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Lighting Northern New England with Water: A Comparative Analysis of Wave and Tidal Hydrokinetic Energy Regulation

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LIGHTING NORTHERN NEW ENGLAND WITH WATER: A COMPARATIVE ANALYSIS OF WAVE AND TIDAL HYDROKINETIC ENERGY REGULATION

John Moran[*]

I. INTRODUCTION

"Today, no area holds more promise than our investments in American energy."[1] In order to limit our dependence on foreign oil, reduce greenhouse gas emissions, and curtail rising consumer energy costs, the United States has adjusted its energy trajectory to support more actively the "development and integration of new clean and domestic renewable energy resources into the electric grid."[2] Although some contend the recent emergence of unconventional oil extraction methods, especially shale gas fracking,[3] may hedge political support for renewable energy sources,[4] hydrokinetic power provides a highly affordable and renewable, carbon-free energy source—our nation's largest supply of

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1. President Barack H. Obama, State of the Union Address (Feb. 12, 2013), *available at* http://www.marketplace.org/topics/economy/2013-state-union-address-annotated-transcript.

2. Hon. Jon Wellinghoff, James Pederson, & David L. Morenoff, *Facilitating Hydrokinetic Energy Development Through Regulatory Innovation*, 29 ENERGY L.J. 397, 397 (2008); *see also* Alison C. Graab, *The Smart Grid: A Smart Solution to a Complicated Problem*, 52 WM. & MARY L. REV. 2051, 2054–55 (2011) (providing extensive discussion of the Smart Grid, which is a transmissive electric grid that has the ability to incorporate a greater amount of renewable energy sources by "connecting new generators to the transmission system").

3. *See* Michael B. McElroy & Xi Lu, *Fracking's Future*, HARVARD MAGAZINE (Jan.–Feb. 2013), http://harvardmagazine.com/2013/01/frackings-future.

4. *Id.*

clean energy.[5] In comparison to renewable wind energies, the fact that water is 832 times denser than air makes the aggregate of "our tides, waves, ocean current, and free-flowing rivers [] an untapped, powerful, [and] highly concentrated [] energy resource."[6] Moreover, hydrokinetic energy may offer the cleanest and swiftest route to energy independence for the United States, particularly for northern New England.[7]

This Comment provides a comparative analysis of hydrokinetic energy projects off the northerly coastlines of New England, focusing exclusively on Maine, New Hampshire, and Massachusetts. Part II offers a basic primer on hydrokinetic technology, and how it actually works. Part III navigates through the vortex of federal and state regulations governing ocean energy development in national waters. Part IV considers the measures that Maine, New Hampshire, and Massachusetts have taken to address the dire need for renewable energy through hydrokinetic energy development. Lastly, Part V concludes that the varying degree of success for hydrokinetic energy projects in northern New England is mostly attributable to tempered energy policies, limited state financial resources, understandable distaste for the existing federal regulatory framework, and considerable attention to legitimate environmental, commercial, and recreational interests. In summary, this Comment presents a comprehensive overview of the ways in which hydrokinetic technology is being used to harness the ocean's power and produce clean, renewable energy for residents throughout "Norumbega" or northern New England.[8]

II. BOXING THE COMPASS: HYDROKINETICS AND HOW IT ACTUALLY WORKS

As the "waves rous'd and ominous . . . rag[e] over the vast [ocean], with many a broken spar and tatter'd sail,"[9] hydrokinetics is the study of

5. H.R. 267, 113th Cong. (2012) (statement of Rep. Diana DeGette).

6. *How Hydrokinetic Energy Works*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/how-hydrokinetic-energy-works.html (last visited Mar. 7, 2014).

7. U.S. DEP'T OF ENERGY, REPORT TO CONGRESS ON THE POTENTIAL ENVIRONMENTAL EFFECTS OF MARINE AND HYDROKINETIC ENERGY TECHNOLOGY 1 (2009) [hereinafter U.S. DEP'T OF ENERGY ENVTL. REP.].

8. *See* Benjamin F. De Costa, *Norumbega and Its English Explorers*, *in* 3 NARRATIVE AND CRITICAL HISTORY OF AMERICA 169, 169 (Justin Winsor ed., 1884) (noting that "[f]rom [1539] until the seventeenth century[,] Norumbega was generally regarded as embracing all New England, and sometimes portions of Canada").

9. WALT WHITMAN, *As Consequent, Etc.*, *in* LEAVES OF GRASS 409, 409–10 (1855).

converting the kinetic energy of ocean waves and natural water flow of ocean currents, tides, and inland waterways into a clean, renewable energy source.[10] "[T]he potential truly is to light the world with water."[11] In contrast to traditional hydropower projects, which use dams and diversions to generate power,[12] hydrokinetic devices use water density to produce the same.[13] Additionally, hydrokinetic power is proportional to the cube of the current velocity, with desirable current velocities hovering around three meters per second (m/s).[14] In recent years, hydrokinetics has diverged into two camps: wave-based and current-based technologies.

A. Wave-Based Hydrokinetic Technology

The process of wave energy extraction[15] involves harnessing energy directly from the surface of ocean waves and converting that energy into zero-emission, renewable power.[16] There are six primary wave-based device concepts: (1) point absorbers, (2) attenuators, (3) oscillating wave surge converters, (4) oscillating water columns, (5) overtopping terminators, and (6) submerged pressure differential devices.[17] The first

10. *Hydrokinetic Projects*, FED. ENERGY REG. COMM'N, http://www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp (last visited Mar. 7, 2014); *see also generally* U.S. DEP'T OF ENERGY ENVTL. REP., *supra* note 7. In Congress's view, "marine and hydrokinetic renewable energy" means electrical energy from the following sources: (1) "waves, tides, and currents in oceans, and tidal areas"; (2) "free flowing water in rivers, lakes, and streams"; (3) "free flowing water in man-made channels"; and (4) "differentials in ocean temperature (ocean thermal energy conversion)." Energy Independence and Security Act of 2007, 42 U.S.C. § 17211 (2012).

11. Ben Dinsmore, *Tidal Energy News: Massachusetts Maritime Academy Helps Test Hydrokinetic Turbine*, THE MAR. SITE (Aug. 7, 2011), http://www.themaritimesite.com/tidal-energy-news-massachusetts-maritime-academy-helps-test-hydrokinetic-turbine/.

12. *See* 42 U.S.C. § 17211.

13. *Hydrokinetic Electric Power Generation*, CTR. FOR CLIMATE AND ENERGY SOLUTIONS, http://www.c2es.org/technology/factsheet/Hydrokinetic (last visited Mar. 7, 2014).

14. *Id.*

15. Although marine energy technologies include ocean thermal energy conversion, this Comment is dedicated only to wave energy converters and current-based hydrokinetic power. *See* 42 U.S.C. § 17211; *see also Hydrokinetic Electric Power Generation*, *supra* note 13.

16. Wellinghoff, *supra* note 2, at 399.

17. ELEC. POWER RES. INST., PRIMER: POWER FROM OCEAN WAVES AND TIDES 4–5 (2007), *available at* http://www.snopud.com/site/content/documents/tidal/tidalprimer.pdf [hereinafter Primer, EPRI]; *see also* U.S. DEP'T OF ENERGY ENVTL. REP., *supra* note 7, at 6 (providing additional descriptions of wave energy technologies).

wave-based technology that channels such wave action[18] is a point absorber, which involves a float and buoy system that uses the "rise and fall of ocean swells" to drive hydraulic pumps, solenoids, and electric generators.[19] Second, an attenuator is a long floating device that drifts parallel to oncoming waves.[20] It is made up of multiple sections that "rotate in [a] pitch and yaw [motion] relative to each other," and it is this motion that is "used to pressurize a hydraulic piston arrangement and turn a hydraulic turbine [or] generator"—producing electricity.[21] Conversely, an oscillating wave surge converter either mounts directly to the ocean floor or hangs "from a floating or shoreline structure" and "swing[s] like a gate in response to the surging movement of water in the waves."[22] The fourth way to extract wave energy involves the use of an oscillating water column device.[23] The "in-and-out motion of waves at the shore enters a column and forces air to turn a turbine. [It] fills with water as the wave rises and empties as [the wave] descends. In the process, air inside the column is compressed, creating energy in the same way a piston does."[24] Fifth, an overtopping terminator is a floating structure that has a water reservoir with a ramp, in which waves topple over the ramp and are contained in the reservoir.[25] The overtopping terminator generates electricity when the water contained in the reservoir flows back out to sea and turns the device's turbines.[26] Lastly, a submerged pressure differential device is located closer to the shoreline and mounted to the seabed.[27] "Wave motions cause the water level to rise and fall above the device, which induces a pressure differential inside the device that can then pump fluid to drive a generator."[28] Besides pilot scale tests with point absorbers and attenuators, the infancy of hydrokinetics presents the further difficulty of predicting which one of

18. *See* Oliver A. Houck, *Rising Water: The National Flood Insurance Program and Louisiana*, 60 TUL. L. REV. 61, 116–19 (1985) (indicating that "wave action" is shorthand for "high-velocity [ocean] waters").

19. Wellinghoff, *supra* note 2, at 399.

20. Primer, EPRI, *supra* note 17, at 4.

21. *Id.*

22. U.S. DEP'T OF ENERGY ENVTL. REP., *supra* note 7, at 6.

23. Wellinghoff, *supra* note 2, at 399.

24. *Id.*; *see also How It Works: Wave Power Station*, BBC NEWS, http://news.bbc.co.uk/1/hi/sci /tech/1032148.stm (last visited Mar. 7, 2014) (illustrating how a wave power station works).

25. Primer, EPRI, *supra* note 17, at 4.

26. *Id.*

27. U.S. DEP'T OF ENERGY ENVTL. REP., *supra* note 7, at 6.

28. *Id.*

these technologies will be the most viable and cost-effective option for the near future.

B. Current-Based Hydrokinetic Technology

In comparison to wave energy, current-based hydrokinetic technologies generate energy from water currents below the wave surface—commonly referred to as tidal energy. Although most current-based devices are used to capture energy from ocean tides and currents, these devices also have the ability to capture energy inland through "free-flowing rivers and engineered waterways[,] such as canals, conduits, cooling water discharge pipes, or tailraces of existing dams."[29] These current-based devices generate energy from water currents through a variety of turbine technologies, including horizontal axis turbines, vertical axis turbines, and both vertical and horizontal helical turbines.[30] Those turbines with vertical axes are placed perpendicular to the water current, whereas turbines with horizontal axes are situated roughly parallel to the water current.[31] The blades of these underwater turbines drive through the water currents and "turn" the generators, thereby "captur[ing] the energy of the water flow."[32]

In addition to turbine systems, another current-based technology requires the mooring of a barge in a current stream "with a large cable loop to which parachutes are fastened. The cable [is] moved along by the current acting against the open parachutes. When the parachutes reach[] the end of the loop, they [] turn the corner and [are] dragged back against the current while closed."[33] The cable's continuous movement along the barge helps "turn" the generators to produce electricity.[34] Like many projects in protected ocean and tidal environments, however, these projects require a developer to navigate the vortex of federal and state regulations governing wave and tidal energy development.[35]

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29. Wellinghoff, *supra* note 2, at 399.
30. Primer, EPRI, *supra* note 17, at 4.
31. *Id.* at 6.
32. Wellinghoff, *supra* note 2, at 399–400.
33. *Id.* at 400.
34. *Id.*
35. *See* STOEL RIVES OCEAN ENERGY TEAM, STOEL RIVES LLP, THE LAW OF MARINE AND HYDROKINETIC ENERGY: A GUIDE TO BUSINESS AND LEGAL ISSUES ch. 3, at 1–2 (4th ed. 2011), *available at* http://www.stoel.com/webfiles/LawofMarine.pdf [hereinafter STOEL RIVES OCEAN ENERGY].

III. THE FEDERAL VORTEX: LEGAL FRAMEWORK FOR OFFSHORE ENERGY AND COASTAL PROTECTION IN NORTHERN NEW ENGLAND

A. Federal Jurisdiction

The burgeoning hydrokinetic industry must confront inconsistent policies and jurisdictional divisions, as well as the legitimate concerns of economic, cultural, environmental, and recreational interest groups.[36] The United States Army Corps of Engineers and United States Coast Guard may also influence the longevity of certain hydrokinetic projects.[37] As the Stoel Rives Ocean Energy Team explained:

> The siting of a marine or hydrokinetic energy project will involve numerous federal, state, tribal, and non-governmental entities charged with or having substantial interests in laws, regulations, and programs regulating [hydrokinetic] facilities, water quality and in-water discharges, state and federal lands located beneath the sea, coastal resources and marine sanctuaries, underwater and other cultural resources, shipping and navigation, crabbing and fishing, endangered and threatened species, marine mammals, migratory birds and seabirds, and recreation and public safety, among other things.[38]

The federal waters consist of four primary jurisdictional zones: the federal territorial seas, the contiguous zone, the Exclusive Economic Zone (EEZ), and the Outer Continental Shelf (OCS).[39] The United States has repeatedly refused to ratify the United Nations Convention on the Law of the Sea (UNCLOS),[40] which was enacted partly to "establish a

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36. Danielle Murray et al., *Riding the Wave: Confronting Jurisdictional and Regulatory Barriers to Ocean Energy Development*, 5 GOLDEN GATE U. ENVTL. L.J. 159, 170–71 (2011).

37. STOEL RIVES OCEAN ENERGY, *supra* note 35, ch. 3, at 1.

38. *Id.*

39. *See* Todd J. Griset, *Harnessing the Ocean's Power: Opportunities in Renewable Ocean Energy Resources*, 16 OCEAN & COASTAL L.J. 395, 406–08 (2011); *see also U.S. Maritime Limits & Boundaries*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN. OFFICE OF COAST SURVEY, http://www.nauticalcharts.noaa.gov/csdl/mbound.htm (last visited Mar. 7, 2014).

40. *See* United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS]; DIVISION FOR OCEAN AND THE LAW OF THE SEA, *Chronological lists of Ratifications of, Accession and Succession to the Convention and the Related Agreements as at 29 October 2013*, UNITED NATIONS: OCEANS & LAW OF THE SEA, http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm# (last updated Sept. 20, 2013). The United States has in fact signed UNCLOS. Stewart Patrick,

truly comprehensive regime for the law of the sea."[41] It appears, however, that the United States may soon ratify UNCLOS within the next few years because "[p]ast [and present] [a]dministrations (Republican and Democratic), the [United States] military, and relevant industry and other groups all strongly support joining the Convention."[42] Even George P. Shultz, former Secretary of State to President Ronald W. Reagan, expressed his support for ratifying UNCLOS in a letter addressed to former U.S. Senator Richard G. Lugar of Indiana: "The treaty has been changed in a such a way with respect to the deep sea-beds that it is now acceptable, in my judgment. Under these circumstances, and given the many desirable aspects of the [Convention] on other grounds, I believe it is time to proceed with ratification."[43] Even despite America's continuing inability to ratify UNCLOS, the federal jurisdictional zones are highly consistent with those prescribed by UNCLOS itself.[44]

(Almost) Everyone Agrees: The U.S. Should Ratify the Law of the Sea Treaty, THE ATLANTIC (Jun. 10, 2013, 7:21 AM), http://www.theatlantic.com/international/ archive /2012/06/-almost-everyone-agrees-the-us-should-ratify-the-law-of-the-sea-treaty/258301/. However, due to Congressional concerns that the treaty "[would infringe] upon national sovereignty and that its deep-sea mining provisions [would] limit free enterprise," the Senate has continually failed to ratify it. Mary Turnipseed et al., *The Silver Anniversary of the United States' Exclusive Economic Zone: Twenty-Five Years of Ocean Use and Abuse, and the Possibility of A Blue Water Public Trust Doctrine*, 36 ECOLOGY L.Q. 1, 30 n.164 (2009). Hence, without ratification, UNCLOS does not legally bind the United States. *See* Vienna Convention on the Law of Treaties art. 16, May 23, 1969, 115 U.N.T.S. 331 (providing that "[u]nless the treaty otherwise provides, instruments of ratification . . . establish the consent of a State to be bound by a treaty").

41. DONALD R. ROTHWELL & TIM STEPHENS, THE INTERNATIONAL LAW OF THE SEA 14 (2010). More specifically, UNCLOS recognized the desirability of a "legal order for the seas and oceans" that would promote global communication, facilitate the efficient use of aquatic resources, and bolster the study, protection, and preservation of the marine environment. UNCLOS, *supra* note 40, pmbl.

42. *Law of the Sea Convention*, U.S. DEP'T OF STATE, http://www.state.gov/e/oes/lawofthesea/ (last visited Mar. 7, 2014); *see also* Press Release, The American Sovereignty Campaign, America's Leading Business Voices Testify: "Law of Sea" Needed for U.S. Economic Growth, Job Creation (Jun. 28, 2012) (on file with author), *available at* http://www.ratifythetreatynow.org/sites/default/files/pdf/Release-SFRC%20Hrg%2006-28-12%20FINAL.pdf (stating that "[the Senate's ratification of UNCLOS] benefits the [United States] economically by providing American companies the legal certainty and stability to do what they do best: putting people to work by creating new and innovative goods and services.").

43. Letter from George P. Shultz, former U.S. Sec'y of State, to Richard G. Lugar, former U.S. Senator (June 28, 2007) (on file with author).

44. *See* Griset, *supra* note 39, at 406–07.

In having codified customary international law relating to the territorial seas, UNCLOS recognizes that a coastal nation's sovereignty extends beyond its respective land territories and internal waters to include its territorial seas, which consist of the adjacent sea belt, seabed, subsoil, and air space above such waters.[45] These territorial seas may not exceed twelve nautical miles, which is measured from baselines determined pursuant to UNCLOS.[46] The normal baseline is the low-water mark along the coastal nation's shoreline as marked on large-scale charts officially recognized by the nation.[47] "In the United States, the baseline is drawn across river mouths, the opening of bays, and along the outer points of complex coastlines."[48] In 1988, acting pursuant to his executive authority,[49] President Reagan proclaimed[50] that the United States's territorial sea was to extend from its default position of three nautical miles to twelve nautical miles seaward from the shoreline.[51] The proclamation expressly disclaimed any intent to modify existing domestic law and was meant only for purposes of international law.[52] The proclamation is congruent and proportional to UNCLOS, which explains that in relation to a ship's innocent passage through territorial seas, "coastal states [are allowed] to adopt laws and regulations regarding safety of navigation, conservation of living resources of the sea, fisheries, marine pollution, sanitation, immigration, customs, and security."[53]

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45. UNCLOS, *supra* note 40, art. 2.

46. *Id.* art. 3.

47. *Id.* art. 5.

48. U.S. COMM'N ON OCEAN POL'Y, An Ocean Blueprint for the 21st Century 70 (2004), *available at* http://www.theatlantic.com/international/archive/2012/06/-almost-everyone-agrees-the-us-should-ratify-the-law-of-the-sea-treaty/258301/.

49. *See* Proclamation No. 5030, 48 Fed. Reg. 10605 (Mar. 10, 1983) (stating that the United States would "exercise [its] sovereign rights and jurisdiction in accordance with the rules of international law"); *see also* Restatement (Third) of Foreign Relations Law § 511 (1987) (international law allows nations to "exercise jurisdiction over . . . [t]he territorial sea . . . a belt of sea that may not exceed [twelve] nautical miles").

50. *See* Proclamation No. 5928, 54 Fed. Reg. 777 (Dec. 27, 1988).

51. *See In re* Air Crash Off Long Island, New York, on July 17, 1996, 209 F.3d 200, 213 (2d Cir. 2000) ("[Proclamation No. 5928] thus alters the three-mile boundary that had historically defined the territorial sea."). In fact, the three-nautical-mile default position for the United States's territorial sea began in 1793 with a statement by Secretary of State Thomas Jefferson. U.S. COMM'N ON OCEAN POL'Y, *supra* note 48, at 49.

52. *See In re Air Crash Off Long Island*, 209 F.3d at 213.

53. *See* Jeremy Firestone & James Corbett, *Maritime Transportation: A Third Way for Port and Environmental Security*, 9 WIDENER L. SYMP. J. 419, 420 n.11 (2003); *see also* UNCLOS, *supra* note 40, art. 21 (denoting specific laws and regulations that a coastal state may adopt in relation to a ship's innocent passage through the territorial sea).

UNCLOS also codified international recognition of a contiguous zone outside the territorial sea of each coastal nation.[54] The United States's contiguous zone is adjacent to the territorial sea of the United States, in which the United States may "exercise the control necessary to prevent infringement of its customs, fiscal, immigration, or sanitary laws and regulations within its territory or territorial sea, and to punish infringement of the above laws and regulations committed within its territory or territorial sea."[55] In 1999, President William J. Clinton formally extended the U.S. contiguous zone from twelve to twenty-four nautical miles, "in accordance with international law, but in no case within the territorial sea of another nation."[56] The primary reason for extending the contiguous zone was to "advance the law enforcement and public health interests of the United States"[57]; more specifically, to improve the United States Coast Guard's ability to enforce and take action against foreign flag vessels throughout the area.[58]

According to UNCLOS, it is also within a coastal nation's sovereign rights to establish an exclusive economic zone (EEZ) adjacent to its territorial sea, which may extend up to 200 miles seaward from the coastal nation's shoreline.[59] The United States's EEZ[60] overlaps the contiguous zone, "[occupying] the area between [twelve] miles (the seaward limit of the territorial sea) and 200 miles offshore for international purposes."[61] In the EEZ, the United States has extensive rights to natural resources found in ocean waters, the seabed, or subsoil.[62]

In addition to the federal territorial seas, contiguous zone, and EEZ, the United States also claims jurisdiction over its outer continental shelf (OCS).[63] In 1945, President Harry S. Truman issued an Executive

54. *See* UNCLOS, *supra* note 40, art. 33.

55. Proclamation No. 7219, 64 Fed. Reg. 48701 (Aug. 2, 1999).

56. *Id.*

57. *Id.*

58. U.S. COMM'N ON OCEAN POL'Y, *supra* note 48, at 72.

59. *See* UNCLOS, *supra* note 40, arts. 55–57; *see also* U.S. COMM'N ON OCEAN POL'Y, *supra* note 48, at 73 (stating that the twelve-mile territorial sea and 200-mile EEZ have not been integrated into United States laws. Moreover, "[m]any laws also use imprecise or inconsistent terms to refer to ocean areas, such as 'navigable waters,' 'coastal waters,' 'ocean waters,' 'territory and waters,' [and] 'waters of the United States.' . . . These terms can mean different things in different statutes and sometimes are not defined at all.").

60. Proclamation No. 5030, 48 Fed. Reg. 10605 (Mar. 10, 1983).

61. U.S. COMM'N ON OCEAN POL'Y, *supra* note 48, at 72.

62. *See id.*; *see also* UNCLOS, *supra* note 40, art. 56.

63. *See* UNCLOS, *supra* note 40, art. 76; Executive Order No. 9633, 10 Fed. Reg. 12305 (Sept. 28, 1945). The continental shelf, for purposes of international law, is

Order[64] and Proclamation[65] announcing that it was the view of the United States that the "exercise of [federal] jurisdiction over the natural resources of the subsoil and sea bed of the continental shelf by the contiguous nation is reasonable and just,"[66] and that Congress and the United States Supreme Court should resolve "any [subsequent] issues between the United States and the several states."[67] In order to sort out the inherent conflict between the federal government's position and several state statutes authorizing residents to prospect for non-renewable resources offshore,[68] the Supreme Court issued a handful of rulings[69] that established federal jurisdiction over the OCS.[70]

In response to these rulings,[71] Congress codified the "United States'[s] jurisdiction over the seabed and returned limited jurisdiction to

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generally defined as the seafloor and subsoil that extend beyond the territorial sea throughout the "natural prolongation of a coastal nation's land mass to the outer edge of the continental margin or to 200 miles from the baseline if the continental margin does not extend that far." U.S. COMM'N ON OCEAN POL'Y, *supra* note 48, at 74. The distance is usually referred to as the continental margin. UNCLOS, *supra* note 40, art. 76. "The continental margin comprises the submerged prolongation of the land mass of the coastal State, and consists of the seabed and subsoil of the shelf, the slope and the rise. It does not include the deep ocean floor with its oceanic ridges or the subsoil thereof." *Id.*

64. 10 Fed. Reg. 12305 (1945).

65. Proclamation No. 2667, 10 Fed. Reg. 12303 (Sept. 28, 1945).

66. *Id.*

67. 10 Fed. Reg. 12305, *supra* note 64.

68. *See* David W. Robertson, *The Outer Continental Shelf Lands Act's Provisions on Jurisdiction, Remedies, and Choice of Law: Correcting the Fifth Circuit's Mistakes*, 38 J. MAR. L. & COM. 487, 493–94 (2007) (providing a more extensive discussion of conflicting state statutes).

69. *See* United States v. California, 332 U.S. 19 (1947); United States v. Louisiana, 339 U.S. 699 (1950); United States v. Texas, 339 U.S. 707 (1950); *see also* Jeffrey C. Cartmell, *A Shift in the Winds: What the Outer Continental Shelf Renewable Energy Program and the Dismantling of the Minerals Management Service Mean for Offshore Energy*, 7 OKLA. J. L. & TECH. 55, 56 (2011) (providing a brief history concerning the development of federal authority on the outer continental shelf).

70. *See Louisiana*, 339 U.S. at 705 (reasoning that if "the three-mile belt is in the domain of the nation rather than that of the separate States . . . the ocean beyond that limit also is."); United States v. Maine 420 U.S. 515, 520 (1975) (stating that "paramount rights over the ocean waters and their seabed were [constitutionally] vested in the [f]ederal [g]overnment").

71. In other words, these rulings effectively transferred the first three nautical miles of a state's coastal submerged lands to the federal government. *Maine*, 420 U.S. at 520; *see also California*, 332 U.S. at 34 (stating that "[t]his country, throughout its existence has stood for freedom of the seas, a principle whose breach has precipitated wars among nations.").

the states."[72] The Submerged Lands Act of 1953 (SLA) restored title to the states concerning the natural resources located within three nautical miles of their coastlines.[73] In August of 1953, Congress passed the Outer Continental Shelf Lands Act (OCSLA),[74] which recognized federal jurisdiction over the OCS—"all submerged lands lying seaward and outside of the area of lands beneath navigable waters as defined in [43 U.S.C.] section 1301."[75] Although these congressional acts brought some clarity to the complexities of offshore federal and state jurisdiction, the problem of assigning regulatory authority to the proper federal agencies has arguably posed a greater threat to the relative infancy of offshore renewable energy development.

B. Federal Regulation

The United States's regulation of offshore renewable energy consists of a "patchwork quilt of federal, state, and local agencies," several of which have jurisdiction over a particular sector of the energy industry and none of which have the authority to regulate an entire industry.[76] Before 2005, it was not clear whether any federal agency had the authority to approve the use of federal waters for renewable energy development. The OSCLA only authorized the Secretary of the Interior[77] to issue leases relating to the development of non-renewable energy resources.[78] In 2005, however, section 388 of the Energy Policy Act

72. Cartmell, *supra* note 69, at 55; *see also* Submerged Lands Act of 1953, 43 U.S.C. §§ 1301–15; Outer Continental Shelf Lands Act of 1953, 43 U.S.C. §§ 1331–56.

73. *See* Submerged Lands Act of 1953, *supra* note 72. It is worth noting that three marine leagues (nine nautical or geographical miles) were designated to Texas' and Florida's Gulf Coast. *Id.* The term "natural resources" includes oil, gas, and all other minerals. *Id.*

74. 43 U.S.C. §§ 1331–56.

75. 43 U.S.C. § 1331(a).

76. Ann E. Drobot, *Transitioning to a Sustainable Energy Economy: The Call for National Cooperative Watershed Planning*, 41 ENVTL. L. 707, 741 (2011).

77. The U.S. Department of the Interior is the nation's "principal conservation agency," charged with "conduct[ing] scientific research, provid[ing] wise stewardship of energy and mineral resources, foster[ing] sound use of land and water resources, and conserv[ing] and protect[ing] fish and wildlife." *About the Department of the Interior*, DEP'T OF THE INTERIOR, http://www.doi.gov/facts.html (last visited Mar. 7, 2014); *see also* 43 U.S.C. § 1451 (2012).

78. *See* Laura Koch, *The Promise of Wave Energy*, 2 GOLDEN GATE U. ENVTL. L.J. 162, 177 (2008); *see also* Thomas C. Jensen, *Offshore Renewable Energy Development After the Energy Policy Act of 2005*, 2007 A.B.A. SEC. ENVTL. ENERGY & RES. 1, 12, *available at*

(EPAct) amended OCSLA,[79] which assigned authority to the Secretary of the Interior to issue leases, easements, and rights-of-way for the development of "energy from sources other than oil and gas"[80] over the OCS.[81] This authority,[82] shortly thereafter, was delegated to the Minerals Management Service (MMS).[83] Therefore, "in order to obtain sufficient property rights to site a wave or tidal project on the OCS, a developer must obtain a lease from MMS."[84] The Federal Energy Regulatory Commission (FERC),[85] however, pursuant to the Federal Power Act

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www.oceanrenewable.com/wp-content/uploads/2007/03/aba-ocs-paper-final.pdf (stating that section 388 of the Energy Policy Act of 2005 gave the "Interior Department jurisdiction over projects that make alternate use of existing oil and natural gas platforms in federal waters"). OSCLA authorized the Secretary of the Interior to issue leases only for the development of oil, natural gas, sand, and gravel. *See* 43 U.S.C. § 1337.

79. *See* Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005) (codified as amended in scattered sections of 26 U.S.C. and 42 U.S.C.).

80. 43 U.S.C. § 1337(p)(1)(C). The EPAct allowed for the development of "wind, wave, ocean current, and other alternative energy sources in federal waters." Koch, *supra* note 78, at 177.

81. This authority extended only to federal waters three-miles seaward from the shoreline. *See* Submerged Lands Act of 1953, *supra* note 72.

82. In conjunction with OCSLA, the Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf, commonly referred to as the Outer Continental Shelf Renewable Energy Program (OCSREP), provides regulations that "specifically apply to activities that '[p]roduce or support production, transportation, or transmission of energy from sources other than oil and gas,' and also regulates activities that '[u]se, for energy related purposes or for other authorized marine-related purposes, facilities currently or previously used for activities authorized under [OCSLA].'" Cartmell, *supra* note 69, at 55 (quoting Renewable Energy Alternate Uses of Existing Facilities on the Outer Continental Shelf, 30 C.F.R. §§ 285.100(a)–(b) (2010)). OCSREP prescribed MMS' responsibilities, which included the "[p]rotection of the environment, . . . [c]onservation of natural resources of the OCS, . . . [a] fair return to the United States, . . . [and] [o]versight, inspection, research, monitoring, and enforcement of activities authorized by a lease or grant." 30 C.F.R. §§ 285.102(a)(2), (4), (8), (12) (2011).

83. "In January 1982, Secretarial Order No. 3071 created the MMS, under the authority 'provided by Section 2 of Reorganization Plan No. 3 of 1950.'" Cartmell, *supra* note 69, at 55 (quoting U.S. Dep't of the Interior, Department Manual, Pt. 118 Ch. 1 §1.3 (Mar. 20, 2006)); *see also* Sec. Order No. 3071 (Jan. 19, 1982). As an agency within the United States Department of the Interior, the MMS was "responsible for managing the mineral resources on and energy-related or other authorized marine-related purposes across the OCS in an environmentally sound and safe manner and to timely collect, verify, and distribute mineral revenues." U.S. Dep't of the Interior, Department Manual, Pt. 118 Ch. 1 §1.3 (Mar. 20, 2006).

84. Megan Higgins, *Is Marine Renewable Energy a Viable Industry in the United States? Lessons Learned from the 7th Marine Law Symposium*, 14 ROGER WILLIAMS U. L. REV. 562, 571 (2009).

85. *See* 42 U.S.C. § 7134 (2012).

(FPA)[86] claimed authority to license marine renewable energy projects,[87] "but acknowledged that developers would still need to obtain a lease from MMS to secure the property rights to site a marine renewable project required by the FPA and terms of a license."[88] MMS nevertheless claimed exclusive authority over marine renewable projects on the OCS, maintaining that FERC lacked authority beyond the three-mile limit.[89] This jurisdictional dispute over the federal regulation of marine renewable energy projects persisted for several years.

In 2009, a Memorandum of Understanding (MOU) between MMS and FERC resolved this growing dispute over the jurisdictional oversight of hydrokinetic and other renewable energy projects on the OCS.[90] The MOU authorized MMS to have exclusive jurisdiction over non-hydrokinetic renewable energy projects on the OCS (i.e., wind and solar energy projects).[91] As for hydrokinetic energy projects on the OCS, FERC and MMS agreed to split jurisdiction, whereby FERC received exclusive jurisdiction to issue licenses and exemptions for construction and operation of hydrokinetic projects, and MMS received exclusive jurisdiction to issue leases, easements, and rights-of-way in relation to hydrokinetic projects[92]—but the arrangement was short-lived.

In the aftermath of the Deepwater Horizon explosion, Secretary of the Interior Ken Salazar promptly dismantled MMS to "separate and reassign the responsibilities that had been conducted by [MMS] into new

86. Federal Power Act of 1935, 16 U.S.C. §§ 791(a)–828(c) (2012).

87. The FPA authorized FERC to issue licenses for the "purpose of constructing, operating, and maintaining hydroelectric projects 'for the development, transmission, and utilization of power across, along, from, or in any streams or other bodies of water over which Congress has jurisdiction under [the Commerce Clause].'" Higgins, *supra* note 84, at 572 (quoting 16 U.S.C. §797(e)). But FERC's authority to issue licenses for wave and tidal projects beyond the three-mile limit has conflicted with the FPA's legislative history. *Id.* "The FPA's legislative history 'conclusively demonstrates' a congressional intent to regulate only hydroelectric generating facilities." *Id.* (quoting Chemehuevi Tribe of Indians v. Fed. Power Comm'n, 420 U.S. 395, 405 (1975)).

88. Carolyn Elefant, *MMS-FERC Jurisdictional Dispute Continues*, OCEAN RENEWABLE ENERGY COALITION, http://www.oceanrenewable.com/2009/01/13/mms-ferc-jurisdictional-dispute-continues/ (last visited Mar. 7, 2014); *see also* Higgins, *supra* note 84, at 565 (stating that "[a] comprehensive and efficient regulatory framework to permit marine renewable energy projects is crucial if [hydrokinetic technologies] are to continue to be developed and deployed in the United States").

89. *See* Elefant, *supra* note 88; *see also* Submerged Lands Act of 1953, *supra* note 72.

90. Memorandum of Understanding Between the U.S. Dep't of the Interior and Fed. Energy Reg. Comm'n (Apr. 9, 2009), *available at* http://www.ferc.gov/legal/maj-ord-reg/mou/mou-doi.pdf [hereinafter FERC-DOI MOU].

91. *Id.*

92. *Id.*

management structures"[93] and "improve the management, oversight, and accountability of activities on the [OCS]."[94] The order divided MMS into three separate agencies: Bureau of Ocean Energy Management (BOEM),[95] Bureau of Safety and Environmental Enforcement (BSEE),[96] and Office of Natural Resources Revenue (ONRR).[97] Like the incentives that plagued MMS, the government's considerable interest in extinguishing any economic incentives from these new agencies is clearly reflected in Secretary Salazar's reallocation of MMS's former responsibilities, where he assigned royalty and revenue functions exclusively to ONRR.[98]

C. The Federal Process: Leasing, Permitting, and Licensing

The present situation between BOEM and FERC concerning the regulatory aspects of marine and hydrokinetic energy projects over the

93. *See* Sec. Order No. 3299 § 1 (May 19, 2010). "Indeed, as the events evolved concerning the Deepwater Horizon spill, the agency then responsible for oversight of virtually all aspects of deepwater exploration and production [MMS], came under harsh scrutiny, and any claim it may have had as an effective regulatory body shattered." Mark A. Latham, *Five Thousand Feet and Below: The Failure to Adequately Regulate Deepwater Oil Production Technology*, 38 B.C. ENVTL. AFF. L. REV. 343, 345 (2011). It was later found that economic incentives were built into MMS's regulatory framework, encouraging MMS to treat safety regulations with more than accommodating leniency. *See* Cartmell, *supra* note 69, at 55 n.143. Although MMS rightfully shouldered most of the blame, it is worth noting that the Department of the Interior and Congress were also held partly accountable. *See* Ronald J. Krotoszynski, Jr., *Transparency, Accountability, and Competency: An Essay on the Obama Administration, Google Government, and the Difficulties of Securing Effective Governance*, 65 U. MIAMI L. REV. 449, 454–57 (2011).

94. Sec. Order No. 3299, *supra* note 93, § 1.

95. BOEM received the "conventional (e.g., oil and gas) and renewable energy-related management functions of the [MMS]." *Id.*

96. BSEE received the authority to exercise the "safety and environmental enforcement functions of the [MMS] including, but not limited to, the authority to inspect, investigate . . . [and] levy penalties." *Id.*

97. ONRR took over the "royalty and revenue management functions of the [MMS] including, but not limited to, royalty and revenue collection." *Id.* Some suggest, however, that these subsequent measures only "perpetuate a system in which important development and regulatory decisions are still located within a conflicted Department of the Interior with an ambivalent environmental mission." Alan B. Sielen, *Time for a Department of the Environment*, 16 OCEAN & COASTAL L.J. 435, 439 (2011). *See also id.* at 439 n.19 (providing a specific example of how many of the underlying systemic failures that contributed to the Gulf Oil Spill can also be found in the workings of other federal departments and agencies with environmental responsibilities).

98. *See* Cartmell, *supra* note 69, at 55 n.143.

OCS has been established by a set of continually revised guidelines.[99] These guidelines were issued to "develop a cohesive, streamlined process that [would] help accelerate the development of MHK [marine hydrokinetic] (i.e., wave, tidal, and ocean current) energy projects [over the OCS]."[100] Before applicants[101] can seek a license or exemption from FERC for OCS hydrokinetic projects, they must first obtain a site lease, easement, or right-of-way from BOEM.[102] "BOEM has the authority to issue three types of leases for MHK projects: commercial leases, limited leases, and research leases,"[103] which are all issued on a competitive basis.[104] BOEM will consider issuing limited and research leases on a case-by-case basis, whereas BOEM and FERC will "coordinate their processes, to the extent practicable to accommodate the specific situation[s]" concerning commercial leases.[105]

After an applicant has obtained the proper lease from BOEM, it must seek a license or exemption from FERC, which follows three different licensing processes: Integrated Licensing Process, Traditional Licensing

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99. *See* FERC, BOEM / FERC GUIDELINES ON REG. OF MARINE AND HYDROKINETIC ENERGY PROJECTS ON THE OCS (July 19, 2012), *available at* http://www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics/pdf/mms080309.pdf [hereinafter FERC-BOEM GUIDELINES]. This document replaced the initial set of guidelines executed on August 4, 2009. *Id.* § 1.1; *see also* Memorandum of Understanding Between the U.S. Dep't of the Interior and the Federal Energy Reg. Comm'n (Apr. 9, 2009), *available at* http://www.ferc.gov/legal/maj-ord-reg/mou/mou-doi.pdf. In regard to the significant changes to the guidelines, "BOEM now allows research leases [in addition to commercial leases and limited leases], and FERC has expedited its pilot project licensure process." Todd Griset, *FERC, BOEM Marine Hydrokinetic Guidelines*, ENERGY POL'Y UPDATE (July 20, 2012), *available at* http://energypolicyupdate.blogspot.com/2012/07/ferc-boem-marine-hydrokinetic-guidelines.html.

100. *See* FERC-BOEM GUIDELINES, *supra* note 99, § 1.1.

101. In order for a nonfederal entity to qualify as an applicant for purposes of holding a lease and a license for an MHK project on the OCS, the entity must be: (1) United States citizen; (2) association of United States citizens; (3) corporation organized under the laws of the United States or any state; (4) state; or (5) municipality. *Id.* § 2.3.

102. *See id.* § 2.4; *see also* FERC-DOI MOU, *supra* note 90, at 2. Any federal agency that has received congressional authorization to operate an MHK project on the OCS does not need FERC licensure, "but [still needs] to obtain a lease from BOEM before doing so." FERC-BOEM Guidelines, *supra* note 99, at § 2.3.

103. FERC-BOEM GUIDELINES, *supra* note 99, § 2.8.

104. *Id.*; *see also* 30 C.F.R. §§ 585.210–585.225.

105. FERC-BOEM GUIDELINES, *supra* note 99, §§ 2.9–2.11. "The FPA requires [] FERC's licensing decisions to give equal consideration to developmental purposes (e.g., power generation, water supply, flood control, irrigation, and navigation) and non-developmental purposes (e.g., fish and wildlife, recreation, and other aspects of environmental quality)." Wellinghoff, *supra* note 2, at 407 n.64.

Process, and Alternative Licensing Process.[106] In addition, project developers who have obtained a proper lease from BOEM may conduct limited testing without a FERC license if: (1) the technology is experimental; (2) "the proposed facilities are to be used for a short period for . . . conducting studies necessary to prepare a license application" or for educational purposes; and (3) the "power generated from the test project [will not] constitute 'developing electric power' for purposes of the Federal Power Act (FPA)."[107] Although BOEM and FERC are committed to refining the regulatory process for MHK energy projects over the OCS, it appears that the process needs further development before it is actually accessible enough for the energy industry to move forward in this sector.

D. Additional Federal Regulatory Regimes

Although FERC and BOEM share primary jurisdictional responsibilities in authorizing MHK projects over the OCS, applicants seeking to develop such projects may also be required to obtain authorization from several additional federal agencies in certain circumstances.[108] These agencies and entities include the Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, National Park Service, Federal Aviation Administration, Department of Defense, and U.S. Coast Guard.[109] The U.S. Fish and Wildlife Service and National Marine Fisheries Service have joint authority in maintaining the health and stability of the marine ecosystem, prohibiting the "taking of marine mammals in United States

106. FERC–BOEM GUIDELINES, *supra* note 99, § 3.3. FERC's default licensing process is the ILP. Wellinghoff, *supra* note 2, at 405.

107. *Id.* § 2.5; *see also* Verdant Power LLC, 111 FERC ¶ 61024 (2005), order on reh'g, 112 FERC ¶ 61143 (F.E.R.C. Apr. 14, 2005) (granting Verdant Power's request for a clarification order with respect to its proposal to temporarily put in place facilities to allow it to conduct hydropower testing at a site in the East River near New York City, New York. The Commission found that the proposed activities did not require licensing under Part I of the FPA).

108. *See* Griset, *supra* note 39, at 414–15. It is worth mentioning that the term, MHK project, "encompasses ocean thermal energy conversion (OTEC), which falls under the jurisdiction of the National Oceanic and Atmospheric Administration (NOAA). However, this [Comment] uses the term MHK only as it applies to [energy projects] under BOEM's leasing responsibility and FERC's licensing responsibility," which mostly refers to ocean wave and ocean current projects. FERC–BOEM GUIDELINES, *supra* note 99, at 2 n.1.

109. *See* Griset, *supra* note 39, at 415.

waters, or by United States citizens on the high seas."[110] Moreover, in order to "promote the protection of essential fish habitat[s]," federal authorities that have the effect or potential to affect such habitats through the issuance of federal permits, leases, or licenses, must consult and review such projects with the National Marine Fisheries Service before any federal actions can occur.[111]

It is clear that while such agencies may not play a major role in project licensure, developers must determine which permits are required for their given project location and technology—not only increasing developers' costs related to labor, materials, productivity, but also escalating financial and investment risk.[112] However, some scholars remain optimistic, stating that while the "challenges in this area are substantial, . . . the rewards will be great *if* hydrokinetic energy achieves its full potential as a clean, domestic contributor to meeting the country's energy needs."[113] The more commonly held view is that overcoming these challenges is a very big "if" indeed.[114] In light of the complicated regulatory framework coordinating MHK projects and subsequent adverse effects on developers, the combination has placed a "chilling effect on the comprehensive development of the nation's renewable ocean energy resources"—frustrating the very same policy objectives that these federal agencies were intended to achieve.[115]

E. Federal Regulation Favorable to the States

Even with FERC and BOEM's considerable regulatory presence, coastal states have maintained substantial authority over offshore MHK energy projects in their adjacent waters with the passage of two federal laws:[116] the Coastal Zone Management Act (CZMA)[117] and the Clean Water Act (CWA).[118]

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110. *See id.* (referring to the Marine Mammal Protection Act of 1972 (MMPA), 16 U.S.C. §§ 1361–1423(h) (2012)).

111. *See id.* (referring to the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MFCMA), 16 U.S.C. §§ 1801–84 (2012)).

112. *Id.*

113. Wellinghoff, *supra* note 2, at 419–20 (emphasis added).

114. *See* Griset, *supra* note 39, at 415.

115. *Id.*

116. STOEL RIVES OCEAN ENERGY, *supra* note 35, ch. 3, at 10.

117. Coastal Zone Management Act of 1972 (CZMA), Pub. L. No. 92-583, 86 Stat. 1280 (codified as amended at 16 U.S.C. §§ 1451–66 (2012)). In response to congressional findings that (among others) new and expanding demands for resources in the territorial sea, EEZ and OCS were placing stress on these areas and "creating the need for resolution of serious conflicts among important and competing uses and values in

1. Coastal Zone Consistency

After the Secretary of Commerce's final approval of a state's management program, any applicant requesting a mandatory federal license or permit in order to conduct an activity, in or outside of the coastal zone, that affects any land or water use or natural resource of the state's coastal zone must provide a certification that the proposed activity is not only in compliance with the enforceable policies of the state's approved program, but also conducted in a manner consistent with the coastal zone management program.[119] "At the same time, the applicant must provide a copy of that certification together with necessary information and data to the state or its designated CZMA agency. Each coastal state must have procedures for public notice of and comment on such certifications."[120] The state or its designated CZMA agency must notify the federal agency within six months that the state concurs with or objects to the applicant's certification.[121] If notice is not provided within the designated six-month time period, then there is a presumption that the state or its designated CZMA agency concurs with the applicant's certification.[122] "If a state refuses to issue such a consistency certification, the Secretary of Commerce may overrule the state and authorize the issuance of a permit only if the Secretary concludes after a notice and comment period that the proposed activities are either consistent with the objectives of the CZMA, or are 'otherwise necessary in the interest of national security.'"[123]

2. Water Quality Certification

Likewise, the CWA requires "[a]ny applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge

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[these] coastal and ocean waters," the CZMA was enacted to encourage and help the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of programs related to the management of coastal development—improving, safeguarding, and restoring the quality of coastal waters and protecting natural resources and existing uses of those waters. *See id.* §§ 1451–52.

118. Clean Water Act of 1972 (CWA), Pub. L. No. 95-217, 91 Stat. 1566 (codified as amended at 33 U.S.C. §§ 1251–1387 (2012)).

119. 16 U.S.C. § 1456(c)(1)(A).

120. STOEL RIVES OCEAN ENERGY, *supra* note 35, ch. 3, at 10 (paraphrasing 16 U.S.C. § 1456(c)(3)(A)).

121. 16 U.S.C. § 1456(c)(3)(A).

122. *Id.*

123. Griset, *supra* note 39, at 415–16 (citing 16 U.S.C. § 1456(c)(3)(A)).

into the navigable waters [of the United States],"[124] must provide the licensing or permitting agency with a water quality certification from the state in which the discharge will occur, stating that there is "reasonable assurance that such facility or activity will not violate" applicable water quality standards.[125] In contrast to the CZMA, if the state, interstate agency, or administrator, fails or refuses to act on a certification request within a reasonable period of time (not to exceed one year) after having received the request, the certification requirements are waived by operation of law (as opposed to the CZMA's presumption of concurrence).[126] "A federal licensing or permit-issuing agency cannot issue its license or permit until the [requisite] certification . . . has been obtained or waived."[127] As a prerequisite to FERC licensure and BOEM lease issuance, the obligatory consistency and water quality certifications provide states with a considerable, preliminary check on the federal government's power to regulate offshore MHK energy projects.[128]

3. Preliminary Conclusion on Federal Offshore Regulation

The confusing patchwork of federal offshore regulation has substantially watered down the possibility for an effective, federal regulatory process concerning marine and hydrokinetic energy projects.[129] The divisive power struggle between FERC and BOEM has made it only more difficult for hydrokinetic energy developers to navigate through the regulatory framework, with developers now devoting a considerable amount of resources to determine the necessary steps toward permitting, leasing, and licensing in their respective regions.[130] The unnecessary amount of governing authorities coupled with the present regulatory framework has led to regulatory uncertainty,

124. 33 U.S.C. § 1341(a)(1).

125. 33 U.S.C. § 1341(a)(4); *see also id.*

126. STOEL RIVES OCEAN ENERGY, *supra* note 35, ch. 3 at 11; *see also* 33 U.S.C. § 1341(a)(3).

127. *Id.*

128. *See* Griset, *supra* note 39, at 416; *see also* STOEL RIVES OCEAN ENERGY, *supra* note 35, ch. 3 at 10 n.21 (discussing the potential exception for FERC's issuance of conditioned licenses). It is important to point out that there are several additional state restrictions on federal regulatory authority not discussed in this Comment, including state review of onshore transmission development associated with offshore energy projects and state regulation of related utility activities. *See* Griset, *supra* note 39, 416–17.

129. Rachael Salcido, *Siting Offshore Hydrokinetic Energy Projects: A Comparative Look at Wave Energy Regulation in the Pacific Northwest*, 5 GOLDEN GATE U. ENVTL. L.J. 109, 128 (2011).

130. Griset, *supra* note 39, at 408.

"which in turn has imposed increased costs, a decreased ability of project developers to secure project financing, and an overall chilling effect on the development of the nation's marine renewable power resources."[131] In light of these substantial obstacles, however, the Hydropower Regulatory Efficiency Act of 2013 may provide the necessary buoyancy to keep the development of hydrokinetic energy technologies afloat.[132] The effect of these regulatory burdens and incentives has produced differing results in northern New England.

IV. STATE-SPECIFIC REGULATORY REGIMES

Maine, New Hampshire, and Massachusetts each present different junctures of hydrokinetic energy development in northern New England. As of this Comment, Maine is the only state in northern New England to have executed a Memorandum of Understanding with FERC,[133] whereas policies coordinating hydrokinetic energy regulation in New Hampshire and Massachusetts have mostly been relegated to the state legislatures, state executive branches, private developers, and non-profit environmental organizations.[134] Each state, however, does currently have several hydrokinetic projects in operation.[135] The following sections identify major regulatory requirements in each state and the extent to which the states have facilitated the process of hydrokinetic energy development in northern New England.

131. *Id.* It should be noted, however, that FERC has established several non-traditional procedural options to better suit "hydrokinetic energy developers seeking to demonstrate the commercial feasibility of their systems or gain information about the potential environmental impact of those systems." Wellinghoff, *supra* note 2, at 406. But even these procedures may not be an attractive option for developers whose technology is only at the demonstration stage. *Id.* at 409.

132. H.R. 267, 112th Cong. (2d Sess. 2012). Although the bill received a unanimous 372-0 approval from the 112th Congress in July 2012, it did not come before the Senate prior to the end of the legislative session. "The bill was reintroduced by Reps. Diana DeGette, D-Colo., and Cathy McMorris Rodgers, R-Wash., to the House [in early February of 2013]." *Hydropower Regulatory Efficiency Act Passes U.S. House*, ELEC. LIGHTS & POWER (Feb. 13, 2013), http://www.elp.com/articles/2013/01/hydropower-regulatory-efficiency-act-passes-u-s--house-committee.html.

133. Memorandum of Understanding Between the Fed. Energy Reg. Comm'n and the State of Maine (Aug. 19, 2009), *available at* https://www.ferc.gov/legal/mou/mou-ma.pdf [hereinafter FERC-ME MOU].

134. *See infra* Part IV.B–C.

135. *See infra* Part IV.A–C.

A. Maine

Along its serrated coastline, Maine is home to extensive ocean energy resources with large tidal ranges and high-velocity narrows offering significant hydrokinetic power potential; particularly, the Gulf of Maine, Bay of Fundy,[136] and Passamaquoddy Bay.[137] Even the Maine legislature agreed with former Maine Governor John E. Baldacci's Ocean Energy Task Force in finding that Maine could become an "international proving ground for testing promising new [hydrokinetic] technologies in state waters in specific locations along the coast in an environmentally responsible manner."[138] These physical characteristics favorable to hydrokinetic energy development complement the state's existing business infrastructure.[139] Moreover, Maine has considerable assets in its current business base, which contribute greatly to the "onshore, offshore, and ocean energy supply chains necessary to develop [hydrokinetic energy] resources."[140] The state has been active in working to expedite the regulatory process for hydrokinetic energy development,[141] and has also encouraged developers to make use of readily available pilot programs, like FERC's preliminary permit procedure.[142] Maine has directed its efforts toward reconciling federal and state regulation by coordinating with the proper federal administrative agencies and passing correlative legislation, further facilitating the development of hydrokinetic energy projects within the state.

As the first of its kind on the East Coast,[143] FERC and the State of Maine executed a Memorandum of Understanding (MOU) on August 19,

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136. Peter Hanlon, *Hydrokinetic Energy: Here, There But Not Everywhere*, GRACE (Jan. 25, 2011), http://www.gracelinks.org/blog/946/hydrokinetic-energy-here-there-but-not-everywhere.

137. *See The History of Tidal Power*, ME. TIDAL POWER, http://www.mainetidalpower.com/index.html (last visited Mar. 6, 2013).

138. 2009 Me. Laws 1465 (codified as amended in scattered sections of 38 M.R.S.A.).

139. JEFF THALER, PERMITTING AND LEASING FOR MAINE MARINE HYDROKINETIC (MHK) POWER PROJECTS, ENVTL. & ENERGY TECH. COUNCIL OF MAINE, 2 (2013). Maine's existing business infrastructure consists of "precision and composites manufacturing, engineering, construction, marine services and trades, applied research and development, and transportation and logistics." *Id.*

140. *Id.*

141. *Id.* at 3.

142. *Id.*

143. Washington signed a similar MOU in June of 2009. *See* Memorandum of Understanding Between the Fed. Energy Reg. Comm'n and the State of Washington (June 4, 2009), *available at* http://www.ferc.gov/legal/mou/mou-wa.pdf. Oregon signed

2009 in order to "coordinate the procedures and schedules for review of tidal energy projects using hydrokinetic technologies in Maine state waters, or in federal waters where the projects affect coastal resources or coastal uses in Maine's designated coastal area"[144] and to ensure that there is a streamlined review process of proposed hydrokinetic energy tidal projects that is not only sensitive to economic, cultural, and environmental concerns, but also able to provide a "timely, stable, and predictable means for developers of such projects to seek necessary regulatory and other approvals."[145] According to the MOU, FERC and Maine agreed that: (1.) each will notify the other when they "become aware of a prospective applicant seeking a preliminary permit, pilot project license, or other license from [FERC] to study or develop a hydrokinetic tidal energy project;[146] (2.) Maine will take action on an "application for a state permit and a request for water quality certification, for a demonstration hydrokinetic tidal project within 60 days of the [s]tate's acceptance" of the application;[147] and (3.) both will "designate management contacts to work to resolve any procedural issues that arise in the review of a specific tidal energy project in Maine state waters, or in federal waters where the project affects coastal resources or coastal uses in Maine's designated coastal area."[148] These specific provisions, as well as those not mentioned, were specifically designed to expedite the regulatory process for tidal hydrokinetic energy projects through transparency, communication, and coordination—ensuring a project's compatibility with both state and federal regulations.[149]

In the interest of facilitating hydrokinetic energy development, the Maine legislature directed the Maine Department of Conservation

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a similar MOU in March of 2008. Memorandum of Understanding Between the Fed. Energy Reg. Comm'n and the State of Oregon (Mar. 26, 2008), *available at* http://www.ferc.gov/legal/mou/mou-or-final.pdf.

144. FERC-ME MOU, *supra* note 133, at 2.

145. *Id.* It is important to note that the MOU between FERC and the State of Maine focuses exclusively on tidal power, without any mention of wave energy. *See generally id.* Although Maine's wave resources may not have been currently viable at the time of the MOU's execution, it does not logically follow to go ahead with the MOU when it accounted for only one segment of the emerging hydrokinetic industry in Maine – tidal. *See* Carolyn Elefant, *Maine and FERC Sign MOU*, LOCE: RENEWABLE OFFSHORE LEGAL BLOG (Aug. 20, 2009), http://lawofficesofcarolynelefant.com/renewablesoffshore/?p=418.

146. FERC-ME MOU, *supra* note 133, at 3.

147. *Id.* at 4.

148. *Id.* at 5.

149. *See id.*

(MDOC) to choose up to five locations within Maine's waters to be designated as "Ocean Energy Testing Areas,"[150] which coincide with Maine's expedited, general permitting process.[151] On December 15, 2009, MDOC designated three sites: Monhegan Island, Boon Island, and Damariscove Island.[152] A special permit program was established for developing proposed wave energy projects within a test site, and a "parallel but not identical general permit process was set up for demonstration tidal energy projects, not just in the three test sites and under a separate statutory scheme."[153] The general permitting program accelerates the state's regulatory approval process for hydrokinetic energy projects.[154] However, if a developer proposes a hydrokinetic energy project for Maine waters that is located outside one of the three designated test sites, then the "applicant must seek un-expedited state approval" because the accelerated general permit program does not apply in that situation.[155]

With regard to the state's collaborative efforts with FERC, BOEM, stakeholders and other limiting agencies, Maine has helped Ocean Renewable Power Company Maine, LLC (ORPC) to produce the first grid-connected marine hydrokinetic project in the Western Hemisphere—ORPC's very own single-device TidGen™[156] Power System.[157] Located in Cobscook Bay, the TidGen™ is situated at the mouth of the Bay of Fundy with the highest tidal range in the world (39 ft. average).[158] The TidGen™ consists of turbine generator units (TGUs)

150. *See Testing Ocean Energy in Maine*, STATE OF ME. DEP'T OF CONSERVATION, http://www.maine.gov/dacf/mcp/downloads/oceanenergy/testingoceanenergy.pdf (last visited Mar. 7, 2014); *see also* 2009 Me. Laws 1465 (codified as amended in scattered sections of 38 M.R.S.A.).

151. *Testing Ocean Energy in Maine*, *supra* note 146.

152. *See id.*

153. Thaler, *supra* note 139, at 3; *see also* Maine Waterway Development and Conservation Act, ME. REV. STAT. ANN. Tit. 38 § 636 (2011).

154. For a greater discussion of the general permitting process and its various requirements, see generally Thaler, *supra* note 139.

155. *Id.* at 10.

156. TIDGEN, Registration No. 4,313,336.

157. *Cobscook Bay Tidal Energy Project*, ENVTL. IMPACTS KNOWLEDGE MGMT. SYS. (TETHYS), U.S. DEP'T OF ENERGY, http://mhk.pnnl.gov/wiki/index.php/Cobscook_Bay_Tidal_Energy_Project (last visited Mar. 7, 2014). The purpose of Tethys is to gather, organize and make available information on potential environmental effects of marine and hydrokinetic and offshore wind energy development. *Environmental Effects of Renewable Energy from the Sea,* TETHYS, U.S. DEP'T OF ENERGY, http://mhk.pnnl.gov/wiki/index.php/Tethys_Home (last visited Mar. 7, 2014).

158. *See* Fed. Energy Reg. Comm'n, Order Issuing Pilot Project License (Minor Project), OCEAN RENEWABLE POWER COMPANY MAINE, LLC, PROJECT NO. 12711-005,

mounted to the sea floor, "bottom support frames, and underpower and data (P&D) cables,"[159] which work together to "capture the energy from the flow in both ebb and flood directions."[160] [161] On September 13, 2012, the commercial TidGen™ was successfully connected to the New England power pool through the Bangor Hydro Electric Company's utility grid (completing phase one), and now the second phase of the project is to install two additional power systems over the next three years—"increasing the Cobscook Bay Tidal Energy Project's output to up to 5 megawatts, which is enough electricity to power 1,200 Maine homes and businesses with clean tidal energy."[162] The success of ORPC's Cobscook Bay Tidal Energy Project may surely set the bar for current and future offshore hydrokinetic projects in northern New England.[163]

B. New Hampshire

It may appear that New Hampshire's regulatory regime concerning renewable energy development in the Seacoast region is fragmented, disjointed, and manifestly lagging behind Maine in several categories.[164]

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138 FERC ¶ 62,168 at 3 (Feb. 27, 2012), *available at* http://www.orpc.co/permitting_doc/ORPC_FERC_pilotlicense_12711-05.pdf.

159. *Id.*

160. *Id.*

161. *Maine*, ORPC, http://www.orpc.co/content.aspx?p=h3jCHHn6gcg%3d (last visited Mar. 7, 2014).

162. *Id.*

163. Aside from ORPC's project in Cobscook Bay, FERC has issued a number of preliminary permits for several other hydrokinetic projects in Maine, including four permits also owned by ORPC: "Treat Island Tidal" in Passamaquoddy Bay; "Lubec Narrows Tidal" in the Lubec Narrows and Johnson Bay; and both "Western Passage OCGEN" and "Kendall Head Tidal Energy" in the Atlantic Ocean. ME. DEP'T. OF ENVTL. PROT., REPORT TO THE JOINT STANDING COMMITTEE ON ENVIRONMENTAL AND NATURAL RESOURCES: 2012 HYDROPOWER PROJECTS IN MAINE 12 (2013), *available at* http://www.maine.gov/tools/whatsnew/attach.php?id=494734&an=1. There are three additional FERC-issued preliminary permits that are not related to ORPC: Tidewater Associates' "Half Moon Tidal Energy" in Passamaquoddy Bay; Shearwater Design, Inc.'s "Homeowner Tidal Power Elect Gen" on the Kennebec River; and Pennamaquan Tidal Power, LLC's "Pennamaquan Tidal Power Plant" in Passamaquoddy Bay. *Id.*

164. *See* ENERGY EFFICIENCY & SUSTAINABLE ENERGY BD., FINAL REPORT ON THE N.H. INDEPENDENT ENERGY STUDY 2 (2012), *available at* http://www.puc.nh.gov/EESE%20Board/Annual%20Reports/VEIC%20-%20EESE%20Board%20Report%20-%20FINAL%20FULL%20113012.pdf [hereinafter N.H. INDEP. ENERGY STUDY]. Between 2008 and 2012, Maine received $12,986,034 in federal funding for marine and hydrokinetic projects from the U.S. Department of Energy's Water Power Program, with New Hampshire having received only $1,510,000. WIND & WATER POWER TECH.

However, further inspection reveals that the state has in fact been making progress toward developing marine and hydrokinetic energy projects in the region, notwithstanding the apparently retrograde motion of its regulatory reform when compared to that of Maine.[165] In the absence of a memorandum of understanding with FERC,[166] New Hampshire has recently become more aware of the potential benefits derived from hydrokinetic energy projects.[167] In November of 2008, the New Hampshire Tidal Energy Commission submitted a report to former New Hampshire Governor John H. Lynch and the New Hampshire Legislature on the feasibility of tidal power generation under Little Bay and General Sullivan Bridges in Dover, New Hampshire.[168] Moreover, pursuant to Senate Bill 323 of 2010, the Energy Efficiency and Sustainable Energy (EESE) Board submitted its Final Report on the New Hampshire Independent Energy Study on November 30, 2012.[169] The EESE report signified New Hampshire's first sincere attempt to articulate a comprehensive energy policy.

In order to enhance the economic impacts of New Hampshire's energy use, the EESE report highlighted three significant themes and imparted three priority recommendations that would help support New Hampshire's growth and prosperity in both the short-term and long-term.[170] The report recommended that New Hampshire clearly articulate a comprehensive energy policy that not only involves legislative and executive branch coordination, but also administers "responsibility and resources for the oversight of [a] goal setting and evaluation process."[171] It further urged the state to "develop an Energy Efficiency Resource Standard (EERS) as a means to promote cost-effective energy efficiency as the first priority energy resource of choice for New Hampshire," and to maintain and strengthen the Renewable Portfolio Standard (RPS).[172]

OFFICE, U.S. DEP'T OF ENERGY, MARINE AND HYDROKINETIC ENERGY PROJECTS 25 (2013), *available at* http://energy.gov/sites/prod/files/2013/12/f5/mhk_projects_2013.pdf [hereinafter MARINE AND HYDROKINETIC ENERGY PROJECTS].

165. *See supra* Part IV.A.

166. *See generally Memoranda of Understanding (MOU)*, FED. ENERGY REGULATORY COMM'N, http://www.ferc.gov/legal/mou.asp#skipnav (last visited Mar. 8, 2014).

167. *See* N.H. TIDAL ENERGY COMM'N, FINAL REPORT OF THE COMMISSION TO STUDY THE FEASIBILITY OF TIDAL POWER GENERATION UNDER THE LITTLE BAY AND GENERAL SULLIVAN BRIDGES, IN DOVER 3 (2008), *available at* http://des.nh.gov/organization/divisions/water/wmb/coastal/ocean_policy/documents/final_te_commission_report08.pdf.

168. *Id.*

169. N.H. INDEP. ENERGY STUDY, *supra* note 164, at 1; *see also* 2010 N.H. Laws 323.

170. *See* N.H. INDEP. ENERGY STUDY, *supra* note 164, at 5–10.

171. *Id.* at 8.

172. *Id.* at 8–10.

The principal hydrokinetic energy projects currently underway in New Hampshire reflect more than a handful of these policy considerations.

In recent years, New Hampshire has been facilitating several hydrokinetic energy projects that have been mostly concerned with applicability considerations and potential impacts on the marine environment. Located in Lee, New Hampshire, Free Flow Energy, Inc. has been developing a "submersible generator as a separate critical subassembly optimized for [marine and hydrokinetic] conditions," which will work in conjunction with multiple turbine styles, especially rotating turbines.[173] This project could possibly offer hydrokinetic system designers more latitude in joining the submersible generator with a complete hydrokinetic system, relating to the turbine, ducting, and supporting structure.[174] Likewise, the University of New Hampshire has been researching, developing, and evaluating the infrastructure of several primary hydrokinetic energy related projects, including Chase Ocean Engineering Laboratory, the General Sullivan Bridge tidal energy site, and the Offshore Wave and Wind energy site.[175] These substantial infrastructure upgrades provide "significant benefits to the . . . research, development, and evaluation capabilities" of New Hampshire's ocean energy industry.[176]

Thirdly, Scientific Solutions, Inc. (SSI) is guiding a "joint effort with . . . ORPC[] to fully develop, integrate, test, and operate a full-scale active acoustic detection system for [marine and hydrokinetic] technology and other offshore renewable energy projects."[177] The joint effort consists of the Swimmer Sonar Detection Network working in conjunction with ORPC's advanced tidal turbine project to help mitigate the unidentified risks associated with marine life and floating debris that threaten hydrokinetic energy development.[178] These three primary hydrokinetic energy projects demonstrate that despite its slow start, New Hampshire is making great efforts toward facilitating hydrokinetic energy development in the Seacoast region.

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173. MARINE AND HYDROKINETIC ENERGY PROJECTS, *supra* note 164, at 5. Free Flow Energy, Inc. received around $160,000 in funding for the project through the U.S. Department of Energy's Technology Advancement Initiative. *Id.*

174. *Id.*

175. *Id.* at 20.

176. *Id.*

177. *Id.* at 15.

178. *Id.*

C. Massachusetts

According to Massachusetts State Representative James Cantwell, "Massachusetts is poised to be a serious global contender in the emerging green energy field of hydrokinetics . . . [w]ith energy experts having calculated that there is more untapped hydrokinetic energy off the Massachusetts coast than what can be generated by ten coal-fired plants."[179] In large part, the state is well positioned to become a general hub for renewable energy markets because of the Commonwealth's inherent strengths in the entire "value chain of activities" associated with clean energy—"renewable energy equipment and generation, power electronics, energy efficiency, and clean energy research."[180] Altogether, these activities to some extent relate to the "development, production, distribution or use of renewable and/or clean energy, or the reduction in use of 'dirty' energy sources" within Massachusetts's existing economic structure.[181] Although there is no crystallized distinction between possibility and probability, Massachusetts's robust regulatory regime, comprehensive energy policy and current business base point toward a greater role for Massachusetts in emerging renewable energy sectors, including hydrokinetics.

In the early 2000s, several reports insisted on significant reform of state and federal policies concerning management of ocean waters off the U.S. coast,[182] and the Commonwealth simultaneously launched its own Ocean Management Task Force to review unsuccessful state policies that were meant to balance the interests of competing uses of state waters and

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179. James Cantwell, *Cantwell's Corner: Water is an Untapped Resource for Renewable Energy*, WICKED LOCAL (Aug. 25, 2011, 12:01 AM), http://www.wickedlocal.com/scituate/newsnow/x911401424/Cantwell-s-Corner-Water-is-an-untapped-resource-for-renewable-energy#axzz2Myszb1xb.

180. David Levy & David Terkla, *Clean Energy in Massachusetts: Already Strong, This Emerging Sector is Poised for Greater Growth,* 9 MGMT. & MARKETING FACULTY PUBLICATION SERIES 13, 13 (2007).

181. *Id.* These activities are important now more than ever, with energy demands predicted to exceed capacity by 2013 and the state expecting to need more than several power plants by 2015. Erica Schroeder, Comment, *Turning Offshore Wind On*, 98 CAL. L. REV. 1631, 1648 (2010).

182. *See generally* PEW OCEANS COMM'N, AMERICA'S LIVING OCEANS: CHARTING A COURSE FOR SEA CHANGE (2003); *see also* U.S. COMM'N ON OCEAN POLICY, *supra* note 48 at 367 (finding that with reference to offshore renewable energy resources, there was "no comprehensive law that [made] clear which . . . individual laws [were] applicable, nor [was] there any indication that overall coordination [was] a goal, thus leaving implementation to mixed federal authorities" and state regulatory regimes).

environmental conservation.[183] Later, Massachusetts more fully appreciated the importance of effectively managing the use and protection of its ocean waters when it received an influx of requests for research and development projects with reference to offshore renewable energy.[184] On May 28, 2008, Massachusetts Governor Deval Patrick signed the Oceans Act of 2008 ("the Act:)[185] in response to these concerns, which required "Massachusetts to develop a first-in-the-nation comprehensive plan to manage development in its state waters, balancing natural resource preservation with traditional and new uses, including renewable energy."[186] Even in the absence of a memorandum of understanding with FERC,[187] this legislation eventually led the Commonwealth to establish one of the most robust and comprehensive state energy policies in the country—the Massachusetts Ocean Management Plan.[188]

Pursuant to the Act, the Ocean Management Plan translated the Act's general policy direction and specific legislative requirements into a comprehensive management approach, applicable through existing state programs and regulations.[189] In order to support the wise use of marine resources, including renewable energy, sustainable uses, and infrastructure, the plan "identif[ied] use areas and promulgat[ed] enforceable management measures" that streamlined the permitting process, minimized conflicts with existing uses and resources, and established procedures ensuring that renewable energy development was of appropriate scale.[190] These enforceable management measures established three primary management areas: prohibited areas, renewable energy areas, and multi-use areas.[191] The plan, however, designated only two marine areas as renewable energy areas exclusively for wind projects, with the "view that none of the other marine renewable technologies [including hydrokinetic, were] ready for commercial

183. *See Press Release: Governor Patrick Signs Law Creating First-in-the-Nation Oceans Management Plan Balancing Preservation, Uses*, MASS.GOV (May 28, 2008), http://www.mass.gov/governor/pressoffice/pressreleases/2008/oceans-bill-signing.html [hereinafter Mass. Ocean Mgmt. Press Release].

184. MASS. EXEC. OFFICE OF ENERGY & ENVTL. AFFAIRS, MASSACHUSETTS OCEAN MANAGEMENT PLAN 1 (Dec. 2009), *available at* http://www.env.state.ma.us/eea/mop/final-v1/v1-text.pdf [hereinafter MASS. OCEAN MGMT. PLAN].

185. *See* Oceans Act of 2008, 2008 Mass. Acts 114.

186. Mass. Ocean Mgmt. Press Release, *supra* note 183.

187. *See generally Memoranda of Understanding (MOU)*, *supra* note 166.

188. *See generally* MASS. OCEAN MGMT. PLAN, *supra* note 184.

189. *Id.* at 1-2, 1-3.

190. *Id.* at 1-4.

191. *Id.* at 2-1, 1-9.

development at [the] time."[192] Although it appears that offshore wind energy projects have secured the lion's share of state resources and political support, such as the offshore wind farm in Cape Cod,[193] Massachusetts still holds promise in developing hydrokinetic energy projects around the state.[194]

During the past five years, the state's fledgling offshore renewable energy industry has consisted mainly of two wave and tidal hydrokinetic energy projects located in remote island communities, not necessarily connected to an electric grid. In 2008, Harris, Miller, Miller, & Hanson (HMMH), along with Woods Hole Oceanographic Institution and the University of Massachusetts, commenced a feasibility study relating to the potential impact of a hydrokinetic tidal engine structure in the Muskeget Channel.[195] "The objective of the feasibility study was to evaluate the potential environmental impacts associated with sediment transport alteration of two established energy technologies, as well as to collect and analyze information on the occurrence and potential impact of protected species in the project area," such as sea turtles, whales, seals, and other large species.[196] In having officially completed the first phase of the study on November 17, 2011, the ongoing second phase involved using the data to potentially build a combined research and

192. William L. Lahey & Timothy J. Roskelley, *Coastal Zone Law*, 1 MASS. ENVTL. LAW (2012).

193. For an extensive discussion of the Cape Wind Project, see Schroeder, *supra* note 181, at 1648–57.

194. Massachusetts Governor, Deval Patrick, recently signed "An Act Relative to Competitively Priced Electricity in the Commonwealth," which granted extensions to long-term contracts between state utilities and renewable energy companies, and raised the cap on net metering in order to shield Massachusetts ratepayers from increasing utility costs while "providing greater reliability and energy independence for all residents of the Commonwealth." *Press Release: Governor Patrick Signs Energy Bill*, MASS.GOV (Aug. 3, 2012), http://www.mass.gov/governor/pressoffice/pressreleases/2012/2012803-governor-patrick-signs-energy-bill.html [hereinafter Mass. Energy Bill Press Release]; *see also* 2012 Mass. Acts 2395. The "extension helps reduce the Commonwealth's dependence on foreign sources of energy, keeping investment dollars . . . in Massachusetts," while the net metering cap creates an incentive for Massachusetts consumers to employ renewable energy technologies, "grows the clean energy industry, creates jobs[,] and reduces greenhouse gas emissions." Mass. Energy Bill Press Release, *supra*.

195. *See* MARINE AND HYDROKINETIC ENERGY PROJECTS, *supra* note 164, at 6. The Muskeget Channel is located between the islands of Martha's Vineyard and Nantucket. *Id.* The fact that the island communities themselves helped to initiate these studies reflects their vulnerability to power supply interruptions, potential increases in sea level and other effects of climate change. *Id.*

196. *Id.*

development facility, as well as a commercial scale tidal energy project capable of supplying electricity to the Town of Edgartown.[197] The town hoped to install the first permanent tidal turbine by the second half of 2013.[198] As of the date of this Comment, the town "received a second permit valid through August 2014. The Preliminary Permit gives Edgartown the exclusive right to apply for a power generation license for power generated from the hydrokinetic energy in the water flowing in this area."[199]

Second, Resolute Marine Energy, Inc. (RME) has been developing a "cost-effective power take-off system" in Newburyport, Massachusetts, to augment its own promising wave energy converter—the Surge Device.[200] The company's project, "Wave Actuated Power Take-Off Device for Electricity Generation," has garnered $159,998 in federal funding from the U.S. Department of Energy, allowing the project to also "assess the cost-to-manufacture power take-off systems at various scales, ranging from multi-kilowatt individual units for early-stage deployments in off-grid applications to sub-megawatt units for multi-megawatt, grid-connected arrays."[201] RME recognizes the economic worth in deploying primarily smaller devices at the outset due to the ease of deployment and maintenance.[202] It is anticipated that successful development of the project will allow for greater testing of the Surge Device, diminish the "levelized cost of electricity," and further the commercial viability of the integrated system.[203] The staunch development of these two primary hydrokinetic energy projects may signal a shift in state policy and

197. *See* Steve Barrett, *Muskeget Tidal Energy Update*, HMMH (Aug. 29, 2011, 5:47 PM), http://www.hmmh.com/blog/?p=921.

198. *Id.*

199. STEPHEN B. BARRET ET AL., ENVIRONMENTAL EFFECTS OF SEDIMENT TRANSPORT ALTERATION AND IMPACTS ON PROTECTED SPECIES: EDGARTOWN TIDAL ENERGY PROJECT 6 (Mar. 19, 2013), *available at* http://www.osti.gov/scitech/servlets/purl/1059377.

200. MARINE AND HYDROKINETIC ENERGY PROJECTS, *supra* note 164, at 15; *see also* Joel Brown, *Nature's Power*, THE BOSTON GLOBE, Mar. 1, 2012, *available at* http://www.boston.com/news/local/massachusetts/articles/2012/03/01/resolute_marine_energys_newburyport_lab_develops_system_for_turning_ocean_waves_into_clean_power_source/ (explaining that "[t]he company's SurgeWEC arrays could serve anywhere from isolated coastal villages in Africa and Asia to island communities to remote military or scientific bases").

201. MARINE AND HYDROKINETIC ENERGY PROJECTS, *supra* note 164, at 15.

202. Brown, *supra* note 200.

203. MARINE AND HYDROKINETIC ENERGY PROJECTS, *supra* note 164, at 15.

regulation toward more offshore renewable energies aside from wind power.[204]

V. CONCLUSION

The degree of hydrokinetic energy development in northern New England is contingent on the ebb and flow of several moving parts, including state-specific energy policies, sticker shock, hydrographic constraints, and unified opposition toward the existing federal regulatory regime.

In regard to state-specific energy policies, Maine, New Hampshire, and Massachusetts have each adopted some type of measure promoting offshore renewable energy technologies, but none have taken the next dual step in executing a memorandum of understanding with FERC and launching a comprehensive energy policy that includes hydrokinetic energy development. In other words, the present state-specific energy policies are incomplete—with the possible exception of Maine. Indeed, Maine is the only New England state to have executed a memorandum of understanding with FERC, but the myriad, narrowly-tailored renewable energy policies dilute the state's ability to integrate energy, environmental, and economic policies into its comprehensive and sustainable energy strategy. Although New Hampshire and Massachusetts have both engaged in creating a comprehensive energy policy, neither have executed a memorandum of understanding with FERC, leaving state developers to wade through the deluge of state and federal regulations alone. It is clear that in order for these states to facilitate hydrokinetic energy development in the future, each must execute a memorandum of understanding with FERC to streamline the state and federal regulatory processes, as well as institute a comprehensive energy strategy that involves a wide array of renewable energy technologies.

Assuming that all three states follow this first recommendation, sticker shock, hydrographic constraints, and unified opposition toward

204. It is also worth mentioning another project relevant to hydrokinetic energy, which is Semprus Biosciences's project in developing "environmentally benign and permanent modifications to prevent biofouling . . . from a broad spectrum of organisms on [hydrokinetic] devices of all shapes, sizes, and materials for the life of the product," including growth on external surfaces by bacteria, algae, barnacles, mussels, and other marine organisms. *Id.* at 16. For a more in-depth discussion on this emerging technology, see ZHENG ZHANG, ENVIRONMENTALLY BENIGN AND PERMANENT MODIFICATIONS TO PREVENT BIOFOULING ON MARINE AND HYDROKINETIC DEVICES 30 (2011), *available at* http://www.osti.gov/scitech/servlets/purl/1038584.

the existing federal regulatory regime pose additional problems for harnessing the ocean's tidal and wave power in northern New England. The first problem relates more to commercial readiness than public concerns, with the emerging hydrokinetic industry requiring a significant amount of startup costs, unlike other similar renewable energy industries. Despite federal funding, the sticker shock for developing hydrokinetic technologies has coaxed some of the states into diverting their financial resources elsewhere. These states have blamed hydrographic constraints as well, but the abundance of upstart hydrokinetic energy projects throughout northern New England helps refute this claim. In balancing the potential return on investment with these somewhat exorbitant price tags, hydrokinetic technologies will provide a cascade of substantial energy efficiency benefits for many years to come—supplementing the local electric grid with clean, renewable power, while also reducing the potential impacts on local economies, maritime environment, and recreational activities by integrating supplemental technologies designed specifically to curb these concerns.

Lastly, the vortex of state and federal regulations governing ocean energy expansion presents the final major barrier to developing hydrokinetic energy projects in northern New England. In conjunction with executing a memorandum of understanding with FERC, the states can streamline the regulatory process by taking advantage of FERC's preliminary permitting program. The program basically allows the states to "dip their toe in the water," so to speak, without having to commit a significant amount of resources to develop hydrokinetic technologies. Even though Maine, New Hampshire, and Massachusetts face several obstacles in harnessing the ocean's natural energy, the previously mentioned recommendations and solutions provide hope for the burgeoning hydrokinetic industry in northern New England.