

**Outline for Economic Development Section of the OETF Report
Subcommittee #4**

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- I. Economic Development Vision
 - a. While the opportunity for ocean energy to contribute to Maine through reduced dependence on oil and natural gas as fuel sources is known, equally important is the opportunity to contribute to Maine's economic development.
 - b. This vision anticipates that Maine businesses can be part of the research and development, design, financing, manufacturing, deployment, operations and maintenance of renewable energy systems, including those from ocean energy sources, as well as the distribution of energy. The vision further contemplates new business opportunities relating to the increased use of innovative electricity-based heating and transportation systems.
 - c. Maine can be more than a plantation whose ocean energy resources are harvested.
- II. Maine's Ocean Energy Cluster
 - a. Definition of a cluster: Groups 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.
 - b. Maine's Ocean Energy Cluster is an emerging "Cluster of Opportunity" - Seeds of clusters of sufficient size and resources to portend growth, or declining clusters with the foresight and capacity to reinvent themselves. [footnote: Rosenfeld, Stuart. 2009. "Generating Local wealth, Opportunity and Sustainability through Rural Clusters." Regional Technology Strategies. www.rtsinc.org. Supported by the Ford Foundation under a project called Wealth Creation in Rural Communities.]
 - c. Note that this is Technology Agnostic: wind, tidal, wave, etc.
 - d. Elements of Maine's cluster in Figure 1- Cluster Diagram
 - e. Maine has companies in almost all parts of this cluster. Some of the companies that are part of this cluster are shown in Table 1
 - f. The core competencies that define this cluster are:
 - i. Knowledge of highly complex systems involving integration of electronics, steel and composites manufacturing in an ocean environment.
 - ii. Marine construction, operations and maintenance
 - iii. Environmental research, assessment and mitigation
 - iv. Composites and other advanced materials research for structures

- v. Existing ports
- vi. Substantial university based R&D support and collaboration
- vii. Knowledgeable legal, regulatory and environmental expertise
- g. Size of Cluster and growth potential. This is very difficult to do, and so we are only trying to bracket the possibilities.
 - i. European Union experience is that jobs are created not only in wind turbine manufacturing, but in component manufacture, installation, operations and maintenance, with consultants and at the universities. Figure 2
 - 1. Employment from offshore wind deployment was 154,106 in the EU in 2007 and is projected to exceed 377,000 by 2030. [Wind at Work: Wind energy and job creation in the EU, January 2009, European Wind Energy Association]
 - ii. Cape Wind analysis done in 2003 by Global Insights estimated this single project would create 391 construction jobs and 50 operations jobs. This doesn't assume any cluster development in the state.
[http://www.windpoweringamerica.gov/econ_project_detail.asp?id=5&print]
 - iii. Ocean Energy Institute estimates that 1 GW of far offshore wind power would generate an estimated job impact as follows:
 - 1. *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.
 - 2. *Construction and Installation Phase*: 3,893 temporary fulltime jobs in installation, \$30.3M. Consumer spending \$39.8M leading to 204 jobs.
 - 3. *Operations and Maintenance Phase*: 135 to 271 permanent full time jobs with spending producing an additional 222+ jobs.
 - 4. *Indirect and Induced jobs*: 620 jobs.
- h. Work that's already been done
 - i. Renewable energy projects and others in the clean technology space which includes targeted technology sectors such as Environmental technologies, Precision Manufacturing, Composites and Advanced Materials, and Marine technologies, have been funded by the Maine Technology Institute. Grants have totalled over \$15 million for clean technology-related research and development, including \$5 million for expansion of AEWG for wind blade testing facility, and \$2.2 for ORPC tidal energy project.
 - ii. Governor's bond proposal for testing facility for U Maine
 - iii. Maine Wind Energy Industry Initiative
 - iv. E2Tech Cluster Grant from MTI

- v. Governor's Renewable Energy Trade Mission to Spain and Germany Sept 2009
- vi. Governor's request to Secretary Chu of DOE in June, 2009
- vii. Draft Memorandum of Understanding with Nova Scotia Offshore Energy Environmental Research Association (OEER), Nova Scotia Department of Energy, Maine Office of Innovation and University of Maine.
- viii. DOE ARRA Proposal for University-Industry Collaborative submitted July 2009.
- ix. Fox Island project

III. Competition and Incentives

- a. The range of incentives that are being offered is broad – reference table from Ernst and Young, 2009 report – Table 2.
- b. Compare this list with what's available currently from Maine – Table 3
- c. Quite a few other states and countries are very active in this area. Table 4 Other State Programs
- d. Other countries, especially in the European Union and UK are being quite aggressive in this area. Employment from offshore wind deployment was 154,106 in the EU in 2007 and is projected to exceed 377,000 by 2030. [Wind at Work: Wind energy and job creation in the EU, January 2009, European Wind Energy Association]
- e. [All of this material is from 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." By Dr. Marcus Boettcher, Niels Peder Nielsen and Dr. Kim Petrick, 2008 (I think).]

Wind industry is one of the highest-growth industries in Europe. Grown over 12 percent over past five years. Cumulative installed capacity is 57 gigawatts.

- i. Germany, Spain and Denmark have benefited the most and account for more than 70 percent of EU's installed capacity and 90 percent of EU wind sector employees. See Figure 3.
- ii. Bain and Company analysis says 4 factors for this:
 - 1. Support schemes to reduce commercial uncertainty (e.g. feed-in tariffs)
 - 2. Rapid building of new infrastructure (e.g. the grid)
 - 3. A swift process for gaining planning consent for installation sites
 - 4. 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.
- iii. These factors attracted wind turbine manufacturers and clusters developed near these factories. Clusters consisted of material and component suppliers as well as universities and research institutions that provided tailored education and R&D support.

- IV. Other issues
 - a. Workforce Development
 - i. There's a long list of occupations that may be affected by the development of ocean energy in Maine. [source 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 US Department of Labor. [www/onetcenter.org](http://www.onetcenter.org).]
 - 1. Some of these are jobs that would have increased demand, but wouldn't change much or require enhanced skills for workers who are currently employed in our sectors such as pulp and paper, fisheries, marine trades.
 - 2. A few are simply new and emerging such as wind energy operations managers, wind energy project managers, wind energy engineers and wind turbine service technicians.
 - ii. As we learn more about how ocean energy will be deployed in Maine, need to keep an eye on impacts on the existing workforce, especially for skills that may need new training.
 - iii. Also, need to be aware that we probably don't have enough workers in place for the scale that will be required for full deployment of offshore wind, so need to plan for this
 - iv. Predictability
 - 1. A major issue for developers and for the entire cluster is predictability of permitting and other regulatory regimes.
 - b. Economy-wide understanding of impact of changes in electricity costs on other sectors of Maine's economy
 - c. Availability of financing for large-scale ocean energy projects is dependent on addressing risks of transportation and sale of energy as well as development and operations.
 - d. John Henshaw from Maine Port Authority raised the issue that we need to set aside land near our three ports so that large scale assembly and staging could be done.
- V. Demand Side
 - a. Expansion of the demand side for electricity is another essential element of the economic development picture
 - i. Makes the economics of the projects work
 - ii. Makes managing fluctuations in electricity generation from wind work
 - b. Part of this is incentives – e.g. tax credits for heat pumps, geothermal, electric cars, etc.
 - c. Part of this is support for R&D of these demand side products and services
- VI. Recommendations
 - a. Continued support for research and development at the university and nonprofit research institutions, as well as by individual companies for new products, processes, materials, etc.

- i. Lead agencies: DECD (Office of Innovation, Maine Technology Institute) and University of Maine.
- b. \$100,000,000 moral obligation credit enhancement program to encourage the development of ocean energy-related projects. Modeled on the Electric Rate Stabilization Program, this program would use the State's credit rating to reduce financing costs of larger projects with strong fundamentals
 - i. Lead agency: FAME
- c. Provide additional support for private investment in energy-related businesses such as improvements to the Maine Seed Capital Tax Credit or other similar programs to help bring these technologies to scale and to build necessary infrastructure for large scale manufacturing.
 - i. Lead agencies: FAME, DECD (Office of Innovation, Maine Technology Institute), Small Enterprise Growth Fund
- d. Continue support of Maine's Ocean Energy Cluster building initiatives.
 - i. Lead agency: DECD (Office of Innovation, Maine Technology Institute)
- e. Collaborate with other regional R&D efforts, i.e., Nova Scotia Tidal Energy initiative, University of New Hampshire to maximize outcomes.
 - i. Lead agencies: University of Maine, DECD (Office of Innovation, Maine Technology Institute)
- f. Create land bank for parcels of land adjacent to Maine's ports for the future use of companies needing staging areas for large offshore construction projects. This could be modeled on or an extension of Land for Maine's Future and/or Working Waterfront initiatives.
 - i. Lead agencies: Maine Port Authority, DECD, SPO
- g. Provide incentives and remove disincentives for consumers and businesses to adopt new technologies to create a demand for additional electricity from Maine renewable sources, and reduce carbon footprint. This could include state tax credits for purchase of heat pumps, geothermal systems, hybrid cars, plug-in electric vehicles. Exclude the incremental cost of a hybrid from automobile excise tax. Property taxes could deduct from valuation the difference between the cost of a heat pump/geothermal system and a typical oil heating system.
 - i. Lead Agencies: SPO, Efficiency Maine Trust
- h. Provide incentives and remove disincentives for developers to site projects in Maine, and for overseas investment by original equipment manufacturers such as wind Turbine and platform vendors. Explore changes in the municipal property tax laws relating to components stored temporarily on land but deployed offshore. [Need specifics!]
 - i. Lead agencies: DECD, SPO
- i. Develop and supply adaptive training to Maine workers who could transfer to this industry. Expand Governor's Training Initiative to include this.
 - i. Lead agencies: DOL, DECD, MCCA, U Maine

- j. Provide objective information to consumers so they can make informed decisions about adopting new heating and transportation technologies.
 - i. Lead agencies: Efficiency Maine Trust

Todd: be sure to include somewhere in the report a broad notion of at what point does Ocean Energy become an imperative—because Oil prices have hit such and such a level...Working back from that date, it will take us X years to get Y amount of ocean energy online, therefore we need to start by 20XX. Motivation is climate change, environmental concerns, national security.

Figure 1. Cluster Diagram

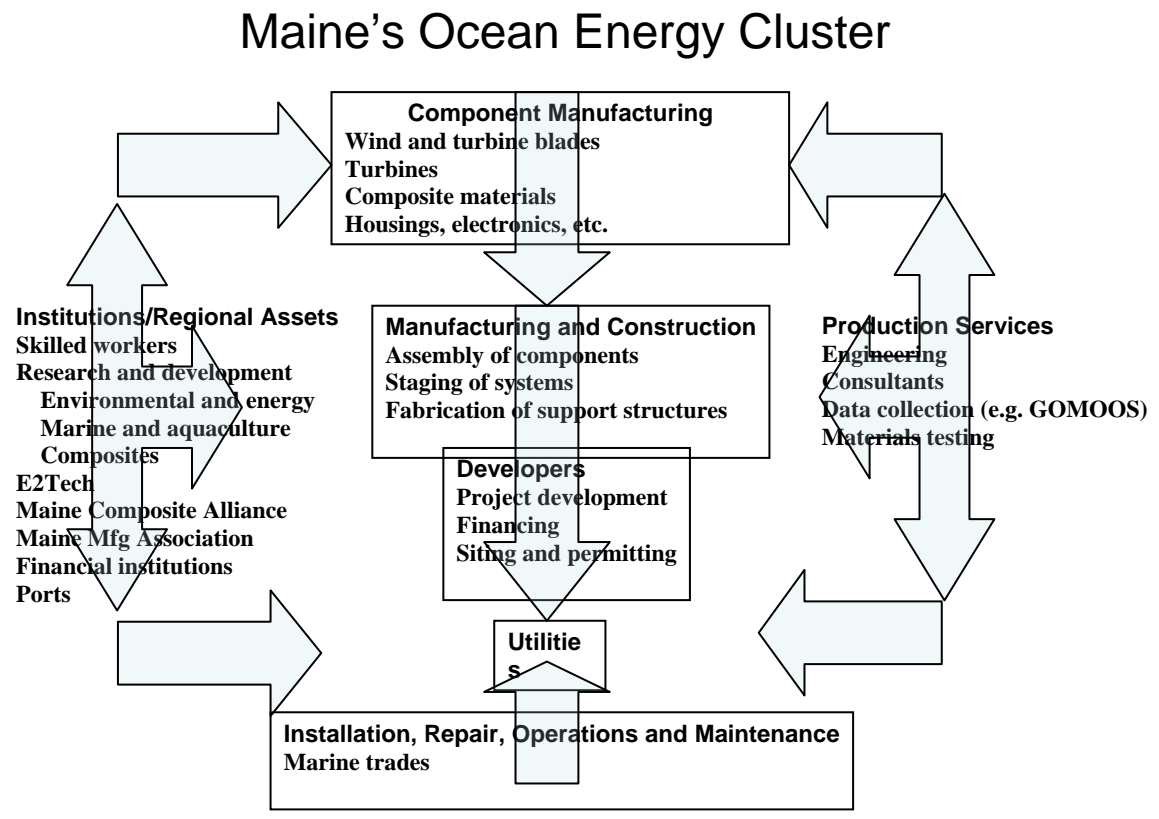
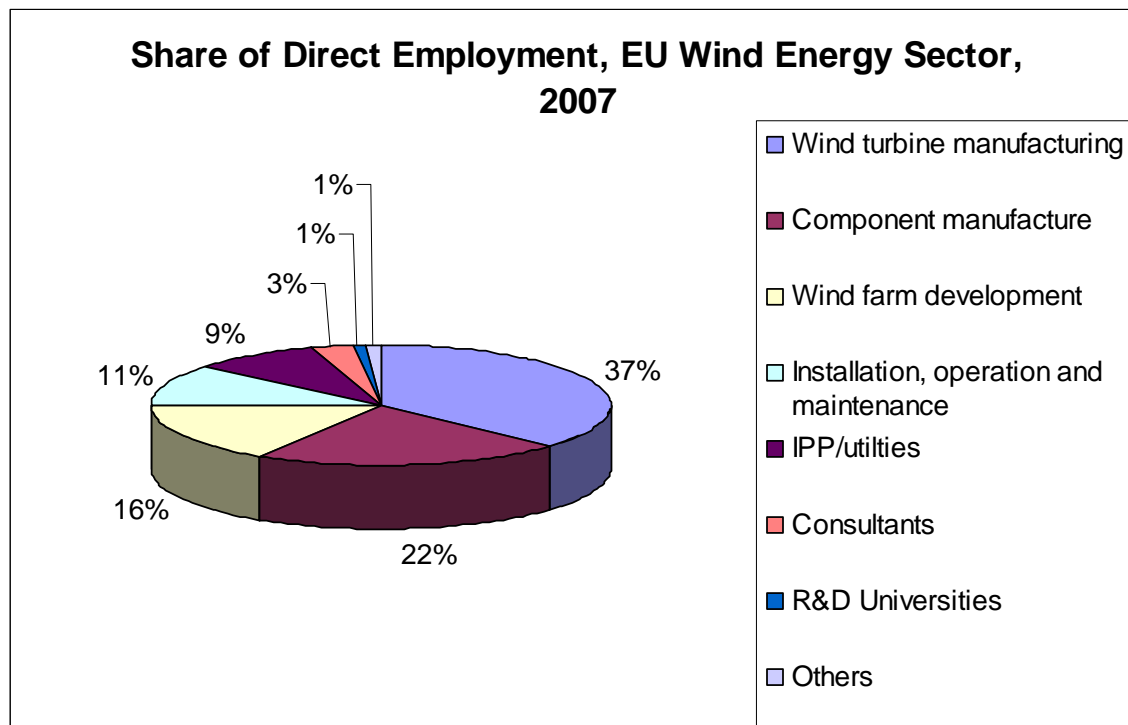


Figure 2. Share of Employment in Various Sectors in European Union



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

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

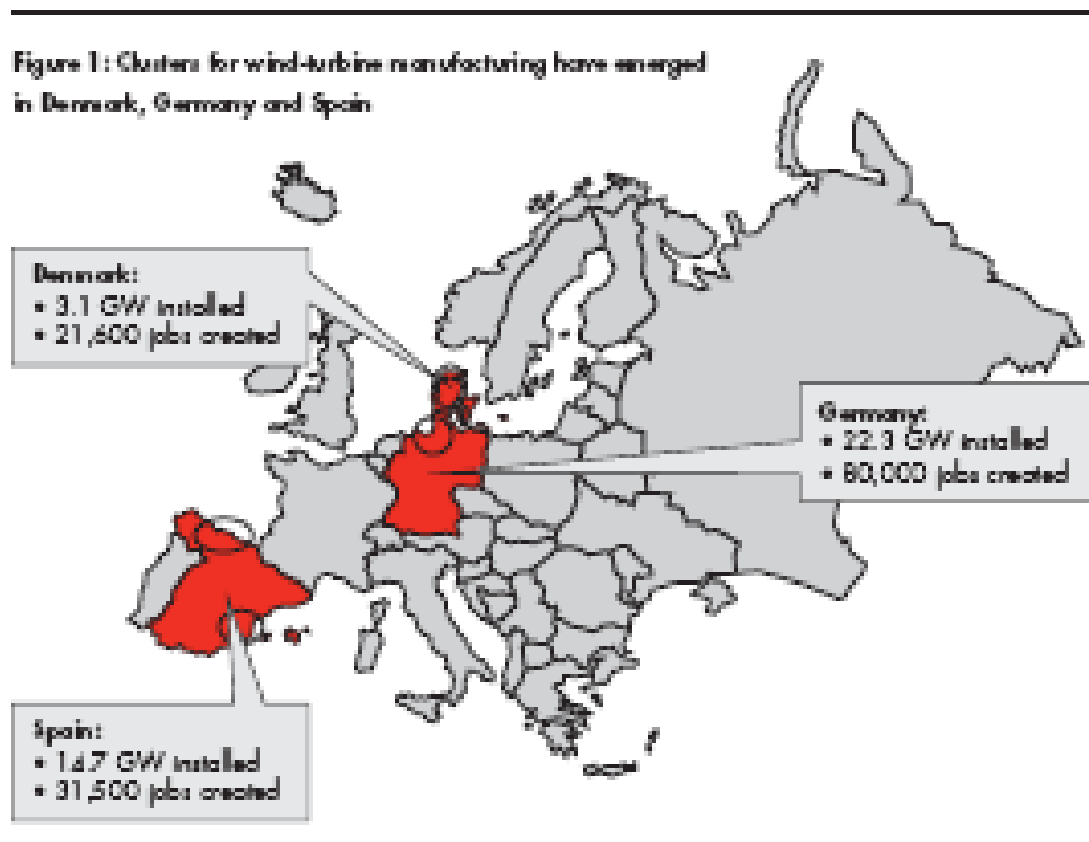


Table 5. Maine's Ocean Energy Cluster (Company names are illustrative and do not include all in Maine....)

Cluster Element	Description	Examples of Maine Companies
Component Manufacturing	Manufacturers of components that make up the final ocean energy project	US Windblades, Bath Kenway Corporation, Augusta Lyman Morse, Thomaston Custom Composites Technologies, Bath Harbor Technologies, Brunswick Mid-State Machines, Winslow Newport Industrial Fabrication, Newport Northeast CNC, Portland
Manufacturing and Construction	Assembly of components, staging of systems, fabrication of structures	Bath Iron Works, Bath Cianbro, Brewer Reed and Reed, Woolwich
Developers	Technology and project development, financing, siting and permitting	Ocean Renewable Power Company, Portland and Eastport First Wind, Newton, MA and Portland Blue Water, Hoboken, NJ Principle Power, Seattle, WA and Camden
Installation, Repair, Operations and Maintenance	All activities related to the installation, ongoing operations, repair and maintenance	
Production Services	Engineering and other professional services, data gathering for permitting, material testing	HDR - Devine Tarbell, Portland Stantec- Portland, Topsham, Presque Isle Maritime Applied Physics Corporation Alion Science and Technology Bernstein Shur-Portland, Augusta Pierce Atwood- Portland, Augusta
Institutional and Regional Assets	University and nonprofit research and development, trade associations, ports	University of Maine activities in environment and energy, marine research and aquaculture, composites and advanced materials. E2Tech Maine Composites Alliance Maine Wind Industry Alliance Maine Manufacturing Association Maine Port Authority Larkin Enterprises Delorme, Yarmouth Northern Maine Community College (training)

		Northeast Technical Institute (training)
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Table 2. Possible Incentives to Support Offshore Wind

Incentive	Potential impact	Implications	Maine's Position
Investment/production tax credits and tax depreciation	Immediate	New investment and production tax credits authorized under ARRA	
Capital grants	Immediate	High cost to state	Maine Technology Asset Fund a model, but significantly higher funds per project will be required
Reduce specific project risks	Immediate	Reduces uncertainty	
Soft loans/credit guarantees	Immediate	Useful for new entrants and smaller developers	Extend existing loan programs to ocean energy projects
Non-financial support for Maine ocean-energy related manufacturing	Medium-term	Could help build capacity over time (3-5 years)	Expedited permitting a la onshore, land banks
R&D funding	Long-term	Advances in new technology likely to see commercialization 10+ years later	Maine Technology Institute, University of Maine
Other, e.g. feed-in tariff	Long term	New legislation required; secondary impacts of higher electricity costs?	

Source: Adapted by Maine Office of Innovation from Ernst and Young, "Cost of and Financial Support for Offshore Wind," A Report for the Department of Energy and Climate Change (United Kingdom), April 2009.

Table 3. Existing Maine Incentives for Developers

Maine Incentives	Description
Pine Tree Zones, statewide	Businesses expanding in Maine in one of the targeted technology sectors (including environment and energy and manufacturing) are eligible for a corporate income tax credit of up to 100% for the first five years and 50% for the next five years; insurance premiums tax credits on same schedule, income tax reimbursement up to 80% for ten years, personal and real property tax reimbursement up to 100% for ten years on new personal and real property, property tax reimbursement up to 100% for 30 years and reduced electricity rates.
Sales Tax Exemptions (fuel and electricity for manufacturing, manufacturing machinery and equipment)	Manufacturers are exempt from paying 95% of the sales tax on fuel and/or electricity used in the manufacturing operation. Also, sales of machinery and equipment used by purchaser directly in production exempt from sales tax.
Governor's Training Initiative	Develops and coordinate training for firms intending to expand or locate in Maine. Includes reimbursements for on-the-job training, competitive retooling, assessment, job-task analysis, workplace safety and literacy, specialized recruitment, high-performance skills or customized technical training.
Maine Quality Centers	Offers free training and education to qualified new and expanding businesses.
Commercial Loan Insurance Program	Insures a portion of a loan made by a financial institution.
Municipal Tax Increment Financing	Maine municipalities may target some of all of the new property taxes from a commercial or industrial project within a designated district to assist in that project's financing.
Jobs and Investment Tax Credit	Up to \$500,000 for investment in qualified property which creates at least 100 new jobs within two years and invests at least \$5 million in one year.
Business Equipment Tax Exemption	Qualified business equipment first subject to property tax assessment on or after April 1, 2008 will be exempt from property taxes.

Table 4. Matrix of Economic Development Policies from Selected Other States

<i>Economic Development Policy</i>	Maine	Massachusetts	Rhode Island	New Jersey	Delaware
<i>Research and development funding</i>	Maine Technology Institute funds R&D&C in all sectors including energy: \$12.7 million since 2006; Advanced Engineered Wood Composites Center with capacity to test large wind blades	Renewable Energy Trust created in 1998 in MA Technology Collaborative; strategic research, marine energy offshore test and development facilities. \$10 million for NREL Wind Technology Testing Center in Charlestown.	Renewable Energy Fund run by RI Economic Development Corporation; Center of Excellence in Research for Offshore Renewable Energy at URI	Rutgers University Energy Institute; Edison Renewable Energy Technologies Fund, New Jersey Commission on Science and Technology for R&D	Center for Carbon-free Power Integration at UD. Green Energy Research and Development Program pays up to 35% of projects such as engineering, adaptation or development of products and processes that relate to renewable energy technology
<i>Cluster development</i>	Maine Technology Institute funds cluster development including in energy. Has funded Ocean Energy Cluster project through E2Tech	MA Technology Collaborative – directory of all renewable energy companies in MA; cluster development			
<i>Project funding</i>		Renewable Energy Trust, Green Communities Act of 2008 grants, loans and equity investments including commercial scale, community scale and small scale wind projects.	Municipal renewable energy investment program to fund qualified municipal projects; similar fund for affordable housing projects. Run by RI Economic Development Corporation		Green Energy Fund, Delaware Energy Office, up to 50% of the installed cost of renewable energy systems.

<i>Economic Development Policy</i>	Maine	Massachusetts	Rhode Island	New Jersey	Delaware
<i>Financial incentives</i>	Pine Tree Zone should apply to land part of projects; TIF allowable for energy projects	Corporate deductions and excise and sales tax exemptions for solar or wind powered systems; support for moving to the state to set up a new renewable energy business		\$19 million in production incentives paid over five years, making bond financing available and also tradeable renewable energy certificates for developer.	
<i>Stimulate demand side</i>	Efficiency Maine, various measures before the legislature e.g. LD 1181	Green Communities Act of 2008 – utility companies required to purchase all energy efficiency improvements; required to entered into 10-15 year contracts with renewable energy developers; net metering allowed	Net metering	Clean Energy Program promotes increased energy efficiency and the use of renewable energy. \$141 mm in financial incentives to residential customers, businesses, schools, and municipalities. Net metering.	House Bill 6, (2006) long-term contracts, self-generation, programs by utilities to reduce or shift electric consumption. Net metering. Tax credit (Green Industries Program) use of recycled materials and reduction of waste generation through source reduction.
<i>Renewable Portfolio Standard</i>	Class I: 10% by 2017; Class II: 30% by 2000	Green Communities Act of 2008 increases rate of increase to 25% in 2030	Enacted in 2004, 16% by 2019	22.5% by 2021	20% by 2019
<i>RGGI</i>	In	In	In	In	In
<i>Use of State Waters</i>	Maine Submerged Lands Program	Oceans Act of 2008 – by 12/31/09 have comprehensive plan to manage development in state waters	Offshore Wind Stakeholders Report decided that formal environmental impact analysis and permitting process will be used to choose sites.		
<i>Pre-approved site(s)</i>					

<i>Economic Development Policy</i>	Maine	Massachusetts	Rhode Island	New Jersey	Delaware
<i>Request for Proposal</i>		No. Cape Wind proposed by private developers.	Yes. Joint development agreement with Deepwater Wind Rhode Island –state will identify approved sites and company will select one for development.	Yes. Garden State Offshore Energy chosen.	Yes. Wind Power Purchase Agreement with Babcock and Brown
<i>Study of Role of Wind in Supplying Power</i>	Gov’s Task force on Offshore Wind		Yes, 2007	Gov’s Blue Ribbon Panel 2004; cost and benefits study of Offshore Wind 2007	
<i>Stakeholder Report</i>			Yes		
<i>Stakeholder Council</i>			Energy Efficiency and Resource Management Council		
<i>Ecological Baseline Study</i>				In progress due 9/09	