Final Report of the Ocean Energy Task Force

to

Governor John E. Baldacci

December 2009

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The Task Force co-chairs also acknowledge and thank the Task Force members and the dozens of members of the public who devoted countless hours to the work that has culminated in this report.

EXECUTIVE SUMMARY

"The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must therefore rise with the occasion. As our case is new, so we must think anew and act anew. We must disenthrall ourselves, and then we shall save our country"

Abraham Lincoln
December 1, 1862

Governor Baldacci established the Ocean Energy Task Force by Executive Order, dated November 7, 2008, to recommend a strategy for moving forward as expeditiously as practicable with the development of the vast, indigenous, renewable ocean energy resources of the Gulf of Maine. The Executive Order recognizes the enormous promise of renewable ocean energy to address state and regional energy needs, including energy independence and security; limiting exposure to the volatile costs and supplies of fossil fuels; attaining our greenhouse gas reduction goals; and stimulating economic opportunity for our citizens. The Order also recognizes that wind is the fastest growing power source in the world and that Maine has significant offshore wind, tidal and perhaps wave power energy resources; that they can play a role in addressing transportation and home heating needs; and, that Maine's universities, research institutions and businesses can provide needed research capabilities, workforce, and industrial infrastructure to support this development. The Task Force was directed to recommend solutions to overcome potential economic, technical, regulatory and other obstacles to vigorous and expeditious development of these ocean energy resources. The Task Force recognizes that such solutions must also sustain the on-going integrity and vitality of the Gulf of Maine by ensuring that potential adverse effects on its biological resources and existing uses – which provide significant economic, ecological, and cultural value to the State – are assessed and appropriately addressed.

The Task Force undertook its mission in the context of the rude shock our state received in 2008, when crude oil prices soared to $147 per barrel and gasoline and heating oil prices topped $4 per gallon – and Maine came face to face with an economic and social catastrophe. These events, which highlighted our state's long over-reliance on oil to heat our homes and fuel our vehicles and on natural gas and other fossil fuels to run our electric power plants, resulted in dramatic economic concerns and hardships for many Maine families and businesses. The prospect of these high or higher fuel prices for prolonged periods underlined the urgent need to significantly reduce and minimize our state's dependence on oil and gas. At the same time, climate change, caused primarily by the burning of fossil fuels, may in fact pose an even greater threat to the environment, economy, social fabric and human health in the only slightly longer term.

Maine faces a choice of energy futures. Today, around 60 percent of Maine (and New England's) electric generation capacity is fueled by natural gas, oil, or coal, not one ounce of which is

indigenous to the state. When home heating and transportation are added to the calculation, we approach 90 percent dependency on fossil fuels. Choosing a business-as-usual course -- which would maintain and probably even deepen this dependency – exposes us to the enormous risk of oil and gas price volatility and shocks, potential supply disruptions, and mounting levels of greenhouse gases. And, we will continue to export billions in energy dollars out of state and overseas every year. The drop in fossil fuel prices since the summer of 2008 has given us a reprieve, but it is unlikely that the current period of relatively low prices will last, especially as the economy pulls out of the recession of the last two years. What goes down can and will go up – the question is whether we use this time to prepare for a new and more sustainable energy future (economically and environmentally) or to simply dig ourselves ever deeper into the fossil fuel energy hole.

We believe that a more prudent choice for Maine is an aggressive and multi-faceted strategy of diversification and development of a variety of regionally indigenous and nearby energy resources. Key elements of this strategy include increased investment in energy efficiency and demand management; development of smaller scale distributed resources, including community wind, solar, and tri-generation; possible increased imports of largely renewable energy from Canada; and development of large scale on- and offshore wind, tidal, and potentially wave resources. Given that each of these options has its own set of costs and benefits, its own set of advocates, and in some cases its foes, it is important to emphasize that these are not mutually exclusive choices.

Of all these alternatives, however, by far the largest and most capable of supporting a low carbon energy future that is largely decoupled from foreign disruption are the great winds which sweep across the Gulf of Maine. These winds are one of the great untapped energy resources on earth and hold the potential to supply a significant portion of Maine's energy needs – not only for lights and computers but heat for houses and fuel for our cars – when balanced with complementary energy sources during periods of calm. Moreover, Maine has the potential to emerge as a net energy exporter through the aggressive development of its offshore wind and other renewable ocean energy resources.

This path can offer additional benefits. Development of these resources also provides us with a rare opportunity to develop new – and expand existing – composites, boatbuilding, construction and other industries with the potential to create and sustain thousands of quality jobs, keeping the economic benefits of energy generation here at home. However, capturing these quality jobs will take strengthening our supply chain so that the maximum number of Maine workers can be employed in this endeavor.

The Task Force has identified the huge potential of this resource, but also its costs and the substantial obstacles to its development. The three primary issues that must be addressed are technical, financial and regulatory.

Simply stated, the technology to economically harness off-shore winds in deep water (greater than 60 meters) does not exist today. Substantial research and testing will be necessary, and Maine has already taken concrete steps to address this in the demonstration area legislation passed last spring. At a stroke, this law -- recommended by the Task Force in its interim report last winter – put us in a national leadership position in terms of research and development for viable deepwater off-shore

wind technology. This leadership was recently recognized by a major grant from the U.S. Department of Energy to the University of Maine for research and demonstration of deepwater floating off-shore wind technology.

Coupled with this technical issue are the questions of predictability, intermittency, and our current inability to coordinate wind availability with peak energy needs – the fact is that the wind doesn't blow at all times in all places (even in the Gulf of Maine). Intermittency can be addressed through availability of other electric generation to provide balancing power and a robust transmission grid to deliver that power. The State's ambitious renewable energy goals simply must be accompanied by the willingness to efficiently site and permit new transmission capacity. Technologic advances will improve predictability, address the downtimes, and help with cycling while smarter grids will help match generation and load.

The Task Force heard interesting and promising testimony – from Europe as well as the United States – on possible solutions to the technical issues, from the production of hydrogen, ammonia, or compressed air at the generation sites to coordination with Hydro Quebec or others for back-up. While there are no definitive answers at this time, this is another area where aggressive research and development can and must play a major role, and Maine should advocate for a major federally funded research and development effort.

The second major issue is financial – offshore energy production in the current climate of relatively low fossil fuel prices, particularly natural gas, is not presently cost-competitive. While new natural gas finds and drilling techniques, and the economic downturn, have depressed natural gas prices, this could change and change fast, just as it did in the spring and summer of 2008. Hence the strategy of supporting technical research (to drive capital costs down), transmission grid development to be ready when the time comes, and the exploration of financing alternatives which will support large scale deployment on a timely basis when circumstances dictate.

The final principal issue the Task Force has identified, somewhat surprisingly, is regulatory. Although far from land and people, off-shore energy development faces a gauntlet of overlapping, complex, expensive, and time-consuming (mostly federal) regulatory hurdles. The Minerals Management Service of the Department of the Interior governs off-shore leases in federal waters; the U.S. Fish & Wildlife Service has jurisdiction over wildlife impacts, most notably avian and bat impacts; the National Marine Fisheries Service has jurisdiction over fish and marine mammal impacts; the U.S. Army Corps of Engineers has jurisdiction over submerged lands impacts; and the Federal Energy Regulatory Commission has jurisdiction over regional and national energy impacts. The complexity of these overlapping, sometimes competing, and poorly coordinated jurisdictions could effectively stifle any substantial development even if the need is great and the technology and finances are in place.

For this reason, one of the Task Force's most urgent recommendations is a rationalization, acceleration and coordination of the ocean energy permitting process on the federal level, to be led by our congressional delegation and the presidential administration. We are in no way recommending a relaxation of environmental safeguards, simply a more coordinated, timely, and predictable process.

At the same time, we recognize the need for better coordination closer to home if we are to build a significant offshore wind industry. The New England states and the New England Independent System Operator need to support and approve plans to build a more robust regional transmission grid that can accommodate the states' renewable energy goals. We must ask for the same if not greater coordination and timeliness from the many state agencies responsible for renewable ocean energy development, including the Maine Public Utilities Commission, Maine State Planning Office, and Departments of Economic and Community Development, Conservation, Environmental Protection and Marine Resources. And, finally, the jurisdiction and role of Maine's municipalities must be clarified in order to advance the State's renewable energy goals.

The Task Force has concluded that making the transition to off-shore energy (wind, tidal, and wave) when the time is right can provide Maine long-term price stability, domestic political control over its energy future, development of a new industry cluster, and jobs for Maine people. Increasing access to an energy resource with a fuel cost of zero for electricity, heat, and transport would provide Maine people with insurance against increases in oil and gas prices. And despite the hurdles that development of Maine's ocean energy resources will encounter along the way to commercialization, the potential benefits dictate our taking concerted action today to ensure that Maine is positioned to capture the tremendous promise these resources can provide us.

Therefore, the Task Force recommends that Maine make a major commitment to preparing the way for the development of its offshore wind, tidal, and wave power. Given the enormity of Maine's offshore wind resource, particularly in deep water, and the promise of new floating deep water wind technologies, the Task Force is recommending that Maine revise its offshore wind power goal to a transformational level – 5,000 megawatts of offshore wind by 2030 – a power source that would enable Maine to electrify in every sense, including heat for our homes and fuel for our cars, and position Maine as a net energy exporter.

As mentioned, P.L. 2009, c. 270, developed by the Task Force and introduced by the Governor in the spring of 2009, establishes a fair, efficient, and predictable process for the temporary, relatively short-term testing of emerging offshore wind and wave technologies in pre-selected state waters. This testing, by the University of Maine and possibly private developers, will advance technologies needed to harness Maine's deep water wind resource.

The Task Force also recommends that we take action immediately to support the electrification of heating and transportation, the sectors responsible for the bulk of Maine families' energy budget, for consuming the vast majority of petroleum products, and for producing a significant share of greenhouse gas emissions in Maine. A critical part of this process must be the redevelopment of the electrical grid and the incorporation of advanced smart-grid information technologies. A major offshore energy source will avail us little if the power cannot be delivered, and the State should move aggressively to support strengthening our current out-dated transmission and distribution infrastructure.

Commercialization of deep water offshore wind power is at least five to ten years down the road. But we must begin now, *today*, to clear the obstacles and cut the lead time for its development. If we wait until a catastrophe is upon us, we'll be starting from scratch and delay now will be our undoing.

In the meantime, shallow water wind is technologically viable today, as demonstrated by approximately 1,500 megawatts of ocean wind currently operating in Europe with the support of significant government financial support. In order to gain experience with the technology, understand the environmental issues associated with such development, and demonstrate Maine's interest in ocean energy to the world, the Task Force recommends that Maine issue a Request for Proposals to attract ocean energy developers, and is recommending actions that help lay the groundwork for issuance of this Request for Proposals. This development could occur in either state or federal waters; unlike the temporary testing that can occur pursuant to the short-term general permit created by P.L. 2009, c. 270, these commercial developments will require full-blown state and federal permits. Issuance of a Request for Proposals will help the State to better understand the issues development of these energy resources will face and how to overcome the obstacles.

Lincoln recognized that the Civil War was a qualitatively different challenge than any our country had ever faced, and his prescription "to disenthrall ourselves" is timeless in its application. Although nothing can match the urgency of the circumstances Lincoln faced, the challenge of minimizing climate change and reducing fossil fuel dependency may well be our generation's supreme test. The occasion truly is piled high with difficulty – but with foresight, vision, and a great deal of hard work, we can and will rise to the occasion.

Summary of Recommendations

The Task Force's recommendations, summarized below, identify strategic steps to facilitate timely and efficient development of Maine's significant offshore wind, tidal, wave, and potentially other renewable ocean energy resources.

❖ *Establish the following state renewable ocean energy goals:*

- Installation of 5 gigawatts (5,000 megawatts) of offshore wind energy generating capacity in Maine's coastal waters and adjoining federal waters by 2030, which the Task Force realizes is an extraordinary goal, whose achievement will require the strong support of public funders, private investors, and the people of Maine, as well as technological advances to achieve costs that are competitive with other energy sources, the development of new end use markets, and the construction of major new transmission and smart grid infrastructure; and
- Timely and efficient development of tidal energy resources at optimal locations in Maine's coastal waters, including but not limited to those in the Passamaquoddy Bay region.

❖ ***Improve the siting, governance, and permitting framework for renewable ocean energy[1] development in general by:***

- Creating an on-line Coastal Atlas to make the best available and continually improving project planning-related information available to public and private decision makers, and pursuing funding opportunities to engage in marine spatial planning in selected state and federal waters that appear promising for offshore wind development;
- Participating actively, in consultation with Maine's congressional delegation, in the federal Interagency Ocean Policy Task Force and related national and regional efforts in support of changes in federal law and policy that align federal agencies' missions with national and state renewable ocean energy and closely related environmental and economic goals and streamline federal review procedures;
- Developing joint federal-state guidance on project siting issues;
- Coordinating and harmonizing federal-state review and decision making processes and related requirements, including information needed for regulatory review;
- Clarifying renewable ocean energy development's consistency with Public Trust Doctrine principles regarding use of state-owned submerged lands areas;
- Facilitating leasing of state-owned submerged lands for renewable ocean energy development on terms that benefit Maine people by providing for commercially reasonable lease fees; creating leasing procedures that facilitate phased development and discourage speculative site banking; and creating a Renewable Ocean Energy Trust Fund to make lease fees generated by renewable ocean energy projects available for research, resource enhancement and compensation to help avoid, minimize, and compensate for adverse impacts, as well as for local harbor planning and infrastructure improvements;
- Encouraging developers to use "best practices" to foster constructive dialogue with potentially effected marine stakeholders in siting renewable ocean energy projects; and
- Developing a state-federal Memorandum of Understanding or other mechanism to coordinate planning for and leasing and permitting of wind energy development in Maine's coastal waters and adjoining federal waters.

❖ ***Promote and support financing and development of renewable ocean energy projects and related businesses in Maine by:***

- Amending state law to direct the Public Utilities Commission to issue a Request for Proposals for renewable ocean energy development projects and to direct transmission and distribution utilities to enter into long term contracts with renewable ocean energy projects for capacity, energy, and renewable energy credits, even if at an above market price, when

[1] As used in this report, the term "renewable ocean energy" generally refers to electricity produced in a sustainable manner using wind, waves, tides, currents, ocean temperature clines (ocean thermal), marine biomass, and/or other renewable sources in, on, or over marine waters, unless the context dictates otherwise.

the rate impact is determined to be reasonable by the Governor and Legislature given the benefits of these projects;

- Further coordinating initiatives of the Department of Economic and Community Development, the Maine Technology Institute**,** the Maine International Trade Center, and other economic development entities to foster development of Maine's renewable ocean energy business cluster though continued support for research and development of wind, tidal, wave and potentially other promising renewable ocean energy technologies; additional support for private investment in energy-related businesses; and collaboration with other regional research efforts, such as the Nova Scotia Tidal Energy Initiative;
- Designating the Department of Economic and Community Development as the initial point of contact and coordinating agency in state government to assist renewable ocean energy developers;
- Coordinating and expanding provision of state financial assistance to encourage the development of renewable ocean energy-related projects by: establishing a moral obligation credit enhancement program modeled on the Electric Rate Stabilization Program; supporting and expanding existing programs, such as loan guarantees, the Maine Technology Institute's programs, the Seed Capital Tax Credit Program, and the Small Enterprise Growth Fund; developing new initiatives and incentives for private investment, including overseas investment by original equipment manufacturers such as wind turbine and platform vendors; aggressively pursuing federal financing options and partnerships; assessing and improving as appropriate pertinent existing Maine business financing programs; and developing funding-related guidance for developers;
- Directing the Maine Port Authority to identify land parcels proximate to existing Maine port facilities, estimate their cost, and make a recommendation to the Legislature regarding acquisition of one or more of these parcels for purposes of facilitating renewable ocean energy development opportunities;
- Providing incentives through the Efficiency Maine Trust for Maine consumers and businesses to adopt new technologies to shift energy demand from fossil-based fuels to electricity produced from Maine renewable sources;
- Expanding and further coordinating current state work force development-related initiatives; and
- Clarifying personal property tax provisions regarding renewable ocean energy-generating machinery and related components.

❖ ***Improve and align energy transmission infrastructure and state energy policy as needed to attain renewable ocean energy goals by:***

- Explicitly recognizing in law the need for new transmission and distribution capacity to achieve the State's wind power and energy conversion goals;

- Undertaking a comprehensive plan to determine the level of transmission and distribution system investment that will be needed to achieve the State's onshore and offshore wind power goals;
- Directing the Public Utilities Commission to undertake a proceeding to explore mechanisms needed to achieve the State's wind power and electrification goals, including: rate design structures that encourage use of intermittent resources; changes to standard offer pricing to include off-peak time of use energy prices; the penetration of time of use meters; long term needs for a smart grid to enable usage and storage of energy from intermittent renewable resources; and other mechanisms to increase the use of renewable resources and reduce the use of fossil fuels;
- Moving aggressively, in accordance with recommendations developed by the Public Utilities Commission, to design and implement a program along the lines of that described in this report to convert Maine homes and businesses to more efficient electric air and ground source heat pumps, and to electric vehicles as they become available in the market, that will reduce Maine consumers' total (electricity, heat, transport) energy bills and help support the development of renewable ocean energy resources and minimize the ratepayer impacts of any above-market prices paid to support those resources;
- Encouraging utilities to expand the transmission system today to accommodate additional renewable generating capacity needed to meet the State's wind power goals, where doing so will reduce costs to ratepayers over the long term;
- Advocating that the Federal Energy Regulatory Commission and Public Utilities Commission permit recovery of generator lead line costs in certain circumstances; and
- Continuing to work at the regional level to resolve transmission cost recovery and related issues as needed to attain state and regional renewable energy goals.

❖ ***Streamline state permitting of appropriately-sited offshore wind energy development by:***

- Clarifying that the Department of Environmental Protection is the lead permitting agency for offshore wind energy proposals statewide, while providing the Land Use Regulation Commission authority over small, community-scale wind projects proximate to islands in Land Use Regulation Commission jurisdiction;
- Amending state law to make the administrative and judicial review processes for offshore wind energy development equivalent to those applicable to land-based "grid-scale wind energy development";
- Making permitting-related procedures and approval criteria regarding scenic impact assessment, project decommissioning, and provision of public benefits the same as those applicable to land-based grid-scale wind energy development in the Department of Environmental Protection's jurisdiction;
- Amending the Department of Environmental Protection's and Land Use Regulation Commission's permitting statutes and rules, as needed, to include approval criteria that

address issues such as, but not limited to, noise and effects on birds, bats, and marine mammal species, and marine habitats as appropriate in an offshore, ocean environment, with due consideration of adaptive management, potential cumulative effects, and avoidance, minimization and compensation for undue adverse effects on biological resources; and

- Clarifying and limiting municipalities' land use and zoning authority to promote consistency with pertinent state standards and requirements regarding offshore wind energy development.

❖ ***Facilitate permitting of appropriately-sited tidal energy projects by:***

- Ensuring full implementation of and collaborative participation by all pertinent federal agencies in the existing Federal Energy Regulatory Commission-State Memorandum of Understanding on siting tidal power pilot projects; and
- Amending state law to make the administrative and judicial review processes for commercial-scale tidal power development under the Maine Waterway Conservation and Development Act equivalent to those applicable to land-based grid-scale wind energy development in Department of Environmental Protection jurisdiction.

❖ ***Support wave energy development opportunities by:***

- Encouraging testing of wave power technology in conjunction with a wind power generation system as provided for 38 M.R.S. §480-HH (Department of Environmental Protection-administered general permit for a "wind energy demonstration project"); and
- Providing statewide Department of Environmental Protection permitting jurisdiction under the Maine Water Development and Conservation Act, as for tidal power projects.

❖ ***Ensure that state consideration and action regarding offshore oil and natural gas development proposals in the Gulf of Maine reflect the best available science.***

❖ ***Support formation of a private sector-led entity to spearhead renewable ocean energy development efforts in Maine.***

I. OVERVIEW OF THE TASK FORCE PROCESS

A. Mission

Governor Baldacci established the Ocean Energy Task Force by Executive Order 20 FY08/09, dated November 7, 2008 (Appendix 1). The primary mission of the Task Force is to recommend strategies:

- To meet or exceed the goals established in the Maine Wind Energy Act, 35-A M.R.S. §3404(2)(B), to install at least 2,000 megawatts of wind capacity by 2015 and at least 3,000 megawatts by 2020, 300 of which could be located in coastal waters;
- Identify potential economic, technical, regulatory, and other obstacles to development of grid-scale offshore wind resources in Maine's coastal waters[2] and adjoining federal waters, and recommend solutions to overcome those obstacles;
- Promote research and testing to facilitate siting of offshore wind energy facilities;
- Foster in-state growth of diverse wind and other alternative energy related businesses;
- Encourage ocean-based tidal and wave energy development where appropriate;
- Update information regarding offshore oil and natural gas resources and evaluate federal initiatives regarding oil and natural gas exploration and development in the Outer Continental Shelf; and
- Overcome any state laws or policies that might serve as obstacles to vigorous and expeditious environmentally responsible development of grid-scale wind and tidal energy generation facilities in Maine's coastal waters and adjoining federal waters in a manner that generates significant benefits for Maine people.

This report provides the Task Force's recommendations to the Governor on well-integrated strategies for moving forward expeditiously to realize the many and varied environmental and economic benefits of well-sited and sustainable development of the vast, indigenous, renewable ocean energy resources that lie off Maine's coast in ways that optimize their benefits to Maine people.

There are a number of ocean energy-related public policy initiatives currently underway, including the Commission to Study Energy Infrastructure[3], the Regional Greenhouse Gas Initiative and

[2] As used in this report, the term "Maine's coastal waters" means waters subject to tidal influence to the three-mile limit of state ownership recognized under the federal Outer Continental Shelf Lands Act. Waters and submerged lands beyond the three-mile limit to the 200-mile limit of the United States' Exclusive Economic Zone are referred to as the Outer Continental Shelf and are owned and managed by the federal government.

[3] P.L. 2009 c. 372, Part F

related Maine efforts, the New England Governor's Conference regional blueprint, and the Interagency Ocean Policy Task Force initiative led by the White House Council on Environmental Quality. Addressing issues such as marine spatial planning,[4] coordination and harmonization of federal agencies' roles and responsibilities, cost allocation for transmission infrastructure development, and greenhouse gas emissions reductions, these initiatives have significant potential to affect the path to development of Maine's renewable ocean energy resources. The Task Force intends that its recommendations help to inform these on-going efforts as its own work has been informed by them.

B. Task Force Process

1. Members

The Task Force's members (see Appendix 2), among whom are several legislators, were selected to ensure the benefit of different perspectives and expertise in its deliberations and thus provide opportunity for development of the strong and effective solutions that may result from forging consensus among diverse viewpoints.

2. Chairs

The Governor selected Beth Nagusky, Director of Innovation and Assistance at the Maine Department of Environmental Protection, and Don Perkins, President of the Gulf of Maine Research Institute, to co-chair and manage the work of the Task Force and its subcommittees.

3. Staffing; consulting services

The Maine State Planning Office provided and coordinated overall staff support for the Task Force. Staff of the Department of Environmental Protection, Department of Conservation, Office of Energy Independence and Security, Department of Economic and Community Development, and the Public Utilities Commission provided staff support, policy analysis and information to inform and guide the work of the Task Force's seven subcommittees (see below). Staff of the Department of Conservation's Bureau of Parks and Lands and Land Use Regulation Commission, the Department of Inland Fisheries and Wildlife, and the Department of Marine Resources, along with federal colleagues in the U.S. Army Corps of Engineers, National Marine Fisheries Service, Environmental Protection Agency, Federal Energy Regulatory Commission, ISO-NE, Minerals Management Service, U.S. Fish and Wildlife Service, and the University of Maine System, including the University of Maine School of Law, contributed information, expertise, and insights that advanced the Task Force's understanding of key issues and related opportunities.

[4] The Department of Environment, Food and Rural Affairs in the United Kingdom developed the following commonly used definition of the term "marine spatial planning": "strategic, forward-looking planning for regulating, managing and protecting the marine environment, including through allocation of space, that addresses the multiple, cumulative, and potentially conflicting uses of the sea … "

Under contract to the Maine State Planning Office, Mr. Jeffrey Pidot, former head of the Maine Department of Attorney General's environmental law section, provided a detailed and cogent independent policy analysis of Maine's regulatory and proprietary (submerged lands leasing) authorities, including options to facilitate siting of offshore wind projects while maintaining the integrity of state review procedures.[5] Under contract to the Department of Environmental Protection, Mr. Waine Whittier prepared a project-oriented economic analysis of offshore wind energy development and conversion of home heating and transportation to more efficient electric powered options (Appendix 3). These analyses greatly assisted the Task Force in exploring key issues and developing its recommendations.

4. Task Force meetings and study process

The Task Force began its work in December 2008 and met ten times in Augusta, Maine. The Task Force had the benefit of presentations and information from utilities experts and transmission grid managers, biologists and natural resources managers, wind, tidal and wave power developers, state and federal regulatory agencies, private consultants, legal scholars, and attorneys, as well knowledgeable and interested members of the public. In addition to providing a solid foundation for the Task Force's findings and recommendations, this wealth of information and analysis underscored the close connections and inherent inter-relations among state energy, environmental and economic development policies. Agendas, presentations, and summaries of the Task Force's meetings and related information are posted on the project website (http://www.maine.gov/spo/specialprojects/OETF/index.htm), established and maintained by the Maine State Planning Office to provide the public with ready access to information considered and developed by and for the Task Force.

5. Subcommittees

At the outset of its work, the Task Force established six subcommittees to explore issues and develop recommendations on the following topics for the full Task Force's consideration: environmental and human impacts; permitting and leasing; transmission and grid management; economic development and emerging technologies; tidal power development; and oil and gas development. The Task Force created a seventh subcommittee charged with identifying interim actions that could be taken by the Task Force to advance the Governor's directive and facilitating resolution of differences among recommendations of the topically-focused subcommittees. The Task Force later established an eighth subcommittee to develop a recommendation on establishment of a public-private entity to provide leadership and coordination of efforts to advance Maine's renewable ocean energy industry. Task Force members chaired these subcommittees, which, as noted above, were staffed by state agency personnel. Appendix 4 lists the membership and outlines the scope and focus of each subcommittee.

[5] http://www.maine.gov/spo/specialprojects/OETF/Documents/Pidot_windpower_report_final.pdf (accessed 12.15.09)

6. Public participation

Members of the public, including representatives of the wind power industry and concerned citizens, had opportunities at each Task Force meeting, as well as at subcommittee meetings, to provide comments on matters under discussion. The Task Force and each of its subcommittees established lists of interested parties who received notice of and materials considered at meetings. To the extent practicable, the Task Force provided opportunities for interested parties to monitor or participate in meetings electronically or via telephone. Through their active participation in these meetings, research, and provision of information, members of the public made important contributions to the work of the Task Force and helped inform and shape development of its findings and recommendations.

7. Interim report and related recommendations

In accordance with the above-noted executive order, the Task Force submitted its interim report and recommendations to the Governor in April 2009.[6] The interim report focused on identifying recommended legislative actions that merited attention by the Governor and Legislature during the then-pending legislative session. The Task Force recommended enactment of changes in state law to facilitate siting and development of wind and tidal power demonstration projects, which the Legislature unanimously enacted as an emergency measure and Governor Baldacci signed into law as P.L. 2009 c. 270.[7]

A key part of this law required the Department of Conservation, in consultation with the Maine State Planning Office, to identify, through a public process, up to five specific areas in Maine's coastal waters where wind energy demonstration projects may be conducted under the Department of Environmental Protection-issued general permit the law created. The law specified that one of these areas, termed the Maine Offshore Wind Energy Research Center, would be for projects conducted by or in cooperation with deep-water wind energy technology researchers at the University of Maine. The Task Force notes that the Maine State Planning Office and the Department of Conservation recently completed this process and have identified three discrete test areas in Maine's coastal waters, including the Maine Offshore Wind Energy Research Center.[8] Recognizing that significant and sustained public and private investment are needed to accelerate commercialization of offshore, deep-water wind energy and other emerging ocean energy technologies, the Task Force considers this an important milestone in the advancement of Maine's ocean energy industry.

[6] http://www.maine.gov/spo/specialprojects/OETF/Documents/OETF_InterimReport.pdf (accessed 12.15.09)

[7] http://janus.state.me.us/legis/ros/LOM/LOM124th/124R1/PUBLIC270.asp (accessed 12.15.09)

[8] http://www.maine.gov/doc/initiatives/oceanenergy/oceanenergy.shtml (accessed 12.15.09)

II. Vision – Using Renewable Ocean Energy to Reduce Reliance on Fossil Fuels and Expand Maine's Green Economy

Wind power is the world's fastest growing utility-scale source of renewable energy. The World Wind Energy Association's most recent forecast for installation of wind energy facilities projected 25 percent market growth despite the on-going global economic slump.[9] Development of wind energy from projects sited offshore promises to play a huge role in the future of wind energy development.[10] While the United States as a whole continues to fall far short of Europe's commitment to wind power, Maine is making important progress toward achievement of its goal to develop 3 gigawatts of wind generation capacity by 2020, and is New England's largest wind energy producer. Maine's wind and renewable ocean energy resources have potential to be a keystone of its future prosperity.

The Task Force believes that issues and opportunities for development of Maine's renewable ocean energy resources should be considered and addressed in furtherance of and guided by the following fundamental public policy goal:

> *Steady reduction and eventual elimination of our state's over-reliance on fossil fuels through transition to use of electric power, produced with renewable energy resources, particularly offshore wind power, to meet the full range of energy needs.*

Development of Maine's vast offshore wind energy resource, particularly that in deep-water areas offshore, is a central feature of the transition to the renewable energy-focused economy envisioned by the Task Force. This transition also includes and necessitates creation of significant opportunities for growth and expansion of Maine's emerging ocean energy business cluster[11] in areas related to manufacturing, research and development, design, financing, deployment, operations and maintenance of ocean energy and other renewable energy systems, energy distribution, and related businesses (Appendix 5). By growing Maine's ocean energy business cluster, the State can transition

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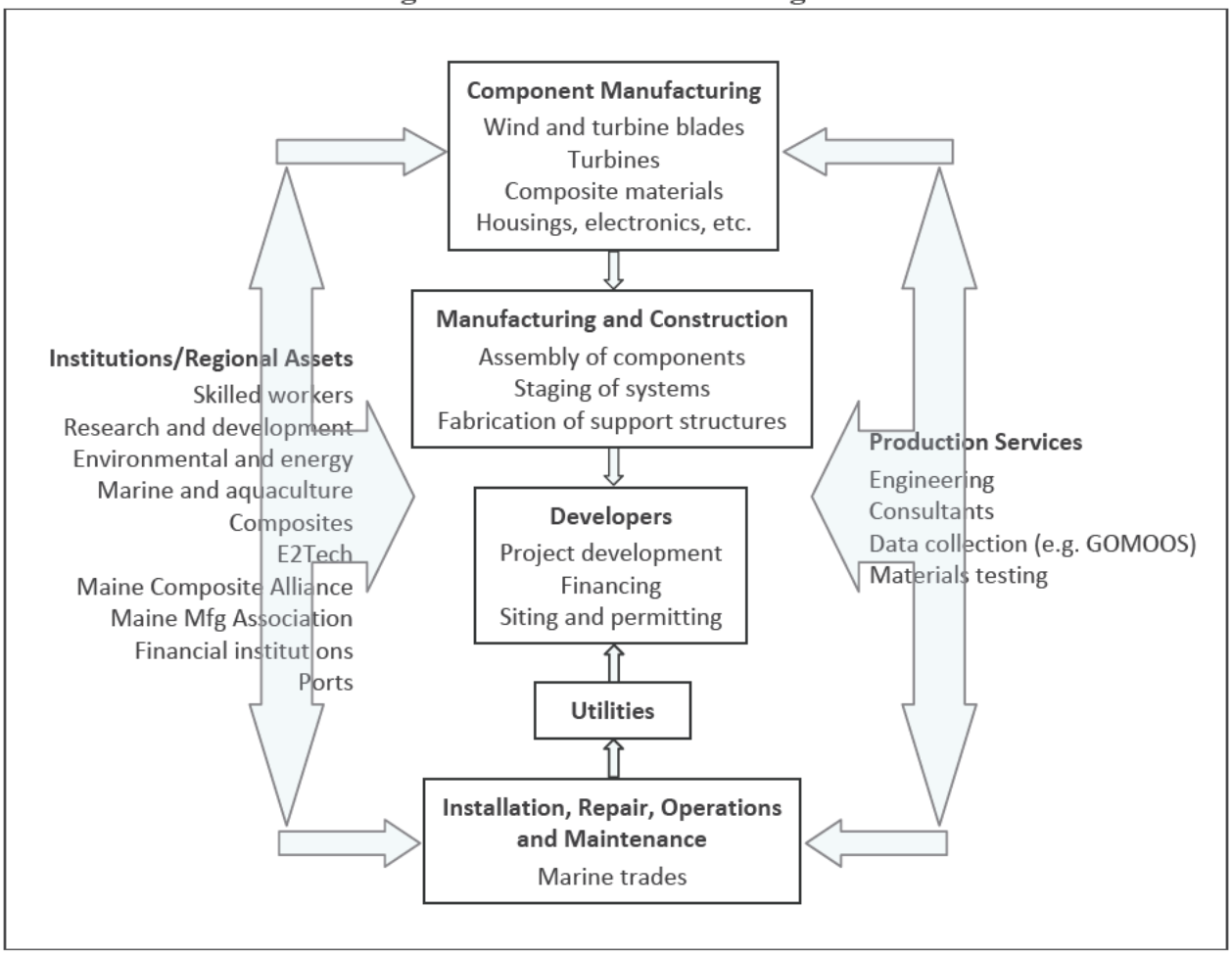
[9] http://www.wwindea.org/home/index.php?option=com_content&task=view&id=245&Itemid=40 (accessed 12.15.09)

[10] In Germany, for example, a world leader in wind energy development and investment, the national governmental announced plans in 2008 to build 30 offshore wind projects with a total generating capacity of 25 gigawatts by 2030 in keeping with its renewable energy policies and goals. See http://www.businessweek.com/globalbiz/content/jul2008/gb2008077_507147.htm?campaign_id=rss_eu (accessed 12.15.09)

[11] A "business cluster" is made up of competing, collaborating and interdependent businesses working in a common industry and concentrated in a geographic region. Clusters draw on shared infrastructure and a pool of skilled workers and represent the specialization and comparative advantage of the region. A synergistic effect is realized when successful companies that focus on a particular industry then cluster locally.

from fossil fuels in ways that will optimize benefits for Maine people and help ensure that indigenous renewable resources are used in ways that generate wealth and business and related opportunities in the State.

Figure 1 – Business Cluster Diagram



Technologies needed to develop deep-water wind energy efficiently are still under development. Current electric power prices, which in the Northeast are largely determined by the price of natural gas, may also present a significant challenge for shallow-water offshore wind development using existing technologies. The application of modern directional drilling and hydro-fracturing techniques to the Marcellus Shale gas province of New York and Pennsylvania, and other existing shale gas provinces in other parts of the country, has the potential to markedly change the United States energy picture. Use of these modern techniques could serve to depress natural gas prices and increase our consumption of gas from the United States.[12]

[12] See http://www.technologyreview.com/energy/23694/page1/ (accessed 12.15.09), which also references concerns that have been expressed about adverse effects on water resources that may result from extracting this gas.

What remains certain is that oil and natural gas are ultimately limited, non-renewable power sources with problematic greenhouse gas emissions whose prices have been volatile and may well prove so in the future. No less certain is the significant economic and related societal hardship Maine people would face if we remain as reliant on oil and natural gas to meet household energy needs as we are today. As outlined by the Ocean Energy Institute[13] and discussed in section IV(B) below, a prolonged or sustained period of prices at those 2008 levels could wreak economic havoc if the State were still deeply dependent on oil and gasoline to meet heating and transportation needs.

Under these circumstances, the Task Force has concluded that the wise course for Maine is to plan ahead and lay a firm foundation today for efficient development of Maine's offshore wind and other renewable ocean energy resources to prepare Maine for the point in time when these technologies become commercially viable and economic.

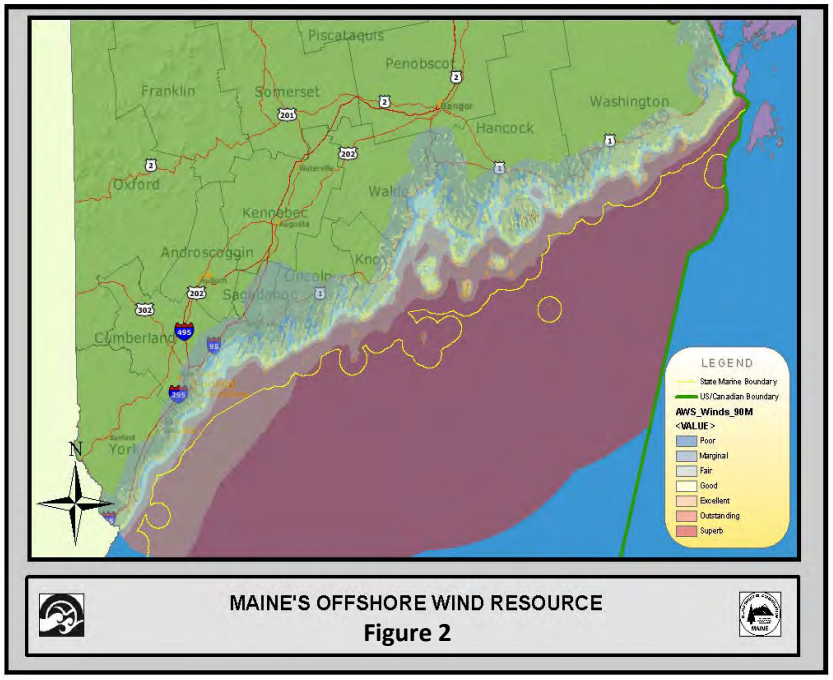
At the same time, it is wisest for Maine to test the waters and pursue creative approaches as well as federal investments to expedite development of these resources. This includes beginning a major shift to electric power to meet transportation and home heating needs, a shift that need not wait for the development of offshore wind and tidal power. Given the climate-change related environmental and economic challenges facing Maine and the nation, the Task Force emphasizes that to make this transformation Maine should actively and persistently pursue development of its offshore wind and other ocean energy resources. As detailed below, wind resources off Maine's shores, particularly those in adjacent federal waters, are vast, relatively proximate to major markets, able (with anticipated technological development) to be stationed in deep-waters areas with limited potential for adverse aesthetic and other impacts, and capable of producing endlessly renewable electricity without generation-related greenhouse gas emissions.

[13] See *Critical Choice for Charting a Course for Ocean Energy in Maine*, Dr. George Hart, presentation to the Ocean Energy Task Force on December 10, 2008; http://www.maine.gov/spo/specialprojects/OETF/Documents/Dec10'08_TFmtg/Hart_NewTechnologies.pdf (accessed 12.15.09)

III. Renewable Ocean Energy's Promise for Meeting Maine's Energy Needs

A. The Central Role of Maine's World Class Offshore Wind Resource

Maine's offshore wind resources have enormous potential to provide energy security and address the full range of Maine's energy uses, while creating new, quality jobs for Maine people. According to estimates prepared for the National Renewable Energy Laboratory, 85 percent Maine's coastal waters contain significant areas with Class 4 or higher winds.[14] More notably, 82 percent of Maine's coastal waters have Class 5 or stronger winds. Federal waters immediately adjacent to Maine are generally considered to have Class 5 or better winds throughout (see Figure 2 – Maine's Offshore Wind Resources). Adding to the value of offshore wind is the fact that ocean-based winds are generally more constant than land-based winds and thus have greater energy production potential.



MAINE'S OFFSHORE WIND RESOURCE
Figure 2

Researchers at the University of Maine estimate that the technical potential of the Gulf

[14] State Wind Resource Assessments [floatto_pwr91]. Conducted by the National Renewable Energy Laboratory, U.S. Department of Energy, Golden Colorado. Spatial Analysis Estimates Conducted by the Maine State Planning Office, 2009). Class 4 winds are generally considered the minimum necessary for commercial utilization. When it comes to wind power, wind speed is enormously important. The power production potential increases exponentially with wind speed in accordance with the following formula: Power = 0.5 x Swept Area x Air Density x Velocity^3, whereas the swept area is the turbine's blades, air density is about 1.23 kg/m^3 at sea level, and velocity is wind speed in meters per second (American Wind Energy Association, *Resources Section*, http://www.awea.org/faq/windpower.html - accessed 12.15.09). National Renewable Energy Laboratory's wind resource calculations are based on estimated wind speed estimates at 90 meters and have seven separate wind classifications (Class 1-7). Class 7 areas are those with the greatest wind energy production potential.

of Maine's offshore wind resource is 149 gigawatts of generation capacity.[15] By way of comparison, there are currently 3.5 gigawatts of installed capacity in Maine and 32 gigawatts in New England. Converting Maine homes and transportation sector to electricity will take 3.8 to 5 gigawatts of offshore wind.[16]

Based on anticipated turbine separation distances for emerging deep-water wind technologies and European experience with ocean wind technology, the University of Maine has calculated that development of 5 gigawatts of offshore wind energy in federal waters would involve use of 320 square miles of federal Outer Continental Shelf area for wind energy production.[17] While 320 square miles is only about 1/10 percent of the total federal Outer Continental Shelf area in the Gulf of Maine, the Task Force recognizes that ocean energy development can and must be pursued with well-informed consideration of natural resources and other human uses of the marine environment to avoid and minimize potential adverse effects and conflicts.

The Task Force suggests that Maine's commitment to support development of 5 gigawatts of deep-water wind energy capacity in the Gulf of Maine would be consistent with and supportive of national wind energy development policy and the State's current role as a leader in the wind energy field. Current federal energy policy calls for meeting 20 percent of the nation's electric power needs with wind power by 2030. The U.S. Department of Energy has concluded that:

> …based on the assumptions used to create the 20 percent Wind Scenario, providing 20 percent of the nation's projected electricity demand by 2030 would require the installation of 293.4 gigawatts of wind technology (in addition to the 11.4 gigawatts currently installed) for a cumulative installed capacity of 304.8 gigawatts, generating nearly 1,200 terawatt-hours annually. Offshore wind technology would account for about 18 percent (54 gigawatts) of total wind capacity by 2030.[18]

So a state goal of 5 gigawatts of offshore wind energy capacity is commensurate not only with Maine's own needs to transform its energy economy but also Maine's share, as a wind energy leader, in achieving this national goal.

Using U.S. Department of Commerce figures regarding construction-related job creation, the University of Maine has estimated that the approximately $20 billion in expenditure needed to build 5 gigawatts of deep-water wind off Maine's coast would mean about "16,700 new or retained jobs

[15] This is a purely theoretical estimate which assumes that the entire wind resource could be developed without regard to constraints related to substrate types, electric transmission, natural resources related impacts or other uses.

[16] See Appendix 3.

[17] At the Task Force's September 25, 2009, meeting, Dr. Habib Dagher explained that University of Maine researchers estimate that 1 gigawatt of deep-water wind capacity would require use of an estimated 64 square miles of ocean area in federal waters for wind turbines and related infrastructure. Additional state submerged lands areas and uplands would also be used if power generated offshore is brought to the electric power distribution grid in Maine.

[18] *20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply*, U.S. Department of Energy (July 2008), p. 151

per year for twenty years, including jobs transformed from the traditional to renewable energy sectors."[19]

There is no other indigenous renewable energy resource in Maine capable of generating electricity on this scale, and no other Maine power source appears to have fewer adverse environmental impacts.[20] While the Task Force acknowledges the important contribution all of Maine's renewable resources can make and that other technologies (e.g., use of wind energy to produce ammonia-based fuels or hydrogen, or solar energy using "black silicon") may necessitate reevaluation of options in the future, offshore wind plainly holds the greatest promise today.

B. The Important Roles of Tidal Power, Community Wind, and Other Renewable Ocean Energy Resources and Conservation in Meeting Local Needs, Creating a Diverse and Robust Renewable Energy Mix, and Building a Renewable Energy-based Economy

1. Tidal power

Strong and predictable tidal currents at select locations along Maine's coast provide opportunities to develop electricity using modern, emerging tidal in-stream energy conversion technologies. Tidal in-stream energy conversion is a type of hydrokinetic power production. Regulated as hydropower development at the federal and state level, tidal in-stream energy conversion differs from conventional hydro and existing tidal barrage technologies in that it does not involve use of a dam to impound waters but, as its name indicates, captures the energy of the tidal flow itself.

A 2006 Maine Technology Institute-funded study by the Electric Power Research Institute assesses Maine's tidal power energy resource potential.[21] The Electric Power Research Institute study assesses the tidal power energy generation potential at a variety of locations along the Maine coast. Electric Power Research Institute identified the ten sites with the most potential and found that Passamaquoddy and Cobscook Bays in Washington county have the State's most promising tidal energy resource. According to early estimates by the Electric Power Research Institute, the ten most promising tidal in-stream energy conversion sites in Maine have a combined total potential generating capacity of approximately 25 megawatts. The Electric Power Research Institute's 2006 report recommended additional analysis of current velocities, encouraged the development of pilot test projects, and urged government to accelerate research and development programs. In Maine, these activities have all been occurring since the Electric Power Research Institute report was published.

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[19] Deepwater Offshore Wind in the Gulf of Maine, University of Maine/Advanced Structures and Composites Center (2009), p. 14; see Bivens, J., *Updated Employment Multipliers for the U.S. Economy* (EPI, 2003)

[20] See, *e.g.,* Prof. Habib Dagher, presentation to Ocean Energy Task Force, *supra* (and references cited therein); see also, Prof. George Hagerman, presentation to Ocean Energy Task Force, *infra.*

[21] Maine Tidal In-stream Energy Conversion: Survey and Characterization of Potential Project Sites (EPRI, April 2006) - http://oceanenergy.epri.com/attachments/streamenergy/reports/Tidal_003_ME_Site_Survey_Report_REV_1.pdf

In his December 10, 2008, presentation to the Task Force, Dr. George Hagerman, who was the study's principal author, suggested that the total statewide capacity may be around 250 megawatts,[22] a figure also used by the University of Maine in its climate action report to Governor Baldacci, reflecting work by University researchers.[23] While significant, this resource is likely much smaller than Maine's deep-water wind resource.

While relatively modest in terms of power production potential compared to offshore wind, Ocean Renewable Power Company estimates that development of 250 megawatts of tidal power in Maine would involve an investment of up to $1 billion over the next five to seven years that could result in employment of 400 to 600 Maine citizens. Experience with Ocean Renewable Power Company's tidal power development in Eastport shows how tidal power development may provide significant benefits to communities while also having a statewide economic impact. Over the last two years Ocean Renewable Power Company has spent approximately $5 million in Maine and provided jobs for over 50 people in seven Maine counties.

In presentations to the Task Force on tidal power in Maine[24], Ocean Renewable Power Company owner Chris Sauer and project manager John Ferland emphasized that Ocean Renewable Power Company's project has provided opportunities for a talented local work force with a variety of skills adapted from boat building, fishing, and related traditional marine trades. Ocean Renewable Power Company's representatives have noted that local involvement with the project has not only resulted in cost-saving innovation through employment of skilled local workers but also has informed decisions on siting of the development in ways that avoid and minimize potential conflicts with existing uses. In addition to regionally and locally significant employment opportunities, distributed tidal power generation projects have potential to foster community support for and broader understanding of the contribution to renewable ocean energy generation and provide localized voltage support and further diversification of the state energy mix.

2. Smaller scale, community wind

Focused on opportunities regarding grid-scale, land-based wind energy development, the Governor's Wind Power Development Task Force expressly recognized "…the benefits and importance of community and smaller-scale wind projects, which include their potential to address local energy supply and cost concerns and to foster public awareness of wind energy's benefits and acceptance of its related environmental and land use effects."[25] The Task Force shares in that recognition as concerns ocean-energy resources, based in part on information presented by Mr. Soren Hermansen,

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[22] *Maine's Other (Non-Wind) Ocean Renewable Energy Resources*, presentation by Dr. George Hagerman to OETF, 12/10/08; see www.maine.gov/spo/specialprojects/OETF/Documents/Dec10'08_TFmtg/Hagerman_TidalWaveEnergy.pdf; see also www.maine.gov/spo/specialprojects/OETF/agendas_mtgmaterials.htm (meeting summary).

[23] Demeo Ann, Peterson Mick and Rubin Jonathan, "Energy" essay as part of *Maine's Climate Future: An Initial Assessment*, University of Maine, Orono, Maine. February 2009.

[24] See, *e.g., Tidal Energy in Maine: Opportunities, Obstacles, and Issues to Be Addressed*, presented to the OETF by Chris Sauer, 1/14/09 - http://www.maine.gov/spo/specialprojects/OETF/Documents/Jan14'09_TFmtg/mainetidalenergy.pdf

[25] *Report of the Governor's Task Force on Wind Power Development: Finding Common Ground for a Common Purpose* (Department of Conservation, February 2008), p. 11

organization leader of the Samso Energy and Environmental Organization in Denmark regarding that island community's development of Samso's wind energy resources with the goal of becoming energy self-sufficient and reducing to zero the community's estimated carbon emissions on an overall net basis.

At the Task Force's March 11, 2009, meeting, Mr. Hermansen explained how that community organization developed eleven land-based and ten ocean-based and largely community-owned wind turbines that provide generation capacity to address the island's electric power demand. Notwithstanding the island's significant wind power assets, given wind power's intermittent nature, Norwegian hydro and Danish coal-fired plants balance Samso's electricity demand and Samso exports wind to Norway. Mr. Hermansen outlined Samso's plans to continue along the path of energy independence through expanded use of wind-generated power to meet transportation and other needs.

The Task Force notes the differences in social, legal, and economic circumstances in Maine and Denmark, including Denmark's feed-in tariff, funded through taxes on fossil fuels that significantly subsidized the wind development, may not allow adoption of Samso's precise approach here. Nevertheless, that European community's experience does urge consideration of parallel options and opportunities for Maine's offshore island communities, among others.

The Fox Island Electric Cooperative's recent land-based wind energy development on Vinalhaven Island to address that island community's electric power needs with locally-owned, renewable wind energy may provide an important example of how community wind development may be undertaken in Maine.[26] Lessons learned from that initiative may prove useful in further shaping and refining state policy on key issues. Legislation enacted last session that approves increase of the installed net capacity limit for net-metering to 660 kilowatt hours and makes micro combined heat and power systems eligible for net-metering,[27] and creates a community-based renewable energy pilot program,[28] has potential to support growth and innovation in this area.

3. Consumer choice and energy conservation

The Task Force recognizes that actions and decisions of individuals at the personal, consumer level need to play an important role in reducing our state's reliance on fossil fuels, driving the growth and expansion of Maine's renewable energy industry and economy, and in making more efficient use of electric power. Shifting demand to off-peak periods, for example, may help make more efficient use of wind energy generated during off-peak times. In time, particularly with wide-spread deployment of improved "smart grid" capability[29] and energy storage technologies,[30] consumer decisions have the potential to become an increasingly potent force. Under the American Recovery and

[26] See http://www.foxislandswind.com/background.html

[27] Resolves 2009 c. 20

[28] P.L. 2009 c. 329

[29] *Smart Grid: Enabler of the New Energy Economy,* Electric Advisory Committee (December 2008)

[30] See *Bottling Electricity: Storage as a Strategic Tool for Managing Variability and Capacity Concerns in the Modern Grid,* Electric Advisory Committee (December 2008)

Reinvestment Act of 2009, Central Maine Power Company will receive $95.9 million for deployment of smart meter technology throughout its customer service area. Bangor Hydro Electric currently has smart meters in its service area. Installation of smart meters in Maine homes and businesses will enhance Maine's ability to support renewable ocean energy.

As the penetration of electric vehicles and more efficient electric home-heating systems in Maine homes and businesses grows, demand for electric power to address household heating and transportation needs will increase dramatically. This will help to make important reductions in the reliance of Maine homes and businesses on fossil fuels and related carbon emissions. Recently enacted state law[31] sets the ambitious energy conservation goal to weatherize 100 percent of Maine homes and half of Maine businesses by 2030 and provides capital investment aimed at increasing energy efficiency and support for a comprehensive state weatherization program.

4. Maine's wave energy resources

Research conducted by Electric Power Research Institute suggests that, as contrasted with wind power and tidal power, Maine's offshore waters are not likely to be an ideal location for wave power development in the near-term:

> As a new and emerging technology, offshore wave power has essentially no production experience and therefore its costs, uncertainties and risks are relatively high compared to existing commercially available technologies such as wind power with a cumulative production experience of about 40,000 megawatts installed. Private energy investors most probably will not select offshore wave technology when developing new generation because the cost, uncertainties and risk are too high compared to commercially available wind power technology. Even once wave technology reaches commercialization and uncertainties and risk are lowered, the economics in Maine are such that investor opportunities will be much greater in states with better wave regimes (Hawaii, Alaska, Washington, Oregon, California, and Massachusetts)…[32]

In his above-noted testimony to the Task Force, Dr. Hagerman, who worked with Electric Power Research Institute in studying Maine's hydrokinetic energy resources, reaffirmed this conclusion. Accordingly, wave power development was not a primary focus of the Task Force's study. The Task Force recommendations regarding wave power[33] are aimed at identifying opportunities for Maine that may arise as the technology continues to develop and mature. Testing and demonstration of wave power technologies in pre-selected sites in Maine's coastal waters is allowed under P.L. 2009, c. 270, where done in coordination with offshore wind development.

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[31] P.L. 2009 c. 372

[32] *System Level Design, Performance and Costs – Maine State Offshore Wave Power Plant*, Report E2I EPRI Global WP-006-ME; http://oceanenergy.epri.com/waveenergy.html#reports

[33] See Section VI, Part 7, below.

C. Oil and Gas Development Potential in the Gulf of Maine

The Task Force recognizes that our nation needs sources of oil and gas for the near term that are not vulnerable to foreign ownership and control, including sources from the federal Outer Continental Shelf. Oil and gas development efforts on the Outer Continental Shelf should be focused in the areas with the greatest potential, and where the potential environmental impacts are minimized. Furthermore, the geology of the Gulf of Maine precludes direct comparisons with hydrocarbon production areas on the Scotian Shelf, such as Sable Island.

The Task Force's subcommittee on oil and gas development, led by State Geologist, Dr. Robert Marvinney, assessed current information regarding the potential for commercially-significant oil and gas development in the Gulf of Maine, and potential benefits and natural resources-related impacts associated with any such development in light of current technology. Based on that assessment, provided as Appendix 6, the Task Force finds that the Gulf of Maine, in comparison to other areas of the Outer Continental Shelf, has low potential and does not merit further oil and gas development efforts. See recommendations, Section VI, Part 8, below.

IV. THE NEED TO ACT NOW TO ADVANCE DEVELOPMENT OF MAINE'S RENEWABLE OCEAN ENERGY RESOURCES

Governor Baldacci's Wind Power Development Task Force, which focused its efforts on Maine's land-based wind resource, concluded that the need to reduce greenhouse gas emissions, while increasing the security of the State's electricity and energy supply and providing other benefits to Maine people, is of paramount importance to the State, and that wind power holds great promise in helping meet each of these closely related challenges.[34] The Maine Legislature affirmed these conclusions in its own findings contained in the legislation enacting that Task Force's recommendations aimed at facilitating siting and development of land-based wind energy projects.[35]

The Ocean Energy Task Force concurs with and reaffirms these conclusions as they pertain to offshore wind, tidal, and potentially other renewable ocean energy sources. Moreover, the Task Force emphasizes the importance of assessing, planning for, and developing offshore wind's potential not only for traditional uses of electric power but for transportation and heating needs. Heat and transport make up almost 90 percent of Maine people's energy expenditures[36] and are responsible for roughly three-quarters of Maine's greenhouse gas emissions.[37] In order to address and resolve Maine's extreme and potentially crippling dependence on oil, the State must consider all end uses of energy and must move to more efficient and cleaner technologies.

The Task Force concludes that the following considerations, summarized below, urge a concerted statewide effort now to advance development of Maine's ocean energy resources:

- Need to reduce greenhouse gas emissions;
- Real and present risks to Maine people posed by volatility in fossil fuel prices;
- Need to position Maine to compete for necessary public and private investment; and
- Need to foster economic and business conditions that attract and support and can sustain growth of Maine's ocean energy-related growth in ways optimize benefits to Maine people.

[34] See *Report of the Governor's Task Force on Wind Power Development, supra* at 7-8.

[35] P.L. 2007 c. 661, Section A-5 and emergency preamble.

[36] See Dr. George Hart presentation to the Ocean Energy Task Force referenced below.

[37] The State Planning Office developed this estimate using estimates from a report from the Climate Change Institute at the University of Maine by C. Cronan, U.S. Census Data, and Department of Environmental Protection information.

A. Climate change concerns and their relationship to greenhouse gas reduction goals

Maine and neighboring states and provinces have taken a leadership role in addressing climate change concerns whose existence and implications are now broadly accepted and possibly viewed as even more imminent than previously understood. The Regional Greenhouse Gas Initiative, in which Maine is a participant, is a ten-state CO_2 cap-and-trade program.[38] The program is focused on CO_2 emissions from electrical generating units. The Regional Greenhouse Gas Initiative calls on the Northeast region to limit CO_2 emissions in 2009, places a cap on them by 2014, and reduces that cap by 10 percent by 2018. As a member of the Conference of New England Governors and Eastern Canadian Premiers, Maine is active in the Conference's greenhouse gas reduction effort pursuant to its 2001 Climate Action Plan which set greenhouse gas reduction goals across all sectors, and calls for cutting those emissions to 10 percent below 1990 levels by the year 2020. In 2004, Maine adopted the Conference's goals by statute.[39]

The Regional Greenhouse Gas Initiative goals are aggressive and their attainment necessitates an unprecedented and concerted statewide effort. Approximately 11,000 megawatts of wind power would be needed in New England in order to meet the 2020 greenhouse gas reduction goal.[40] At present, there are about 174 megawatts of installed wind energy capacity in Maine, another 91.5 megawatts under construction, and 115 megawatts[41] of capacity permitted but not yet under construction. All of this is land-based. There is another 53 megawatts of proposed wind energy in Maine for which regulatory permits are currently being sought, and approximately 1500 megawatts of wind energy in the ISO-NE queue that has been studied and another 4000 megawatts in queue but not yet been studied. The 462 megawatts Cape Wind project is the only offshore wind energy now in the ISO-NE queue.

As noted above, transition in time to use of renewably generated electric power to address energy demands for transportation and heating will require installation of significantly more capacity than that needed to meet Regional Greenhouse Gas Initiative's goals.[42]

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[38] A key part of this cap-and-trade program involves auctioning of allowances for CO_2 emissions in excess of caps set under Regional Greenhouse Gas Initiative. State participating in the Regional Greenhouse Gas Initiative have held five auctions to date, through which 134,873,748 2008 CO_2 allowances and 6,520,593 2012 allowances have been sold. These sales generated a total of $432,834,987.48. Maine's breakdown is 4,230,870 2008 allowances and 190,365 2012 allowances, with total proceeds of $13,507,410.05, which will be disbursed by the Maine Efficiency Trust for energy efficiency projects and programs.

[39] 38 M.R.S. §576

[40] *Report of the Governor's Task Force on Wind Power Development, supra* at 12.

[41] State approvals for the two projects that would provide this capacity have been appealed.

[42] A recent Department of Environmental Protection report charts progress in attaining Regional Greenhouse Gas Initiative goals. See Brook, J. (February 18, 2009). The Regional Greenhouse Gas Initiative: Profile of Maine's Experience. Presented at: The Association of Professional Foresters of New Brunswick, 2009 Annual General Meeting.

B. Real and Present Risks to Maine of Anticipatable Spikes and Volatility in Fossil Fuel Prices

Maine is perhaps the nation's most oil dependent state. According to the U.S. Energy Information Administration, about three quarters of Maine homes – the highest percentage in the nation – rely on petroleum for home heating.[43] According to estimates prepared by Maine's Office of Energy Independence and Security using Energy Information Administration data, the total cost of petroleum in Maine in 2008 was about $5.97 billion.[44] About 85 percent of that amount, about $5 billion, left the state as what Office of Energy Independence and Security has dubbed Maine's "petro-dependence tax." This figure is over 150 percent of the State's total tax revenue in 2008, and is a staggering cost borne by Maine households and businesses to meet their total energy needs.[45] Political instability and conflict in many of the world's oil producing areas has highlighted grounds for supply and reliability-related concerns regarding the availability of foreign oil as we move into the future.

In 2008, when prices for the fossil fuels on which Maine people are now so deeply dependent for home heating and transportation sky-rocketed, Maine people began to experience the economic and related social hardships of continued reliance on these non-renewable, largely foreign energy supplies. Energy needs (heat, transportation and electricity) made up nearly 25 percent of Maine family budgets in 2008, and this figure could grow to nearly 50 percent by 2018 if oil prices were to increase significantly again; there is an urgent need in Maine for affordable energy.[46] In 2008 about 90 percent of the total energy need of Maine households and businesses depended upon fossil fuels (oil and gas), with 50 percent burned for transportation, 40 percent burned for home heating, and only about 10 percent burned to meet current electric power uses.[47] If fuel oil and gasoline prices were $4/gallon, the Ocean Energy Institute calculates that the average Maine household would incur about $10,000/year in energy expenses if this reliance on petroleum persisted. At $10/gallon fuel prices, this additional annual expense soars to $35,000.[48] In sum, anticipatable increases in oil and gas prices could result in costs many Maine households and businesses simply could not sustain. Notably, widespread use of electric powered heat pumps and vehicles would result in marked savings under each of these scenarios - $6,400/year with $4 fuel and $16,000/year with $10 fuel - even as electricity prices rose with liquid fuel prices (electricity priced at 15 cents/kwh and 37.5 cents/kwh, respectively).[49]

The Task Force notes that maintenance of stable electric power prices that are in line with or lower than fuel oil prices may be a key to widespread transition to electric power to address the full range

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[43] Energy Information Administration website http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=ME

[44] *Maine Comprehensive Energy Plan: Maine Energy Profile*, p. 26-7.

[45] *Id.*

[46] See *Critical Choices in Charting a Course for Ocean Energy in Maine*, presentation by Dr. George Hart to the OETF, 12/10/08 - www.maine.gov/spo/specialprojects/OETF/Documents/Dec10'08_TFmtg/Hart_NewTechnologies.pdf

[47] *Id.*

[48] *Id.*

[49] *Id.*

of Maine's energy needs. Increases in electricity prices in the 1980s, due in part to public policy fostering renewable energy development, led to more widespread consumer dependence on fuel oil as opposed to electricity for home heating.

Closely related to concerns about volatile and unpredictable pricing for natural gas and oil is the critical issue of energy reliability. At present, Maine, like the New England regional electricity system as a whole that serves it, is highly dependent on natural gas for generation of electricity. Natural gas and oil provide nearly 65 percent of ISO-NE's electric generating capacity.[50] Given the manner in which the New England region's electrical energy markets work, the price of natural gas effectively sets the price of electricity. The price of natural gas historically has been strongly influenced by national and international economic and political events outside the control of policy makers in Maine or New England.

The Task Force notes that, while it presents price-related problems and extraction-related risks to water quality and associated values in some cases,[51] natural gas has some advantages as an energy source, including: markedly lower emissions as compared with oil and coal, particularly in terms of particulates and carbon; large United States and Canadian supplies; and a currently low price as compared with offshore wind and other renewable sources. In the near term, it is possible natural gas could help bridge the transition to sustainable, less-polluting energy produced by offshore wind and other renewable sources. Technological advancement and related cost reductions, public policies that provide financial support for ocean energy and transmission system improvements, and limitations on greenhouse gas emissions and other public policies that serve to include now externalized costs in energy prices are needed and appropriate to bring offshore wind and other ocean energy prices down to more competitive levels.

C. Need to Position Maine to Compete for Necessary Public and Private Investment

In keeping with the above-noted estimates on wind energy development's job creation potential, there is considerable current and foreseeable competition for public and private investment in wind and other renewable ocean energy resources. Other East Coast states are making concerted efforts to bring offshore wind power into their energy mix to meet renewable portfolio standards[52] and related policy goals, and to help secure related manufacturing and employment opportunities for their citizens. Rhode Island, Delaware, New Jersey, and Massachusetts are chief among them.[53]

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[50] State of Maine Comprehensive Energy Plan 2008-09 (Office of Energy Independence and Security) January 2009, p.82.

[51] http://www.nytimes.com/2009/12/08/business/energy-environment/08fracking.html?_r=1&scp=2&sq=natural%20gas&st=cse (accessed 12.15.09)

[52] EPA defines a renewable portfolio standard as a "requirement that an electric power provider generate or purchase a specified percentage of the power it supplies/sells from renewable energy resources, and thereby guarantee a market for electricity generated from renewable energy resources" http://www.epa.gov/greenpower/pubs/glossary.htm#

[53] The Task Force had the benefit of and expresses its appreciation for presentations by John Weber and Grover Fugate, key state personnel in Massachusetts' and Rhode Island's ocean energy-related ocean resources planning initiatives, respectively, at its May 2009, meeting.

Appendix 7 provides an overview of these states' approaches to attract and site offshore wind energy development.

Through support for its goal of providing 20 percent of the nation's electric power generation capacity with wind energy by 2030 and strong energy and climate policies that support a green economy, President Obama's administration has placed a strong emphasis on development of America's wind and other renewable ocean energy resources. There is some prospect that federal funds for research, development and siting-related planning efforts, as well as other support, including cooperative work with Minerals Management Service and other federal agencies, may be directed at states that are demonstrating active interest and ability to support, foster and secure opportunities for development of those resources.

The marked downturn of the American and world economy, driven by systemic problems in the financial sector, has compounded the challenge of financing large capital projects, like offshore energy development. As a result, competition for available investment dollars is all the more keen.

The Task Force believes that the State should focus its efforts on ocean energy opportunities in which it may have a competitive advantage. It is worth noting that none of the East Coast states discussed above as leaders in the offshore wind development area has appreciable on-shore wind energy resources, whereas as Maine has nationally significant on-shore wind energy resources. Also, ocean wind development contemplated in each of those states would involve use of existing, shallow water technologies and would occur in federal Outer Continental Shelf waters.

Maine, by contrast, has a unique opportunity to test and develop deep-water wind technologies within state and federal waters relatively distant from the mainland. Exciting opportunities exist for testing these technologies in Maine's coastal waters in the near term and subsequently for deploying commercial scale deep-water projects in Maine's coastal waters or, more probably, proximate federal waters. This niche affords Maine an important competitive advantage concerning investment in the next generation of larger, 5 megawatts or greater capacity offshore wind turbines and related floating, spar, or other support technologies currently under development.

The U.S. Department of Energy recently awarded an $8 million grant to the University of Maine-led public-private consortium which will support design, installation, and testing deep-water wind technology at the offshore energy wind test site the State has designated for the University of Maine research and development initiatives in accordance with P.L. 2009 c. 270 as well as related work by the University of New Hampshire at an offshore test site in the Isle of Shoals off New Hampshire. Floating platform design is a focus of the consortium's research and development plan, which includes evaluation of issues and opportunities regarding use of more durable, lighter composite materials. This significant federal grant reflects national recognition of Maine's potential to lead the nation in advancing research, development and commercialization of the deep-water wind technology and demonstrates its ability to collaborate with key players in the global wind energy field, as the recent visit by representatives of the Norwegian energy firm Statoil demonstrates. The Task Force strongly supports the efforts of the consortium and recognizes the key role it can play in securing future opportunity for the State.

The Task Force believes that Maine can optimize its chances for location of related manufacturing and other business enterprises in this state by establishing itself now as a leader in the growth and development of the renewable ocean energy industry, particularly the deep-water wind industry. If Maine fails to do so, experience in Europe, discussed below, suggests that major opportunities may be lost to states where early, major investments in United States offshore wind and other renewable ocean energy development projects are made.

D. Current Need to Lay the Foundation to Attract, Support, and Sustain Growth of Maine's Renewable Ocean Energy Businesses to Optimize Economic Development Benefits to Maine People

Promotion and support for growth and expansion of Maine's renewable ocean energy business cluster and related quality jobs are integral to positioning the State to take advantage of current and anticipated opportunities in Maine and the Northeast region. Based on the work of its economic development subcommittee, the Task Force has identified the following as key issues to maximize the economic benefit from renewable energy development.

Energy Pricing and Project Financing Support and Incentives

Government incentives continue to play an important role in promoting and supporting growth and development of renewable ocean energy and related industries. There is currently a broad range of incentives offered to support wind energy development in the United States. Appendix 8 (reference table from Ernst and Young, 2009 report) provides a comparison showing which of these incentives is currently available in Maine.

Obtaining adequate financing is one of the major hurdles facing renewable energy developers. Quite a few other states and countries have been active in providing incentives in an effort to address economic challenges facing offshore wind energy development in order to meet renewable energy and related climate change policy goals. Appendix 9 provides a summary of selected states' programs.

The European Union and the United Kingdom have been particularly aggressive in this area. The wind industry is one of the highest-growth industries in Europe with over 12 percent growth over the past five years. Europe currently has an aggregate installed wind energy capacity of about 40 gigawatts, with Germany, Denmark, and the United Kingdom contributing the most to this total.[54] Approximately 1.5 gigawatts of this capacity is offshore. Growth in Europe's ocean wind industry has been fueled by significant government subsidies, including hefty feed-in tariffs.[55] Germany,

[54] Jake Ward (November 3rd, 2009). Deepwater Offshore Wind: 5 gigawatts by 2030 In Maine. Presentation to Cutler and Buck's Harbor Fishermen, Cutler School, Cutler Maine

[55] Applied Technology and Management Inc., Loria Emerging Energy Consulting LLC, Maguire Group Inc., TRC Companies Inc., and Birch Tree Capital LLC. 2007. *Final report: RIWINDS phase I wind energy siting study* (Report prepared for the State of Rhode Island Economic Development Corporation); http://www.energy.ri.gov/documents/independence1/RIWINDSReport.pdf

Spain, and Denmark have benefited the most and account for more than 70 percent of the European Union's installed capacity and 90 percent of the European Union's wind sector employees.

Figure 3. Clusters for Wind turbine manufacturing in Denmark, Germany and Spain. Source: Bain and Company

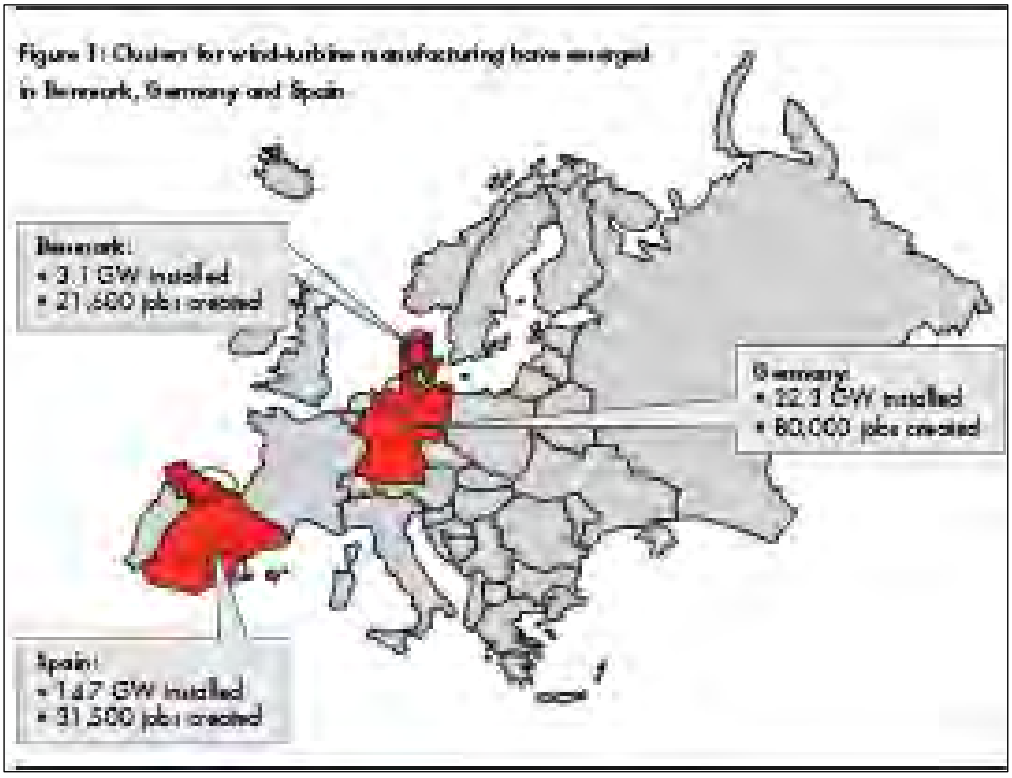
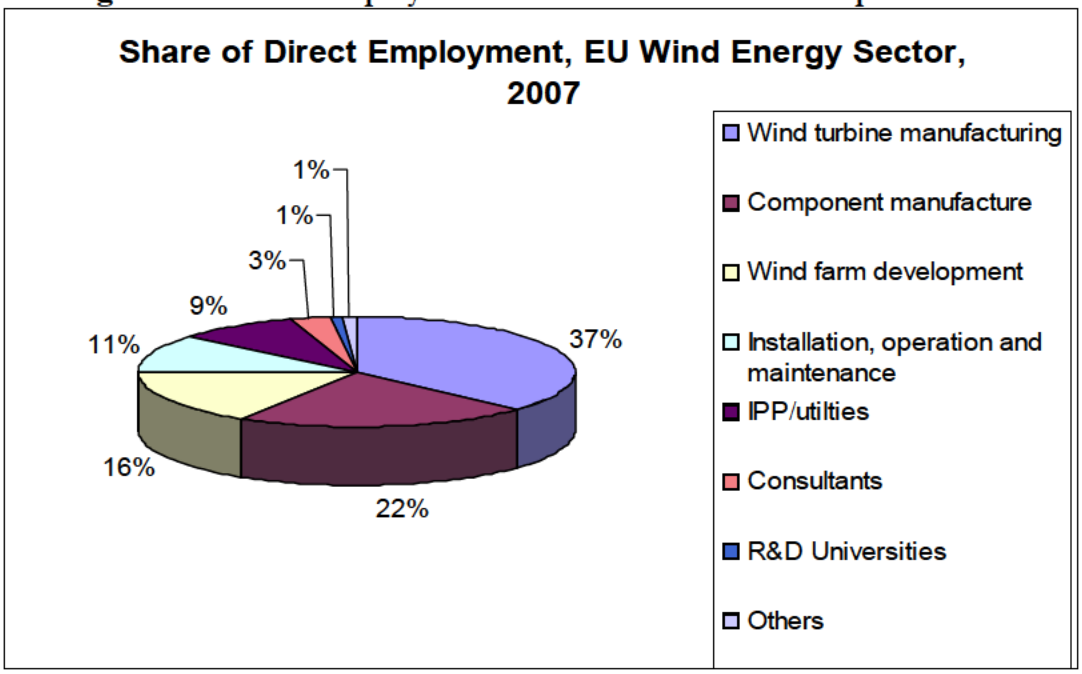


Figure 4. Share of Employment in Various Sectors in European Union



Source: European Wind Energy Association, ***Wind at Work: Wind Energy and Job Creation in the EU***

Bain and Company analysis[56] suggests that there are four factors integral to Europe's success to date in developing its wind resources and related industries:

- Support for energy pricing policies that reduce commercial uncertainty, such as feed-in tariffs[57];
- Rapid building of transmission and other necessary grid infrastructure;
- Fast and efficient planning and regulatory review for approval of installation sites; and
- Public support for wind energy in local communities generated either by participation on ownership of wind farms or through tax revenues paid to local authorities for tangible benefits to communities.

The Task Force notes that on the strength of these four factors European nations active in the wind energy development area attracted wind turbine manufacturers and that related business clusters developed near these factories. These related businesses include material and component suppliers

[56] Bain and Company, "A closer Look at the development of wind, wave and tidal energy in the UK: Employment opportunities and challenges in the context of rapid industry." Dr. Marcus Boettcher, Niels Peder Nielsen and Dr. Kim Petrick , 2008.

[57] A "feed-in tariff" is a law or public policy that requires utilities to buy electricity produced with renewable resources, such offshore wind or tidal energy at a government-set, above-market prices that address high renewable energy production costs relative to those using traditional fossil fuels and thus support renewable energy development.

as well as universities and research institutions that provided tailored education and research and development support.

The Task Force notes that it is reasonable to infer that these factors are also germane to the tidal power industry. Employment opportunities created by tidal power investments in Maine to date discussed above further illustrate the connection between ocean generation facility siting and job creation in related industries.

There are evident economic and political differences between Maine and the European Union that may preclude wholesale or verbatim adoption of Europe's financial support policies for wind power and other ocean energy industries. Nevertheless, each of the four factors listed above has been cited as essential by prospective developers of ocean energy in Maine waters and the Task Force believes that state policy makers should give careful consideration to them when assessing the efficacy of existing or planning additional financial incentives and other measures to foster growth of Maine's ocean energy industry.

Research and Development and Cluster Development

Maine has taken and is advancing some important steps to provide incentives for and support growth of offshore wind, tidal, and other aspects of the State's nascent ocean energy business cluster. Actions to date have included:[58]

- Provision of over $12 million in funding for renewable energy and other clean technology research and development projects through the Maine Technology Institute;
- A $6 million bond initiative, scheduled for public vote in June 2010, to support the University of Maine Marine Wind Energy Demonstration Site;
- Establishment of the Maine Wind Energy Industry Initiative;
- Cluster Development Award to the Environmental and Energy Technology Council (E2Tech) for Ocean Energy cluster;
- The EnergyOcean 2009 Conference, hosted in Rockland, Maine, in June 2009; and
- Statewide expansion of Pine Tree Zones, effective September 2009, that will include wind and tidal energy projects with a substation or other facility located on the mainland.

According to "U.S. Offshore Wind Energy: A Path Forward,"[59] a recent paper by the U.S. Offshore Wind Collaborative, there are many areas where additional research is needed. For instance, improvements in remote-sensing measurement technologies will help to improve the accuracy of offshore wind characterization. Better information on water depth, current, seabed, and wave heights is also needed. Technical design issues, such as support structures and anchoring technologies, turbine capacity, drive trains, control systems and turbine blades, are all intensified for

[58] See Appendix 10.

[59] U.S. Offshore Wind Energy: A Path Forward – A Working Paper of the U.S. Offshore Wind Collaborative, October 2009, http://www.usowc.org (accessed 12.15.09)

the offshore environment. Finally, research will continue to be needed to improve siting, environmental assessments, monitoring and impact mitigation regarding wind, tidal, wave, and other ocean energy technologies as they develop.

While acknowledging the value of the State's efforts in this area to date, the Task Force believes that additional state investment and other steps to address barriers to private investment are needed now to optimize potential for Maine people and help ensure that Maine's indigenous renewable resources are not just harvested for export but used to generate wealth and business and related employment opportunities in this state.

Workforce Development

Establishment of a robust in-state ocean energy industry has the potential to create and enhance job opportunities in a host of occupations.[60] A 2003 analysis of the Cape Wind project by Global Insight, for example, estimated that, without assuming any related cluster development, that single commercial-scale project would create 391 construction jobs and 50 operations jobs.[61] In addition, the Ocean Energy Institute estimates that one gigawatt of deep-water wind power development would have the following jobs-related effects:

- *Assembly and manufacturing:* 2,153 to 2,691 temporary full time direct jobs, $28.8M in salaries and wages to supply chain, $26M of additional consumer spending and 134 jobs as a result.
- *Construction and Installation Phase:* 3,893 temporary fulltime jobs in installation, $30.3M. Consumer spending $39.8M leading to 204 jobs.
- *Operations and Maintenance Phase:* 135 to 271 permanent full time jobs with spending producing an additional 222+ jobs.
- *Indirect and Induced jobs:* 620 jobs.[62]

In the European Union, which is the world's wind energy leader, employment from offshore wind deployment totaled 154,106 in 2007 and is projected to exceed 377,000 by 2030.[63]

Most of the ocean energy-related job opportunities would involve increased demand for workers with skills held by those currently employed in existing Maine business sectors such as pulp and paper, fisheries, and marine trades. A few others, such as wind energy operations managers, wind energy project managers, wind energy engineers and wind turbine service technicians, require more

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[60] See Erich Dierdorff et al, February 2009, *Greening of the World of Work: Implications for O*NET-SOC and New and Emerging Occupations* (Developed by the National Center for O*Net Development for the U.S. Department of Labor); http://www.onetcenter.org/)

[61] Global Insight. April 2003. "Economic Impact Analysis of the Cape Wind Off-shore Renewable Energy Project; http://www.windpoweringamerica.gov/econ_project_detail.asp?id=5

[62] See Thorne, Malaika. 2008. Maine's Offshore Wind Energy Future: Economic Impacts and Job Creation. Ocean Energy Institute.

[63] See Wind at Work: Wind energy and job creation in the European Union, January 2009, European Wind Energy Association; see also Bain and Company, *supra*

specialized knowledge and training. Development of Maine's offshore wind resources industry at a scale sufficient to provide wind energy to address state transportation and heating needs would require additional suitably skilled workers. For example, increase in demand for conversion of oil-based home heating to electric-based heat pumps and for power for electric cars has the potential to both change and add significantly to employment opportunities.

State economic development agencies and higher educational institutions need to monitor growth and development of Maine's ocean energy industry with an eye toward the effects and implications for the work force, especially with regard to the needs for training and skill development. Planning to provide needed educational programs and work force training should be done in concert with state energy resource planning.

Conversion of Heating and Transportation to Electricity

Expansion of the demand for electricity to include transportation and home and business heating is another essential element of the economic development picture. Electrification of these end uses with more efficient heat pumps and electric vehicles can help reduce total energy bills (i.e., electricity, heat, and transport) while improving energy security and reducing carbon dioxide emissions. Due to these significant efficiency, gains, a carefully designed electric conversion program would reduce consumer total energy bills from day one. In Appendix 3 Waine Whittier sets forth the fundamental principles of a home heat conversion program: 1) there is no up-front cost to the homeowner; 2) all up-front costs would be rolled into the monthly electric bill; 3) the price of electricity would be guaranteed not to increase faster than a certain rate for a 20 year contract term; 4) the homeowner would realize immediate savings in heating energy costs; and 5) only homes that meet specified efficiency levels will be eligible for conversion to a heat pump. The upfront funding for such a program could potentially come from a variety of sources, some of which may require enabling legislation. These could include: a bond issue, Maine's transmission and distribution utilities, the Efficiency Maine Trust, and/or the Regional Greenhouse Gas Initiative. These funds would be paid back over time by participating ratepayers. Similar program provisions could apply to an electric vehicle conversion program.

The Task Force believes it makes sense to undertake the design and implementation of an electric conversion program today, regardless of the State's moving forward with development of its offshore wind resource. However, the electric conversion program could and has been recommended to help pay for the above-market costs of offshore wind and tidal power. By converting to electric heat pumps and vehicles, participating consumers would help build demand for offshore wind and tidal power, and by paying an electric rate (taking into account the cost of the loan) that is above the current electric rate, these participating ratepayers would help support the above market costs of offshore wind and tidal power. Even at this higher rate, the consumer would still save from day one, due to the greater efficiencies of heat pumps and electric vehicles as compared to their petroleum fueled counterparts. All above-market costs of contracts with offshore wind or tidal projects not covered by the electrification program described above would be paid by the general body of ratepayers. As explained elsewhere in this report, the Task Force recommends that ratepayer impacts be kept to a reasonable level, as defined by the Governor and Legislature giving due consideration to a balance of both the costs and benefits of these resources.

Assuring Adequate Port Resources

Ocean energy developers, including those developing both tidal and offshore wind resources, will require significant on-shore land resources at or close to port facilities for manufacturing, assembly, maintenance, and support of the energy generating equipment. There is a risk that the growth of the ocean energy sector could be stunted if there is insufficient real estate and infrastructure available to manufacturers, assemblers, and developers. Ocean wind developers, for example, construct huge towers with very large blades that need to be assembled near the ports from which they can be barged to installation sites. Because of the time it will take to fully develop offshore wind and other ocean energy opportunities and the pressure on real estate near port facilities, it is important that a process be established in the near term to identify key real estate needs and acquire or protect them.

Simplifying Municipal Tax Issues

Existing laws regarding the ability of municipalities to tax personal property, including ocean energy-related machinery and equipment, are not clear, as the laws were written long before ocean energy was a topic under consideration. Ordinarily, a municipality taxes personal property owned by residents or located within the municipal borders on April 1 of each year. Tax rates vary considerably from town to town. Under the Maine Constitution[64], if the Legislature creates a new exemption from this tax, the State must reimburse the municipality for not less than 50 percent of the lost revenue. By statute, this reimbursement obligation extends to the unorganized territory as well.[65]

Without legislative clarification, it is not clear whether or to what extent an ocean energy generating facility may be subject to municipal personal property tax. The lack of clarity regarding municipal boundaries discussed below and the potential for future change in a municipality's boundaries by the Legislature's amendment of its charter create more uncertainty, as does the prospect of multiple requests to the Legislature for boundary changes aimed at securing taxing jurisdiction. Further, it is unclear whether turbines, blades, towers, or other renewable ocean energy-generating machinery or components that are intended to be located offshore are taxable by a municipality if located temporarily within its boundaries on April 1, even if moved offshore prior to April 1st of the following year.

The Task Force believes that these uncertainties should be addressed now to prevent them from becoming deterrents to the development of offshore energy projects and to create a more predictable and equitable taxation structure that attracts renewable ocean energy development. While the complexities of Maine's tax laws and municipal boundary issues make it difficult to propose simple solutions, the Task Force believes that the Legislature should at a minimum consider legislation necessary to exempt renewable ocean energy-generating machinery and components that are in transit and only temporarily located in a municipality from municipal personal property tax and to exempt renewable ocean energy development from personal property taxation unless it is installed within currently existing municipal boundaries.

[64] Constitution of the State of Maine, Article IV, Part 3, §23.

[65] 36 M.R.S. §661(5)

V. KEY CHALLENGES AND IMPEDIMENTS TO DEVELOPMENT OF MAINE'S WIND AND OTHER RENEWABLE OCEAN ENERGY RESOURCES

The Task Force has identified hurdles that stand in the path of development of Maine's offshore wind and other renewable ocean energy resources. These hurdles can be overcome but doing so will take concerted and well-coordinated efforts by the government, academic, and private sectors. The following summarizes key challenges in the areas of technological development, grid infrastructure and management, natural resources management and permitting, and project financing and economics.

A. Technological Barriers and Challenges

1. Status of deep-water wind technologies[66]

The offshore wind technology in depths of up to at least 60 meters, and possibly 90 meters, has been proven commercially viable and is in widespread use in Europe. Such technologies, including monopile support structures and turbines designed for use in the marine environment, are on the market and could be deployed in sufficiently shallow areas of Maine's coastal waters or adjoining federal water to generate electricity.

On the other hand, technologies that would enable the placement of wind turbines on floating platforms or other structures in greater depths needed to tap the world-class deep-water wind resources in Maine's coastal waters or in adjoining federal waters are under development and have not yet been proven ready for commercial utilization. Lack of the requisite technology is an obvious barrier to establishment of the deep-water wind industry in Maine or elsewhere in the near term.

To date, no offshore wind energy projects have been built in the United States; and no offshore wind energy project has been proposed for siting in Maine's coastal waters or adjoining federal waters. Northern European nations across the Atlantic, on the other hand, are world leaders in ocean wind energy.

In Europe, offshore wind turbine construction has generally involved the use of monopiles driven into the seafloor or foundations weighted at the bottom as support structures.[67] The utility of

[66] This section is largely adapted from Attachment K (Assessment of the Status of Offshore Wind Power Technology, Economic Viability and Future Outlook) to the final report of the Governor's Wind Power Development Task Force.

[67] Massachusetts Technology Collaborative, U.S. Department of Energy, and General Electric. 2005. *A framework for offshore energy development in the United States.* http://www.masstech.org/offshore/final_09_20.pdf (accessed 12.15.09)

monopiles decreases as water depths increase since the foundation must be driven deeper to ensure stability of the turbine against wind, wave, and current forces.[68] Since monopiles are usually driven into the seafloor, areas with softer bottoms are most feasible from a construction standpoint. Comparatively high costs, such as those associated with drilling through harder rock bottoms, while technically feasible, are a factor that may make a project uneconomic.[69] Also, there is very limited availability in the United States of "jack-up barges" capable of lifting the turbines, large pile-driving equipment and cable-laying ship-based equipment and other marine equipment needed for deep-water construction.[70]

Offshore wind faces a number of transmission-related technical and cost challenges. Costs and technical concerns generally increase with the length of electric transmission cable needed to connect offshore sites with the onshore grid. Long cable lengths raise concerns not only with construction practicality and cost but also power loss. In general, AC cables longer than 20 miles in length can have significant power loss. Use of DC technologies and converter stations to allow cables to conduct direct current provide options to address this issue. The costs of these systems can, under certain circumstances, be competitively disadvantaged as compared with AC systems. The ideal circumstances for DC line installation involve long distances (greater than 30 miles) with few intermediate DC converter stations (taps) along the line. The more taps there are, the higher a DC system's price tag, even though the line itself may be a cheaper alternative than AC for the distance traveled and reliability secured. An ideal system might be comprised of DC for long distance transmission converted to AC for local distribution.[71] Connection to the existing electric grid on land may also necessitate infrastructure upgrades to handle the new power supply, further adding to project-related costs. (See discussion of transmission-related challenges in section B, below).

Insurance coverage of cables required by project financers can also add significantly to project costs.[72] Inherently higher operations and maintenance costs as compared with land-based or even inshore wind energy development and other electric power generation options, present another major challenge.[73]

Development of larger turbines for deployment offshore is seen as a key to addressing the cost issues outlined above through improved economies of scale (i.e., reduction in the unit cost per

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[68] Applied Technology and Management, LLC , et al (2007), *supra.*

[69] See Whittier analysis, *supra*; also, Coakley, L. "Coke". 2008. Personal communication with Coke Coakley, Florida Power and Light, with John Weber, Maine State Planning Office, regarding offshore wind power technology. January 17, 2008

[70] General Electric Energy. 2007. Offshore wind energy presentation; www.clemson.edu/scies/wind/Presentation-Grimley.pdf (accessed 12.15.09)

[71] United States Congressional Address by the Government Accountability Office, February 1, 2008; http://www.gao.gov/new.items/d08347r.pdf (accessed 12.15.09)

[72] Coakley, *supra*

[73] Butterfield, S., W. Musial, J. Jonkman, and P. Sklavanous. 2005. *Engineering challenges for floating offshore wind turbines.* Paper presented at 2005 Copenhagen Offshore Wind Conference, Copenhagen Denmark. Conference paper National Renewable Energy Laboratory/CP-500-38776. 13 pp.

kilowatt generation). For example, Germany's North Sea alpha ventus project involves the use of 5 megawatt capacity turbines.[74] In its 2008 Annual Report, the International Energy Agency noted that in the United Kingdom, for example, "the higher capital costs of offshore are due to the increase in size of structures and the logistics of installing the turbines at sea," noting that offshore turbines are 20 percent more expensive than terrestrial ones and that "towers and foundations can cost more than 2.5 times offshore than onshore for a project of similar size."[75]

Turbine support technologies to enable the wind power industry to capture wind in deeper water areas are under active development. The National Renewable Energy Laboratory notes that adaptation of designs and techniques from the oil and gas industry is likely to play a key role in advancement of wind power industry.[76] Current examples include the following:[77]

- Floating turbine support structure under development by Blue H Technologies, a prototype model was launched in late 2007 offshore Italy in water depths of about 300 feet;
- Principle Power's "WindFloat", a three-column floating structure designed to support a wind turbine manufactured for marine applications in the power range of 3.6 to 10 megawatt; and
- StatoilHydro's (Statoil) floating platform design adapted from technology deployed in the oil and gas industry.

Statoil, a state-owned Norwegian company, recently announced installation of its two-year "Hywind" pilot project which is comprised of a 2.3 megawatts wind turbine with 80-meter diameter rotors and a 65-meter tower installed on a floating platform with a 100-meter draft of a kind used in the past by the oil and gas industry as a production platform that is attached to the seabed with a three-point mooring spread. Towed to sea and installed at a depth of 220 meters near Stavanger, Norway, this pilot project marks an important milestone in the development of the offshore wind industry. Notably, in press materials announcing the project, Statoil explains that "[f]loating wind power remains an immature technology, and the road to commercialisation and full-scale construction of wind farms will be long" and its goal is to "test how wind and waves affect the structure, learn how the operating concept can be optimised and identify technology gaps."[78]

While it recognizes the many technological and associated cost-related challenges the deep-water wind energy industry faces, the Task Force concludes that technological advances are improving the economic viability for offshore projects by allowing larger turbines that take advantage of economies

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[74] See http://www.alpha-ventus.de/fileadmin/user_upload/Pressekit/av_Factsheet_091005_EN.pdf (accessed 12.15.09)

[75] *IEA Wind Energy: Annual Report 2008*, executive summary, p.21; www.ieawind.org/AnnualReports_PDF/2008.html (accessed 12.15.09)

[76] See Butterfield, et al., *supra*

[77] The Task Force's mention of these particular technologies, information about which was presented to it during its study process, does not reflect or constitute their endorsement by the Task Force or State. They are referenced only as examples of emerging technologies.

[78] See http://www.statoilhydro.com/en/NewsAndMedia/News/2009/Pages/InnovativePowerPlantOpened.aspx (accessed 12.15.09)

of scale and can be sited in deeper waters over which there is greater wind power generation potential. As projects in the United States and elsewhere continue to be developed and constructed, the industry will gain experience and technical capability needed to produce wind power over deeper waters.[79] Incentives for technological advances (e.g., increased costs for generating electricity with fossil fuels that result in a more attractive economic model for offshore wind energy development, or government subsidies or programs) may also help to increase the pace of development.

The current status of the technology for tapping the energy potential of Maine's huge deep-water wind resource underscores the importance of support for research and development aimed at commercialization and closely related efforts to foster growth of Maine's ocean energy business cluster emphasized elsewhere is in the report.

2. Tidal power technology

Tidal energy projects use tidal action (tidal amplitude or currents) to generate power. Tidal energy projects have higher power densities (power output per unit area) than either solar photovoltaic or wind projects, which increases their attractiveness for development and utilization.[80] Designs for tidal energy systems have been patented since the 1800s. At present, there are no commercial-scale tidal projects in operation in the United States, although there are several in operation world-wide.[81]

In recent years, interest in tidal power, as a source of renewable, predictable power that produces electricity without greenhouse gas emissions, has grown worldwide and promising technologies are under development. Ocean Renewable Power Company, for example, has been conducting in-water demonstration testing off Eastport, Maine, and in 2008 became the first company to generate electricity from Bay of Fundy tidal currents.

Existing commercial-scale tidal energy projects all use traditional tidal dam (barrage) technology. This technology generates electricity using the "head" created by holding tidal water back behind a dam, then passing that water through a turbine once on-going tidal action creates a sufficient difference in water levels on the two sides of the dam to power hydro-mechanical or hydro-electric systems. The nearest such project is the 20 megawatts Annapolis Royal project in Nova Scotia,

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[79] Musial, W., and S. Butterfield. 2006. *Energy from offshore wind.* Paper presented at the 2006 Offshore Technology Conference, Houston TX. Conference paper NATIONAL RENEWABLE ENERGY LABORATORY/CP-500-39450. 14 pp.

[80] Bedard, Roger, George Hagerman, Mirko Previsic, Omar Siddiqui, Robert Thresher, and Bonnie Ram. 2005. Final Summary Report, Project Definition Study, Offshore Wave Power Feasibility Demonstration Project. Report No. E2I EPRI Global WP-009-US Rev 2. September 22, 2005; Hagerman, George, Brian Polagye, Roger Bedard, and Mirko Previsic. 2006b. Methodology for Estimating Tidal Current Energy Resources and Power Production by Tidal In-Stream Energy Conversion Devices. Report No. EPRI TP-001 NA Rev 3. September 29, 2006.

[81] Free Flow Energy, Inc. 2009a. Report to Assess the Design/Inspection Criteria/Standards for Wave and/or Current Energy Generating Devices. MMS Project Number 628. March 31, 2009; Bedard, Roger, Mirko Previsic, Brian Polagye, George Hagerman, and Andre Casavant. 2006. North American Tidal In-Stream Energy Conversion Technology Feasibility Study. Report No. EPRI TP-008-NA. June 11, 2006.

Canada.[82] Combinations of multiple dams and/or reversible turbines can be used to generate power on both the incoming and outgoing tides, as was proposed for Passamaquoddy Bay in the 1930s.[83]

While generally using tried-and-true technology, tidal barrages have high capital costs and potentially significant environmental impacts. Finally, there is a limited number of sites with tidal range and channel width characteristics necessary for economic viability.

There is currently one tidal barrage project under active consideration in Maine, at the entrance to Half Moon Cove in Cobscook Bay, Washington County.[84]

New tidal in-stream energy conversion technologies (commonly referred to as hydrokinetic technologies) seek to use tidal currents to generate electricity without a dam or barrage.[85] All of these technologies are currently in the research and development stage, with limited *in-situ* operations to date.

There are two primary types of tidal in-stream energy conversion devices - horizontal axis and vertical axis turbines. Turbine designs include helical or "cross-flow" units (similar in design to the blades on a hand-power lawnmower) and axial flow (propeller-type) units of varying diameters that are either open or closed (ducted) and that have either fixed or variable-pitch blades.[86] Deployment configurations include single, dual, or multiple units utilizing bottom foundations (either pilings or weighted platforms), monopole foundations (underwater windmills), or anchoring systems for units positioned in the water column.[87] Hydrokinetic systems may use conventional generator technology (wire-wound rotors and stators) or may employ permanent magnet generators that are located either above-surface or are submerged.[88]

Since 2006, the Federal Energy Regulatory Commission has issued seventeen study permits for tidal hydrokinetic projects in Maine waters. At this time, nine of these permits are still active.[89] Two of these permits were issued to Ocean Renewable Power Company for potential sites in Cobscook and Passamaquoddy Bay in Eastport. Ocean Renewable Power Company is pursuing development of a

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[82] Hagerman, et al. (2006b), *supra*

[83] Popular Science Monthly. 2005. Electricity from Ocean Tides. Vol. 127 No. 2. August 1935.

[84] Tidewalker Associates. 2009. Pre-Application Document submitted to the Federal Energy Regulatory Commission for the Half-Moon Cove Tidal Power Project. March 2009.

[85] Bedard, et al (2006), *supra*

[86] *Id.*

[87] Previsic, Mirko. 2006. System Level Design, Performance, Cost and Economic Assessment – Maine Western Passage Tidal In-Stream Power Plant. Report No. EPRI TP-006-ME. June 10, 2006; Ocean Renewable Power Company, Maine, LLC. 2009. Ocean Renewable Power Company, Eastport Tidal Energy Project, Draft Pilot License Application. Vols. I-III. July 2009; and Hagerman, George. 2006c. Energy from Waves, Tides, Ocean Currents, and Free-Flowing Rivers: An Overview of Resource, Technology, and Business Issues. Presented to FERC Technical Conference. December 6, 2006.

[88] Ocean Renewable Power Company, *supra*; and Free Flow Energy, Inc. 2009b. Free Flow Energy Signs Development Agreement with Lucid Energy Technologies for Use of Gorlov Helical Turbine. Press Release dated October 10, 2009.

[89] Maine Department of Environmental Protection 2009. Status of Tidal Power Project Proposals in Maine as of October 1, 2009.

proprietary turbine-generator unit that uses an advanced cross-flow turbine and integral permanent magnet generator, mounted in a semi-buoyant frame, and anchored in the water column. Ocean Renewable Power Company's plans call for deployment of a small-scale grid-connected pilot project in 2010.[90] Ocean Renewable Power Company continues to advance its project and now has a pilot project license application pending before Federal Energy Regulatory Commission. Other technologies may be field-tested in Maine waters in the near future.[91]

3. Wave power technology

Although they have not reached the mature stages of development of existing wind power technologies, wave energy extraction technologies are advancing. There are over 100 differing methods for wave energy extraction now under development.[92] A number of wave energy technologies use hydraulics to convert water level oscillations into electricity. Others employ compressed air or direct mechanical drive. Some ride on the ocean's surface, while others are submerged. Some produce electricity at the device, while others pump pressurized water to onshore generators. Some are designed for shallow, inshore locations, others for offshore, deep-water locations.

Major investments in wave energy are being made in the United Kingdom, Portugal, Japan, South Korea, and Australia.[93] The world's first commercial-scale wave power project, off the coast of Portugal, was dismantled in 2008 due to technical problems after about six months of operation. Reported to be the world's largest active "hydro-electric wave energy device" and the only one producing power, one wave power technology was deployed and connected to Scotland's electric grid in November 2009.[94]

There are no wave energy projects under active development or study in Maine waters at this time. To date, Federal Energy Regulatory Commission has issued or has pending less than a dozen preliminary (study) permits for wave energy projects in the United States. All are on the West Coast, in the states of California, Oregon, Washington, and Hawaii. The one license issued to date by the Federal Energy Regulatory Commission for a wave energy project was subsequently surrendered for economic reasons prior to any project construction.

The wave energy potential off the New England and Mid-Atlantic coasts has been estimated at 110 terawatt hour/year.[95] Although the Electric Power Research Institute has suggested that wave technology, if developed commercially, will likely be deployed in states, such as Oregon, with wave

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[90] Ocean Renewable Power Company, *supra*

[91] Freeflow Energy (2009b), *supra*

[92] http://www.emec.org.uk/wave_energy_developers.asp (accessed 12.15.09)

[93] See, e.g., www.carnegiecorp.com.au (announcements November 16, 2009); www.oceanpowertechnologies.com (investor relations November 6, 2009); and www.aquamarinepower.com (press release, February 23, 2009) (all accessed 12.15.09)

[94] http://www.aquamarinepower.com (November 20, 2009 press release) (accessed 12.15.09)

[95] Hagerman, et al. (2006c), supra

energy resources more promising than Maine's,[96] wave energy facilities may become economically viable in Maine and other places with more modest wave energy resources as technologies are refined and unit costs come down.

It is simply too soon to say how large a contribution wave energy could make to Maine's renewable ocean energy mix. It is possible that wave power technology could afford commercially significant opportunities for Maine in the future. There was testimony and information presented to the Task Force, for example, that there may be a role for wave power deployed in combination with offshore wind energy to address in part intermittency-related issues associated with wind power. Wave power technology of this kind may be tested, as an element of a wind energy demonstration project, pursuant to the above-noted legislation facilitating siting of ocean energy test projects enacted last session (P.L. 2009 c. 279).

B. Electric Transmission-related Barriers and Challenges

The integration of up to eight gigawatts of new on and offshore wind into the state and regional generation mix will require correspondingly significant investment in state and regional transmission infrastructure, and possibly to its distribution infrastructure, particularly if goals to pursue electrification of the home heating and transportation sector are pursued. These ambitious renewable energy goals also demand that attention be paid to transmission investment cost recovery; the "smart grid," and utility rate design.

Transmission and Distribution

As it evolved, the Maine transmission system was designed for approximately two gigawatts of installed generating capacity. The addition of four times this capacity from an intermittent resource, such as wind, will necessitate an as yet undetermined amount of expansion of the transmission system. The North American Reliability Council has noted that:

> Many new variable generation plants interconnecting with the bulk power system will be located in areas remote from demand centers and existing transmission infrastructure due to fuel availability. Additional transmission infrastructure is therefore vital to reliably accommodating large amounts of wind resources, specifically in order to (1) interconnect variable generation output planned in remote areas; (2) smooth the variable generation output across a broad geographical region; and (3) deliver ramping capacity and ancillary services from inside and outside a Balancing Area to equalize supply and demand.[97]

[96] Previsic, *supra*

[97] Special report-Accommodating High Levels of Variable Generation to Ensure the Reliability of the Bulk Power System, North American Electricity Reliability Council, April 2009, pgs. 34-5

Maine must explicitly recognize that investment in transmission and distribution capacity is an intrinsic part of its renewable energy strategy. According to Lisa Martin, Manager of Transmission Development at Bangor Hydro:

> Getting to 3,000 megawatts will take a considerable overhaul – picture the current 345 kilovolt lines and assume you would need two of them for every one; or the 115 kilovolt lines would need to be upgraded and augmented. This point should be well understood – this is a REALLY big change, not an incremental growth. Not just the lines but also the associated equipment within Maine and beyond would need to be changed. It would take a LOT of public support to make this happen from the perspective that it would take more new utility corridors.[98]

Recent efforts to site new or expand existing transmission facilities, such as the Maine Public Service interconnect, the Maine-New Brunswick Corridor Project, and Central Maine Power Company's Maine Power Reliability Project, illustrate inherent complexities and difficulties in expanding transmission infrastructure.

The Joint Coordinating System Plan suggests that 15,000 miles of new transmission lines, at a cost of $80 billion, will be needed to meet a 20 percent wind energy scenario in the Eastern interconnect.[99] Distribution infrastructure capacity likely will also need to be expanded, especially if the Task Force's recommendations to promote movement to more efficient and less polluting electricity-based forms of home heat and transportation, such as heat pumps and electric vehicles, are implemented.

Pre-designating renewable energy zones could help the State achieve its ocean energy goals most efficiently at the lowest cost. To reassure the environmental and business communities, and to minimize environmental impacts and costs over the long run, the ideal solution would be for Maine and the region to limit the costs and scope of such incremental transmission by comprehensive advance planning, including pre-designating the offshore zones in which such projects will be subsidized. Without an overarching plan, lead lines and transmission may develop project by project, willy-nilly, lacing Maine in a web of incremental lines and forfeiting the economies of scale possible by sizing lines for reasonably likely future expansion. Advanced planning would help address "chicken and egg" dilemma: energy developers are hesitant to build new plants until transmission lines are in place, but transmission companies will not build until they know there will be a steady supply of energy. An overarching and pro-active comprehensive plan incorporating the amounts of power sought, its location, and supporting development of the necessary infrastructure, would be the ideal solution to this dilemma, as demonstrated by Texas, which is among the nation's wind development leaders (see below).

[98] Personal communication (email). Lisa Martin, Bangor Hydro Electric to Beth Nagusky, Department of Environmental Protection. February 23, 2009.

[99] Joint Coordinated System Plan (2008); http://www.jcspstudy.org (accessed 12.15.09)

The Task Force realizes that the State currently does not have the resources to engage in this exercise. The Task Force has recommended[100] that the State seek resources to develop a Coastal Atlas to help ensure that public and private decision making on appropriate locations for offshore energy development is based on the best available information. In time, if the significant financial and technical resources needed became available, this initiative could be expanded, with provision for stakeholder involvement, to include designation of areas that are well or ill-suited to ocean energy development.

Upfront planning for transmission and distribution capacity increases is of paramount importance, and the Task Force is recommending that the Public Utilities Commission, the Office of Energy Independence and Security, and the Public Advocate engage experts to develop a long range plan for the State's transmission and distribution system to accommodate state wind and tidal energy development goals , as well as to meet any goals adopted to electrify home heating and transportation. The plan should estimate the amount and cost of incremental transmission and distribution capacity needed to achieve these goals. State agencies should cooperate with the ISO-NE, North American Electricity Reliability Council, and other organizations to develop these estimates.

Utilities today generally size their transmission and distribution systems to meet current load and projected demand. However, utility regulators have been reluctant to approve capacity increases even where there is a strong likelihood that those capacity additions will be needed to meet the growth in wind power development called for by state wind power goals. The Task Force believes that the utilities should be encouraged to increase the capacity of their transmission and distribution infrastructure over the next two decades to help the State achieve its on and offshore wind power goals by 2030, particularly where building today for tomorrow's reasonably anticipated increases in generation will reduce costs to ratepayers over the long term. As noted above, proactive planning to identify on and offshore energy development areas and transmission corridors could lower the costs of such new or expanded lines.

Notwithstanding some key differences in circumstances, Maine and the Northeast region can look to Texas, which has quickly catapulted to being a national leader in the development of wind power, for transmission policy-related ideas. Texas operates its own, single-state transmission system, which is the size of the Northeast's, and provides impressive incentives for wind power development that are clearly working. Texas's public utilities commission has approved development of new transmission infrastructure that will enable eleven gigawatts of new wind resources to go on-line. Texas has established renewable energy zones and provided subsidies for development of wind in those zones, including property tax concessions and production tax credits. The costs of generator lead lines are paid by ratepayers, in contrast to how they are treated in Maine and the rest of New England.[101]

[100] See Section VI, Part 2(A)

[101] Under changes in law restructuring electric utilities, generator leads are a generation cost that is paid for by the developer.

The need to cover generator lead line costs plainly disadvantages development of wind power in relatively remote offshore (or onshore) locations as compared to a new combined cycle gas plant, for example, which can locate near transmission. Furthermore, as noted previously offshore and wind faces transmission related technical and cost challenges. The cost of underwater cables linking the generation platform to the shore-side transmission system can run into the millions of dollars per mile, depending largely on bottom conditions. The use of AC lines is limited by distance, and the cost of DC transmission lines must include the cost of converter stations.

Incorporating the costs of generator leads into transmission and distribution rates can be a wise investment, as the addition of renewable generation can displace generation from higher priced fossil units and lead to reduced electricity prices. A 2006 Texas study concludes that an investment of $4.9 billion in new transmission would save Texas ratepayers $1.7 billion annually in fuel costs, thereby paying for the new transmission in less than 3 years.[102] A separate study for Kansas, Oklahoma and Texas reached a similar conclusion.[103]

To the extent generator lead lines are subject to Federal Energy Regulatory Commission jurisdiction, the State should advocate for changes in cost recovery policy at the regional and federal levels. To further encourage such lead line and incremental transmission development, the State, through the Governor, Office of Public Advocate, Office of Energy Independence and Security, and Public Utilities Commission, should also advocate for federal treatment for incremental transmission capacity related to wind energy equivalent to that Federal Energy Regulatory Commission and Congress authorized for the Midwest "Green Transmission Superhighway," a proposal to bring wind from the Great Plains to eastern markets. This treatment includes use of federal eminent domain authority, and financial and other incentives.

Even in the absence of socialization of the costs of lead lines, Maine can help by making available leaseholds on state-owned lands at discounted rates for rights of ways for transmission infrastructure, including public highways and submerged lands.

The Task Force recommendations help address the high cost of renewable ocean energy by "socializing" the costs of both lead lines and incremental transmission across New England consumers. Adopting such a policy would require a change in current ISO-NE rules. If New England wants an industrial policy to favor its own generation over imports from the Midwest via the "green superhighway," it must act as a unified region. Maine officials should do all they can to frame, articulate, and implement such a policy.

Serious attention is being paid to transmission policy at the federal, regional, and state levels. However, at times individual states have engaged in battles over issues such as transmission siting and permitting, construction, and cost allocation. New England must do a better job of acting

[102] Electric Reliability Council of Texas (ERCOT) Competitive Renewable Energy Zones (CREZ) Transmission Optimization Study (April 2008).

[103] This study projected that a $400 to $500 million per year transmission investment would yield $1 billion in reduced electricity costs annually, and an additional $1 billion in CO_2 reductions, increased property taxes and other wind-related economic activity. Charles River Associates Study, First Two Loops of Southwest Power Pool Extra High Voltage Overlay Transmission Expansion: Analysis of Benefits and Costs (September 26, 2008)

collectively so Maine and the region can move forward with the development of indigenous renewable energy resources on a massive scale. On-going efforts by the Governor and his Office, Public Utilities Commission, and the Office of Energy Independence and Security must continue.

At a minimum, New England's leaders should insist that the federal government address our region's transmission-related interests on par with the multi-state and enormously costly Midwest transmission corridor proposal intended to bring wind power from the Dakotas to major East Coast cities. On April 4, 2009, Federal Energy Regulatory Commission approved a 12.38 percent return on investment in a "green superhighway" calling for a 3,000-mile, high voltage, 765 kilovolt line with a 12,000 megawatts capacity and a cost of $10-12 billion, despite that fact the proposal had not been submitted to any of the states along the route."[104]

A Smarter Grid

Smart grid [105] upgrades are needed to successfully integrate significant new renewable energy resources into the bulk power system. Such upgrades are needed to help balance the generation of significant amounts of intermittent wind and tidal power with electric load and to help move toward electrification of home heating and transportation. Consumers should also be given price signals that encourage use of these resources when they are generating.

According to Federal Energy Regulatory Commission Chairman Jon Wellinghof:

> A 'smarter' bulk power system, and the generation and demand resources associated with it, will operate more securely, reliably and efficiently. Improved monitoring of the electric system with real time information from advanced sensors, and the enhanced ability to process information and coordinate actions of millions of devices and systems in real time, will allow system operators to optimize system reliability and reduce grid costs and congestion. The Smart Grid will also play a critical role in the integration of new renewable resources and will be vital to enable advanced technologies, such as plug-in electric vehicles with 'vehicle to grid' capabilities.[106]

Smart grid advantages can include:

i) Higher levels of efficiency and demand response;
ii) Reduction in the amount of incremental transmission required;

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[104] "Energy Industry Updates", Foley & Lardner LLP Publications, April 30, 2009.

[105] "Smart Grid" is a much-used but seldom-defined term. We use it to include: 1) Development of relevant principles for planning and system development; 2) Pricing for demand response programs, among other attributes; 3) Cost/benefit evaluations of potential upgrades; 4) Interconnection and standards for equipment; 5) Data storage, collection and dissemination protocols; and 6) Access by grid participants to Smart Grid functionalities.

[106] Statement re Proposed Policy Statement and Action Plan Dkt. #PL09-04-000, Federal Energy Regulatory Commission Chairman Jon Wellinghoff, March 19,2009.

iii) Facilitating off-peak usage, for example by technologies favorable to wind consumption, such as plug in vehicles and home heating through ground pumps and thermal storage;
iv) Giving customers more control over energy bills and allowing their participation in the energy market through time of use pricing;
v) System integration and efficiency;
vi) Stimulus funding eligibility through the U.S. Department of Energy's Smart Grid Investment Grant Program, such as the $96 million Central Maine Power recently received for advanced meters;
vii) Identification of elements which would be particularly helpful to the use of wind and other intermittent power sources.

To advance usage of Maine's renewable energy resources to reduce the use of fossil fuels not only for lights and computers, but also for home heating and transportation, the Task Force is recommending that the Legislature direct the Public Utilities Commission to undertake a proceeding to explore mechanisms needed to achieve the State's wind power and electrification goals, including: rate design structures that encourage use of intermittent resources; changes to standard offer pricing to include off peak time of use energy prices; the penetration of time of use meters; long term needs for a smart grid to enable usage and storage of energy from intermittent renewable resources; and, any other mechanism to help Maine achieve its goals to increase the use of renewable resources and reduce the use of fossil fuels.

While the elements of a smart grid may seem complex and exotic, Maine can rely on experience from the Federal Energy Regulatory Commission, ISO-NE, and other expert sources for precedent to guide policy development. The work done to date by Bangor Hydroelectric to install "smart" meters and the recent major federal stimulus funding for installation of "smart" meters in the Central Maine Power territory are evidence that significant progress is being made on this front that will favorably influence Maine's ability to integrate wind into its system.

Request for Proposals and Long Term Contract with Ocean Energy Projects combined with Heating Conversion Program

New Jersey, Delaware, and Rhode Island have all signed contracts with developers of offshore wind projects.[107] The Task Force believes that Maine should begin to "test the waters" by issuing a Request for Proposals aimed specifically at commercially viable renewable ocean energy projects. This will help position Maine to better understand and overcome the hurdles that will be associated with development of its ocean energy resources, such as siting, permitting, and interaction with federal agencies.

The Task Force notes that this Request for Proposals process is distinct from the on-going state effort to identify up to five offshore wind energy test areas in state waters. Because they are ineligible for the 60-day Department of Environmental Protection general permit for a demonstration project, a commercial-scale project selected through the Request for Proposals process would need to obtain all pertinent federal, state, and potentially local permit or other

[107] See Appendix 7

approvals and provide for public notice and comment as required under applicable review procedures.

The Task Force recommends that the Legislature direct the Public Utilities Commission to issue a Request for Proposals for renewable ocean energy projects,[108] and that it direct a transmission and distribution utility to sign a long term contract (which should include the purchase of energy, capacity, and renewable energy credits) with a project if the rate impact is determined to be reasonable.

Given the economics of offshore wind and tidal projects today, Maine needs to think creatively about how to finance them without having an unreasonable rate impact. The Task Force has designed a conceptual program that couples Maine's renewable ocean energy goals with its goals to reduce reliance on fossil fuels, which as outlined above present serious price-related risks to Maine homeowner and businesses.

It is possible to combine the State's renewable energy goals and its goal to reduce dependence on fossil fuels and greenhouse gas emissions. The essence of the home heating electrification program described in more detail in Appendix 3 would be to convert Maine homes from oil heat to more efficient heating sources that rely on electricity (e.g., heat pumps), or that use off peak power, preferably power generated from renewable resources (e.g., thermal energy storage). Either would help to reduce energy bills and carbon emissions significantly, as well as using large quantities of off peak wind energy. The Task Force recommends that the State establish programs and goals to expedite the process of electrifying homes and businesses.

The home heating electrification program described in Appendix 3 would provide an on-bill financing mechanism to Maine ratepayers who weatherize their homes and convert to a more efficient electric heat source. The tariff could be designed to help subsidize the above-market costs of the renewable ocean energy project. The above market costs not covered by these customers could be rolled into the transmission and distribution or energy prices of remaining customers.

The Task Force believes that the rate impacts of any contracts with ocean energy developers must be reasonable. The Governor and Legislature should play a key role in defining what is reasonable in light of goals to advance development of the State's renewable ocean energy resources. The Task Force recognizes that this will be a balancing exercise. On the one hand, Maine's electric rates are among the highest in the country, which undermines its competitive position and standard of living. At the same time, some rate impact may be necessary to promote development of Maine's offshore wind and tidal power industry, to reduce our fossil fuel dependence and greenhouse gas emissions, and to increase energy independence by taking advantage of one of our greatest untapped natural resources. On balance, the Task Force believes that the rate impact should be no greater than the current system benefit charge, which is approximately $0.0015 per kilowatt hour, and adds less than one dollar to the average residential monthly utility bill.

[108] This can be done through an amendment to Maine's existing long term contracting statute (35-A M.R.S. § 3210-C) directing the commission to conduct a competitive solicitation specifically for renewable ocean energy projects.

C. Regulatory challenges

1. Governance framework

As outlined in previous studies of the governance framework[109], proposed development in the marine environment in Maine and elsewhere in the United States faces a complex array of federal, state, and local environmental and natural resources reviews and the obligation to obtain approvals from multiple governmental agencies.[110] Proposed development of renewable ocean energy resources is no exception.[111]

Notwithstanding the important underlying natural resources protection and management objectives of the web of laws of which it is comprised, the Task Force notes that the existing governance framework has significant potential for imposition of major and potentially unpredictable project-development costs. Such potential costs include studies and analyses required to demonstrate compliance, delays associated with multiple, complex administrative procedures, project design changes, and compensation and mitigations measures required as conditions of regulatory approval. No less significant are the cost and timing-related uncertainties inherent in such a multi-faceted regulatory regime. The Task Force anticipates that such uncertainty could be a significant deterrent to investment in offshore renewable energy ventures. Accordingly, the Task Force believes that the existing governance framework needs to be streamlined while ensuring regulatory and submerged lands management authority to identify and address natural resources issues including potential conflicts with existing uses and to secure appropriate compensation to the public for use of submerged lands. Key issues to be addressed include:

- Mechanisms for optimal coordination among federal and state review authorities;
- Jurisdictional provisions, review, and appeal procedures, and approval criteria in key state environmental laws, such as the Site Location of Development Act and Natural Resources Protection Act, that ensure their applicability and utility in addressing natural resources issues that offshore wind projects may present, in a manner consistent to the extent practicable with that for land-based wind;

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[109] *America's Living Oceans: Charting a Course for Sea Change (Pew Oceans Commission*, May 2003, http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Protecting_ocean_life/env_pew_oceans_final_report.pdf (accessed 12.15.09); and *An Ocean Blueprint for the 21st Century: Final Report of the U.S. Commission on Ocean Policy* - http://oceancommission.gov/documents/full_color_rpt/welcome.html (12.15.09)

[110] In order to enhance the Task Force's understanding of and opportunities for targeted improvements to the governance framework, Maine State Planning Office contracted with Jeffrey Pidot, former head of the Maine Attorney General Office's natural resources division, to provide an objective assessment of Maine's pertinent regulatory and proprietary (submerged lands leasing) authorities, including options to facilitate siting of offshore wind projects while maintaining the integrity of state review procedures. Mr. Pidot's research, focused in particular on approaches to submerged lands leasing in light of Public Trust Doctrine and related public interest considerations, offers a more detailed discussion and of topics addressed in this section.

[111] Appendix 11 provides a summary of the primary regulatory reviews and related federal, state, and local environmental approvals that may be required for wind, tidal or wave energy development in Maine's coastal waters or adjoining federal Outer Continental Shelf areas.

- Recognition of the compatibility of Public Trust Doctrine principles and use of public submerged lands for development of renewable ocean energy resources;
- Provisions of the state submerged lands leasing program, including commercially reasonable lease fees that ensure public benefit, as applied to renewable ocean energy projects;
- Nature and scope of municipalities' decision making role regarding renewable ocean energy projects that use state-owned submerged lands;
- Assurance of federal review agencies' participation in implementing the federal-state Memorandum of Understanding on review of tidal power projects; and
- Clarification of the Department of Environmental Protection's authority over wave energy projects.

Paragraphs a through c, below, outline and address Maine governance framework-related challenges to all types of ocean energy development posed by submerged lands leasing and potential municipal regulatory requirements. Sections d and e focus on issues specific to offshore wind, and tidal and wave power, respectively.

a. Federal-State coordination

The current federal regulatory framework poses formidable barriers to development of ocean energy resources. Multiple federal agencies have review, permitting, or leasing obligations. There is no single federal agency responsible for coordinating or harmonizing federal agencies' review of development proposals. Although President Obama's administration has clearly made satisfaction of 20 percent of our nation's electricity demand with wind power by 2030 a national goal, federal agencies' review and permitting authorities and practices have not been aligned with this important objective. Indeed, there is no single federal ocean policy to unify, guide, or reconcile their actions.

The Task Force believes that current federal law and policy are among the primary obstacles to the efficient growth and expansion of the ocean energy industry and must be refined and improved to streamline siting and development of ocean energy in appropriate locations. Accordingly, the Task Force believes it is critical for the State, in consultation with Maine's congressional delegation, to take an active role in regional and national efforts to fashion a unified federal ocean policy that facilitates development of appropriately-sited ocean energy projects. In the immediate term, close collaboration with federal agencies is critical to ensure that existing opportunities to streamline and harmonize federal and state review procedures are identified and implemented.

Federal regulatory requirements apply to projects both in state waters and on the federal Outer Continental Shelf.[112] Compliance with the National Environmental Policy Act, for example, which obligates federal agencies to prepare an environmental assessment or in some cases a more extensive environmental impact statement in connection with a proposed federal permitting, leasing, or other authorization action, may generate significant project costs, in some cases costs that developers of non-renewable projects in coastal waters do not incur. Notably, Minerals Management Service's

[112] See Appendix 13

alternative energy leasing rules specify that developers of offshore wind projects must pay the costs of National Environmental Policy Act compliance documentation and associated studies, while Minerals Management Service itself incurs such costs for oil and gas leasing and plans.[113] Faced with ocean energy projects new to our region, federal resource agencies may request pre-construction field studies to gauge potential environmental adverse effects for purposes of National Environmental Policy Act or required federal environmental reviews or approvals. The U.S. Fish and Wildlife Service, for example, has indicated that it may request three years of pre-construction bird migration-related studies even for a small-scale wind energy testing and demonstration project.[114] This significant federal role in offshore energy siting creates potential not only for cost, complexity, and delay associated with federal reviews and approvals themselves but also potential for conflict or duplication in relation to the state regulatory framework. The Task Force believes a concerted effort to improve federal-state consultation regarding regulatory review of ocean energy development is needed to avoid and minimize these potential pitfalls.

The State's decision making role, other than that provided by the federal Coastal Zone Management Act (see below) regarding permitting and leasing is limited to projects proposed for siting within the three-mile limit of state jurisdiction. Section 307 of the Coastal Zone Management Act, the so-called "federal consistency" provision, provides Maine, like other states with a federally approved coastal zone management program, authority to review federal actions for consistency with the "enforceable policies" of its program. In Maine, select state environmental laws, including the Site Law and Natural Resources Protection Act, provide the enforceable policies. Maine has integrated Coastal Zone Management Act consistency review into the process for state environmental permit review of ocean energy and other projects within the State's boundaries. The Coastal Zone Management Act also provides a means for exercise of a state's federal consistency review authority over projects outside its territorial limits on the federal Outer Continental Shelf. The Task Force believes that this federal consistency authority may and should be exercised judiciously to address significant impacts on state coastal resources or uses while avoiding placement of an additional hurdle in front of offshore energy development.

b. Submerged lands management and the Public Trust Doctrine

Since ocean energy development takes place on publicly owned submerged lands, a developer must obtain a lease or easement from the State for project activities within the three-mile limit of state jurisdiction or from the federal government for project activities located seaward of the three-mile limit on the Outer Continental Shelf. An ocean energy project on the Outer Continental Shelf may require lease or easement approval from both the state and the federal government in the case of project with generation facilities, offshore wind turbines, for example, located on the Outer Continental Shelf and a transmission cable bringing power over state submerged lands to connect with the power grid on land.

[113] 74 FR at 19689 (Alternative Energy/National Environmental Policy Act compliance for Plans).

[114] Letter of August 4, 2009, Lori Nordstrum (USFWS) to Matt Nixon (SPO).

The Submerged Lands Division with the Department of Conservation's Bureau of Parks and Lands is responsible for considering applications for leasing Maine's submerged lands.[115] State law prescribing the Bureau of Parks and Land's leasing authority does not specify that offshore wind power or other ocean energy development is a type of "water-dependent use" afforded a preference under that law.

The Minerals Management Service in the U.S. Department of Interior is responsible for leasing lands on the Outer Continental Shelf for renewable ocean energy development as well as oil and gas exploration and development. Minerals Management Service recently completed rulemaking to adopt specific standards, procedures, and energy generation-related lease fees for issuance of federal Outer Continental Shelf lease for offshore wind and other alternative ocean energy development.[116]. Minerals Management Service has not yet issued a lease for a commercial project under this new program. However, the Task Force is concerned that Minerals Management Service's lease process is lengthy, complex, and inherently and unnecessarily risky for developers. For example, the program does not give a developer any assurance of rights to a site after it has spent considerable funds on a test project to determine whether the site is viable for full commercial development.

Unlike the Minerals Management Service, the Bureau of Parks and Lands does not currently have lease approval or lease fee criteria specifically tailored to ocean energy development. Recent amendment of the Bureau of Parks and Lands' authority to allow it to negotiate appropriate lease fee terms for "offshore projects" on a case by case basis does not cover offshore wind or other renewable ocean energy development.[117]

Submerged lands leasing decisions are made subject to the common law Public Trust Doctrine. This doctrine provides in effect that the State (or federal government regarding Outer Continental Shelf areas) holds submerged lands in trust for the public and is responsible as trustee for ensuring that a lease or easement authorizing private use of submerged lands provides commensurate public benefit. Offshore wind power development is a new, emerging use of the ocean environment which hosts multiple traditional uses, including fishing and navigation, recognized under the Public Trust Doctrine as appropriate uses of submerged lands areas.

The Task Force recognizes that, notwithstanding offshore wind energy development's overall climate change-related environmental benefits, it is appropriate to clarify the consistency of this important new use with Public Trust Doctrine principles, including those that may favor use of submerged lands for "water-dependent" uses, and thus with other established Public Trust uses. In addition, the Task Force believes that establishment of a commercially reasonable fee schedule for offshore wind and other renewable ocean energy development is an important step to adding certainty and predictability to Maine's ocean energy governance framework. The Task Force further believes that development of such a fee schedule for commercial-scale development merits more detailed consideration through rulemaking pursuant to clear legislative direction that ensures fair

[115] 12 M.R.S. §1862

[116] 30 C.F.R. Part 285

[117] P.L. 2009 c. 316, sections 3 and 4

value to the public in return for use of state submerged lands without providing an economic disincentive for investment.

c. Ambiguity regarding municipalities' marine boundaries

The potential for ambiguity regarding a proposed ocean energy project's location in relation to municipal boundaries creates further uncertainty and complexity. Maine has 138 municipalities located on coastal waters. In Maine, as in many jurisdictions, municipal boundaries are established by legislative charter. The Legislature adopted and has amended these charters at various times. Although detailed analysis of these many municipal charters has not been done,[118] experience of and other agencies which have worked directly with them in administering state programs have noted imprecision and inconsistencies in their language regarding ocean boundaries (seaward extent and lateral boundary with neighboring municipality(ies)). Because the Department of Environmental Protection's jurisdiction applies to a project located within the boundaries of a municipality (State's organized areas), with the Land Use Regulation Commission exercising jurisdiction over a project in the unorganized areas of the State, this ambiguity needs to be addressed to clarify the ocean energy projects' regulatory obligations.

d. Permitting offshore wind energy development

Although it appears any offshore wind development subject to the Department of Environmental Protection's jurisdiction would require a Natural Resources Protection Act permit due to its location on a "coastal wetland,"[119] it is unclear how the Department of Environmental Protection would calculate the project footprint as needed to determine the applicability of the Site Location of Development Act (Site Law), a state law that is generally applicable to larger scale development and affords a vehicle for assessment of a wide range of potential impacts.[120] Also unclear is the applicability of certain Site Law approval criteria, which were generally developed and focused to address land-side development, to ocean-based offshore wind development. The Task Force notes, in addition, that the Site Law's provisions to facilitate land-based, grid-scale wind energy development, including those regarding assessment of potential scenic effects and administrative review and appeal, do not apply to comparable development below the mean high tide line.[121]

The Task Force believes that offshore wind energy development, in light of its greater potential for environmental, renewable energy, and other public benefits recognized by the Legislature in enacting changes to facilitate land-based wind development, merits consideration using the same administrative and judicial review procedures as grid-scale land-based wind development. Moreover, to ensure adequate review and identification of measures to address potential adverse effects on natural resources and communities that may differ from those associated with land-based wind, the Task Force thinks the Department of Environmental Protection should review wind power-related

[118] As an initial step, at the Maine State Planning Office's request, the Law and Legislative Reference Library compiled these charters.

[119] 38 M.R.S. §480-B(2)

[120] 38 M.R.S. §482(2)

[121] 35-A M.R.S. §3451(3)(A)

Site Law and Natural Resources Protection Act criteria and related study, monitoring, and other review protocols and develop offshore wind-specific rules and policy as needed. The Task Force also believes the Land Use Regulation Commission should similarly assess and revise its approval criteria applicable to the type of community-scale project over which the Task Force recommends the Land Use Regulation Commission have jurisdiction. See Section VI, Part 5, below.

e. Permitting tidal and wave power development

i. Tidal power

Development of Maine's tidal power resources involves use of new technologies in the State's biologically rich and diverse, and often heavily and variously used, coastal waters about which federal and state regulators may lack basic information, such as species' presence or abundance, directly related to regulatory review and approval requirements. These circumstances, coupled with the complex framework of local, state, and federal regulation applicable in the marine environment, present a number of regulatory challenges to this emerging Maine industry.

Both tidal power and wave power development are forms of "hydropower development" subject to regulation under Maine's Water Development and Conservation Act.[122] The Maine Water Development and Conservation Act provides a vehicle for consolidation of state permitting, water quality certification, and Coastal Zone Management Act consistency review authorizations.

The potential benefits of this consolidated state review were enhanced by the recently formed Memorandum of Understanding among the Federal Energy Regulatory Commission and Maine agencies (Appendix 12) that coordinates the Department of Environmental Protection and Federal Energy Regulatory Commission review and decision making regarding hydrokinetic tidal power development, including development eligible for review under the Federal Energy Regulatory Commission's pilot project license process.[123] Recent changes in Maine law[124] closely coordinate state permitting and submerged lands permitting processes with this innovative Federal Energy Regulatory Commission process for permitting pilot projects. The Memorandum of Understanding further details how the Federal Energy Regulatory Commission and the State will coordinate their project review efforts.

[122] 38 M.R.S. §632(3)

[123] In April, 2008, in recognition of the commercialization potential nationwide of hydrokinetic technologies and their role in helping the United States create a new source of domestically produced renewable energy, Federal Energy Regulatory Commission developed it hydrokinetic pilot project license process to advance testing of new technology while minimizing the potential for environmental impacts. The goal of the process is to allow developers to test and evaluate new hydrokinetic technologies and determine environmental effects of the technologies, while maintaining Federal Energy Regulatory Commission oversight and agency input. Federal Energy Regulatory Commission developed guidelines to provide that licenses could be granted within six months to allow for project installation, operation, and environmental testing as soon as possible. Pilot projects must be temporary, limited in size, removable, and able to shut down on short notice, and license terms ensure environmental monitoring and safeguards during the short project term.

[124] P.L. 2009 c. 270

While significant steps have been taken to address tidal energy's regulatory challenges, the Task Force believes that developers continue to face the following significant obstacles, as further discussed below:

- Lack of baseline data and information needed to inform regulatory decisions;
- Lack of coordination and shared objectives among federal agencies regarding support of renewable ocean energy; and
- Lack of federal commitment to adaptive management for pilot projects.

The Task Force is aware that several marine hydrokinetic projects have been delayed in various regions of the United States due to lengthy environmental permitting requirements, particularly imposed by federal resource agencies. The Task Force believes that environmental permitting requirements, particularly pre-construction studies of existing conditions, should be commensurate with the scope and size of the pilot projects currently proposed and less demanding than those for a full-scale, commercial project.

At the root of this industry's regulatory challenges are significant gaps in the existing baseline information regarding Maine's coastal waters and related natural resources. Ocean Renewable Power Company representatives have commented to the Task Force that federal resources agencies have requested the company to undertake a costly and significant effort to collect and assess baseline environmental data in support of the Federal Energy Regulatory Commission's approval of its pilot project proposal. Ocean Renewable Power Company suggests that the information requested is comparable to baseline data required for full-scale, riverine hydropower project development, and that such an approach, at the pilot project stage, is fundamentally at odds with the technology development-oriented intent underlying the Federal Energy Regulatory Commission's pilot project license. Ocean Renewable Power Company emphasizes that the costs and time needed to meet such study requests may significantly slow or even stifle the development of new technologies due to start-up research and development companies' difficulties in financing such generalized studies of evolving technology. In addition, where more than one year of baseline studies is requested, the timeframe of the proposed studies may extend beyond the time deadlines of the Federal Energy Regulatory Commission licensing process and so undermine the pilot license's objective of getting technology in the water to test and assess its efficiency. Preparation of baseline studies, particularly in an area that has not been previously characterized by researchers, either with regard to physical site characteristics or marine populations, may present significant financial challenges for the State's fledgling tidal power industry.

The Task Force believes that Ocean Renewable Power Company's experience illustrates core challenges facing the industry. As stewards of marine waters and submerged lands, the state and federal government can and should play a more prominent role in conducting research and developing baseline information on site characteristics and marine populations. The Task Force is also aware that there are limited funds for such federal and state government sponsored research and that available research funds need to be prioritized. The Task Force notes that higher education institutions, such as the University of Maine, state agencies, and non-governmental organizations can play a vital role in acquiring baseline environmental information and knowledge.

In addition, the Task Force believes that adaptive management, particularly as applied to pilot projects, may afford a flexible, efficient, and effective tool to address problems presented by less than complete baseline information. Adaptive management may be used to ensure that project-related adverse effects are addressed if identified through well-designed post-construction monitoring.

The Task Force also suggests that its is vitally important to clarify federal policy to ensure that natural resources agencies, such as the U.S. Fish and Wildlife Service and National Marine Fisheries Service, have the authority, flexibility, and responsibility to share a common overall goal of supporting and facilitating the growth and development of in-stream tidal power and other renewable ocean energy resources. The National Ocean Council proposed in the interim report of the Council on Environmental Quality's Oceans Policy Task Force[125] may provide a suitable forum for development of this shared federal policy objective and for identification of specific initiatives and changes in federal agencies' policies, programs, and authorities needed ensure its meaningful implementation.

Section 2, below, discusses this regulatory challenge in more detail in the broader context of overall improvement of science-based information available for both public and private decision makers.

ii. Wave power

P.L. 2009 c. 270 addressed the state-permitting related issue of potentially ambiguous municipal boundaries by clarifying that the Department of Environmental Protection has exclusive permitting jurisdiction under the Maine Water Development and Conservation Act regarding tidal power development statewide, and that Land Use Regulation Commission rezoning and land use permitting are not required for such projects. In keeping with the joint suggestion of the Land Use Regulation Commission and Department of Environmental Protection, the Task Force thinks a comparable change to the Maine Water Development and Conservation Act regarding proposed wave energy development is an appropriate clarification.

2. Information on natural resources and related human uses to guide decision making

Lack of baseline information on key natural resources issues, such as migratory bird and bat migration routes and more localized feeding patterns, may exacerbate problems with the existing complex regulatory structure described above. As discussed in more detail below in relation to tidal power development, the lack of such information may trigger natural resources agencies' requests for costly and time-consuming field studies, at the applicant's expense, to provide information to assist agencies in making a threshold determination on whether there are resources or uses that may be impacted by the proposed development. Compounding problems created by the lack of available baseline information to guide agency comments and regulatory decisions is the lack of clear protocols for undertaking and assessing the results of studies that may be required.

[125] *Interim Report of the Interagency Ocean Policy Task Force* (CEQ, September 2009); http://www.whitehouse.gov/administration/eop/ceq/initiatives/oceans/interimreport (accessed 12.15.09)

Studies recently undertaken by the environmental consulting and engineering firm, Stantec, University of Maine, the U.S. Fish and Wildlife Service, and the not-for-profit BioDiversity Research Institute[126] to evaluate bat and birds movements off the coast of Maine provide examples of the type of basic research needed to fill voids on key natural resources questions tied to state and federal regulatory or leasing approval criteria. The pilot study begun this fall by Stantec, for example, is the first study of its kind on the Atlantic coast and its results are expected to provide some baseline data for the planning of offshore wind projects in the region and a basis for related research in other offshore areas.[127]

The Task Force's subcommittee 1 considered issues regarding information and protocols for assessment of potential adverse effects of ocean energy development on and conflicts with other natural resources values and related human uses of the marine environment. Working together, the University of Maine and state agencies have compiled a comprehensive data bibliography that lists available sources of siting-related information. Much of the subcommittee's work focused on assessment of the nature, scope, and availability of information for assessing and addressing project effects. The subcommittee's work also contributed significantly to the State's efforts to identify areas in state waters suitable for offshore wind energy demonstration projects pursuant to P.L. 2009 c. 270. In addition, the subcommittee explored in detail several natural resources issues, such as the availability of information to assess potential avian impacts.

Based on the subcommittee's review of potential impacts and pertinent information resources available to assess them in making siting decisions, the Task Force concludes that:

- *Information Gathering and Dissemination.* There is a great deal of information concerning the habitat, species, and existing uses in the Gulf of Maine. There is an even greater amount of information necessary to fill gaps in this information. Well-coordinated, comprehensive data gathering efforts must continue to add to current information about the ecosystem as a whole so public and private decision making is guided by the best available information.
- *Standing Technical Review Committees.* The Task Force has had the benefit of input from many experts in the fields of marine habitat, birds and bats, marine mammals, commercial and recreational fisheries, and other existing human uses of the marine environment. Maine should continue to seek to benefit from this expertise as efforts to develop the ocean's renewable energy resources continue by maintaining standing technical committees on birds and bats and marine mammals and fisheries, and ensuring an appropriate forum to consider human uses.
- *Adaptive Management.* The Gulf of Maine is a dynamic ecosystem that has great value environmentally, economically, and emotionally. Regulation and management of offshore renewable energy projects must take a precautionary approach and must be able to adapt to the best available data as it becomes available in order to minimize adverse impacts. This will require sustained monitoring of environmental impacts to identify and respond to unanticipated changes in the environment. Regulation must take into account not just the

[126] http://www.briloon.org/windpower/ (accessed 12.15.09)

[127] http://www.stantec.com/News.html (accessed 12.15.09)

construction and operation of offshore renewable energy projects but also cumulative impacts of such projects.

- *Avoidance, Minimization, and Compensation.* In developing offshore energy projects, applicants should seek to avoid any adverse impacts to habitat, existing uses (both human and non-human), and species using the effected resource. Applicants and regulatory agencies should ensure that any undue adverse impacts that cannot be reasonably avoided are minimized to the greatest extent possible. For any undue adverse impact that cannot be avoided and that has been minimized to the greatest extent possible, an applicant should provide, take, or fund appropriate measures that compensate for that impact.

The Task Force's recommendations regarding these conclusions are provided in Sections VI, Parts 2 and 5.

D. Multiple Use-Related Challenges

Maine's nearshore, coastal waters are home to multiple and in some places longstanding uses, including commercial fishing and water-based recreation, that are closely associated with communities' character, economic vitality, sense of place, and identity and values. Ocean energy development, particularly if proposed in in-shore areas, may initially be seen as potentially at odds with these community interests.

While the ocean industry as a whole faces challenges in addressing real as well as perceived use conflicts, these challenges may be particularly difficult for in-shore, shallow water wind energy development. Given the diverse and intensive use of the harbors, bays, and protected nearshore areas in Maine' coastal waters, and the high value of these areas for marine industry, tourism, recreation, sport and commercial fishing, and many other uses, as well as anticipatable economic and social concerns regarding long-term visual and noise impacts, the Task Force notes that developers should be encouraged to explore areas seaward of Maine's bays and headlands when evaluating offshore wind energy development opportunities.

Notwithstanding these challenges, the Task Force believes that there is significant potential for identification, management, and resolution of potential conflicts through early consultation and collaboration to the extent practicable. Constructive dialogue with marine stakeholders is vital to allaying or at a minimum accurately defining the nature and scope of potential use conflicts and economically viable options to address them. Shared understanding of the proposed technology and how and where it would be deployed and related cost considerations is critical. For example, it appears that the tidal power generation facilities under development by Ocean Renewable Power Company can and are anticipated to be deployed in high-energy areas not commonly used for lobstering and at depths that would not interfere with vessel passage. The State should strongly encourage and facilitate through guidance to prospective ocean energy developers an open and community-focused approach to development. While recognizing that a number of development-related costs may be expected to increase with a project's distance from shore, Ocean Renewable Power Company's approach to siting and design of its proposed tidal energy project in Eastport provides a useful example of such a community-based approach.

VI. RECOMMENDATIONS: FACILITATING DEVELOPMENT OF MAINE'S RENEWABLE OCEAN ENERGY-RELATED RESOURCES

The Task Force's recommendations reflect its detailed consideration of key issues regarding financing and economics, transmission and grid-management, potential effects of development on the environment and related human uses, permitting, leasing and related ocean governance, and other related matters. The Task Force believes that the following integrated package of recommendations provides a strategy for facilitating development of Maine's significant offshore wind, tidal, wave, and potentially other renewable ocean energy resources:

❖ *Part One: Setting an Appropriate State Goal for Offshore Wind Energy Development*

Amend the Maine Wind Energy Act[128] to set a goal of installation of five gigawatts of offshore wind energy generating capacity in Maine's coastal waters and adjoining federal waters by 2030.

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[128] The Maine Wind Energy Act, 35-A M.R.S. §3404(2)(B), establishes the following goal:

"At least 3,000 megawatts of installed capacity by 2020, of which there is a potential to produce 300 megawatts from generation facilities located in coastal waters, as defined by Title 12, section 6001, subsection 6, or in proximate federal waters."

This statutory goal is based on the recommendation of the Governor's Wind Power Task Force ("WPTF"), which "considered the issue of wind power goals for Maine within the larger context of New England's electrical generation system and Maine's energy and greenhouse gas reduction policies." Report of the WPTF, *supra*, at 12. The WPTF based this goal in part on detailed modeling analysis prepared by a consultant team led by Bob Grace of Sustainable Energy Advantage. That analysis "concluded that approximately 11,000 megawatts of wind power would be needed in New England in order to meet our 2020 greenhouse gas reduction goal, even assuming a major increase in energy efficiency across the region, substantial development of other renewable energy sources (including solar and tidal), and significant contributions in greenhouse gas reductions from transportation and other sources." *Id.*, at 12-13. This analysis noted that "the potential for offshore wind power development is also very large, yet the costs of offshore wind power remain high, particularly so in the near-term for deep tidal zones along Maine's coast." *Id.*

In presenting his analysis to the WPTF, Mr. Grace explained that his assessment of the potential contribution of offshore wind to the above-noted state wind energy goal, among other assumptions, excluded development potential beyond 20 nautical miles of shore and in deep water and that the area in which development potential was estimated was reduced to 12.5% of total area identified to reflect conservative estimate of feasible development (consistent with analysis done for RGGI)." *Development of a Wind Power Resource Deployment Framework for Maine & New England,* Bob Grace, Sustainable Energy Advantage, LLC October 30, 2007; presentation to WPTF - http://www.maine.gov/doc/mfs/windpower/meeting_summaries/103007_summary_files/Grace_Wind_Task_Force_103007.pdf

In sum, the Task Force concludes that the goal of 300megawattsof installed ocean wind capacity by 2020, while potentially appropriate for shallow-water wind development using existing technologies does not (nor was intended) to account for and reflect the enormity of the deep-water wind development potential, particularly in federal OCS areas adjoining state waters.

Given the central importance and potential of offshore wind resources to help Maine achieve energy independence and reduce greenhouse gas emissions the Task Force believes that the Legislature's establishment of this goal is appropriate and necessary to guide and benchmark state efforts in the renewable ocean energy field. As outlined above, achievement of this goal has the potential to enable Maine to meet the full range of state energy needs, including home heating and transportation, from renewable ocean energy and is consistent with Maine's contribution, as a national wind energy leader, to the national goal of 20 percent wind power by 2030. The Task Force realizes that achievement of this extraordinary goal will require the strong support of public funders, private investors, and the people of Maine, as well as technological advances to achieve costs that are competitive with other energy sources, the development of new end use markets, and the construction of major new transmission and smart grid infrastructure.

❖ *Part Two: Improving the Governance Framework for Renewable Ocean Energy Development*

The Task Force has determined that the existing governance framework in Maine needs improvement to facilitate orderly, efficient, and timely consideration of offshore wind energy, tidal power, wave, and potentially other renewable ocean energy proposals that are important to Maine's future and necessitate use of publicly-owned submerged lands areas. Recommendations in this part address challenges common to renewable ocean energy development proposals. Parts 5, 6, and 7 address offshore wind energy, tidal, and wave power issues, respectively.

A. Making the Best Available and Continually Improving Information Available to Public and Private Decision Makers

The Task Force believes that assurance of a shared understanding of the best available information on natural resources and related human uses in the marine environment is vitally important to efficient and appropriate siting of renewable ocean energy development and optimizing public and private efforts to avoid, minimize, and compensate as appropriate for potential adverse effects on natural resources and related human uses. The Task Force recommends that the following efforts be undertaken concurrently with (not as a precursor to) implementation of proposed changes in state permitting and leasing laws and rules:

1. The Maine State Planning Office, in conjunction with the Department of Conservation/ Bureau of Parks and Lands, the Department of Marine Resources, and the University of Maine System, coordinate development, publication and maintenance of the following, as detailed, non-regulatory guidance:

    a. An on-line Coastal Atlas that provides a map-based, user-friendly information resource to facilitate public (leasing and permitting) and private (site selection and investment) decision makers' use of the best available information regarding planning for and siting of offshore commercial wind energy development and other matters;

b. On-line information, developed in consultation with the Department of Environmental Protection, the U.S. Army Corps of Engineers and state and federal natural resources agencies, on:

   i) Characteristics, such as presence of endangered species, location of shipping lanes, concentrations of commercial fishing activity or stocks, that may present difficult regulatory issues under applicable state and federal wind energy laws; and

   ii) Studies of existing conditions that may be required to provide information needed for requisite federal and state reviews and approvals and identification of options for collaboration with higher educational institutions, state or federal agencies, non-governmental organizations, and others in acquiring such baseline environmental information.

   In designing this resource, focused on Maine's coastal waters, the agencies should build on pertinent current efforts (including those of the University of Maine and the Task Force itself) and consider options to address the information needs identified in the "Data and Information Needs Assessment" found in Appendix P of the State's January 2007 Bay Management study.[129] Funding to support this effort should come from the following state sources: project-specific federal funding; (over time) a portion of submerged lands leasing fee for offshore wind or other development utilizing state submerged lands for energy transmission or generation; and a portion of state share of Outer Continental Shelf alternative energy development related revenue.

2. The Governor should work with Maine's congressional delegation to secure an appropriation needed to undertake the above-described Coastal Atlas-related work in coordination with related regional and national marine spatial planning efforts, including those of the Northeast Regional Ocean Council.

The Task Force notes that the Coastal Atlas may, in time, serve as a map-based (Geographical Information System) tool to inform ocean management planning efforts aimed at identifying and mapping areas well-suited or unsuited to commercial offshore wind energy development due to the potential for significant adverse effects on or conflicts with natural resources or related existing human uses. The Task Force believes that such an effort is impracticable in Maine at this time due to its scope, scale, and related costs if directed at Maine's extensive coastline and adjoining federal waters and uncertainties regarding technologies that may be deployed.

B. Coordinating Federal-State Decision Making

As emphasized in its report, the Task Force considers improved federal-state coordination on natural resources planning for and environmental review of proposed ocean energy projects essential

[129] Managing Maine's Nearshore Coastal Resources: Report of the Bay Management Study (Maine State Planning Office/Department of Marine Resources, January 2007) http://www.maine.gov/dmr/baystudy/finalrpt/index.htm (accessed 12.15.09)

to the timely and efficient growth of the renewable ocean energy industry. The following recommendations, along with recommendations on coordination of federal and state permitting, below, are aimed at such improvement:

1. The Governor and Maine's congressional delegation should work together to urge that the White House Office of Energy and Climate Change Policy, working with the Council on Environmental Quality-led Oceans Policy Committee, or other appropriate senior-level management coordination groups, develop and implement changes needed in federal law and policy to ensure that federal agencies coordinate effectively and efficiently among themselves and with coastal states to tailor environmental review, including that required under the National Environmental Policy Act, to the size and scope of the project under review and to streamline environmental review, leasing, and other siting-related decisions regarding renewable ocean energy projects, including offshore wind energy and pilot and commercial scale marine hydrokinetic development.

2. The Maine State Planning Office, in consultation with the Governor's Office, should work with the Minerals Management Service to establish a federal-state task force or other mutually-agreeable mechanism to ensure optimal federal-state coordination and consultation regarding siting and development of renewable ocean energy resources on federal Outer Continental Shelf areas proximate to Maine.

C. Encouraging Developers to Use "Best Practices" to Foster Constructive Dialogue with Potentially Effected Marine Stakeholders in Siting Renewable Ocean Energy Project

The Task Force believes that an open and community-focused approach to renewable ocean energy development that features collaboration with marine stakeholders should be strongly encouraged. Accordingly, the Task Force recommends that:

> Developers proposing to site renewable ocean energy development projects, particularly in nearshore areas in Maine's coastal waters, would be wise to explore opportunities for consultation and dialogue with communities and other stakeholders potentially effected by the proposed development as early in the development process as practicable and consider use of the "best practices" for stakeholder and public engagement developed by the National Coalition for Dialogue and Deliberation, which focus on collaboration, openness and information sharing, and respect for diverse viewpoints,[130] in planning and implementing public outreach efforts. The Task Force further recommends that the Department of Economic and Community Development, in its role as initial point of contact, provide these recommended "best practices" to prospective renewable ocean energy developers for their consideration.

[130] See Appendix 13 and http://www.thataway.org/?page_id=1442 (accessed 12.15.09)

D. Clarifying Consistency with Public Trust Doctrine Principles

The Task Force believes that facilitation of well-sited renewable ocean energy development is in the public interest and thus serves and is consistent with the State's obligations as trustee and steward of state submerged lands resources under the Public Trust Doctrine. Accordingly, the Task Force recommends the following:

1. As a foundation for submerged lands leasing and related permitting provisions recommended below, the Legislature make findings, tied to offshore wind and tidal energy generation goals, that:

    a. Maine's coastal waters and submerged lands provide unique and valuable opportunities for development of wind, tidal, and potentially other indigenous, renewable ocean energy resources, such as wave power;

    b. Concerns regarding climate change and related degradation or loss of marine resources and related human uses make development of and transition to use of renewable ocean energy resources consistent with sound stewardship of trust resources; and

    c. With provision for avoidance, minimization, and compensation for harms to existing public trust-related uses and resources, such as fishing and navigation; restoration of effected lands upon completion of authorized uses pursuant to permitting criteria; and adequate compensation to the public for use of its trust resources pursuant to state submerged lands leasing criteria, development of these renewable ocean energy resources in appropriate locations promises significant trust-related benefits to Maine people for whom the State holds and manages submerged lands and their resources.

2. Amend the Bureau of Parks and Lands' leasing statute (12 M.R.S. §1862) to specify that, as per Public Trust Doctrine-related legislative findings outlined above, the Bureau of Parks and Lands may lease state submerged lands to facilitate development of renewable ocean energy resources and direct the Bureau of Parks and Lands to amend its rules accordingly. As necessary, this amendment would clarify that wind power development on state submerged lands is to be considered a "water dependent use."

E. Facilitating Use of State Submerged Lands for Renewable Ocean Energy Development that Benefits Maine People

The Task Force believes that establishment of commercially reasonable fees that provide compensation to the public for use of state-owned submerged lands for renewable ocean energy development is integral to and serves the State's stewardship obligations under the Public Trust Doctrine. The Task Force also believes that the amount, nature, and schedule for payment of this compensation should reflect renewable ocean energy development's potential to provide significant energy, economic, and environmental benefits to Maine people, including environmental benefits, as well as the need for research and development and technological advancement to secure those benefits. Accordingly, the Task Force offers the following recommendations:

1. Coordinate and streamline the state submerged lands leasing process as follows:

   a. Amend the Bureau of Parks and Lands' submerged lands leasing statute (12 M.R.S. §1862) and other pertinent state laws to clarify that:

      i) The Bureau of Parks and Lands must adopt (or may condition its leasing decision on) pertinent findings and conclusions in the Department of Environmental Protection's Site Law and/or Natural Resources Protection Act permit (or Land Use Regulation Commission land use permit), as applicable; and

      ii) The Bureau of Parks and Lands retains authority to make findings on issues not addressed by the Department of Environmental Protection or Land Use Regulation Commission and require rent and compensation as discussed below.

   b. Amend state law to require an applicant for a renewable ocean energy development project to file pertinent state permit applications prior to or concurrently with a submerged lands lease application to facilitate the Bureau of Parks and Lands' review of lease applications as received (as under current law, without a competitive bidding process) in coordination with the Department of Environmental Protection or Land Use Regulation Commission permitting process, as applicable and to participate in a joint, interagency pre-application meeting regarding its lease and permit applications;

   c. Lease term: i) For "offshore commercial wind energy development," the Bureau of Parks and Lands may issue a 30-year, renewable lease[131] (dating from completion of project construction, with provision for phased development); and ii) authorize the Bureau of Parks and Lands to issue a longer operational lease (up to 50 years), equivalent with the Federal Energy Regulatory Commission license term, for a commercial tidal power development; and

   d. Prior to issuance of a 30-year lease, the Bureau of Parks and Lands may, if requested by the developer and with provision for public notice and comment, issue the following authorizations intended to allow a developer to maintain right, title, or interest in a submerged lands area throughout the development process and to discourage speculative and site banking:

      i) Up to 2-year lease option: granted to establish title, right, or interest for permitting only, if the complete project under consideration is described at least in concept;

      ii) A submerged lands lease, for up to three years, to allow a developer to undertake feasibility testing and pre-development monitoring for ecological and human use impacts, subject to provision of conceptual plans and conditioned on receipt of pertinent permit approvals; and

[131] Current Maine law allows for a 30-year submerged lands lease term.

iii) A submerged lands lease, for up to five years, to allow a developer to secure requisite permits and complete pre-operation construction, subject to provision of detailed development plans describing all operational conditions and restrictions.

2. Ensure commercially reasonable submerged lands leasing fees as follows:

Fees for demonstration projects

a. Amend the Bureau of Parks and Lands' submerged lands leasing statute to specify that for ocean energy demonstration projects the annual rent for the requisite submerged lands shall be as follows:

i) Wind energy demonstration project issued a general permit under 38 M.R.S. §480-HH: $10,000 per year for the term of the general permit;

ii) Tidal power pilot project issued a general permit under 38 M.R.S. §636-A: $100/acre of submerged lands occupied by the project per year for the term of the general project, provided the annual lease fee may not exceed $10,000. As used in this recommendation, the area "occupied" would include the sum of the area on which turbine(s), other testing and monitoring equipment, all anchoring or mooring lines or structures, and the connecting cable to shore are placed, and any other such areas where it is necessary to exclude transient Public Trust uses to avoid unreasonable interference with the project purposes; and

iii) No submerged lands leasing fee may be required for an ocean energy demonstration project located in the Maine Offshore Wind Energy Research Center, where non-commercial projects may only be tested by or in cooperation with the University of Maine.

Fees for commercial-scale projects; rulemaking

b. Direct the Bureau of Parks and Lands to amend its submerged lands leasing rules within one year to include a rental fee schedule for leasing submerged lands for tidal power development, wave power development, "offshore commercial wind energy development," and other wind energy development that is designed to balance state goals of assurance of fair compensation for use of and mitigation of potential adverse effects on or conflict with existing uses of state-owned submerged lands that are held in trust for the people of the State with related state goals of facilitating development of an in-state renewable ocean energy industry. Legislation mandating this rulemaking should specify that:

i) Lease fees must be commercially reasonable and comparable to pertinent lease fees in other jurisdictions both in terms of the fee amounts and provision for a graduated fee schedule that reflects consideration of energy production levels and debt service obligations in the initial years of a development;

ii) In developing the rules Bureau of Parks and Lands must consider ocean-energy related submerged lands leasing fees in other states; fees provided for by the Minerals Management Service's Alternative Energy Program for leasing Outer Continental Shelf areas; current market practices in the wind power industry regarding lease arrangements; and other pertinent information;

iii) The fee structure shall include an amount adequate to cover the Bureau of Parks and Lands pertinent administrative costs;

iv) The fee structure must allow the developer of a wind, tidal, wave, or other renewable ocean energy development to enter into a contract for sale or use of project-generated power that, through reduced rates or otherwise, provides the State or Maine electric consumers a portion of the dollar value of the pertinent rental fee for use of state submerged lands. The developer would be obligated to provide monetary payment to the State for the remaining portion of the rental amount.

v) The rules shall require the Bureau of Parks and Lands to consult with and consider the recommendations of the Public Utilities Commission regarding provision of energy as rent (see previous recommendation) and related permit terms and conditions for a lease for an "offshore commercial wind energy development," tidal power, wave power, or other renewable ocean energy development;

vi) The rules shall clarify that potential adverse effects on existing uses, such as fishing, are addressed through the rental fee structure and the Bureau of Parks and Lands may not require case-by-case payment of an amount in addition to rent as mitigation for such project-specific effects; and

vii) The rules must incorporate the statutorily established fees and exemption for ocean energy demonstration projects recommended above.

3. Establish a non-lapsing, dedicated fund, the Renewable Ocean Energy Trust Fund, into which the following funds would be deposited: 1) rental payments; and 2) state share of federal revenues from alternative energy leasing on the Outer Continental Shelf.[132]

4. Clarify that the Trust's funds will be dedicated to protection and enhancement of the integrity of Public Trust-related resources and uses, including renewable ocean energy development as per the legislative findings recommended above and will be used as follows:

   a. Cover pertinent administrative costs of the Bureau of Parks and Lands' submerged lands leasing program (administered by the Bureau of Parks and Lands);

[132] In accordance with the Energy Policy Act of 2005, the Minerals Management Service is required to provide eligible states 27 percent of the revenues from any offshore wind or other alternative projects on the federal Outer Continental Shelf that is located wholly or partially within the area extending three miles seaward of the State's three-mile limit (the so-called 8(g) zone under the Outer Continental Shelf Land Act). The Minerals Management Service's rules provide for distribution of shared revenue among coastal states that are within 15 miles of the geographic center of the project.

b. Distribute the remaining balance as follows:

i) 40 percent: Research, monitoring, and other efforts to avoid, minimize, and compensate for potential adverse effects of renewable ocean energy development on noncommercial fisheries, seabirds, shorebirds, migratory birds, and other coastal and marine natural resources, including but not limited to development, enhancement, and maintenance of the Coastal Atlas (map-based information resource to guide public and private decision making; see related recommendation above) and field research to provide baseline or other data to address siting issues presented by wind, tidal, wave, or other renewable ocean energy development (funds administered by the Department of Marine Resources, in consultation with the Maine State Planning Office and Department of Inland Fisheries and Wildlife);

ii) 40 percent: Resource enhancement, research on fish behavior, species abundance and distribution and other issues, or other efforts to avoid, minimize, and compensate for potential adverse effects of renewable ocean energy development on commercial fishing and related activities (funds administered by the Department of Marine Resources); and

iii) 20 percent: the Shore and Harbor Management Fund, for public infrastructure and municipal planning for harbor protection (current use of submerged lands funds in excess of the Bureau of Parks and Lands' administrative costs)[133](administered by the Bureau of Parks and Lands).

❖ *Part Three: Promoting and Supporting Development of a Renewable Ocean Energy Industry and Related Businesses in Maine*

While the Task Force acknowledges the value of the State's efforts to date to encourage the development of renewable ocean energy resources, it makes the following recommendations rooted in the four factors noted above that have provided a foundation for Europe's successes:

1. The Department of Economic and Community Development (Commissioner's Office, Office of Innovation, Office of Business Development, Maine Technology Institute**,** and the Maine International Trade Center), and related agencies including the Finance Authority of Maine, and the University of Maine System, should work collaboratively, as lead agencies, to support the development of an ocean energy cluster in Maine by:

a. Continued support for research and development of wind, tidal, wave, and potentially other promising renewable ocean energy technologies at the University and non-profit research institutions, as well as by individual companies, for new products, processes, materials, and other pertinent innovations;

[133] 12 M.R.S. §1863

b. Additional support for private investment in energy-related businesses to help bring these technologies to scale and to build necessary infrastructure for large scale manufacturing; and

c. Collaboration with other regional research efforts, such as the Nova Scotia Tidal Energy Initiative.

2. The Governor should designate the Department of Economic and Community Development as the initial point of contact in state government to assist entrepreneurs and/or developers seeking to develop ocean energy projects by helping make state agencies and programs more accessible and approval processes as transparent as possible.

3. The Finance Authority of Maine, Department of Economic and Community Development, Maine Technology Institute, Maine International Trade Center, the Public Utilities Commission, Efficiency Maine Trust and Small Enterprise Growth Fund should work collaboratively, as lead agencies, to provide state financial assistance to ocean energy-related projects and projects that reduce Maine's dependence on fossil fuels for heating and transportation by:

a. Establishing a moral obligation credit enhancement program, modeled on the Electric Rate Stabilization Program, to use the State's credit rating to reduce financing costs of electric ratepayer-backed projects that do not pose a significant risk of financial loss to the State and that will support the goals of assisting in the development of commercial scale renewable ocean energy projects or the conversion of homes and businesses away from the use of oil and gas as a primary energy source;

b. Supporting and expanding existing programs to encourage investment, including loan guarantees, the Maine Technology Institute's programs, the Seed Capital Tax Credit Program, and the Small Enterprise Growth Fund, and developing new initiatives to attract surging venture capital investment in the "clean energy" sector;

c. Aggressively pursuing federal financing options and partnerships to support renewable ocean energy-related businesses and research and development, including advocating for improvements to federal financing programs that help to attract capital;

d. Providing incentives and removing disincentives for developers to site projects in Maine, and for overseas investment by original equipment manufacturers such as wind turbine and platform vendors;

e. Assessing the appropriateness of existing Maine business financing programs for their suitability for renewable ocean energy development, and making changes and improvements where specific modifications are needed; and

f. Developing guidance for developers on potential public and private funding sources to support renewable ocean energy research and development, resource assessment, baseline environmental studies and evaluations, and on-going monitoring.

4. The Department of Labor, Department of Economic and Community Development, Maine Community College System, University of Maine System, Maine Maritime Academy, and the Boat School (an affiliate of Husson University) should work collaboratively as lead agencies to develop and supply adaptive training to Maine workers who could transfer to the renewable ocean energy industry. The Governor's Training Initiative should be expanded to include such training opportunities.

5. The Legislature should direct the Maine Port Authority to identify land parcels proximate to existing Maine port facilities, estimate their cost, and make a recommendation to the Legislature's joint standing committees on transportation and utilities and energy regarding acquisition of one or more of these parcels for purposes of facilitating renewable ocean energy development opportunities.

6. The Efficiency Maine Trust should:

   a. In consultation with the Public Utilities Commission, design and implement a program, along the lines of that described in Appendix 3 of this report, to convert Maine homes and businesses to more efficient electric air and ground source heat pumps, and to electric vehicles as they become available in the market, that will reduce Maine consumers' total (electricity, heat, transport) energy bills and help support the development of renewable ocean energy resources and minimize the ratepayer impacts of any above-market prices paid to support those resources;[134]

   b. Develop legislative recommendations, in consultation with the Maine State Planning Office, regarding:

      i. Expanding existing state tax credits for purchase of alternative energy resources to include heat pumps, geothermal systems, and hybrid or plug-in electric vehicles; and

      ii. Providing municipal tax incentives such as deducting from property valuations the difference between the cost of a heat pump/geothermal heating system and a typical oil heating system; and

   c. In collaboration with the Maine State Planning Office, develop reliable, objective information and educational materials for businesses and consumers that can encourage and permit them to make informed decisions about adopting new heating and transportation technologies.

[134] See Appendix 3 for a more detailed description of such a conversion program that would rely on on-bill financing with no up-front cost to the homeowner or business, and that would produce immediate savings to the consumer and revenues to help fund above-market costs of ocean energy projects.

7. Clarify that renewable ocean energy-generating machinery and related components, including but not limited to turbines and support structures, that are in transit to be located on or above state submerged lands but happen to be within a municipality on April 1 are exempt from municipal personal property taxation under existing exemptions in 36 M.R.S. § 655 regarding industrial inventories including goods in process and finished work on hand, stock-in-trade, property in possession of a common carrier held en route to a final destination, and/or vessels in the process of construction owned by persons residing out of the State.

8. Clarify that a municipality may not levy personal property tax on renewable ocean energy-generating machinery and related components, including but not limited to turbines and support structures, unless the personal property is deployed as part of a wind, tidal, wave, or other renewable ocean energy development that is located within the boundaries of that municipality as established by legislative charter prior to December 1, 2009.

9. Amend state law to: 1) provide an exemption from personal property taxation for personal property that is deployed as part of a wind, tidal, wave, or other renewable ocean energy development; and located in, on, or over Maine's coastal waters and within the unorganized areas of the State; and 2) remove the statutory provision requiring the State to provide reimbursement to the unorganized territories in relation to this exemption.

❖ *Part Four: Making Needed Changes in Energy Transmission Infrastructure and State Energy Policy*

1. Amend state law and state energy plan to explicitly incorporate the likely need for expansion of state transmission and delivery capacity to achieve the State's onshore and offshore wind goals.

    a. Amend 35-A M.R.S. § 3404 (1) to make it the policy of the State, that in furtherance of the State's wind power goals, the State take every reasonable action to encourage the attraction of appropriately sited development related to wind energy, including any additional transmission infrastructure needed to transport additional renewable energy to market to help the State achieve its on and offshore wind power goals.

    b. Encourage the expansion of transmission capacity not only to serve current load, but also to serve the reasonably anticipated future growth of generation to meet the State's on and offshore wind renewable energy goals by giving explicit authority to the Public Utilities Commission to authorize transmission capacity increases when it determines that they are expected to minimize long term transmission and distribution system costs.

    c. Amend the state energy plan to acknowledge the need for new transmission capacity to support development of significant amounts of offshore wind.

2. Direct the Public Utilities Commission to work within the ISO-NE and at the Federal Energy Regulatory Commission to change existing rules regarding cost recovery of generator lead lines by permitting rate recovery of interconnection facilities sited in designated areas and needed to serve renewable energy projects.

3. Explicitly recognize in state law and the State's energy plan the economic and environmental benefits of electrification of the heating and transportation sectors. Target conversion of homes and businesses to more efficient heat pumps only if they have already been weatherized or are in the process of being weatherized in accordance with the State's weatherization programs.

4. Ask the Legislature to direct the Public Utilities Commission to initiate a proceeding to explore mechanisms needed to achieve the State's electrification of home heat and transport policy and goal to promote and best utilize Maine's renewable energy generation potential, including examination of the following:

    a. Rate design structures that will encourage the use of intermittent renewable energy resources, including off peak time of use transmission and distribution rates;

    b. Changes to the standard offer pricing to include off peak time of use energy prices;

    c. The penetration of time of use meters;

    d. The long term needs for a "smart grid" that will enable the efficient usage and storage of energy produced by intermittent renewable resources; and

    e. Any other mechanisms that would encourage the development and usage of Maine's renewable energy resources to replace the use of fossil fuels for heat and transportation whenever conversion would reduce overall energy consumption, increase the State's energy independence, and reduce greenhouse gas emissions.

    The Public Utilities Commission should report to the Legislature, including recommendations for rate design changes, "smart grid" investments, and other mechanisms needed to promote electrification of the home heating and transport sectors.

5. Amend state law to direct the Public Utilities Commission to issue a Request for Proposals for renewable ocean energy projects and to direct a transmission and distribution utility to enter into a long term contract for the energy, capacity and renewable energy credits from an offshore wind facility if the ratepayer impact is reasonable based on a determination by the Legislature and Governor. The commission can take the risks associated with fossil fuel price volatility over the next 20 years, greenhouse gas emission reductions, and the State's offshore wind energy goals into consideration. The commission shall also consider the energy and cost savings from state programs to weatherize and convert homes to more efficient heat sources in determining the reasonableness of ratepayer impacts. Use existing system benefit charge level as benchmark for determination of reasonableness.

6. The Public Utilities Commission and the Office of Energy Independence and Security should continue to work through the ISO-NE, and the Governor's Office should continue to work through the New England Governors/Eastern Canadian Premiers Conference and other regional fora, to best achieve the State's wind goals in the lowest cost manner possible with a focus on regional cooperation. The adoption of rational cost allocation policies for transmission and distribution investments that further the regional system's reliability and help achieve its renewable energy and climate goals while minimizing litigation is essential.

❖ *Part Five: Facilitating Permitting of Appropriately-Sited Offshore Wind Energy Development*

As discussed above, the Task Force believes that existing state and federal environmental permitting requirements, while needed to assess and address potential adverse effects on coastal resources and related human uses, may unduly inhibit commercial-scale shallow and deepwater offshore wind development[135] and makes the following recommendations:

1. The Maine State Planning Office should work with the Minerals Management Service, Army Corps of Engineers, U.S. Fish and Wildlife Services, National Marine Fisheries Service, and other federal agencies to develop a Memorandum of Understanding (using the Memorandum of Understanding with the Federal Energy Regulatory Commission on tidal power development as a model) or other appropriate vehicle for inter-agency collaboration on planning for and leasing and permitting of wind energy development in Maine's coastal waters and on the Outer Continental Shelf that:

    a. Articulates that, to the extent consistent with their legal authority, each state and federal agency will work collaboratively to facilitate siting of offshore wind energy development;

    b. Clarifies information, including any pre-construction studies of existing conditions, that an applicant may be required to provide under pertinent state and federal authorities;

    c. Identifies ways, including but not limited to use of existing or development of general permits, to coordinate and streamline state and federal review procedures; and

    d. Identifies, as soon as possible, a standard set of license conditions for state and federal licenses and permits for offshore wind energy development.

2. Clarify and streamline state permitting requirements as follows:

[135] The recommendations cover projects that propose use of existing, demonstrated technologies designed for shallow water deployment as well as those proposing technologies currently under development and designed for deep water deployment.

a. Amend the Land Use Regulation Commission's authorizing legislation, the Site Location of Development Act and other pertinent state laws, to clarify that the Department of Environmental Protection is the lead state permitting agency (not the Land Use Regulation Commission permitting or rezoning required, except as recommended in section 3, below) for a wind energy development located in a "coastal wetland" as defined by the Natural Resources Protection Act;

b. Require the Department of Environmental Protection to consult with and consider comments of the Land Use Regulation Commission and neighboring municipalities in exercising its decision-making authority regarding wind energy development located in a "coastal wetland";

c. Amend state law to clarify that the Land Use Regulation Commission has land use permitting jurisdiction over a "community-based offshore wind energy development" that is "locally owned" (as defined by 35-A M.R.S. §3602) (community-based renewable energy project); is used primarily to offset part or all of the electricity requirements of the local owners or community in or adjacent to which the project is located; may be connected to the ISO-NE grid; employs generating facilities of a size commensurate with the pertinent community's need; and is located no more than one nautical mile from a coastal island in Land Use Regulation Commission jurisdiction;[136]

d. Clarify that a "community-based offshore wind energy development" is an allowable use in the limited areas, described above, where the Land Use Regulation Commission has land use permitting jurisdiction and direct the Land Use Regulation Commission to amend its rules accordingly;

e. Amend state law to make the administrative and judicial review processes for "wind energy development in a coastal development" (including such a project subject to the limited Land Use Regulation Commission jurisdiction described above) comparable to those applicable to land-based "grid-scale wind energy development", as follows: the Department of Environmental Protection (or the Land Use Regulation Commission) makes initial permitting decision (no original Board of Environmental Protection jurisdiction); the Board of Environmental Protection may hear an appeal of a Department of Environmental Protection decision on the record (no *de novo* review); 185 day permit review period (270 days if a public hearing is held) for site law-scale projects; the Department of Environmental Protection (or the Land Use Regulation Commission) may contract, at the applicant's expense, for expertise needed for timely review; and appeal direct to the Law Court;

f. Amend Site Law (38 M.R.S. §481, *et seq.*), and Natural Resources Protection Act (38 M.R.S. §480-A, *et seq.)* as follows:

[136] The Task Force intends that current law authorizing the Department of Environmental Protection to assume jurisdiction over projects located in both the organized and unorganized area would apply.

i. Clarify that a Site Law permit is required for an "offshore commercial wind energy development," meaning a "wind energy development" as defined by 35-A M.R.S. §3451(11), that has an aggregate generating capacity of 3 megawatts or more; is proposed to be located in whole or in part in a "coastal wetland;" and includes transmission lines and other "associated facilities"[137] as defined by 35-A M.R.S. §3451(1);[138]

ii. Authorize the Department of Environmental Protection, in its discretion, to address development of "associated facilities," including transmission lines, separately as provided for "grid-scale wind energy development" under 38 M.R.S. §344(2-A)(A);

iii. For wind energy development located in a "coastal wetland" that has an aggregate generating capacity under 3 megawatts and thus is not subject to Site Law permitting under the Task Force's proposal, amend the Natural Resources Protection Act to contain approval criteria regarding noise, safety-related setbacks, and shadow flicker that are comparable to the Department of Environmental Protection certification criteria for small-scale land based wind development under 35-A M.R.S. §3456 and tailored as appropriate to address ocean-based, offshore development;

iv. Clarify that the approach to scenic impact assessment applicable to "grid-scale wind energy development" under Natural Resources Protection Act and Site Law,[139] including the scenic impact standard, assessment method, and distance limitations, also applies to wind energy development proposed for location in a "coastal wetland;"

v. Require, as a Site Law approval criterion, demonstration that a proposed "offshore commercial wind energy development" would provide tangible benefits to communities in the project area in the manner that such benefits are required for land-based "grid-scale wind energy development," clarifying that project-related greenhouse gas emissions and related environmental benefits would likewise be presumed;

vi. Require project decommissioning and provision of related financial assurances for all wind energy development located in a "coastal wetland" in accordance with current approach for land-based "grid-scale wind energy development"; and

vii. Amend Site Law and Natural Resources Protection Act, and/or related Department of Environmental Protection rules, as needed, to include approval criteria that address issues, including but not limited to noise and effects on birds, bats, marine mammal

[137] "Associated facilities" means elements of a wind energy development other than its generating facilities that are necessary to the proper operation and maintenance of the wind energy development, including but not limited to buildings, access roads, generator lead lines and substations as used 35-A M.R.S. §3451(1)

[138] In some cases, project-related transmission lines may include upland as well as submerged power lines.

[139] See 35-A M.R.S. §3452 and related Site Law and Natural Resources Protection Act provisions.

species, and marine habitats as appropriate in an offshore, ocean environment, with due consideration of adaptive management, potential cumulative effects, and avoidance, minimization and compensation for undue adverse effects on biological resources;

g. Amend Land Use Regulation Commission's permitting laws and/or rules as appropriate to provide approval criteria and administrative review procedures for "community-scale offshore wind energy development" (see above) that are substantially similar to those recommended for the Site Law and Natural Resources Protection Act in sections 5 and 6, above;

h. Direct the Maine State Planning Office, within two years, to review and update as appropriate, considering pertinent criteria in the methodology adopted by rule pursuant to P.L. 2007 c. 661, the scenic resources of state or national significance identified in the coastal scenic inventories specified in the definition of "scenic resource of state or national significance."[140]

i. The Maine State Planning Office should submit for National Ocean Atmosphere Administration review and approval amendments to the Maine Coastal Program needed, if any, to clarify that renewable ocean energy development activities proposed on the federal Outer Continental Shelf are not subject to review under Maine's coastal zone management program under provisions of the Coastal Zone Management Act regarding listed federal activities, listed federal license or permit activities, or Outer Continental Shelf development activities but that the State would exercise its right to request Coastal Zone Management Act consistency review of any such Outer Continental Shelf activity if it determined that the activity may have adverse effects on resources or related human uses in its coastal zone.

3. Recognizing the evolving state of key technologies and related scientific knowledge on potential siting-related effects, the Governor should establish a standing, non-regulatory technical committee comprised of persons with pertinent scientific expertise on birds, bats, marine mammals, marine habitats, and other biological resources, including but not limited to academic professionals from the University of Maine, to advise the Department of Environmental Protection, Land Use Regulation Commission, and Bureau of Parks and Lands on development of rules, development of monitoring protocols, evaluation of monitoring reports, and scientific developments regarding offshore wind, tidal, wave, and other types of renewable ocean energy development. The Governor should designate one committee member to serve as chair whose responsibilities would include convening the committee and managing its work. In developing rules and monitoring protocols and evaluating monitoring reports regarding offshore wind, tidal, and other types of renewable ocean energy development, the Department of Environmental Protection, Land Use Regulation Commission, and Bureau of Parks and Lands, in coordination with the Department of Marine Resources, should in addition request the recommendations of the

[140] 35-A M.R.S. §3451(9)

Advisory Council of the Department of Marine Resources regarding potential adverse effects on commercial and recreational fisheries and other existing human uses of the marine environment.

4. As noted above, ambiguity regarding the precise location of municipalities' boundaries on state submerged lands creates significant potential for confusion over approval requirements, conflicting assertions of decision making authority, and resulting regulatory costs and complexities and delays. In making the following recommendation to address this problem, the Task Force notes that Maine municipalities do not have an established history of land use regulation of ocean-based development activities. The Task Force believes that ensuring state-level decision making is appropriate. Ocean energy development activities will occur principally on state-owned submerged lands held and managed under the Public Trust Doctrine in the interests of Maine people as a whole. Developers may be reluctant to invest the necessary time, effort, and capital without reasonable assurance that environmental siting and economic regulatory decisions will be made at the state level. Amend state law to clarify that a municipality:

    a. May not enact or enforce a zoning ordinance that prohibits siting of renewable ocean energy-related generation or associated facilities within the municipality and must make reasonable allowance for siting of such facilities at one or more locations within the municipality;

    b. May not enact or enforce any land use standard, or other requirement regarding renewable ocean energy development which, as applied to generating or associated facilities proposed for location on state submerged lands, imposes any requirement that is more restrictive than the Department of Environmental Protection standards under the Site Law, Natural Resources Protection Act, or the Maine Water Development and Conservation Act, as applicable;

    c. May only regulate renewable ocean energy development that is located within its boundaries as established by the Legislature prior to December 1, 2009; and

    d. Must take final action regarding all pertinent authorizations to site, construct, or operate a renewable ocean energy project within 60 days of final agency action by the Department of Environmental Protection on all related state permit applications.

5. Amend state law to clarify that, for purposes of municipal land use or zoning as applied to renewable ocean energy development, there is a rebuttable presumption that the boundaries of Maine municipalities do not extend below the mean low water line on waters subject to tidal influence.

6. Amend state law to authorize the Department of Environmental Protection to wholly or partially exempt a renewable ocean energy development from compliance with the terms of a local land use or zoning ordinance, including but not limited to a local shoreland zoning

ordinance, if the Department of Environmental Protection determines that such an exemption is reasonably necessary for public welfare or convenience.

❖ *Part Six: Facilitating Development of Appropriately-Sited Tidal Energy Projects*

The Task Force's tidal power subcommittee developed recommendations to address barriers to growth and development of Maine's fledgling tidal power industry. Reflecting the tidal industry's pioneering role in Maine, for the most part these recommendations touched on matters of concern to the renewable ocean energy industry as a whole. The Task Force incorporated key elements of the subcommittee's proposals into a number of its findings and recommendations, including those regarding coordination of federal-state decision making; "best practices" for stakeholder engagement; transmission and grid management improvement; and making the best available information available for public and private decision-making.

The Task Force makes the following additional recommendations specifically aimed at addressing challenges facing Maine's tidal power industry:[141]

1. Timely and efficient development of tidal energy resources at optimal locations in Maine's coastal waters, including but not limited to those in the Passamaquoddy Bay region.

   The Task Force believes that establishment of this goal will provide policy direction and support for agency initiatives to support needed research and development, advocate for needed federal collaboration, and pursue other related initiatives. Achievement of this goal would make Maine the first state in nation with a working, commercial-scale tidal power project and advance the tidal power industry generally.

2. The Department of Environmental Protection, in consultation with state resource agencies, should work with the appropriate federal agencies to ensure that the Federal Energy Regulatory Commission's hydrokinetic pilot project license process is fully implemented in Maine, including its provisions regarding a six-month application review process. The Department of Environmental Protection should work with the Federal Energy Regulatory Commission to encourage the U.S. Fish & Wildlife Service, National Marine Fisheries Service, Army Corps of Engineers, and other pertinent federal agencies to join as signatories to and supplement the Memorandum of Understanding, as appropriate, to:

   a. Articulate that, to the extent consistent with their legal authority, each state and federal agency will work collaboratively to facilitate siting of pilot and commercial-scale tidal power projects in furtherance of national, regional, and state renewable ocean energy-related goals;

[141] See also recommendation, above, regarding expansion of technical advisory committees to include pertinent expertise on tidal power development-related issues.

b. Clarify information, including any pre-construction studies of existing conditions, that an applicant may be required to provide under pertinent state and federal authorities;

c. Identify ways, including but not limited to use of existing or development of general permits, to coordinate and streamline state and federal review procedures; and

d. Identify, as soon as possible, a standard set of license conditions for state and federal licenses and permits for marine hydrokinetic projects.

3. Amend state law to make the administrative and judicial review processes for commercial-scale tidal power development under the Maine Waterway Conservation and Development Act the same as those applicable to land-based "grid-scale wind energy development" in Department of Environmental Protection jurisdiction, as follows: the Department of Environmental Protection makes initial permitting decision (no original Board of Environmental Protection jurisdiction); the Board of Environmental Protection may hear appeal on the record (no *de novo* review); 185 day permit review period; the Department of Environmental Protection may contract, at applicant's expense, for expertise needed for timely review; and appeal direct to the Law Court.

❖ *Part Seven: Supporting Wave Energy Development Opportunities*

In keeping with its understanding of the nature of wave power opportunities in Maine's coastal waters and adjacent federal waters, the Task Force recommends the following:

1. Encouragement for testing of wave power technology in conjunction with a wind power generation system as provided for 38 M.R.S. §480-HH (Department of Environmental Protection -administered general permit for a "wind energy demonstration project");

2. Amendment of the Maine Waterway Development and Conservation Act (38 M.R.S. §630, *et seq*.,) to clarify that the Department of Environmental Protection has statewide jurisdiction over wave power projects, as per P.L. 2009 c. 270 (clarifying the Department of Environmental Protection's statewide jurisdiction under the Maine Waterway Development and Conservation Act over tidal power projects).

❖ *Part Eight: Ensuring Well-informed and Effective State Consideration and Action Regarding Offshore Oil and Natural Gas Development*

The Department of Conservation and Maine State Planning Office, as lead agencies, should monitor proposed federal legislation and federal planning activities regarding oil and gas development on the Outer Continental Shelf, including the Minerals Management Service's preparation of five-year leasing plans pursuant to the Outer Continental Shelf Lands Act, and in consultation with the

Department of Marine Resources, other state agencies, and the Governor's Office, as appropriate, prepare state comments in accordance with the Task Force's finding that the Gulf of Maine, in comparison to other areas of the Outer Continental Shelf, has low potential and does not merit further oil and gas development efforts.

❖ *Part Nine: Form a Private Sector-led Entity to Spearhead Renewable Ocean Energy Development in Maine*

The Task Force acknowledges that its own efforts as reflected in this report represent only another milestone along the route to securing the benefits of Maine's renewable ocean energy resources for the people of the State as well as its natural environment. The Task Force tasked subcommittee 8 with evaluating the need for, and value of, creating a public/private entity to advance commercialization of Maine's renewable ocean energy after its own work is done. Subcommittee 8 met with leaders from academia, industry, utility companies, professional service providers, trade associations and nongovernmental organizations. This subcommittee concluded that a new private sector-led entity, attentive to the need for a strong public-private partnership, is an appropriate and necessary vehicle for spearheading renewable ocean energy development efforts in Maine. The subcommittee emphasized, and the Task Force concurs, that this new entity would supplement rather than supplant or duplicate pertinent existing efforts by state agencies, the University of Maine System, or various trade associations. This entity would focus on attracting private industry to the state and providing the type of industrial and professional services needed to develop Maine's tidal, wind, wave and potentially other renewable ocean energy resources.

In accordance with the recommendations of subcommittee 8, the Task Force makes the following recommendation aimed at ensuring effective advocacy to build on and enhance its own efforts to date:

> The private sector should create an industry-led, development-oriented entity dedicated to advancement of the renewable ocean energy industry as a whole in furtherance of the goals and policies recommended by the Task Force and any resulting legislative directives. The entity's objectives, in addition to support for tidal and wave power initiatives, should include siting of commercial-scale offshore wind energy development in Maine's coastal waters or adjoining federal waters by 2015. The Task Force recommends that this entity develop its own organizational structure and governing practices. The Task Force suggests provision for non-voting, *ex officio* representation of the State to optimize opportunities for private-public collaboration.

CONCLUSION

Environmental, economic, and energy security considerations all support and decisive action to carry out a strategy to encourage creation of conditions that favor implementation of a Maine-based five gigawatt-scale offshore wind generation industry. Well-concerted action to advance federal and state policies that promote conversion to cleaner and more efficient forms of energy for home heating and transportation needs to be a core element of this strategy.

Renewable ocean energy resources located off Maine's shores have tremendous potential to meet the lion's share of Maine's energy needs while providing significant business development and job growth opportunities. Offshore wind resources, particularly those in deep-water areas in state and adjacent federal waters, are of particular significance. Development of these resources has potential, in time, to substantially reduce the risky reliance of Maine families and businesses on fossil fuels while establishing new renewable energy-related industries with substantial opportunities for job creation.

Technological and energy infrastructure limitations, current economic conditions, regulatory complexities, and related cost considerations are significant but not insurmountable barriers to harnessing deep-water wind and other renewable ocean energy resources. Essential technologies are rapidly evolving. Federal and state leasing and permitting processes can be fine-tuned, streamlined and harmonized to facilitate siting while avoiding, minimizing, and compensating as appropriate for adverse effects on natural resources and related human uses. Precisely-targeted economic development efforts, including support for research and development and project financing, can foster growth and expansion of a robust renewable ocean energy industry.

Fuel price spikes in 2008 spotlighted the intertwined economic, environmental, and energy challenges Maine faces, and the economic and social peril our state will face if these challenges are not vigorously addressed. Breaking our dependence on of fossil fuels requires vision for the future and decisive action at present. Looking to future as well as present needs, the State needs to make realization of the vast potential of its renewable ocean energy resources a top priority. Acting now, through strong public-private partnerships, Maine can secure nearer term benefits, such as those stemming from growth of our already emerging tidal power industry, and position the state for the investment needed to establish, grow, and reap the enormous promise of our offshore wind industry.