U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

WIND AND WATER POWER PROGRAM

# New England Wind Forum

A Wind Powering America Project — Newsletter #6 — September 2010

Doug Welch, Courtesy of Hull Municipal Lighting Plant/PIX11261

## New England and Northeast Look to the Horizon...and Beyond, for Offshore Wind

In early December, Boston hosted the American Wind Energy Association's second annual Offshore Wind Project Workshop. U.S. and European offshore wind stakeholders convened to discuss the emerging U.S. offshore wind industry and provided evidence of a significant increase in activity along the Atlantic Coast from the Carolinas to Maine. The wind power industry and policymakers are looking to offshore for long-term growth, driven by aggressive policy goals, economic development opportunities, a finite set of attractive land-based wind sites, and immense wind energy potential at a modest distance from major population centers.

The past few months have seen a tremendous increase in offshore wind-related activity, from federal permitting and state policy to project contracting, development, and regulatory approvals, culminating in a glimpse at offshore wind economics. Since the release of the final rule on offshore renewable energy development on the Outer Continental Shelf (OCS) by the Interior Department's Bureau of Ocean Energy Management Regulation and Enforcement (BOEMRE) last spring, the federal government has moved forward with implementation. BOEMRE announced that it would establish a new Atlantic OCS regional office in 2010 to support the region's offshore renewable energy development. This office is responsible for evaluating permits for renewable energy activities including leasing, environmental programs, the formation of task forces, state consultation, and post-lease permitting in federal waters off the East Coast. BOEMRE recently met with local stakeholders to discuss streamlining the permitting process established last year, including hosting an OCS Wind Energy Summit for governors and representatives of Atlantic Coast states in February. BOEMRE also formed intergovernmental task forces with Rhode Island, Massachusetts, and

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other coastal states to determine target areas for offshore wind development in preparation for a Request for Information (RFI) to initiate leasing of East Coast offshore wind parks. BOEMRE has already issued an RFI for Delaware, but BOEMRE's oil spill containment responsibility may delay the release of additional RFIs.

### State Policy Initiatives Move Forward

Meanwhile, New England states have taken significant steps to encourage offshore wind planning, permitting, and development in state and adjacent federal waters. In December, the final **Massachusetts Ocean Management Plan** was released, which encourages more community-scale offshore wind energy development through the creation of a formal role for regional planning authorities in wind, wave, and tidal energy (namely in determining "appropriate scale" for commercial and community-scale projects and providing explicit approval for community-scale projects). The plan specifies that 50% of any mitigation funds will be directed to one or more host communities. It also indicates that up to 100 turbines may be sited as community-scale projects and identifies two designated wind energy areas suitable for larger, commercial-scale wind energy development: one off the Elizabeth Islands and the other south of Nomans Land, off Martha's Vineyard. Adjacent to these areas, the plan identifies potentially suitable locations in federal waters for commercial-scale wind energy development.

In April, the Maine legislature passed LD 1810, An Act to Implement the Recommendations of the Governor's Ocean Energy Task Force (the **final report** was released in December 2009 and discussed in the last newsletter), now codified as Public Law, Chapter 615. While Massachusetts has a shallow continental shelf amenable to offshore wind development with depths similar to the offshore wind development in Europe, Maine's wind potential lies in deeper waters. The report recommended establishing a goal of 300 megawatts (MW) of offshore wind energy in Maine by 2020 and 5,000 MW by 2030. It detailed policy recommendations to facilitate leasing of submerged lands, establish fees and royalties, create mechanisms to discourage site banking, and form a Renewable Ocean Energy Trust Fund. In enacting the task force recommendations, the law addresses funding, development and transmission siting, port facilities, financing, leasing, and other components aimed at streamlining and supporting the growth of a deep water offshore wind industry. The law required the state's public utilities commission (PUC) to solicit offshore energy proposals and directed state utilities to enter into 20-year contracts for up to 30 MW of offshore energy generation facilities (these could include wind, wave, or tidal). It stipulated that the price and other terms proposed should not have an unreasonable impact on electricity rates. In parallel, the University of Maine was awarded $12.4 million in January from the U.S. Commerce Department's National Institute of Standards and Technology, through the American Recovery and Reinvestment Act of 2009 (ARRA), to construct a deepwater offshore wind energy research and testing facility. Separately, the University of Maine received an $8 million award from U.S. Department of Energy stimulus funds to install turbines for offshore wind testing at Monhegan Island, Boon Island, and Damariscove Island.

The Rhode Island Ocean Special Area Management Plan (SAMP) is currently in the public review phase. The Ocean SAMP is a zoning mechanism for state and adjacent federal waters in an attempt to reach Rhode Island's in-state wind goal of 15% of the electric load. Led by the Rhode Island Coastal Resources Management Council (CRMC), the Ocean SAMP will serve as a federally recognized coastal management and regulatory tool. It will be funded by Deepwater Wind, the state's competitively selected "preferred developer," and in return, Deepwater Wind has first choice of approved offshore wind sites identified in the SAMP, although parallel legislative initiatives have accelerated some development ahead of SAMP completion.

### Offshore Wind Projects Achieve Development Milestones

The increase in attention to offshore wind is partially attributable to the focus on high-profile projects like Cape Wind's project in Nantucket Sound and Deepwater Wind's Block Island, Rhode Island project (See detailed updates elsewhere in this issue). During the spring of 2010, Cape Wind achieved a series of major milestones. It selected a turbine manufacturer, received final federal approvals from Secretary Salazar, obtained FAA clearance, and filed with the Massachusetts Department of Public Utilities for approval of a long-term power and renewable energy credit purchase agreement with utility National Grid for 50% of its output. Rhode Island's pilot-scale project in state waters off Block Island suffered a setback when the long-term contract between Deepwater Wind, the state's preferred developer, and National Grid was unanimously rejected by the three-member PUC on March 30, 2010, due to rate impact concerns. Subsequently, the Rhode Island legislature passed a new law sending a revised long-term contract back before the PUC to be considered under different criteria, with a final written decision due in mid-August. Meanwhile, under its Memorandum of Understanding with the state, Deepwater continues to pursue a larger-scale project in federal waters off Rhode Island.

### Offshore Wind Economics Moves to Forefront

With the filing of the region's first offshore wind power contracts for approval, regulators and the public got their first glimpse at the price tag and experienced some sticker shock. First, the Deepwater Wind 28.8-MW Block Island pilot project sought approval for a 20-year contract starting at 24.4¢/kilowatt-hour (kWh) (excluding transmission costs), and the costs would escalate by 3.5% annually. Testimony in the case supported the well-understood notion that offshore wind economies of scale are steep (hence the majority of projects proposed are in the 300- to 600-MW range or larger) and the notion that a pilot-scale project has a higher unit cost than a full-scale project. The project was also proposed for deeper

water than most existing offshore wind plants; thus it requires new foundation technology that is just moving beyond the first demonstration installations. Based on these issues, it is not surprising that the price exceeds that of a full-scale project. Nonetheless, when compared to current market electricity prices (deeply suppressed by the recession and the recent exploitation of large natural gas reserves) and other available renewable energy alternatives (including land-based wind), the proposed price represented a substantial premium.

In early May, Cape Wind and National Grid filed for contract approval in Massachusetts. This was a 15-year proposal, with a contract price of 20.7¢/kWh (including the cost of required transmission), escalating at 3.5% annually. This price was higher than expected and is being decried by project opponents. Expectations were shaped by reports of lower costs in the early days of Cape Wind based on cost modeling by BOEMRE during the project's Environmental Impact Statement proceeding, far greater economies of scale than the smaller Rhode Island project, the lower-cost of land-based renewable energy alternatives, and the project developer's assertions that Nantucket Sound was the best (most economical) offshore wind site in the region. However, expectations may not have been entirely reasonable because all generation technologies experienced substantial cost increases in 2007-2009. Further, when using the Deepwater Wind contract as a comparison, the smaller-than-expected price difference can be attributed in part to 5 fewer years under the shorter contract term to amortize large fixed costs.

Nonetheless, perhaps these two data points are truly indicative of what the first generation of offshore wind will cost. This raises a big question about price expectations. Offshore wind, while a commercially viable technology in Europe today, is in an immature technology implementation phase today in the United States. The situation is compounded by the lack of local manufacturers of offshore wind equipment (why locate where there is no market?), and the lack of any local installation and support infrastructure (there are no specialized ships in the eastern United States to support the industry). The Town of Hull, Massachusetts, which currently has two operating onshore wind turbines that enjoy near-unanimous public support, is considering shelving a planned offshore wind project due to cost concerns. All observers expect offshore wind prices to decline over time as the industry matures, gathers scale economies, and develops the local infrastructure required. The public's expectations may need to be that the first projects will cost more and are necessary stepping-stones to building the infrastructure needed to lower costs as the industry matures. There is now pressure on the offshore wind industry to demonstrate progress toward decreasing the per-kWh cost over time.

## Accelerated Wind Development Pace in New England Increases Focus on Wind Farms as Neighbors

As the newly updated New England wind map (see article inside, p. 5) shows, the pace of wind development throughout the region has rapidly accelerated in the past few years. As wind power installations become a neighbor to more people in both populated and rural settings, several factors are increasing public attention on wind power. Issues impacting public acceptance include concerns about sound, visual impacts, related health concerns, impacts on property values, and the effectiveness of wind power, as a variable resource, at achieving the expected benefits of reduced fossil fuel usage, emission reduction, and increased jobs. Public acceptance of wind rests on questions such as "What constitutes an 'appropriately sited' wind power facility?" Other questions arise from concerns about the impacts of change and the resulting fear of the unknown. These concerns, which inevitably coincide with any development activity (a new residential subdivision, mall, highway, transmission line, or power plant), are heightened in a number of communities.

With the pace of wind development accelerating, questions are raised throughout the region. Are reports of annoyance or disturbance unusual occurrences blown out of proportion, or are they representative? At what distance are neighbors insulated from potential problems? What are appropriate setbacks in densely populated and rural communities? How will local stakeholders be impacted by a view of a wind farm? With more questions than answers, and in some cases heavy handed pressure from the community, and under time pressure to react to wind development proposals, several communities have passed or proposed ordinances requiring substantial setbacks or sound limits, voted down proposed projects, or implemented temporary wind siting moratoriums to allow time to study the facts (see article inside, p. 4).

In this issue, we highlight an example on the island of Vinalhaven, Maine, where some nearby supporters of the community-owned, three-turbine installation are experiencing sound disturbance exceeding expectations. We report on a range of project approvals, rejections, and appeals, and the development of ordinances and moratoria in a number of communities reacting to wind project proposals. And we introduce a new undertaking — the New England Wind Energy Education Project — which is intended to provide objective information on the impacts affecting public acceptance of appropriately sited wind power facilities.

## Issues Affecting Public Acceptance of Wind Energy

### Fox Islands Wind Project Seeks to Manage Unexpected Impacts

The consumer-owned Fox Islands Electric Co-op has operated the electric utility in Vinalhaven (Maine) since 1974, but it did not develop an interest in wind until 2001. Wind power was initially considered an alternative to significant and costly upgrades to the undersea power cable, which connects the islands to the mainland. After years of feasibility and development work, the co-op implemented a creative financing and ownership structure that leveraged both federal tax incentives and Rural Utility Service (RUS) financing to fund and build the three-turbine, 4.5-MW project that was expected to also reduce and stabilize retail electricity prices. The utility's member-owners and the project's neighbors were extremely supportive of the project.

Now the project may inadvertently become a laboratory for understanding and mitigating the sound impacts of wind projects. Within weeks after the project's December 2009 commissioning, a handful of neighbors – some of whom were ardent supporters of the project – began voicing concerns to the co-op regarding the sound of the project's operation. Shortly thereafter, a group of neighbors formed the Fox Island Wind Neighbors (FIWN) organization to articulate their concerns, primarily related to the unanticipated noise impacts. FIWN asked that the turbines' operation be curtailed or stopped altogether. The co-op, in its capacity as project owner and representative of the impacted community that owns the co-op, is studying the issue, attempting to understand the nature and regularity of the problem, the reach of its impact, and how to mitigate it. Confounding the co-op's efforts to study the issue, other neighbors, some located closer to the turbines, have reported that they are not bothered by sound at all.

In February and early March, the co-op's board of directors issued a request to the 18 households within a half-mile of the project, asking occupants to keep detailed logs describing the sounds of the turbines and their perceived level of annoyance. During this period, the turbines were manually slowed during random periods in an effort to test whether moderate slowing of the turbines had a noticeable effect on annoyance. The results, which were prepared with help from Lawrence Berkeley National Laboratory, are summarized in a **May 2010 update from the co-op**. They indicate statistically insignificant impacts on perceived annoyance to the moderate changes in turbine operation. However, the test was hampered by a low survey response rate and occurred during a period when only two of the three turbines were operating; therefore, the researchers urged further study. The co-op recently received a grant from the U.S. Department of Energy through its National Renewable Energy Laboratory to continue studying the sound issue.

### Maine Towns Seek to Slow Wind Development Pace

While Maine's expedited permitting process has contributed to the acceleration of wind project development, citizens in many Maine towns have raised questions about wind farms as neighbors (see p. 3, "Accelerated Wind Development Pace in New England Increases Focus on Wind Farms as Neighbors"). They have tried to slow down, limit, or otherwise control wind development through a series of ordinances. Many of the towns are active wind development sites. In many cases, the proponents of these actions state that their intent is to buy time to gather information to make better-informed siting decisions. In other cases, the actions may reflect some resident's desire to limit or foreclose wind development. Maine communities that have taken action to date are:

- Thorndike: adopted a wind turbine ordinance
- Penobscot: passed a temporary wind turbine moratorium while it develops a complete wind turbine ordinance
- Fort Kent: approved a wind turbine ordinance, which unlike many other wind turbine ordinances approved by Maine communities, regulates wind turbines by noise, rather than distance
- Montville: approved a wind turbine ordinance
- Burnham: voted to begin developing a wind turbine ordinance
- Unity: rejected a wind turbine ordinance
- Eddington: adopted a 180-day wind turbine moratorium
- Avon: adopted a 180-day wind turbine moratorium
- Woodstock: did not pass a proposed wind turbine moratorium
- Rumford: approved a 6-month extension on the existing wind turbine moratorium
- Blue Hill, Orland, Brooklin, and Stonington: are in various stages of considering a moratorium
- Dedham: adopted an ordinance that sets towers height limits
- Rockland: did not pass a proposed wind turbine moratorium.

### New England Wind Energy Education Project Kicks Off Its Eight-Part Webinar Series

Good decisions require good information. With the rapid increase in wind power development activity throughout the region and the accompanying increased attention to public acceptance of wind power, the New England Wind Energy Education Project (NEWEEP) was launched in early 2010. The organization is producing an eight-part Webinar series and an in-person conference (planned for spring of 2011) designed for the general public, local officials, facility siting decision-makers, policy-makers, and others seeking objective information on wind energy impacts.

The free NEWEEP Webinar series:

- Collects and disseminates accurate, objective, and up-to-date information on critical wind energy issues impacting market acceptance of the hundreds of land-based and offshore wind development projects proposed in the region
- Enhances the region's public acceptance of appropriately sited wind energy generation.

NEWEEP is funded by the U.S. Department of Energy's (DOE's) **Wind Powering America** (WPA) initiative under a 2-year grant and is directed by a steering committee consisting of New England state agencies, regional and national research organizations, and New England's regional grid operator. It is neither industry-funded nor industry-driven. The objectives of the NEWEEP Webinar series are to:

- Cut through the clutter of competing, conflicting, and sometimes misleading information on critical issues pertaining to wind energy generation
- Help address concerns in communities where wind projects are proposed
- Identify areas for future research (data gaps).

NEWEEP kicked-off its first Webinar May 5 with "The Impact of Wind Power Projects on Residential Property Values," followed by "Understanding the Impacts of Wind Turbine Sound" on July 13. "The Impacts of Wind Power Variability: Grid Integration & Environmental Objectives" will be presented in early fall.

NEWEEP is designed to complement the **New England Wind Forum** (NEWF) Web site and newsletter. NEWEEP's Web site, currently under construction, will become a part of NEWF's Web site. NEWEEP's invitations to upcoming Webinars and all Webinar materials – audio recordings and presentation files, transcripts, reference materials – will be posted on the **New England Wind Forum** (NEWF). To receive NEWEEP webinar invitations, please **SIGN UP** for the NEWF newsletter/ NEWEEP Webinar invitations.

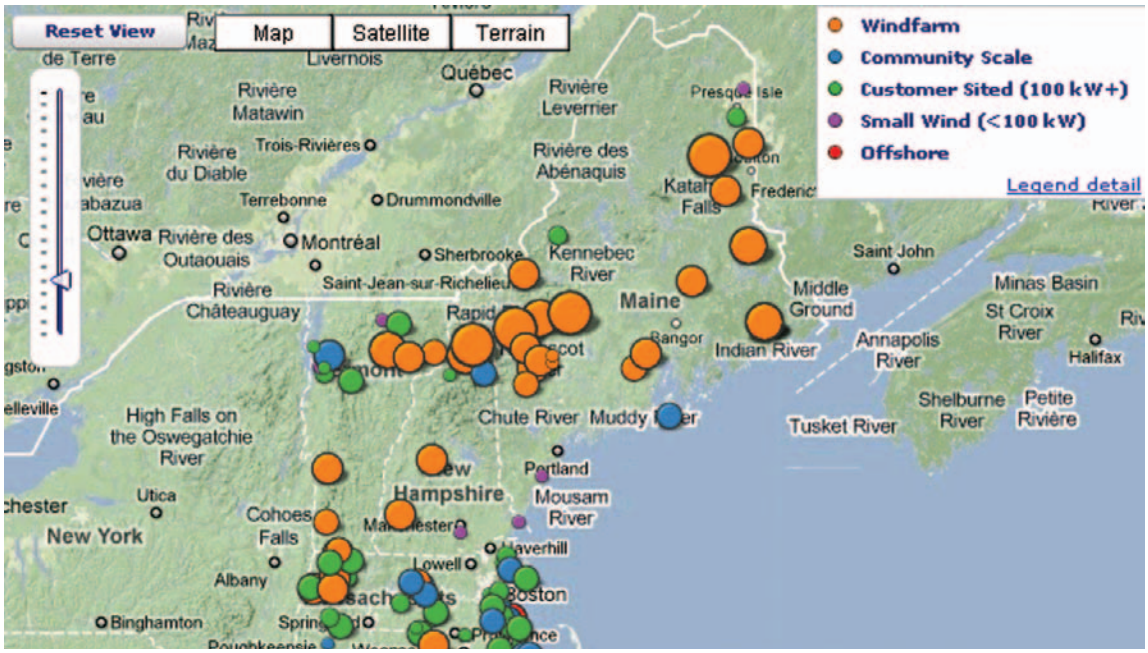
### First NEWEEP Webinar Explores Impact of Wind Projects on Property Values

NEWEEP's first Webinar, "The Impact of Wind Power Projects on Residential Property Values," had nearly 450 registrants and featured a presentation by Ben Hoen, consultant to Lawrence Berkeley National Laboratory. Hoen gave an overview of research conducted to date, as well as a discussion of measuring, mitigating, and managing potential impacts going forward. An extensive question and answer session followed, allowing participants to explore their experience and concerns and identifying needs for additional information.

Preceding Hoen's presentation, moderator Bob Grace of Sustainable Energy Advantage, LLC introduced the NEWEEP project and Webinar series, and Heather Hunt, executive director of New England States Committee on Electricity (NESCOE), provided context for the NEWEEP project with a presentation on "Wind Power's Role in Meeting Regional Policy Objectives."

## Wind Project Updates

As demand for wind power continues to expand, development is keeping pace. This newsletter provides a broad – though not comprehensive – update of wind power development activities throughout the region. We are also pleased to announce the release of a new and improved **wind project map** hosted on the NEWF Web site. This new map reflects all of the projects tracked by the NEWF and includes new features which allow you to filter the data by state, project size, or other criteria. Check out **projects in New England**.



PIX17545

Stetson II Wind Farm. Courtesy of First Wind.

## Commercial-Scale Wind Project Update

**Maine**: In April 2010, developer First Wind commissioned its **Stetson Wind II** project, a 17-turbine, 25.5-MW expansion of the Stetson Wind Project (Phase 1 was 57 MW and began commercial operation in 2009). Harvard University agreed to purchase half of the power and renewable energy credits produced by the project for 15 years. First Wind continues to develop additional projects across Maine, including two projects that it hopes to construct in 2010. The company received permit approvals in April 2009 from the Maine Department of Environmental Protection (DEP) for its proposed 40-turbine, 60-MW **Rollins Mountain** project in Lincoln, Burlington, and Lee. An appeal of that permit by the Friends of Lincoln Lakes group, which argued that the DEP ignored conflicting scientific evidence about the project's potential impacts on residents and wildlife, was rejected in March 2010. However, a separate appeal is currently before the Maine Supreme Judicial Court and is expected to be resolved in 2010. In addition, the Maine DEP also issued permits for First Wind's 34-turbine, 51-MW **Oakfield** Wind Project. The permit has been appealed to the state Board of Environmental Protection. Finally, First Wind is also preparing studies in advance of submitting a permit application for its **Longfellow** wind project near Rumford. The Longfellow project could be as large as 50 MW.

In October 2009, the first 66-MW phase (comprised of 22, 3-MW turbines) in TransCanada's 132-MW **Kibby Mountain Wind Project** was energized in Kibby and Skinner Townships in the Boundary Mountains. The remaining 66 MW are now under construction. This second phase is expected to be operational by the fall of 2010. Once operational, Kibby Mountain will become the largest wind project in New England. TransCanada is also seeking to develop the **Kibby Mountain Expansion** on Sisk Mountain (up to 45 MW). Maine's Land Use Regulation Commission held public hearings on the project and is now reviewing the full project permit application. The developer's goal is to have the project commissioned by 2012.

In 2009, Patriot Renewables announced the **Saddleback Mountain** and **Spruce Mountain** wind projects. Patriot submitted its DEP permit application for the Spruce Mountain project. Up to 20 MW in capacity, the Spruce Mountain project is tentatively planned for construction in 2011. The Saddleback Mountain project in Carthage may be up to 34.5 MW, with construction anticipated for 2011-2012. Patriot intends to file permits in 2010.

In August 2009, the DEP approved Independence Wind's permit application for the 22-turbine, 55-MW **Record Hill Wind Project**, proposed for Byron and Roxbury. That permit is under appeal, although it is expected to be resolved in 2010. Construction is currently planned for 2011. Independence Wind is also planning the **Highland Plantation Wind Project**. Permit applications for the project have been submitted with the hope of installing the 120- to 140-MW project in the 2012 timeframe. Meanwhile, Horizon Wind Energy is developing the **Northern Maine Aroostook County Wind Project** in phases, with the first, **Number 9**, potentially up to 350 MW. Wind measurement and environmental studies are ongoing. This first phase is proposed for a mountain ridge west of Bridgewater. The project will depend on additional transmission capacity, though developer Horizon Wind said that it will finance construction of a transmission line if needed.

PIX17546

Granite Reliable Power Wind Park. Courtesy of Noble Environmental Power

**New Hampshire**: Earlier this spring, the Supreme Court denied the Industrial Wind Action Group's appeal of the New Hampshire Site Evaluation Committee's 2009 granting of a certificate of site and facility to Noble Environmental Power's 99-MW **Granite Reliable Power Wind Project** under development in Coos County. In May, the Vermont Public

Service Board approved a long-term power purchase agreement between two Vermont utilities, Green Mountain Power (GMP) and Central Vermont Public Service Corporation (CVPS), and the New Hampshire facility. CVPS plans to buy 30% of the output, and GMP will purchase 25% of the output for 20 years starting in 2012. Iberdrola filed for SEC approval of its 48 MW **Groton** wind farm in April, with the intent of starting construction on the 24-turbine project in 2011. Meanwhile, Wagner Forest Management continues to advance the 180-MW **North Country Wind** project in Coos County. MET towers have been installed onsite and are collecting wind speed data. The project is part of the Coos transmission loop, in which a number of other renewable energy projects intend to interconnect. It will, therefore, require a major network enhancement. Wagner is involved in the transmission planning process at the state level, and it is hoped that North Country Wind can become an anchor project for new transmission. (See related article in the Wind Policy Updates section.)

**Vermont**: In Lowell, Green Mountain Power (GMP) and the Vermont Electric Co-op are working to develop the **Kingdom Community Wind Project**. In May, GMP filed for Public Service Board approval of the proposed 21-turbine, 63-MW project. Although a new MET tower was recently installed, wind resource data have been collected at this site by various wind project developers dating back to 2003. The proposal was filed after the town voted 75% in support of the project, a key indicator of strong local support that the utilities sought before filing. Meanwhile, the **Vermont Community Wind Farm** recently announced that it no longer plans to proceed with a proposed 40- to 80-MW wind farm in and near Ira. The developer performed a series of fatal flaws analyses, entered into several landowner agreements, and was preparing a state Section 248 permit application. The project was proposed principally for the Town of Ira, but it also proposed several turbines in Poultney, Middletown Springs, Tinmouth, Clarendon, and West Rutland. The developer's decision was influenced by Ira's recent passage of a wind turbine ordinance that eliminated any potential for installing turbines in that community.

Meanwhile, First Wind's **Sheffield Wind Project** lacks only a stormwater permit to begin construction of its 16-turbine, 40-MW wind farm. While that permit has been under appeal since 2009, resolution is anticipated soon. If the permit is upheld, construction is expected to start in 2010. In southern Vermont, Iberdrola continues to advance the **Deerfield Wind Project** (an expansion of the existing facility in Searsburg). The United States Forest Service is expecting to release a Supplemental Draft Environmental Impact Statement in mid-summer with a Final Environmental Impact Statement and Record of Decision by the end of the year. The Deerfield project previously received its Certificate of Public Good from the Vermont Public Service Board in early 2009. The Deerfield project will be the first on Forest Service land.

The **Georgia Mountain Wind Project**, a three- to five-turbine, 12-MW project proposed for Milton, has completed a comprehensive set of environmental studies and is anticipating receipt of its Section 248 permit by summer 2010. Project proponents intend to begin construction by the year-end 2010 deadline to qualify for the 30% federal cash grant.

The rights to the **Grandpa's Knob** wind project, a facility in the early stages of development, were recently sold by Noble Environmental Power to Vermont-based Reunion Power. Reunion Power will evaluate the site's potential for wind generation up to 50 MW.

**Massachusetts**: The 20-turbine, 30-MW **Hoosac Wind Project** under development by Iberdrola Renewables in western Massachusetts awaits resolution of an extended legal appeal of its wetlands permit. In late 2009, the developer filed a Notice of Project Change with state regulators, increasing the number of acres. In February 2010, Secretary for Energy and Environmental Affairs Ian Bowles issued a Certificate indicating that the changes did not require a full Environmental Impact Report.

The 130-turbine, 468-MW **Cape Wind Project** proposed for Nantucket Sound cleared a number of hurdles en route to construction. Since the last newsletter, Cape Wind received its final approvals, which include a Record of Decision from BOEMRE (bringing the environmental review process to conclusion) and a formal notification from Secretary of the Interior Ken Salazar that the project is not eligible for listing on the National Historic Register.

In addition, Cape Wind filed a contract with the Massachusetts Department of Public Utilities (DPU) for approval of a power purchase agreement (PPA) with National Grid. That PPA envisions operation in late 2012. National Grid agreed to purchase 50% of the project's output for 15 years. Cape Wind also seeks approval of a second PPA with National Grid for the remaining 50% of the project's output; this one will be transferable by National Grid to one or more third parties. If approved, this approach would expedite financing through the effective pre-approval of a PPA, obviating the need for subsequent approval proceedings, in Massachusetts or elsewhere, as a prelude to financing.

In addition, the Massachusetts Supreme Court ruled in favor of Cape Wind regarding the undersea cable connection to the mainland. The project also received approval from the Federal Aviation Administration in its determination that no hazard to air navigation exists. Nonetheless, the project expects significant additional challenges from long-time opponents before it can begin construction, which is targeted for 2011.

In contrast, Patriot Renewables is no longer actively pursuing its **South Coast Offshore Wind Project**, originally proposed for Buzzards Bay. The company has turned its focus to onshore projects throughout northern New England. Patriot Renewables also recently announced a project in western Massachusetts that could be as large as 16 turbines and

approximately 32 MW. MET towers have been installed in Savoy, and another tower is planned for Adams. The 12.5-MW **Minuteman Wind Project** recently received its special permit from the Town of Savoy. Project developers are now expected to turn attention to interconnection and resolve with the Western Massachusetts Electric Company questions regarding whether the project requires improvements to the local distribution system. Minuteman Wind hopes to complete construction of five 2.5-MW Clipper turbines in 2011. The equipment transportation plan is finalized, and Minuteman Wind now seeks long-term PPAs for the project.

After more than a decade in development, the 10-turbine, 15-MW **Berkshire Wind** facility in western Massachusetts remains stalled with two and a half project towers constructed. Construction was halted in October 2009 after a real estate developer planning to build luxury condominiums on an adjacent property was granted an injunction by the Massachusetts Land Court in a dispute over the project's access road. There is no specific timetable for resolution of the injunction, and the court has instructed the parties to work on a settlement.

**Rhode Island**: In Rhode Island, the state's Office of Energy Resources selected Deepwater Wind as the preferred developer to construct the state's first offshore wind farms. A PPA between Deepwater Wind and utility National Grid outlines the pilot-scale 28.8-MW **New Shoreham Wind Project**, which will be located off Block Island. This project was recently rejected by the Rhode Island Public Utilities Commission. The agreement was part of the Rhode Island legislative mandate that Narragansett Electric (National Grid) solicit for long-term contracts for renewable energy. While the project cost continues to be controversial, based on continued support by the both the Administration and the legislature, new legislation was passed in early June to send the contract back to the PUC for review under different criteria.

**Connecticut**: BNE Energy, Inc. has installed a MET tower for its **Colebrook Wind Project**. The project, which could include up to five turbines, received partial development funding from the Connecticut Clean Energy Fund. The same developer is planning a similar project in Prospect.

## Community-Scale and Customer-Sited Wind Projects Update

An entire industry has grown up around communities and end-users interested in evaluating the potential of installing their own wind energy generators. While dozens of such projects are in development, a sampling of recent, noteworthy projects is discussed below. Additional project descriptions are available on the **NEWF Web site**. Several states — particularly Massachusetts, Rhode Island, and Vermont — have continued programs to fund community-scale and customer-sited wind project feasibility studies. More information on these programs can be accessed on state pages on the New England Wind Forum Web site.

In November 2009, the **Princeton Municipal Light Department** (PMLD) energized its new, 3-MW installation, consisting of

PIX 17547

Massachusetts Military Reservation's 1.5-MW Fuhrlander. Courtesy of AFCEE/MMR

two 1.5-MW Fuhrlander turbines. The project is expected to provide 40% of the town's annual load, on average. The two turbines replaced eight 40-kW machines that operated on the southwest side of Mount Wachusett since 1984. The **Massachusetts Military Reservation** (MMR) on Otis Air Force Base received and installed its 1.5-MW Fuhrlander turbine in the same shipment that carried PMLD's equipment for its 3-MW wind project. As a result, MMR also commissioned its single, 1.5-MW turbine in fall 2009. The turbine will partially power the Air Force base's groundwater clean-up efforts. This is the first of a multi-phase wind development effort for the MMR. The installation of two to three more turbines are planned on the base in late 2010 or early 2011, with another one or two scheduled for late 2011 at the base's PAVE/PAWS radar station. Down the road, the **Town of Falmouth,**

PIX 17548

Blades awaiting installation of a Vestas 1.65-MW turbine at Falmouth wastewater treatment facility in November 2009. The Massachusetts Military Reservation's new 1.5-MW Fuhrlander turbine can be seen in the background. Courtesy of Kathryn Craddock, Sustainable Energy Advantage, LLC

PIX 17549

Falmouth Wind 1 in operation. Courtesy of AFCEE/MMR

**Massachusetts** has installed a 1.65-MW Vestas wind turbine at its wastewater treatment facility. The turbine is one of two Vestas machines originally purchased by the Massachusetts Renewable Energy Trust (MRET) for the cancelled Town of Orleans project. It was installed in fall 2009. Falmouth also seeks to develop a second, similarly sized turbine at that same location. In addition, a second MRET turbine will be installed this spring at the **NOTUS Clean Energy** site, also in Falmouth.

PIX 17550

Templeton Municipal Light & Water Co. constructs the tower for its 1.5-MW AARE turbine in May 2010. Courtesy of Sean Hamilton, Templeton Municipal Light & Water Co.

PIX 17551

Templeton Municipal Light & Water Co. turbine. Courtesy of Sean Hamilton, Templeton Municipal Light & Water Co.

In May, the **Templeton (MA) Municipal Light & Water Co.** began construction of a 1.5-MW AAER turbine, which was procured through a joint Request for Proposal with the Berkshire Wind Energy Cooperative and a $2.16 million Clean Renewable Energy Bonds allocation. The turbine will provide electricity to the municipal utility system, as opposed to connecting behind the school's meter.

Partner installers of Vermont manufacturer Northern Power Systems have worked on a series of installations of its new 100-kW turbines throughout the region. In addition to those mentioned since the last newsletter, **Mount St. Mary's Abbey** (Wrentham, MA, December 2009), **Bolton Valley Ski Resort** (Bolton, VT, November 2009), Phoenix Press (New Haven, CT, January 2010), and the **Easton Pond Business Center** (Middletown, RI, September 2009) have each installed a Northwind 100. More turbines will be installed throughout the region in the coming months in the growing customer-sited niche.

In response to a solicitation discussed in the last newsletter, the Rhode Island Department of Environmental Management, in conjunction with the Town of Narragansett, selected Chevron Energy Solutions Co. to help evaluate potential development opportunities for wind projects of up to five turbines on state- and town-owned land in Narragansett (**see presentation**). Chevron intends to host public meetings to discuss potential locations for development on publicly owned land within the town. Meanwhile, the Narragansett Bay Commission has moved one step closer to building three 1.65-MW turbines at the Field's Point Wastewater Treatment Facility in the Port of Providence, Rhode Island. FAA approval, a potential fatal flaw given the project's proximity to T.F. Green Airport, was provided in January 2010 to the commission. The project previously received funding from the state's Office of Energy Resources to complete a project feasibility study, as well as a federal Clean Renewable Energy Bonds authorization for the project. The commission hopes to see the project installed in 2011.

In July 2008, the town of **Kittery, Maine**, commissioned a 50-kW wind turbine provided and installed by Entegrity Wind Systems. However, due to system underperformance, the turbine was shut down. The local community negotiated with the now-bankrupt Entegrity to sell the turbine to a third party and recoup a majority of its initial investment. Assuming a deal can be reached, the turbine will likely be decommissioned and removed in 2010.

PIX 17552

Mount Saint Mary's Abbey Northern Power Systems 100-kW turbine. Courtesy of Sustainable Energy Developments, Inc.

## Wind Policy Updates — Federal

### U.S. Fish & Wildlife Service Wind Turbine Guidelines Advisory Committee Transmits Final Recommendations on Wildlife Impacts to the Secretary of the Interior

On April 13, 2010, the Wind Turbine Guidelines Advisory Committee transmitted its final recommendations to the Secretary of the Interior through the U.S. Fish & Wildlife Service. The committee, comprised of 22 members representing federal, state, and tribal governments, wildlife conservation organizations, and the wind industry, was formed in 2007 under the Federal Advisory Committee Act to provide advice and recommendations on how to avoid and minimize the impacts of land-based wind farms on wildlife and its habitats.

As summarized in the report, the committee's guidelines are founded upon a "tiered approach" for assessing potential impacts to wildlife and their habitats. The tiers include:

- Tier 1: Preliminary evaluation or screening of sites (landscape-level screening of possible project sites)
- Tier 2: Site characterization (broad characterization of one or more potential project sites)
- Tier 3: Field studies to document site wildlife conditions and predict project impacts (site-specific assessments at the proposed project site)
- Tier 4: Post-construction fatality studies (to evaluate direct fatality impacts)
- Tier 5: Other post-construction studies (to evaluate direct and indirect effects of adverse habitat impacts and assess how they may be addressed).

This framework allows the developer to determine whether there is sufficient information, whether or how to proceed with development of a project, or whether additional information gathered at a subsequent tier is necessary to make those decisions.

### Federal Energy Regulatory Commission (FERC) Issues a Notice of Inquiry Regarding Variable Energy Resources; New England Representatives Submit Comments

In January 2010, FERC issued a Variable Energy Resource Notice of Inquiry (VER NOI, Docket RM10-11, see Cool Link section) seeking information about integrating variable energy resources (VERs), such as solar and wind generators, into the grid. A number of New England parties submitted comments, including generators, system operators, and purchasers. In summary, ISO New England (ISO-NE) and the New England Power Pool (NEPOOL) submitted comments on the Notice of Inquiry.

- NEPOOL's comments appear to be non-controversial and deferential to a future stakeholder process following the completion of the New England Wind Integration Study (NEWIS), being performed by ISO-NE.
- ISO-NE submitted substantial comments, which contain many suggestions (also generally predicated on the results of the NEWIS), that could significantly alter the way VERs participate in the New England markets, including:

  — Supporting both a centralized and decentralized wind forecasting system

  — Re-visiting whether VERs should be required to participate in the Day Ahead Energy Market and potentially be exposed to the price risk of deviations in the Real Time Market

  — Stating that higher reserve requirements may be needed but a dedicated wind-balancing reserve product would not be necessary

— Re-visiting the wind reactive power requirements set forth in FERC Order No. 661a to establish a dynamic reactive power requirement for VERs

— Requiring that all VERs have or be capable of accepting a retrofit so that they are able to provide ancillary services such as frequency control

— Applying Effective Load Carrying Capability consistently to all resources including VERs (This is a departure from the current Forward Capacity Market capacity rating methodology.)

— Allowing negative energy offers to make curtailment decisions on an economic basis, in recognition that current re-dispatching practices curtail VERs more than economically preferable.

## Wind Policy Updates — States

Energy policy is a hot topic among New England state policy makers. The dominant themes include siting reform, transmission policy, and long-term contracting – whether through net metering, feed-in tariffs, or other mechanisms. In addition to these topics (which are addressed in more detail below), policy makers in Maine passed statewide interconnection standards for small renewables earlier this year, as well as a bill requiring the demonstration of an in-state "tangible benefit" for projects seeking expedited permitting. Policy makers in the other New England states have been equally active. The following section summarizes key policy updates impacting wind energy in the region.

### Transmission Is Key to Wind Expansion in Northern New England

Without additional transmission, much of the region's wind potential will be unable to either reach the grid or reach the region's load centers. The Eastern Wind Integration and Transmission Study released earlier this year, by the National Renewable Energy Laboratory, was initiated by the Department of Energy in 2008 to examine the operational impact of 20-30% energy penetration of wind on the power system in the Eastern Interconnect. This study was set up to answer questions that utilities, regional transmission operators, and planning organizations had about wind energy and transmission development in the east.

Recent developments impacting the enhancement of northern New England's transmission grid include:

- Central Maine Power Company's filing for a Finding of Public Convenience & Necessity for its **Maine Power Reliability Program** (MPRP) proposal to upgrade the reliability of its bulk transmission system. This includes a PUC examiner's report in the form of a draft order recommending approval of a Certificate of Public Convenience and Necessity (CPCN) for substantially all of the 345-kV backbone of MPRP, but it defers or denies most other portions of the project. The western spur, a 115-kV line from Larrabee Road to Rumford in western Maine, is one component found unnecessary for reliability reasons by the staff. However, because it would support the Maine policy goal of additional wind energy development, the staff recommended deferring a decision until Central Maine Power Company completes a comprehensive analysis of western Maine transmission needs to support wind development. Section 254, a 115-kV line from Orrington to Coopers Mills, was also rejected by the staff for reliability reasons. Because staff members did not have strong enough evidence as to how this line would benefit wind development, they suggested this component be denied at this time. On a parallel track, after months of negotiations between Central Maine Power Company and a group of interveners, a settlement was reached and presented before the Maine PUC on May 6. At the time of this writing, the settlement proposal includes more transmission components than the examiner's report.
- Two alternative proposals – one by Maine Public Service and the other by Algonquin Power Fund – have been submitted to build transmission lines along the **Bridal Path**, a right-of-way owned by Maine Public Service to connect areas of substantial wind development in northern Maine with the New England high-voltage transmission grid. Algonquin Power Fund petitioned the PUC for a Certificate of Public Convenience and Necessity to construct a 26-mile **Northern Maine Interconnect** (NMI) to provide a direct connection between northern Maine and ISO-NE (Docket No. 2009-421). One issue identified by staff examiners for comment in party briefs is whether the PUC has the authority to order Maine Public Service to transfer its rights in the Bridal Path to Algonquin Power for the development of a transmission line.
- Maine recently enacted LD 1786, **An Act Regarding Energy Infrastructure Development**. One aspect of the new law is to create opportunities for leasing energy corridors that could be used to connect Canada, Maine, and southern New England. One of the primary justifications for the legislation was to enable wind power development expansion.
- The New Hampshire Legislature, ISO-NE, and interested stakeholders established the **North Country Transmission Commission** in 2008 to plan possible paths for the design and construction of necessary transmission capacity for renewable energy development in Coos County. Coos County is the site of the ISO-NE interconnection, and its queue shows interconnection requests for approximately 400 MW of renewable energy projects. In 2009, the legislature passed SB 85 to expand the commission's role, asking them to "seek and obtain federal funds to upgrade the 115-kilovolt transmission loop in Coos County." This includes establishing an appropriate method for sharing the costs and benefits of the upgrade between ratepayers and the owners of the generation facilities to develop renewable resources in northern New Hampshire. In March 2010, the commission hired a consultant to study options

for construction and cost allocation of the project. For more information, see the **New Hampshire Transmission, Interconnection, and System Integration** page.

- Three economic study requests were submitted to ISO-NE this year. Pursuant to Attachment K of ISO-NE's Open Access Transmission Tariff (OATT), all of the requests were related to renewable energy transmission. They were presented to the ISO-NE Planning Advisory Committee (PAC) at the April 27th meeting. The requests included:

  — **New England Independent Transmission Company (NEITC)** submitted a transmission upgrades request that would enable 700 MW of wind and biomass generation development in northern New Hampshire to reach the regional market. The request included three scenarios with a high-voltage line from Comerford to Coos Loop on to Rumford and then to Suroweic.

  — **New England States Committee on Electricity (NESCOE)** submitted a request to provide a baseline expansion scenario given current market, reliability, and policy constructs that could be used as part of the Eastern Interconnection Planning Collaborative (EIPC) initiative. The study views a single year, 20 years in the future. It includes the retirement and replacement of older carbon-heavy resources in the region with efficient natural-gas-fired generation in the same locations versus replacement of them with renewable resources and additional transmission.

  — **Sea Breeze Atlantic, RTS** requested a study of its proposed NewSeaBos submarine HVDC cable transmission project, which runs from the Newington, New Hampshire area to the Boston/Southeastern Massachusetts (SEMA) area. One of several justifications indicated in its presentation included increasing the amount of renewable generation deliverable to load centers, specifically to create benefits including "access of renewable energy into Boston area."

Their study scope was discussed at the May 25 PAC meeting, dubbed "Environmental Day." In June, the PAC prioritized three studies. There is no deadline for completion of the economic studies.

### Massachusetts Wind Siting Reform Act

As outlined in the previous newsletter, the Massachusetts Wind Siting Reform Act continues to be debated in the Massachusetts legislature. After significant discussion, the Massachusetts Senate updated and approved a new version of the wind siting reform bill. The revised bill responds to many of the concerns raised by its objectors, such as the Massachusetts Municipal Association, which argued that local entities were given no authority in project siting. Meanwhile, on May 19, the House released its own version of the bill which, while similar to the Senate bill, differs in a few key areas. It is unclear when a vote may take place on the bill, but it is expected to happen relatively soon.

### Transcanada Power Marketing Lawsuit Challenges Constitutionality of Long-Term Contracts between Massachusetts Utilities and In-State Generators

On April 16, 2010, TransCanada Power Marketing filed a civil lawsuit in Massachusetts District Court against the Massachusetts Department of Energy Resources (DOER) and the Massachusetts Department of Public Utilities (DPU). The suit, Case #4:2010cv40070, asserts that the in-state requirement in the state's renewable energy long-term contracting pilot program (Section 83 of the Green Communities Act) violates the constitution's Interstate Commerce Clause by creating favorable terms for in-state renewable generators, while discriminating against the purchase of electricity from out-of-state renewable generators like TransCanada's Kibby Wind Power Project. TransCanada seeks judgments of "irreparable harm" and "damages"; a judgment that the requirements are unconstitutional, invalid, and unenforceable; preliminary and permanent injunctions preventing the program from proceeding in its current form; and damages, attorney fees, and trial fees. While the parties have settled a similar claim relating to the state's solar program, the claim creates a degree of uncertainty that has slowed contracting under the pilot program. The same arguments also may implicate renewable energy policies of in-state favoritism in other states.

### Vermont Sets Feed-In Tariff Rates for Wind; Differentiates above/below 100 kW

In May 2009, Vermont became the first state in the nation to enact a law creating a full slate of advanced cost-based renewable energy feed-in tariffs. Tariff rates are differentiated by technology and project size. Interim rates were in effect from September 2009 to January 2010, at which time the Public Service Board established the rates effective through January 15, 2012. Wind plants up to 100 kW were paid at a rate of 20¢/kWh for standard offer contracts awarded before January 15, 2010, and 20.83¢/kWh for those awarded after January 15. Contracts awarded to wind projects in excess of 100 kW are paid at 12.50¢/kWh and 11.25¢/kWh for the respective periods. The tariff contract length is 20 years, and 30% of the rate is subject to a fixed 1.6% annual inflation rate. Detailed information regarding Vermont's feed-in tariff rate-setting process is available on the Public Service Board's **Docket 7523 and 7533 Web site**.

### Net Metering Updates

**Massachusetts**: As the Massachusetts Department of Public Utilities finished implementing the Green Communities Act's net metering provisions, two issues concerned wind developers. First, distribution utilities will determine the applicable electric rate class for net metered renewable energy projects based on the maximum flow of power in either direction. Therefore, a project with only a minimal onsite load but with a large renewable energy facility may be treated as a large electric customer for purposes of billing and net metering, reducing the value of the electricity. The issue is most relevant for wind developers who install stand-alone generation projects with minimal

onsite load and net meter power to other end users. The other issue pertains to the net metering cap. The Green Communities Act limits the amount of load utilities must allow to net meter to 1% of peak load. Early indications are that the net metering cap could be reached as early as 2010 or 2011. If so, the lack of a queuing procedure is likely to cause substantial uncertainty as to whether projects would qualify for net metering. If a project cannot know whether it qualifies until it is built, this imposes a substantial risk that undermines investment in net metering projects.

**Connecticut**: Several Connecticut towns requested a declaratory ruling from the Department of Public Utility Control (DPUC) on the aggregation of retail accounts for the purpose of net metering renewable energy generation. The DPUC consolidated these requests to be considered under the recently opened **Docket No. 10-03-13**.

**Rhode Island**: Two bills failed to pass in the Rhode Island legislature that would have changed the net metering landscape within the state. Bill H7714 Substitute A passed the House prior to the end of the legislative session. It would have explicitly added other renewable energy sources beyond wind, such as solar, and combined heat and power with systems eligible for net metering. In addition, it would have raised project caps to 3.6 MW, removed the system-wide cap, and eliminated standby rates for renewables and Combined Heat and Power (CHP).

**New Hampshire**: This spring the New Hampshire legislature passed HB 1353, which updated the state's net metering regulations. The bill raises the net metering cap from 100 kW to 1 MW. For generators of greater than 100 kW, the generation will be credited at the generation service component of the default service rate only and will not avoid any transmission and distribution charges.

### Maine Implements Community-Based Renewable Energy Pilot Program

The Maine Public Utilities Commission (PUC) adopted final rules implementing the Community-Based Renewable Energy Pilot Program (Docket 2009-363). This program encourages locally owned electricity generating facilities of 10 MW or less. Qualifying facilities must be at least 51% owned by qualifying local owners, have local support (in the form of an official pronouncement of the municipality), and have an in-service date beginning after September 1, 2009. Once qualified, a facility can choose one of two incentive options: 1) a long-term contract (20 years unless the facility agrees to a shorter duration), or 2) a renewable energy credit (REC) multiplier, in which the REC compliance value is 150% of the quantity of electricity produced. The pilot has an aggregate 50-MW limit; 10 MW of the total 50-MW limit is reserved at the outset of the program for generators smaller than 100 kW or qualified generation in the service territory of consumer-owned transmission and distribution utilities. The total generating capacity of projects receiving the REC multiplier incentive is also limited to 10 MW. The Fox Islands wind project (4.5 MW) already applied to the PUC to qualify for the REC multiplier, suggesting that the 10-MW limit may be reached quickly.

The payment level for projects less than 1 MW will be fixed at 10¢/kWh, akin to a feed-in tariff. For projects of 1 MW to 10 MW, the price may vary depending on competitive bids but may not exceed 10¢/kWh or the project's cost of energy. These purchase prices are for energy only; generators have the option to sell capacity and RECs to another party, but for projects greater than 1 MW, capacity and REC revenue must be taken into account by the PUC when determining whether the project would over-recover its costs.

**NOTE**: Follow the link here to check for the most up-to-date data on each state. **DSIRE** is a comprehensive source of information on state, local, utility and federal incentives and policies that promote renewable energy and energy efficiency.

## Perspectives

### An interview with John Norden, Manager of Renewable Resource Integration, Independent System Operator — New England

*In 2008, as Independent System Operator — New England Inc. (ISO-NE) considered adding thousands of megawatts of wind power to the region's electric grid, they turned to John Norden. With more than 27 years of experience in the region's electric systems and market operations, John was tasked with understanding the challenges posed by adding growing amounts of variable wind generation to the system. We spoke with John as ISO-NE undertakes an in-depth study of integrating wind power into the grid.*

PIX 17553

John Norden

**Q. What is the ISO's role with respect to wind power?**

**A.** ISO-NE has three primary responsibilities: operating the New England bulk power grid reliably, administering New England's wholesale electricity markets efficiently and fairly, and administering the regional transmission tariff, which includes developing an annual regional transmission plan. Aspects of wind power are related to all three responsibilities. For example, because many of the onshore wind resource-rich areas in New England are located far from both load centers (such as Boston or southwest Connecticut) and the high-voltage transmission system, developing and delivering wind power will impact the design and operation of the transmission system. All resources—including load, generation, and transmission—have characteristics that must be taken into account,

so the goal is to enable the entry of all technologies that can contribute while meeting the region's policy objectives and the ISO's operating objectives. Wind power is a fairly new entrant into this resource mix, and the ways in which it can participate are evolving. As a result, the ISO is actively studying how wind power might affect the region's power system. At the same time, we also are working with stakeholders to reduce the barriers to entry for wind power and other emerging technologies while still meeting the reliability objectives of New England within an efficient market framework.

**Q. The ISO recently undertook an extensive wind power scenario analysis. What were the objectives of this analysis, and what did you learn?**

**A.** ISO-NE began its review of large-scale wind integration in 2007 with two studies: the *New England Electricity Scenario Analysis* and the *Technical Assessment of Onshore and Offshore Wind Generation Potential in New England*. These studies considered how wind power might help meet future electricity needs in New England, and it provided an analysis of how much wind power could potentially be installed in New England, where it might be located, and the energy production characteristics of those potential facilities. These studies led to two more detailed studies that reviewed several scenarios of large-scale wind penetration. The goal of these analyses was to quantify economic and environmental impacts and potential transmission requirements, as well as to understand the effect on power system operations. The first of these latest two studies, the *New England 2030 Power System Study*, was performed as a technical input for the *New England Governors' Renewable Energy Blueprint*. It was released in the fall of 2009. The second study, the New England Wind Integration Study (NEWIS), is currently underway, with **interim results** already available NEWIS is scheduled to be completed later this year.

**Q. What will be the biggest challenges to integrating large-scale wind in New England?**

**A.** The biggest challenge is whether we can build the transmission infrastructure necessary to access the region's high-quality wind resources. Besides transmission, the next step for successful wind power integration will be to develop a centralized forecast of wind plant output to help plan and operate the power system in a reliable and efficient manner.

**Q. With respect to wind power's variability, how are requirements to accommodate wind production on the grid similar to, and different from, other generation types in the New England portfolio? How are the issues related to the variability of wind similar to, and different from, the issues associated with handling variations in load? How does the ISO handle either?**

**A.** The largest differences between a wind resource and a conventional power plant, such as a gas-fired combined cycle facility, are variability and predicting that variability. It's fairly straightforward to predict the output of a gas-fired generator and its fuel source, although generation is subject to occasional unplanned outages. On the other hand, the power generated by wind turbines is dependent on the forces of nature, which in this case is when the wind blows. For instance, if a wind farm is capable of producing 100 MW under ideal, nameplate conditions, that same facility would only be capable of operating at that level if the wind blew above 25 MPH—all the time. Wind in New England doesn't blow this hard all the time, so the expectation is that wind turbines will usually operate at some lesser value based on the availability of its fuel source. When we measure this megawatt production over the course of the year and look at high-quality onshore sites where turbines might be built, we see that, on average, the energy produced in relation to the physical turbine capability might be about 35%. For offshore facilities that number usually jumps to more than 40%, based on research that we have conducted to date. So while we prepare for new wind plants in New England, we also have to prepare for wind power's variability. We do this now for river hydro facilities. We will prepare for this by generating a forecast of expected operations of the wind plants. Once this forecast has been prepared, we then add conventional resources to the supply mix to be dispatched that day. Of course, this example is greatly simplified, but it provides a general idea of how wind facilities will be integrated with the other available resources to meet consumer demand and maintain reliability.

While load is also variable, the ISO is extremely good at forecasting load, with the forecast consistently within 1% to 1.5% of actual load in any hour. For ISO New England, this amounts to a forecast variation of a few hundred megawatts in any hour. The system has a range of operating reserves on hand to deal with this variation, as well as unplanned generation outages. The hour-to-hour variability of wind generation is both more erratic and less readily predictable than load. While wind is a low percentage of system resources – a few hundred megawatts today – the total wind variability may often be in the load forecast imprecision range; thus, the number of hours does not add to the system's operating reserve needs. As the penetration of wind power grows, even though diverse wind plant locations over a wide area have been shown to smooth out the variability somewhat in the aggregate, the combined variability of load and wind production will increase.

**Q. Has ISO New England learned anything from recently commissioned wind farm installations in Maine and New Hampshire?**

**A.** Until the past couple of years, the few wind plants that were connected to the power system were not even large enough (electrically) for the ISO to really "see." One thing we have learned with these recent additions is that the industry, as a whole, has some things to learn about wind integration. From the ISO perspective, wind plants are new, and the type of power system resource they provide is very different from other more traditional generation resources—they are much more variable and unpredictable. Having said that, wind

power doesn't only generate energy, but it also provides other services that help support the operation of the grid, such as voltage support. With the installations completed to date, we have coordinated with the developers and wind operators to successfully interconnect these facilities, and we have established good working relationships with all parties to focus on providing reliable power to the interconnection.

**Q. Late last year, the ISO commissioned the New England Wind Integration Study, or NEWIS. How does the NEWIS differ from the scenario analysis?**

**A.** The primary difference between other analyses that ISO-NE has performed and NEWIS is the focus of the study. NEWIS was designed to highlight the operational effects of large-scale wind on the region's bulk power system—in other words, what are the challenges across the entire year, from minutes to hours to days. Because of this focus, the data used for the output of the wind plants in NEWIS have a much finer resolution, which helps make the data more useful to a system operator as we prepare to operate with higher levels of wind on the system.

**Q. What have other wind integration studies from other electric markets in the United States and abroad led you to expect from NEWIS? What is the objective of NEWIS?**

**A.** Large-scale wind integration studies are a recent phenomenon. In the United States, one of the first studies was performed in 2004 by the New York State Energy Research and Development Authority (NYSERDA). The most recent studies by the National Renewable Energy Laboratory and the U.S. Department of Energy (NREL/DOE) are the Eastern and Western wind integration studies released this year. These large-scale studies demonstrated that integration of a large amount of wind power is very region-specific. Each region has particular wind, generation, transmission, and load characteristics that must be considered when investigating the potential impacts and benefits of large-scale wind power for a balancing area. The objective for NEWIS is to consider a range of possible wind power scenarios and their potential impacts to New England.

**Q. What is the status of NEWIS, what have you learned so far, and what do you expect to learn?**

**A.** NEWIS is about 50% completed. So far, one small surprise showing up in the model is that New England's wind resources have slightly higher capacity factors than we expected, even though this model is very similar to one used for the NREL/DOE Eastern Wind Integration Study. For example, we thought approximately 12 gigawatts (GW) of wind would be required from an onshore-based wind scenario to reach a level in which wind contributes 20% of New England's annual electric energy. Instead, we found that even after screening for a range of land use and environmental issues, roughly only 10 GW of nameplate wind would be needed. We have had many good discussions among the team working on the project (General Electric's Energy Applications and Systems Engineering group, EnerNex, and AWS Truepower), NEWIS' technical review committee, and internal and external stakeholders. One part of the NEWIS—recommendations for technical interconnection requirements for wind generators—has already been released (see Cool Links). We have learned that wind power increasingly has the capability to play as a "full member of the team," not only generating electricity but also providing the ancillary services required to keep the grid operating reliably and efficiently. For example, today's wind technology can participate in voltage regulation, which can be very useful, especially at the outside edges of the transmission system where many wind plants are being installed. We anticipate that the main impediment to integrating large amounts of wind power in New England—from a technical perspective—will be the current lack of transmission infrastructure to "go and get" the high-quality wind resources that are in the New England wind resource area.

**Q. Integrating large amounts of wind into the system will have some impact on how the system is run. At what level of penetration might wind power increase the cost of maintaining reliability? How much might such changes cost, and how would these costs compare to the cost of wind itself, and the value of the wind generation in the ISO's energy and capacity markets?**

**A.** The penetration of wind power will be the primary predictor of the impact of wind power on a given power system. There are different methods of measurement, but wind penetration is, in essence, a ratio of the amount of wind power to the amount of load in a particular system. At low penetration levels, the impact of wind on the system operations is minimal. Other studies have found that the impact of even a fairly large amount of wind will be modest, but these studies analyzed particular regions. For example, system operators such as the ISO are required to carry an additional amount of resources above what is required to simply meet the variability of forecasted load. This additional amount of operating reserve margin includes resources that can be brought online quickly to cover sudden, unexpected events that can affect the reliability of the system. Wind power's variability, along with our ability to accurately predict that variability, can potentially increase the size of the required operating reserve margin. NEWIS considers both the power system and the cost impacts of wind penetration at different, higher levels, and these results should be available later this year.

**Q. Other regions have implemented wind forecasting systems to inform grid operators and help them operate systems with increasing amounts of wind power. How predictable is wind power? Does wind forecasting work? How does it help, and what are its limitations?**

**A.** Wind forecasting is very important because it helps make the most efficient use of the energy produced both by wind and non-wind generation while helping to ensure system reliability. A state-of-the-art generation forecasting system works toward these goals by producing a forecast for expected wind genera-

tion, ideally for the following week, to allow for optimization of other resources and short-term maintenance scheduling. Although a crystal ball would be ideal, significant benefits can be gained even from an imperfect forecast. Generally speaking, the closer you get to real time, the more accurate a forecast becomes. For example, an estimated wind generation forecast will probably be sufficient for one week ahead, but as we get closer to the operating day, operating constraints of non-wind generation will increase the value of an accurate wind generation forecast. This could help reduce reserve margins required to meet unexpected changes in wind generation. Accurate, very short-term forecasting (i.e., next hour to next 10 minutes ahead) will allow even more changes in wind generation to be accommodated in the real-time market, as opposed to being met with other regulating resources. Ramp forecasting is one area in which wind forecasting has room for improvement because of the sudden up or down swings from wind that can be especially tricky to manage during certain load conditions.

## Hot Topics

### Distributed Wind's Role Expands

In contrast to the significant land-based, commercial-scale wind farm development activity, which dominated wind development activity in northern New England, the community-based and customer-sited distributed generation (DG) market has thus far been more prevalent in southern New England. Each of the six New England states is now host to at least one DG wind project. In Massachusetts, DG wind (9.7 MW) represents a majority of the state's operating wind capacity, and in Rhode Island (2.4 MW) and Connecticut (.1 MW), it represents all of the installed capacity.

Experience has shown that DG wind can often be easier to site, permit, and install than typical commercial-scale wind projects. However, until recently, not many turbines were available in the sub-megawatt size range. Two community-scale wind turbine manufacturers headquartered in New England — Northern Power Systems of Barre, Vermont and Aeronautica WindPower of Plymouth, Massachusetts — have focused on sales and installations in the New England market. In addition, a range of other proven turbine technologies are manufactured globally but are available locally, such as the Vestas RRB and Elecon T-600, both 600-kW machines. New products offered in the sub-megawatt turbine scale have helped advance numerous projects. Equipment availability and ease of installation are two of the primary drivers for continued DG market growth.

Some of the other motivating factors for the expansion of the DG wind market include electric customers' desire to take control of energy costs, to act in accordance with their principles, or to take advantage of available incentives. Smaller-scale turbines often fit better with land usage requirements and landscapes than the larger turbines typically installed at wind farms. Hundreds of DG wind projects have been proposed, particularly in southern New England.

### Co-ops Primed to Play Increasing Role in Wind Energy

The Cape & Vineyard Electric Co-op (CVEC), which represents 15 community members on Cape Cod, was created in 2008 with the sole purpose of developing and owning wind power projects on the Cape. CVEC secured $20 million in Clean Renewable Energy Bonds financing in 2009, and it is in the latter stages of development on a handful of projects. Most of the projects under development would be eligible for net-metering, Massachusetts Clean Energy Center grants, and other tax benefits, which make them economically viable, attractive investments. The recently created Vineyard Power Co-op on Martha's Vineyard is interested in developing more than 40 MW of offshore wind in tandem with a number of land-based energy solutions.

## Small Wind Corner

### Wal-Mart Hosts New England's First Power Purchase Agreement-Supported Small Wind Farm

Deerpath Energy of Marblehead, Massachusetts, has installed and commissioned 12 Southwest Windpower micro wind turbines at Wal-Mart's new store on Rt. 146 in Worcester. The project was financed, designed, and installed by Deerpath, who will own and operate the turbines. It will sell the generated power to Wal-Mart, through a power purchase agreement, for up to 25 years. The turbines were installed atop 48-foot light poles that were specifically engineered to work with the wind turbine equipment. The project is expected to serve up to 5% of the Wal-Mart Supercenter's electric load.

### Connecticut Small Wind Demonstration Project Continues

The Connecticut Clean Energy Fund (CCEF) launched the Small Wind Turbine Demonstration Project in 2009 to learn more about small wind opportunities in the state. CCEF selected four sites in different terrain: coastal, near-coastal, and inland/mountain, to assess different development opportunities. The four sites are the Coventry High School, the Lebanon High School, the Meriden YMCA Mountain Day Mist Camp, and the New Haven Visitor Information Center. Wind monitoring equipment has been installed in Coventry, Lebanon, and Meriden and is planned for New Haven. Once wind speed data have been collected, CCEF's consultant, the Cadmus Group, Inc., will install an Endurance S343 5-kW turbine in Coventry, a Bergey Excel-S 10-kW turbine in Lebanon, and a Scirroco 6-kW in Meriden.

Much like the small wind laboratory at the Museum of Science in Boston, CCEF intends to analyze system performance in relation to wind speeds to help understand some of the aspects of small wind siting. CCEF's hope is that enough data can be collected to help create an effective small wind funding program.

### Massachusetts Clean Energy Center Updates Commonwealth Wind: Micro Wind Rebate Program

The Massachusetts Clean Energy Center (MassCEC) revised its Commonwealth Wind: Micro Wind rebate program. The funding initiative, available for wind projects of less than 100 kW, includes a combination of upfront rebates and performance-based incentives. The MassCEC temporarily suspended its rebate program in April 2010 to solicit stakeholder comments about proposed changes to the program. After receiving comments, the MassCEC made a few important changes to the program and has since resumed making awards. The most significant change to the program was a tightening of the technology eligibility requirements. Other changes include clarifications of the program's applicability to multi-turbine projects, creating space for projects of less than 15 kW, and instituting minimum estimated performance requirements.

## Cool Links

- **Photos of the Massachusetts Military Reservation's wind turbine, Cape Cod, MA**
- **Map of all wind energy projects in New England**
- **Photo gallery of the Falmouth 1 wind turbine, Falmouth, MA**
- **Real-time performance of the Falmouth 1 turbine by Powerdash**
- **Video of the Princeton Municipal Light Department's wind farm construction on Mt. Wachusett, MA**
- **Photo gallery of Princeton, MA wind farm**
- **Video of turbine construction at Massachusetts Water Resources Authority**
- **Photo gallery of Boston's Deer Island Wind Farm**
- **Technical Requirements for Wind Generation Interconnection and Integration, a report prepared for ISO New England**
- **FERC Notice of Inquiry Regarding Variable Energy Resources** (This is a search page. Enter: RM10-11 in the Docket number window)
- **Database of State Incentives for Renewables and Efficiency (DSIRE)** link to **www.dsireusa.org/**

Clean Energy States Alliance (CESA) received a 2-year grant from the U.S. Department of Energy to fund a new **States Advancing Wind initiative**. The initiative will develop new organizational and analysis activities to advance outreach and provide technical assistance to state agencies and officials across the nation regarding the merits, approaches, and policy tools available to accelerate distributed wind project development. CESA will achieve these goals through an active Web site, a peer-to-peer listserv for state officials, four topical Webinars, and briefing papers throughout the year on policy, finance, and best practices to advance distributed wind projects for state officials. CESA is also creating a wind finance toolkit and a state best practice and program guide to support wind development, in addition to supporting the U.S. Offshore Wind Collaborative and the Great Lakes Wind Collaborative. Finally, CESA is available to provide direct technical assistance to interested states. To join the listserv, send an e-mail with "Wind Listserv" in the subject line and your contact information to Anne Margolis (**anne@cleanegroup.org**).

## Events

Check the New England Wind Forum's Web site for an up-to-date **calendar** of wind-related events, from conferences and workshops to siting hearings, in New England.

## New England Wind Forum — The Newsletter

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