors, directly investing in supply chain manufacturers, and investing in technology research and development.[265] However, their supply chain has also benefitted from the steady stream of projects, which was again supported by a reliable policy framework. The U.S., on the other hand, has been shown to have the manufacturing capacity and efficiency to support an offshore wind industry;[266] however, as described throughout this Article, it lacks the long-term policy focus that attracts investors. The U.S. supply chain faces the classic 'chicken or the egg' issue—manufacturers cannot reasonably enter the market without projects to purchase their goods; developers and investors hesitate to invest in offshore wind because the costs are high, partly due to an undeveloped supply chain and a lack of economies of scale.

The U.S.'s investment in technology research and development is a nice start, but crafting a strong supply chain will require more action. As leases are awarded and projects move closer to development, the U.S. could do more to solicit investment in the offshore wind supply chain. The U.K.'s Centers for Offshore Renewable Engineering is a replicable idea and could be used to connect states pushing offshore wind as well as attract investment. States with strong offshore oil and gas supply chains could be good targets for such a program. Manufacturers in the offshore oil and gas industry are already beginning to diversify, as Bay State Wind has partnered with German-based EEW and Louisiana-based Gulf Island Fabrication to produce monopile foundations and transition pieces to support the offshore wind efforts in the Northeast.[267] The combination may produce up to 1,700 jobs.[268] A program to help build business relationships such as this, whether administered by the federal government, the states, or by a state-consortium, could help drive investment in the offshore wind supply chain.

C. Streamline the Permitting Process

The U.S. permitting process for offshore wind is a maze that contributes to long lead times and raises the cost of projects. In the U.K.,

265. *See supra* Section IV(A)(3).
266. *Offshore Wind Market Acceleration Projects*, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, https://perma.cc/UW5W-Y8LJ (last visited May 12, 2018).
267. *EEW embraces US offshore*, RENEWS (Mar. 4, 2018), https://perma.cc/EZ8D-K5CB.
268. *Id.*

the Crown Estate determines zones suitable for wind farms, and then auctions off those leases. Essentially, the government handles habitat and ocean planning functions, while the developer must conduct an environmental impact study for the ultimate site they select for the project. The developer only has to clear the National Infrastructure Directorate and the Department of Energy and Climate Change, but avoids interfacing with the Ministry of Defence, the Department of Environment, Food and Rural Affairs, Department of Transport's Maritime and Coastguard Agency, and others; the government has already handled those approval processes.[269]

The BOEM conducts a similar analysis to the Crown Estate upon awarding a lease, and it engages with relevant agencies and state intergovernmental task forces (if the state has one). However, the developer/lessee then must interface with the Coast Guard, the Army Corps of Engineers, the Navy, NOAA, the Fish and Wildlife Service, the EPA, FERC, etc.[270] This process needs to be streamlined and push some of the permitting load from the developer to the BOEM, as the U.K. framework does.

While it is important that offshore wind developers comply with federal law and that federal agencies exercise their authority over the process, the reality is the long lead time kills investment. These projects are already capital and time intensive, so the federal government, in order to incentivize offshore wind production, should cut down hurdles where possible. This process is already under way, as the Department of Interior has committed to reducing "unnecessarily burdensome regulations."[271] This commitment has already borne fruit: The Department of the Interior announced the "One Federal Decision" framework in April 2018, which establishes a single project permitting schedule, allows for concurrent project review, and will result in a single environmental impact statement and decision.[272] The memorandum of understanding between the agencies will apply to all federal project approvals.[273] The BOEM has also proposed guidelines that would loosen the approval of construction and operations plans by allowing developers to submit a range of plans for approval.[274] This would allow developers to clear BOEM review without committing to a specific design, which will speed up the process by pushing off developers' decision making and give developers flexibility in

269. *See supra* Section IV(A)(1).
270. *See supra* Section I.
271. Treiser et al., *supra* note 57.
272. *Id.*
273. Raya B. Treiser & Nathaniel B. Custer, *Infrastructure Series: Agencies Establish One Federal Decision Framework for Project Reviews*, WILMERHALE (Apr. 12, 2018), https://perma.cc/6N5E-FJT9.
274. Treiser et al., *supra* note 57.

construction. These policies, if enacted with fidelity, should work wonders for the permitting process.

CONCLUSION

The U.K.'s policy framework helped their offshore wind industry become the most powerful in the world. The U.S. could easily replicate a few key policy ideas in order to strengthen its own offshore wind industry. The most critical policy shift is long-term support for the industry, which should be expressed in all levels of the policy framework. Reliable investment incentives are crucial, and could be driven by state- or federal-level direct investment programs, renewables obligations, or a contracts for difference model. The U.S. supply chain, which is ripe for growth, should be supported and supplied with a steady stream of projects to court investors in the nation's manufacturing capacity. Lastly, efforts to streamline the permitting process are under way, and should be continuously monitored for effectiveness. The U.S. offshore wind industry is on the precipice of greatness, and with these lessons from abroad, could become the next great American success story.