Climate Change, Offshore Wind Power, and the Coastal Zone Management Act

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I. Introduction

Climate change is one of the most pressing global issues of the twenty-first century. Since the advent of the industrial revolution (ca. 1750), anthropogenic activities have resulted in a substantial increase in atmospheric concentrations of greenhouse gases (GHG): carbon dioxide (CO^2) from an approximate 280 parts per million (ppm) to a current 380 ppm; methane from 700 parts per billion (ppb) to 1700 ppb; and nitrous oxide from 270 ppb to 310 ppb.[2] Scientific studies indicate that increasing amounts of GHG will result in a global greenhouse effect, warming the Earth an estimated 3-11° F by the end of the 21st Century.[3]

Atmospheric GHG increases are largely a result of energy activities, land-use changes, and deforestation, [4] with the first being, by-far, the most significant.[5] As of 2005, approximately 70 percent of total United States electric energy was generated from fossil fuels, a primary source of GHG. In combination with global environmental and climate concerns and the rapidly escalating cost of traditional fossil fuels (in hand with larger geopolitical considerations),[6] a number of alternative energy sources are under development or consideration, including: geothermal, solar, ocean, biomass, and wind sources, among others.

Of the various types of alternative energy sources, wind power is currently the most cost-competitive, as compared to traditional sources of electricity generation in the United States (i.e., coal and natural gas), [7] with average kilowatt-hour (kWh) costs being between 4 and 10 cents for onshore facilities and 6 and 10 cents for offshore facilities, subject to the quality and consistency of the wind.[8] Recognizing this emerging market, developers have begun to plan and develop coastal and offshore wind energy farms,[9] the largest and best-known being Cape Wind Associates' proposal for a 130 turbine facility off Massachusetts in Nantucket Sound, with another important proposal by Bluewater Wind for a wind farm off Delaware.

In light of the enormous potential of the wind resource, the United States Department of Energy (DOE) has recently released a report estimating that wind could supply 20% of the domestic electricity supply by 2030, with offshore resources providing a substantial percentage of this amount, especially for coastal states. DOE specifically noted "26 of [of 28 coastal states] would have the wind resources to meet at least 20% of their electric needs, with many states having sufficient offshore wind resources to meet 100% of their electric needs. For most coastal states, offshore wind resources are the only indigenous energy source capable of making a significant energy contribution."[10]

The Energy Policy Act of 2005 (EPAct) authorized the Minerals Management Service to regulate energy development on the outer continental shelf (OCS) of the United States. A number of other federal resource and environmental laws are, however, applicable to energy development on the OCS, and in the nearer-shore coastal zone, including: the Coastal Zone Management Act

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[1] The views expressed in this article are the author's alone and do not necessarily represent those of NOAA, NOAA's Office of the General Counsel, or the U.S. Department of Commerce.
[2] *See* NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 4 (2007).
[3] *See* U.S. COMMISSION ON OCEAN POLICY, AN OCEAN BLUEPRINT FOR THE 21ST CENTURY (2004), AT 43 (citing J.T. HOUGHTON ET AL. EDS. CLIMATE CHANGE 2001: THE SCIENTIFIC BASIS (2001)).
[4] *See* STERN, *supra*, note 2, at 4.
[5] *See* MELANIE JARMAN, CLIMATE CHANGE 110 (2007).
[6] The real cost per barrel of oil has risen from approximately $25 to $125 in seven years, while coal has risen from approximately $25 per metric ton to 125 per metric ton in five years.
[7] Hydropower is perhaps the most cost effective now-existing alternative energy source. It is an energy source, however, that will be difficult to further increase in scale, as few rivers, capable of being used in hydropower generation, are not already being used.
[8] *See* BEN CIPITI, THE ENERGY CONSTRUCT 91 (2007).
[9] One of the largest issues with developing on-shore wind farms is the "Not in My Backyard" response from some located near, or having an interest in, a proposed project.
[10] U.S. Department of Energy, 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electric Supply 48, *available at* http://www1.eere.energy.gov/windandhydro (internal citations removed)[hereinafter Wind Energy Report].

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(CZMA),[11] Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA),[12] Endangered Species Act (ESA),[13] National Historic Preservation Act (NHPA),[14] Clean Water Act (NHPA),[15] and Rivers & Harbors Act (RHA),[16] among others. Of these, the CZMA has perhaps the most significant potential impact on wind power development on the OCS and in the coastal zone, in light of federal-state relations and allowances for local land and water use decisions.

II. Roadmap

In the context of federal environmental and resource law, this paper will focus on how the CZMA has potential impact upon wind power projects located in the United States coastal zone and on its OCS. It will begin its analysis by briefly developing the history of wind power so as to provide essential context, while also introducing the benefits of offshore wind as a power source. Next, this paper will examine the maritime zones established by the United Nations Convention on the Law of the Sea, reviewing United States implementation of relevant principles. Continuing, this paper will examine the overarching legal environment regulating wind power projects in the United States, specifically focusing on those marine specific laws that are of the most potential relevance. Last, this paper will examine how the CZMA and the doctrines of federal and interstate consistency have great potential influence on coastal and offshore wind power projects.

III. Brief History of Wind Power

The use of wind to generate energy has a long history, with the earliest examples of wind-powered technologies being used in the pumping of water and grinding of grain approximately 2,000 years ago. Over time, the harnessing of wind into mechanical energy, largely through the use of windmills, diffused throughout Europe, the Middle East, and Asia, and underwent rapid development and refinement. In Europe, the harnessing of flowing water and wind was extensively used by human society, and would prove to be perhaps the most effective and concentrated sources of energy until the creation of the steam engine at the advent of the Industrial Revolution.

Wind power was also widely employed in the United States, especially on the Great Plains, where it was extensively used as a source of mechanical energy, and then in the generation of electricity. It has been estimated that at the turn of the nineteenth century, the United States was the world leader in wind with approximately 6 million small wind power machines in use, most in the states of the Great Plains, many generating electricity.[17] With the advent of rural electrification projects, the use of wind power steadily declined, until interest was ultimately reawakened in both the United States and Europe by the Middle Eastern oil embargoes of 1973 and 1979.

The last quarter of the twentieth century and first decade of the twenty-first have seen great advances in wind power technologies both in the United States and abroad. Two of these developments are of the most profound importance: wind mills developed into efficient turbines, some with a peak capacity of 5 MWe, and individual turbines were interconnected to form large-scale wind farms. Although there was much interest and development in wind power after the Middle Eastern oil embargoes in the United States, by the 1990s, the center of the industry had shifted back to Europe, due to policies that there fostered renewable energy development. This transition is best shown by comparing the amount of peak wind energy capacity available in Europe, as compared to the United States, in 2003: approximately 25,000 MWe to 6000 MWe.[18] Wind power is currently the world's fastest growing source of renewable energy and currently provides approximately 40 GW of energy globally into the grid.

IV. Offshore Wind Power

While the onshore siting of wind power turbines is still extremely popular, a recent trend, especially in Europe, has been to site new units, in large-scale farms, offshore. Despite being approximately 40% more expensive, offshore wind power projects have at least one benefit over many terrestrial sites: a higher potential peak energy capacity, as compared to many onshore facilities. One

[11] *See* 16 U.S.C. §§ 1451-1464 (2000).
[12] *See* 16 U.S.C. §§ 1801-1884 (2000).
[13] *See* 16 U.S.C. §§ 1531-1544 (2000).
[14] *See* 16 U.S.C. §§ 470-470-1 (2000).
[15] *See* 33 U.S.C. §§ 1251-1276 (2000).
[16] *See* 33 U.S.C. § 403 (2000).
[17] *See* Darrell M. Dodge, Illustrated History of Wind Power Development, *available at* http://www.telosnet.com/wind/early.html.
[18] *See* ROBERT EVANS, FUELING OUR FUTURE: AN INTRODUCTION TO SUSTAINABLE ENERGY 95 (2007).

of the most vocal criticisms of onshore wind power projects is the intermittent nature of the wind resource—when the wind does not blow, no energy is produced. Offshore wind energy projects can conversely take advantage of the relatively consistent nature of coastal winds, caused by the different specific heat capacities of land and water.

Although offshore wind turbines of 5 MW capacity have been installed, most recent projects have utilized smaller units, from 2 to approximately 4 MW, in careful collective arrangement to take maximum advantage of wind flow, linked together to distribute power onshore. According to DOE, "[t]urbines in offshore applications are arranged in arrays that take advantage of the prevailing wind conditions measured at the site. … [A] power grid connects the output from each turbine, where turbine transformers step up the generator and the power electronics voltage to a distribution voltage of about 34 kilovolts (kV). The distribution system collects the power from each turbine at a central substation where the voltage is stepped up and transmitted to shore through a number of buried, high-voltage subsea cables."[19] Currently, turbines can be emplaced in water up to 100 feet in depth, with research ongoing to develop technology so as to site turbines in even deeper water.

In the future, a likely important consideration in the domestic siting of offshore wind facilities is the topography of the continental shelf. In geological terms, the continental shelf is essentially an extension of the adjoining continental land mass, sloping downward very gradually until the shelf break, where the water becomes deeper very rapidly. On the whole, the shelf break is generally encountered in waters approximately 500 feet in depth.

In the waters off the United States, there is a significant difference in the width of the continental shelf. In the Atlantic Ocean and Caribbean Sea, the continental shelf extends for a considerable distance, providing for a large amount of space for the potential siting of offshore wind power facilities. In the Pacific Ocean, however, the continental shelf is very narrow, with the ocean becoming deep very close to land. This has obvious implications in terms of the siting of offshore wind turbines, requiring placement much closer to land, if at all.

V. Maritime Zones and Coastal Authority under International and Domestic Law

The United Nations Convention on the Law of the Sea (UNCLOS), which came into force in 1994, recognized eight maritime zones, each providing coastal and other States with varying degrees of authority over resources in the marine environment. As by their very nature offshore wind projects would be located in the marine environment, maritime boundaries are an important consideration, especially in terms of applicable jurisdictional authorities. Although the United States has not adopted UNCLOS, it accepts its provisions as best evidence of customary international law. This section will give a brief overview of relevant international and United States laws relating to coastal jurisdiction.

All eight maritime zones are measured from the coastal baseline, which, in general, is the outer boundary of a State's terrestrial land mass.[20] Under UNCLOS, the coastal baseline is, on the whole, measured from the low-water line, as marked on official State charts. Although the United States accepts this principle internationally, due to its federalist structure, a different principle is used domestically to identify boundaries between federal and state jurisdiction. To this end, the Submerged Lands Act confirmed coastal state jurisdiction in "all lands permanently or periodically covered by tidal waters up to but not above the line of mean high tide."[21]

The first maritime zone is internal waters, which are those waters landward of the baseline. In the United States, the individual states have jurisdiction over their territories and any associated marine areas within the baseline, with the Public Trust Doctrine providing an important limitation in state authority over "tidelands and lands below navigable waters."[22] Navigable waters have been defined by the Supreme Court as waters "used or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water."[23] In accordance with this doctrine, public trust lands may be conveyed, but any divestment must be made explicit, and in some way in the public interest.

The second maritime zone is the territorial sea, which are those waters which extend from the baseline to 12 nautical miles (NM).[24] In 1953, two companion pieces of legislation addressed the issue of jurisdiction in the now-existing domestic territorial

[19] Wind Energy Report, *supra* note 10, at 49.
[20] *See generally* United Nations Convention on the Law of the Sea, Articles 3 – 16 [hereinafter UNCLOS].
[21] 43 U.S.C. § 1301(a)(2) (2000).
[22] *See* DONNA R. CHRISTIE & RICHARD G. HILDRETH, COASTAL AND OCEAN MANAGEMENT LAW IN A NUTSHELL 19 (2007).
[23] The Daniel Ball, 77 U.S. (10 Wall.) 557, 563 (1870).
[24] It must also be acknowledged that the Public Trust Doctrine is likely applicable on the marine side of the baseline, although likely its importance would be concentrated in the immediate coastal zone.

sea.[25] The Submerged Lands Act confirmed that title in the resources of the first three NM belonged to the adjacent coastal state, measured, ordinarily, from the mean low water line.[26] Conversely, however, the Outer Continental Shelf Lands Act (OCSLA) provided that the "subsoil and seabed of the outer continental shelf appertain to the United States and are subject to its jurisdiction, control, and power of disposition."[27] The outer continental shelf was further defined as "all submerged lands lying seaward and outside of the area of lands beneath navigable waters …, and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control."[28]

The third maritime zone is the contiguous zone, extending from 12 to 24 NM, and over which States may exercise jurisdiction in "prevent[ing] infringement of its custom, fiscal, immigration or sanitary laws and regulation within its territory or territorial sea."[29] In 1999, through Presidential Proclamation, the United States declared a contiguous zone, but its declared interests extended only to law enforcement, public health, and cultural resource issues, codifying those interests provided by UNCLOS.

The fourth maritime zone is the exclusive economic zone (EEZ), which runs from the baseline to 200 NM, and in which, the State has "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superadjacent to the seabed and of the seabed and its subsoil."[30] Importantly, in the EEZ, such sovereign rights explicitly extend to exclusive authority over "the production of energy from the water, currents and winds."[31] Again through Presidential Proclamation, the United States, in 1983, declared a domestic EEZ, specifically including rights in energy production from wind. UNCLOS Article 56 explicitly links the EEZ with the fifth maritime zone, the continental shelf, providing that "[t]he rights set out in this article with respect to the seabed and subsoil shall be exercised in accordance with [those provisions relating to the continental shelf)."[32] The Continental Shelf extends, in general, to 200 NM, and to a maximum of 350 NM, and is an area in which a State has jurisdiction "for the purpose of exploring … and exploiting its (natural, mineral, and other non-living) resources."[33] In light of the rights provided to States by these maritime zones, and by virtue of the expansive definition of the Outer Continental Shelf under OCSLA, the United States endowed the Minerals Management Service with jurisdiction over renewable energy production on the OCS in the EPAct.

The final three maritime zones are not essential to the issue of marine wind power projects, and will only be briefly developed in the interests of completeness. The sixth maritime zone is the high seas, which are those waters (specifically, the water column) not within the jurisdiction of any coastal State. The seventh maritime zone is the Area, which are those areas of the seabed beyond the jurisdiction of any State. The last maritime zone is archipelagic waters, which are those waters within the jurisdiction of an archipelagic State.

VI. Laws Relating to Wind Power Projects in the United States

In the United States, marine wind power projects can be broken into two general categories: those in a maritime zone under a state's jurisdiction and those in a maritime zone under federal jurisdiction, although admittedly in cases of the former, there is still overlap. Both of these general categories will be examined below, where relevant federal laws will be introduced.

A. State Lands and State Waters

If a wind power project is to be located on state land or in the first 3 NM of the territorial sea, state and local law will largely regulate its development under zoning ordinances and state permits, unless the lands are public, in which case the Bureau of Land Management has jurisdiction and operates under federal law and policy. Although state and local law will largely regulate projects on state lands and in state waters, consultation with federal authorities may be required if aviation or federally-protected habitat and species are impacted.[34] Section 404 of the Clean Water Act is also likely applicable in state waters for projects that

[25] It must be acknowledged that in 1953, the United States only recognized a three mile territorial sea. With its extension in 1988 by Presidential Proclamation to 12 NM, the three mile state/federal jurisdictional boundary line was not impacted.
[26] This three mile limit is the general rule. Pursuant to the Submerged Lands Act, coastal states may claim beyond three miles "if it was so provided by its constitution or laws prior to or at the time such State became a member of the Union, or it has been heretofore approved by Congress." 43 U.S.C. § 1312 (2000). Under this provision, both Florida and Texas have been able to exert jurisdiction to 3 marine leagues on their gulf coast, a distance which is approximately 10 NM.
[27] 43 U.S.C. § 1331(a) (2000).
[28] *Id.*
[29] UNCLOS, Article 33.
[30] UNCLOS, Article 56.
[31] *Id.*
[32] *Id.*
[33] UNCLOS, Article 77.
[34] Relevant laws relating to federally protected habitat and species include the ESA, MMPA, and MBTA.

require dredge and fill. Importantly for wind projects in state waters, a permit is likely still required from the Army Corps of Engineers due to the Corps' authority over obstructions to navigation in "navigable waters of the United States." Through the "hook" of the required Army Corps permit, the National Historic Preservation Act is also likely applicable.

B. Federal Waters

Until 2005, the Army Corps of Engineers, through the River and Harbors Act, largely regulated wind power projects in the territorial sea beyond 3 NM.[35] Through the RHA permit and National B. Environmental Policy Act[36] review process, environmental, habitat, and resource impacts were evaluated and considered. Concomitant with these laws, other environmental and resource management laws were independently relevant and addressed: the CWA, the ESA, the MSFCMA, the CZMA, the Clean Air Act,[37] the Marine Mammal Protection Act,[38] the Migratory Bird Treaty Act,[39] and the Fish and Wildlife Coordination Act.[40]

As mentioned above, the EPAct consolidated regulatory jurisdiction over renewable energy projects on the OCS in the MMS. Specifically, pursuant to Section 388 of the Act, MMS was given authority to issue leases, easements, or rights-of-way for renewable energy projects. In November 2007, MMS finished a Programmatic Environmental Impact Statement, evaluating renewable energy development on the OCS in the context of environmental and societal impacts. On July 9, 2008, MMS issued a Proposed Rule for the regulation of alternative energy on the OCS, recommending, in part, the formalized incorporation of other existing federal environmental and resource legal review into a structured regulatory process. Currently, MMS is also independently regulating two wind power projects that pre-date EPAct (Cape Wind and another offshore Wind Farm off Long Island) utilizing the pre-2005 ad hoc regulatory environment, and over which MMS has assumed from the ACE direct regulatory authority pursuant to Section 388(d) of EPAct.

VII. The Coastal Zone Management Act and Wind Power

The CZMA created a federal-state partnership for coastal and ocean management. Key to the program is not the very limited federal financial support available to participating coastal states (34 of 35, as of 2008), but rather the concept of "federal consistency." Federal consistency is the legal doctrine requiring agency activities or federal actions be consistent with federally-approved state coastal zone management programs. The CZMA provides for two types of federal consistency, the second of which is directly relevant to offshore wind energy development.

The first type of consistency relates to a direct federal agency activity. Federal agency consistency requires that "[e]ach federal agency activity within or outside the coastal zone that effects any land or water use or natural resource of the coastal zone … be carried out in a manner … consistent to the maximum extent practicable with … enforceable policies of [federally] approved State management programs."[41]

The second (and more relevant to offshore wind power) type of federal consistency applies to federally licensed or permitted activity that "affects any land or water use or natural resource of the coastal zone."[42] Under this type of consistency, states are afforded great authority over local land and water use decisions, including those that require a federal license or permit. Pursuant to this second type of federal consistency, a project developer must submit to the participating state coastal zone management program a statement of consistency that its project is consistent with enforceable state policies. If the state disagrees, it may object to this developer certification, whereupon no federal agency may issue ANY permit, unless the decision is overturned by the Secretary of Commerce (Secretary) under one of two national policy grounds: " ... the activity is consistent with the objectives of [the CZMA] or is otherwise necessary in the interest of national security."[43]

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[35] *See* Jeremy Firestone, Willet Kempton, Andrew Krueger, & Christy Loper, *Regulating Offshore Wind Power and Aquaculture: Messages from Land and Sea*, 14 Cornell J.L. & Pub. Pol'y 71 (2004). I am indebted to this article for informing my analysis.
[36] *See* 42 U.S.C. 4321-4347 (2000).
[37] *See* 42 U.S.C. §§ 7401-7661 (2000).
[38] *See* 16 U.S.C. §§ 1361-1407 (2000).
[39] *See* 16 U.S.C. §§ 703-712 (2000).
[40] See 16 U.S.C. §§ 661-667e (2000).
[41] 16 U.S.C. § 1456(c)(1)(a) (2000).
[42] 16 U.S.C. § 1456(c)(3)(a) (2000).
[43] *See id.*

In an administrative decision, the Secretary has further developed the concept of consistency, expanding it to the reviewing of projects with multiple state impacts.[44] The decision was eventually codified into regulations at 15 C.F.R. § 930.150-930.157. Under this doctrine, known as interstate consistency review, a participating state may even potentially review "any reasonably foreseeable effect resulting from a federal action occurring in one State of the United States on any coastal use or resource of another State that has a federally approved management program."[45]

Federal consistency has important relevance to wind power in that it would allow a state to review any federally-permitted projects that occur off its coast line, even in federal waters, if any land use, water use, or natural resource (i.e., fisheries) of the coastal zone will be effected by the project. Furthermore, a coastal State may even be able to review reasonably foreseeable effects on coastal use or resources of an activity that occurs in the waters of a neighboring state.

VIII. Conclusion

Due to its low carbon footprint, wind power is an energy source of growing importance. Although issues with the intermittent nature of the wind resource may limit develop in some terrestrial areas, the marine environment has proven itself ideal, due to the relative consistency of wind flow. Regardless of the final structure created by MMS in the implementation of the EPAct, an important consideration in the offshore siting of wind power projects is the CZMA.

[44] *See* Virginia Electric Power Company Consistency Appeal Decision and Findings (May 19, 1994), *available at* http://www.ogc.doc.gov/czma.htm.
[45] 15 C.F.R. § 930.151 (2007).