I. INTRODUCTION

A. Report Process

During its 2004 session, the Legislature enacted The Maine Wind Energy Act, P.L. 2003, ch 665, §§3,4 (the "Act"). As part of that Act, the Legislature directed the Public Utilities Commission ("Commission") to conduct a study of the viability of and potential for the development of wind power in the State. In particular, the Act specifies that the study should examine the realistic potential for wind power development in Maine, the cost of wind power, potential markets, impacts of wind power on the electric grid, potential for siting wind facilities on tribal lands, and obstacles to wind power development in the State.

In conducting its study, the Commission held interviews and meetings with a wide variety of entities having expertise or interest in issues involving wind power and renewable resources, including discussions with wind power developers, utilities, grid system operators, environmental groups, wind power opponents, tribal representatives, and other state agencies.[1] The Commission also conducted extensive research on a variety of wind power and renewable resource issues. Finally, to solicit input from the public, the Commission released a draft report and sought written comment on the draft from all interested parties.[2]

The results of the Commission study are contained in this report. The report is structured as follows:

- **Section II – Wind Power Potential:** Review of the major considerations in determining whether a particular site is viable for wind power development and presentation of estimates of wind power potential in the State.

- **Section III – Cost of Wind Power:** Description of the cost of developing wind power and its economics relative to conventional generation resources.

- **Section IV – Available Markets:** Discussion of potential markets for wind power developed in Maine in New England states and neighboring Canadian provinces.

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[1] Entities with whom the Commission held discussions are listed in Appendix A of this report.

[2] Written comments on the draft report can be viewed at www.state.me.us/mpuc by going to the virtual docket and referencing Docket No. 2004-810.

- **Section V – System Implications:** Discussion of the implications of wind power development on overall system reliability, market operations, air emissions and existing generating facilities.

- **Section VI – Obstacles to Wind Power Development:** Presentation of the major obstacles to wind power development in the State.

- **Section VII – Siting of Wind Power on Tribal Lands:** Discussion of the potential for wind power development on tribal lands and obstacles to that development.

- **Section VIII – Alternative Approaches to Promoting Wind Power Development in Maine: Considerations and Recommendations:** Presentation of various approaches to promoting wind power development, with a discussion of issues to be taken into account in setting policy and how certain policies might best be implemented.

B. Desirability of Wind Power

The Commission views its charge from the Legislature to be to prepare and present an objective assessment of a variety of issues, as specified in the Act, related to the viability of wind power and the potential for its development in the State. The purpose of this assessment is to provide the Legislature with an aid for determining overall State energy policy and the available means for effective promotion of wind power if the Legislature determines such action to be in the public interest. Although the attributes of wind power (both positive and negative) are referred to throughout this report, the Commission offers no conclusion as to whether the active promotion of wind power should be a part of the State's energy policy or whether public or ratepayer funds should be expended to aid wind power development in Maine.

Governmental support for wind power development is primarily justified on the basis of environmental and system diversity benefits. The principal environmental benefit of wind power is that it is an electric generation source that does not produce air emissions. Enhanced system diversity tends to stabilize and moderate electricity prices, and provide greater system security. Wind power opponents are of the view that environmental benefits are often overstated and tend to be outweighed by negative impacts, primarily the visual degradation of large areas of the landscape and harm to migratory birds (and other wildlife). Opponents also state that wind power is costly, requires public subsidies and that air quality improvements can be better achieved through other means, such as the promotion of energy conservation and the enhancement of pollution controls.

The Legislature has established State goals for substantial reductions in greenhouse gases over time, 38 M.R.S.A. § 576. The Commission is not an environmental agency and has no view on the best means to achieve air quality improvements or the degree to which the State should actively promote or use public funds to support wind power development for purposes of meeting air quality goals. In keeping with the Commission's role as an economic regulation agency, however, this report does comment on the costs and system attributes of wind power.

The Legislature, through the Maine Wind Energy Act, has adopted a policy on wind power. Specifically, the Act states:

> The Legislature finds that it is in the public interest to explore opportunities for and encourage the development, where appropriate, of wind energy production in the State in a manner that is consistent with high environmental standards and that achieves reliable, cost-effective, sustainable energy production on those sites in the State that will attract investment and permit the development of viable wind energy projects. The Legislature finds that the development of the wind energy potential in the State needs to be integrated into the existing energy supply and transmission systems in a way that achieves system reliability, total capital cost-effectiveness and optimum short-term and long-term benefits to Maine people.

Further refinement of the State's policy regarding the promotion of wind power is a question for the Legislature.

II. WIND POWER POTENTIAL

Maine has substantial potential for the development of wind power facilities throughout the State. There is theoretical potential for thousands of megawatts, but the realistic potential for development that is economic, environmentally sound and publicly acceptable is not likely to exceed a thousand megawatts, at least for the foreseeable future.

A. Development Considerations

There are four major considerations in determining whether a particular site is viable for wind power development. These are:

- *Availability of Wind Resource:* The power of wind in an area is often described in terms of its "Class," with Class 1 having the least power and Class 7 having the most power.[3] Typically, Class 4 has been considered the minimum power necessary to support grid scale wind development. However, because of Maine's specific wind climate as well as improved technology, Class 3 areas in Maine may be considered viable production sites. While the relationship of wind speed to resource class varies, in general, an average wind speed of 15 mph or greater at a minimum height of 70 meters (230 feet) is necessary to support grid scale facilities.

- *Proximity to Suitable Transmission:* Generally, sites within 5 miles of transmission facilities are desirable and those beyond 10 miles are not economically attractive because of the cost to construct transmission from the wind generator to the grid.[4] Moreover, the ability of existing transmission facilities to transport additional power can be a factor.

- *Environmental Sensitivity and Other Physical Characteristics:* Areas that are environmentally sensitive (e.g. wetlands and bird migration routes) are generally

[3] The Pacific Northwest Laboratory ("PNL") developed these Classes in the late 1970s and they are still widely quoted in the industry. Wind power density is a better measure of the energy potential from a wind location than is wind speed, but it is complex to calculate and to understand. Thus, many maps consider only wind speed. A description of the PNL classes is contained in Appendix B to this report.

[4] Very large projects could likely support greater distances of transmission construction.

not feasible because of the costs of mitigating the environmental impact. In addition, some areas are unsuitable for wind development due to physical characteristics or topography.

- *Public Acceptance:* Some areas are not feasible because the generation facilities cause impacts that are unacceptable to citizens and that cannot be mitigated in any way (e.g., visual impact or land use that is incompatible with local or State guidelines).

There are some differences of opinion as to the optimal type of area for wind power development in Maine. Traditionally, mountain ridges have been considered the primary area for wind power development in the region.[5] However, large areas of flat land (where winds tend to blow steadily and there are fewer trees that can cause turbulence), such as blueberry or potato fields, are also considered by some as viable candidates for wind facilities.

Although Maine's coastal and offshore areas have substantial wind resources, at this time it is not likely that these areas will be a significant source of wind development. Such development, especially in the more southern areas of the State, would likely be subject to significant public opposition. Moreover, the construction and maintenance of facilities offshore is significantly more expensive than on land and the transport of the power to the mainland could affect available fishing areas.

The number of feasible sites for wind power development may increase with technological advances. For example, newer wind turbine technologies that require less wind power may allow development in locations that are currently not feasible. With more available wind development sites, developers should have more options for locating facilities in less controversial areas.

B. Wind Potential Estimates

Wind potential has been considered at varying levels, ranging from purely theoretical (i.e., generating potential if wind installations were possible wherever the wind is strong) to the economically and politically possible (i.e., potential if generators are placed close to the transmission grid, in areas that are less environmentally sensitive, with consideration given to objects that block the wind, and where public opposition is likely to be low). Publicly available information is useful as a screening tool for developers and as general guidance

[5] Although wind speed generally increases with elevation, mountain ridges above certain altitudes (generally around 4,000 ft) are not good candidates for development because of harsh weather and the potential for ice build up.

for policy makers. However, the precise identification of viable sites is extremely costly and time consuming, and has been performed primarily by developers who consider the information to be highly proprietary. The following paragraphs summarize the most reliable data available, at varying levels of specificity.

At the broadest level, national and regional efforts have resulted in relatively accurate wind maps that display wind speeds at 30 meters (98 feet), 50 meters (164 feet), 70 meters (230 feet), and 100 meters (328 feet) above the ground.[6] Current grid scale wind generators require adequate wind power at 70 meters, while small-scale generation can be constructed with lower wind power at 30 meters. The maps show wind power at various power densities or wind speeds. These maps do not compensate for obstacles such as buildings or local elevation variations, which could affect wind flow. However, they provide a picture of the regions in which wind development could most effectively be pursued, and also provide an initial screening mechanism for developers. Not surprisingly, the maps show that the most significant wind potential in Maine is found on the coast and on ridge crests in the mountains. However, the maps also show pockets of other areas with sufficient wind.[7]

In 1991, the Pacific Northwest Laboratories determined theoretical wind potential throughout the nation by adjusting the potential for specific areas based on geography, land-use and environmental factors. The study estimated Maine's theoretical wind potential (at class 3 or higher) to be 56 billion kWhs, the highest potential of any New England state and the 19th highest potential of all 50 states.[8] While interesting, this estimate is of limited practical use. It would require approximately 18,000 MWs of wind generation, almost 10 times the electric load in Maine or 12,000 wind turbines (typically sized at 1.5 MW), to produce that level of generation. This is clearly far more than can realistically be constructed.

More recently, the National Renewable Energy Laboratory ("NREL") analyzed wind generation potential using improved wind speed data and newly developed Department of Energy ("DOE") exclusions. In that study, summarized in the chart below, NREL calculated a theoretical potential in Maine of approximately 8,000 MWs at class 3 or higher, of which 1,000 MWs were located within 5 miles of a transmission line.[9] A study group in Connecticut estimated that only 25% (2,000 MWs) of the 8,000 MWs could be developed at

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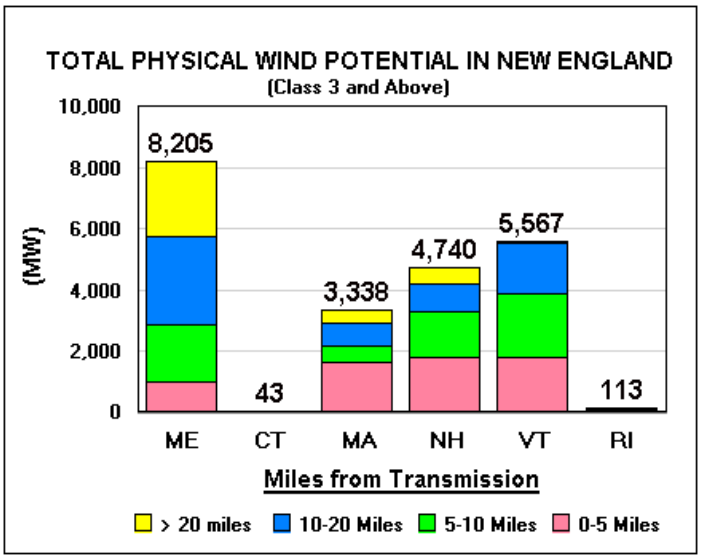
[6] Such maps of northeastern states have been produced by TrueWind Solutions of Albany, NY.

[7] A regional wind map at 70 meters is contained in Appendix C to this report. Maps at additional heights and an interactive map allowing investigation of particular geographic areas may be found at http://www.mtpc.org/RenewableEnergy/green_power/wind_energy.htm.

[8] A table with the PNL results is contained in Appendix D to this report.

[9] A table with the NREL results is contained in Appendix E to this report.

costs reasonably close to the current market conditions. The Connecticut study was used in Maine's Climate Action Plan investigation. [10]



Finally, educated estimates from a variety of persons familiar with the wind industry in Maine range from several hundred megawatts to over a thousand megawatts of wind generation that might realistically be developed in Maine. This conclusion is generally consistent with the more recent NREL and Connecticut studies.[11]

C. Wind Development Experience

There are currently no large-scale wind facilities located within Maine[12] or in New England.[13] However, there are projects currently in various

[10] Maine's Climate Action Plan stakeholders used the Connecticut group results as an input for computer modeling whose results indicated very little wind potential in Maine (in the range of 30 MW under the reference case). The stakeholders agreed that this was an unreasonably low estimate. The Commission also agrees that this conclusion is not reasonable given the known level of interest in developing wind generation in Maine.

[11] The realization of the State's wind potential as described in this section of the report would require the installation of hundreds of large wind towers in various areas around the State. For example, 1000 MW of wind capacity would require over 650 wind turbines, assuming each turbine had a capacity of 1.5 MW.

[12] There are smaller scale facilities used primarily to serve on-site needs. For example, G.M. Allen & Sons, Inc., which owns and operates a blueberry processing facility in Orland Maine, makes use of a 50 kW wind power project located on its premises.

[13] There are several smaller facilities in operation in New England. These include facilities located in Princeton, Massachusetts (0.3 MW), Searsburg,

stages of development and there have been attempts to construct wind facilities in the past. Maine wind development experience is summarized below.

1. Mars Hill

The wind project closest to realization is an approximately 50 MW facility located in Mars Hill. The facility is expected to cost in the range of $55 million and will have approximately 4 to 6 full-time employees. The facility generally has the support of the Town of Mars Hill and of various environmental organizations. However, an objection to the project was raised before Maine's Board of Environmental Protection ("BEP") regarding the need for preconstruction data on the risks to migratory birds and bats. The BEP has permitted the project with various conditions, including pre- and post-construction studies. Construction is expected to begin in the Spring, 2005 and the facility is expected to be operational before the end of the year.

2. Redington

Efforts to develop a wind project in the Redington area mountains have been under way for a number of years. The project is expected to be in the range of 50 MW to 90 MW. The location is considered controversial in large part because the towers can be observed from the Appalachian Trail. Formal filings for an environmental permit and other regulatory approvals have not yet been made.

3. Fox Island

The Fox Island Electric Cooperative has been considering the development of wind generation to serve the needs of the residents on the island. The Cooperative has monitored wind speeds using a DOE grant and is considering installing wind capacity that would exceed its customers' electricity requirements.[14] Interconnection studies and the permitting process have not yet begun.

Vermont (6 MW), and Hull, Massachusetts (0.7 MW). The Hoosac Wind project in Massachusetts has permits to expand from 6 MW that are currently operational to 40 MW. A large facility, known as Cape Wind (420 MW), is being considered for waters off of Cape Cod; it would be the first offshore wind facility in the United States.

[14] Exporting power would likely require a statutory change because current law prohibits consumer-owned utilities from providing wholesale generation service except for "incidental sales." 35-A M.R.S.A. § 3207(1)(B).

4. Boundary Mountains

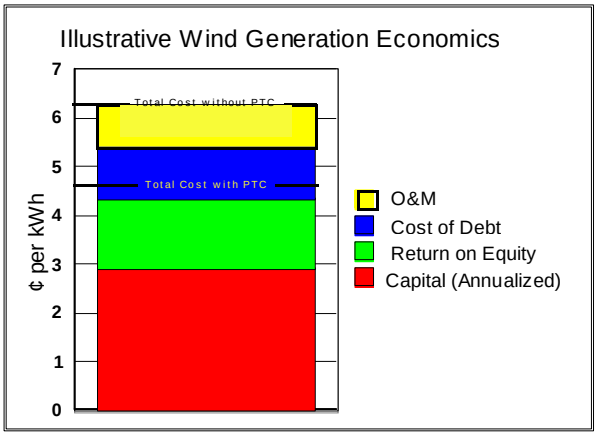
In the 1990s, there was an attempt to develop a large wind facility in the Boundary Mountains of western Maine. The facility would have been in the range of 200 MW. The project completed most of the permitting process and had obtained contracts to sell part of its generation to utilities in New England. However, the developer entered bankruptcy proceedings and the facility was never constructed.

III. COST OF WIND POWER

The cost of wind power is competitive with the cost of other generation resources in New England assuming the continued availability of the federal production tax credit.

The current cost of wind power is competitive with the cost of alternative resources in New England.[15] The installed cost of wind power has declined rapidly over the last decade because of technological improvements and is expected to continue to decline for some time into the future. Currently, however, the ability of wind power to compete with other resources remains dependent on the existence of a federal production tax credit ("PTC") in most cases.[16]

Table 1



Similar to other types of generators, a wind facility has development, equipment and installation costs, debt and equity costs, taxes, and O&M costs. For wind facilities in Maine, the Commission has been informed that capital costs are in the range of $1,200 per kilowatt, more than double the typical capital cost of gas-fired facilities. To put this in perspective, a 50 MW facility at $1,200 per kilowatt would have $60 million in capital costs. Table 1 provides an example of the cost components of wind generation under a reasonable set of assumptions.[17]

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[15] The costs in this section refer to the all-in, average life cycle cost of generation (both capital and operating costs). This section does not discuss "indirect costs" such as the cost of additional system reserves or transmission upgrades, nor does it discuss any potential cost benefits such as cost reductions that may result from greater fuel diversity (these are discussed in section V of this report).

[16] The PTC is applicable for the first 10 years of a facility's operation. Federal tax code provisions for accelerated depreciation also help the commercial viability of wind power.

[17] Capital costs are assumed to be $1,200 per kW, the debt-equity ratio is assumed to be 50/50, the capacity factor is assumed to be 31%, the return on equity is assumed to be 12%, the realized effect of the PTC is assumed to be 1.6 ¢/kWh and the project is assumed to be amortized over 15 years. This example is intended only to provide a general representation of wind generation costs under a simplified set of assumptions. It does not include the effect of taxes or the time-value of money as these factors can vary significantly depending on the specifics of a project and a project's financing structure. In addition, this table reflects the PTC as it would exist for the first 10 years of the project, not averaged over the life of the project.

As seen in Table 1, under the stated set of assumptions, the all-in, life cycle cost for a moderately sized, grid-scale wind generation facility is between 6 and 7 ¢/kWh without the PTC. With the PTC, however, the effective cost to a developer is between 4 and 5 ¢/kWh.[18]

Because wind generation projects are so capital intensive, the economics are very sensitive to the cost of financing. Currently, the financial community is likely to demand at least an 8% interest rate on debt to finance a privately developed wind facility.[19] As shown on Table 1, this results in a cost of debt of approximately 1.1¢/kWh (levelized over 15 years). However, under the set of assumptions presented here, every percentage point in the cost of debt represents approximately 0.15 ¢/kWh. In other words, if the interest rate is reduced from 8% to 6%, the cost of the project over its lifetime is reduced by approximately 0.3 ¢/kWh.

Other expenses, including operation and maintenance ("O&M"), property taxes, insurance, land lease payments and facility maintenance are also significant and are estimated to be around 1 ¢/kWh. Of that amount, property tax is likely to be among the largest components.[20] In addition to the costs mentioned above, the generator must supply a profit for its equity investors. A reasonable expectation would be a 12% or higher return -- translating to an average annual cost of 1.4¢/kWh.

Siting studies are sometimes costly (e.g., Mars Hill's study has cost approximately $300,000 to date, while the Redington project has incurred costs in excess of $2 million to date). However, those amounts are still a low percentage of the total project cost of larger projects, adding a fraction of a cent per kWh over 15 years (for example, under the above-described assumptions, every $1 million in extra permitting costs adds less than 0.1 ¢/kWh). Relatively

[18] A significant amount of literature suggests that the capital cost of grid scale wind facilities is in the range of $1,000 per kW. If this capital cost is assumed (along with the other cost assumptions stated above), the cost of wind power drops to between 5 and 6¢/kWh without the PTC and between 3 and 4¢/kWh with the PTC.

[19] The cost of debt likely varies significantly among developers. A private developer will likely pay at least 8% debt. However, if a generator is financed on the balance sheet of a large electric utility or generation owner, as has been the case for the majority of generators built in recent years, the debt payment may be closer to the overall corporate debt rate, which is likely to be lower because of project diversity.

[20] On a per kilowatt-hour basis, property tax constitutes four times the cost of wind power compared to a gas facility because wind facilities cost more to build and have lower capacity factors.

large up front costs would have a greater impact on smaller projects and those using lower wind speed sites.

Moreover, if a facility is constructed in northern Maine and the power is sold in Canada or New England, there is a cost to transmit the power through the transmission systems of northern Maine and (if sold in New England) Canada. Transporting power from northern Maine to New England can add more than 2 ¢/kWh to the cost of the power.

Actual wind power costs do vary widely from facility to facility. A substantial factor that drives the variability of cost per kilowatt-hour of a facility is its "capacity factor," which in turn is a function of the quality of the wind resource in the area.[21] The capacity factor refers to the amount of energy a wind facility actually generates compared with its total capacity. There is disagreement about the likely capacity factor of wind facilities.[22] Wind power developers expect capacity factors of new facilities to be in the range of 30% to 40%; however, the experience of facilities currently in operation has been significantly lower capacity factors. Capacity factors do not refer to the actual amount of time a facility generates electricity. For example, a 35% capacity factor does not mean a facility will generate 35% of the time; the facility may generate a much greater portion of the time at lower than maximum capacity (e.g. 70% of the time at half capacity).

Finally, the federal PTC, which lowers the cost of generation by 1.6 to 1.8¢/kWh (depending on the equity owner's ability to take advantage of the credit), appears crucial to the current economics of wind facilities. This is illustrated by the large number of projects that were delayed until the recent renewal of the credit.[23]

As mentioned, the cost of grid scale wind power is generally competitive with the current cost of other resources in New England. The ability of wind power to compete with other resources depends to a significant degree on the level of oil and gas prices; as these prices rise, wind power becomes more economic. Wind, which has an advantage in that its costs do not depend on

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[21] The American Wind Energy Association has stated that an increase in average wind speed of 2 miles per hour could result in the generation of 50% more electricity.

[22] To illustrate the sensitivity of wind power costs to capacity factor, if a 25% capacity factor is assumed in the cost example presented above (rather than the 31% capacity factor assumption), the cost of wind power would be between 7 and 8¢/kWh without the PTC and 6 and 7¢/kWh with the PTC.

[23] The federal PTC expired during 2003 and its renewal was unknown through most of 2004. The Congress recently extended the PTC though 2005. The American Wind Energy Association has stated that the PTC is a critical factor in financing new wind power facilities.

fluctuating fuel prices, can be expected to remain cost competitive into the foreseeable future based on current fuel price expectations. Thus, larger scale wind projects (assuming the continued existence of the federal PTC) should not be viewed as requiring further financial assistance or subsidies to allow them to compete on a cost basis in the current electricity market.

IV. AVAILABLE MARKETS

Sufficient markets are currently available to wind power facilities developed in Maine and these markets are likely to remain available into the foreseeable future.

A. State Renewable Requirements

Maine does not itself constitute an electricity market. Rather, southern Maine is part of the broader New England market (i.e. ISO-NE or NEPOOL market) and northern Maine is part of the broader Maritimes control area.[24] In addition, power is routinely traded between the New England region and neighboring regions. Thus, all of New England, the New York control area, the PJM control area,[25] the Maritimes control area,[26] and possibly Quebec represent potential markets for wind power facilities located in Maine.

Massachusetts and Connecticut have relatively aggressive Renewable Portfolio Standards ("RPS") that create an attractive market for wind power generated in Maine.[27] Both RPSs have limited eligibility criteria that include wind power with percentage requirements that increase over time. The increased demand caused by these RPSs has resulted in a substantial premium for qualifying resources, such as wind power. This premium has been in the range of 3.5 to 5¢/kWh and a substantial premium can be expected to continue until a significant quantity of additional eligible resources are developed in the region. The premium is realized through the sale of what is referred to as renewable energy credits or RECs. The use of RECs allows a wind facility to sell its "renewable attributes" to one buyer, while selling its actual energy output to another buyer.

Wind power facilities located in Maine are eligible for both the Massachusetts and Connecticut RPSs. However, the Massachusetts RPS requires that the power be delivered into ISO-NE region. Thus, wind facilities located in northern Maine must transport their power out of northern Maine through New Brunswick and into ISO-NE area to qualify for the Massachusetts

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[24] Southern Maine comprises approximately 10% of ISO-NE's load and northern Maine comprises approximately 3% of the Maritime's load.

[25] The PJM control area consists of Pennsylvania, New Jersey, Delaware and Maryland.

[26] The Maritimes control area includes New Brunswick, Nova Scotia, Prince Edward Island and northern Maine.

[27] The details of the RPS in Massachusetts and Connecticut are included in the Commission's recent report to the Legislature on the promotion of renewable resources. *Report and Recommendations on the Promotion of Renewable Resources,* pages 57-60 (Dec. 31, 2003) ("*MPUC Renewable Report")*.

RPS. This transmission requirement adds significant costs[28] that represent a barrier to accessing the Massachusetts market.[29] Connecticut does not have a delivery requirement, making it a more readily accessible market for facilities in northern Maine.[30]

In addition to Massachusetts and Connecticut, other states in the region have adopted or are considering adoption of renewable standards that would provide a market for Maine wind power facilities. Most notably, Rhode Island has recently enacted RPS legislation for new renewable resources that takes effect in 2007; facilities in the ISO-NE portion of Maine would be eligible and facilities located in northern Maine would also be eligible if the power is delivered into the ISO-NE control area. New York has also adopted a new renewable RPS in which wind facilities in Maine would be eligible if their power is delivered into the New York control area.[31]

B. Canadian Markets

The neighboring Canadian provinces of New Brunswick, Quebec, and Nova Scotia also provide potential markets for Maine wind facilities, particularly those located in northern Maine. In particular, New Brunswick has recently opened its electricity markets to competition and is required by law to adopt an RPS. Thus, New Brunswick represents a significant potential market for Maine wind facilities and this potential would increase if Point Lepreau (New Brunswick's 635 MW nuclear plant) permanently closes down and New Brunswick is thus required to acquire significant additional generation resources.

New Brunswick is a primary market for wind facilities located in northern Maine in that a direct connection exists. However, power can also be transmitted through New Brunswick into Quebec and Nova Scotia. The potential

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[28] The tariffed transmission costs to transmit power out of northern Maine, through New Brunswick and down to the NEPOOL system range above 2¢/kWh. However, in some circumstances, it may be possible to obtain discounts off the tariffed rates.

[29] In addition, the MEPCO line that connects the New Brunswick system to the NEPOOL system is currently fully subscribed for firm capacity. It is unclear, however, whether this is likely to present a significant obstacle for wind developers as non-firm capacity is often available. Moreover, a second tie-line, if constructed, would provide additional capacity for transactions from northern Maine into the ISO-NE control area.

[30] Connecticut requires the resource to be located in the ISO-NE control area or in neighboring states with comparable renewable requirements, including northern Maine.

[31] New Jersey and Maryland also have recently adopted or revised RPSs in which Maine wind facilities would be eligible subject to deliverability requirements. The cost of delivery, however, may be economically prohibitive.

of New Brunswick (as well as Quebec and Nova Scotia) as a market for facilities located in the ISO-NE portion of Maine would be expanded if the currently planned second tie-line between Maine and New Brunswick is constructed. The current tie-line between regions can support approximately 100 MW of transactions south to north; this would be expanded to 400 MW with the second tie line. The current capacity north to south is in the range of 700 MW and this would be increased to 1000 MW with the new tie-line. Thus, the construction of the second tie-line would enhance both the ability of wind facilities located in the ISO-NE portion of Maine to sell into New Brunswick and the ability of wind facilities located in northern Maine to sell into the New England market.[32]

C. Green Market

Finally, a "green market" has developed in Maine and elsewhere. A green market refers to individuals or businesses that are willing to pay a premium for "green" or "clean" power for environmental or other reasons. The voluntary green market provides another outlet for Maine's wind power that will likely grow with time, although its precise impact is impossible to determine with any accuracy.

Wind is well positioned to benefit from a green market because it is more universally accepted as "green" than are some other renewable fuels. Currently, over two thousand accounts (individual, business and governmental) are served from green marketers.[33] While this represents less than one percent of Maine's consumers, improved marketing could result in wider purchases of green power. The Legislature has explicitly directed the Commission to inform electricity consumers in the State of the benefits of renewable power and the opportunities to purchase electricity generated from renewable resources.[34] In addition, the likely increase in standard offer prices – as a result of increasing natural gas prices – may provide wind generation more opportunities in the retail residential and small commercial markets.

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[32] As a result of a recent ISO-NE ruling, the cost of the second tie-line will be rolled into the regional transmission tariff and will therefore not represent a cost to generators that transport power on the line. The tie-line requires the approval of the Commission and a permit from the DEP. All necessary approvals on the Canadian side of the border have been obtained.

[33] For example, in Maine, over a thousand residential customers purchase power from a green supplier and the College of the Atlantic, Colby College, Bangor Theological Seminary and Unity College have decided to make a commitment to green power. The State has about 750 accounts (approximately 10% of its load) that are served by a green supplier. Green power products that are available in Maine can be found at the Maine Green Power Connection website, www.mainegreenpower.org.

[34] P.L. 2003, ch. 665, sec. 1.

V. SYSTEM IMPLICATIONS

Wind power does not present any serious or insurmountable grid system reliability or market operation concerns, nor is wind power development in Maine likely to have a substantial impact on existing generating facilities beyond those resulting from possible changes in market prices.

A. Overview

Wind power is not currently a significant resource in the northeastern United States and has some characteristics that distinguish it from most other generating resources. For these reasons, concerns have been raised that, if wind power grows to become a significant resource in the region, there may be substantial adverse reliability, operational, or other system implications.

A growth of wind power in the region at reasonably feasible levels should not result in any serious or insurmountable reliability or operational problems. Although wind power is relatively new in the northeast, it is quite prominent in other areas of the world and of the United States. Worldwide, there is in the range of 40,000 MW of installed wind power (about 30,000 MW in Europe and 6300 MW in the United States). Some power systems, most notably in Western Europe, have incorporated significant amounts of wind generation. For example, Denmark's wind power penetration is about 60% of its peak load, while Germany and Spain have wind power penetrations that are 15% of their peak loads.[35] In the United States, California (approximately 2000 MW), Texas (approximately 1300 MW), Minnesota (approximately 560 MW), and Iowa (approximately 470 MW) have significant wind power capacity. New Mexico has installed wind capacity that equals approximately 15% of its peak load, and Minnesota will soon have installed capacity equal to approximately 10% of its total installed capacity. The American Wind Energy Association reports that wind energy capacity in the United States has expanded at an annual average rate of 28% over the last 5 years and approximately 1700 MW of wind capacity was added during 2003. Thus, a substantial amount of wind power has been integrated into electrical grids around the world and in many areas of the country without causing insurmountable, or generally even serious, system reliability or operational problems.

Within the northeast, the New York ISO has completed a study that concluded that wind power could comprise at least 10% of the system mix without reliability or operational issues.[36] Commission discussions with

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[35] Wind power development in Europe has generally been subsidized to varying degrees.

[36] *The Effects of Integrating Wind Power on Transmission System Planning, Reliability, and Operations,* Commissioned by the New York State System

representatives of the ISO-NE and the system operator in northern Maine also revealed no serious concerns about the potential for wind power growth in New England.

With respect to wind power development in Maine, MPS conducted system impact studies on the Mars Hill project that revealed no major system problems. MPS did identify the need for some minor upgrades, the cost of which is the responsibility of the project developer. CMP has completed a study of the Redington project and concluded that the facility would have no adverse impact on system reliability, but that upgrades would be required that would be paid for the developer. Additionally, the project has received ISO-NE approval.

B. Wind Power Characteristics

1. Reliability

Wind power has several characteristics that raise some system reliability concerns. First, wind power is intermittent in nature. As such, the availability of wind power cannot be known with certainty. However, the system has historically integrated intermittent resources (e.g. run-of-the-river-hydro), and load itself is inherently unpredictable. Moreover, newer wind turbines have a greater ability to regulate changes in output more quickly if the system requires, and the sophistication with which wind power output can be forecasted both on a day-ahead and an hour-ahead basis is increasing. These developments lessen any reliability impact caused by the intermittent nature of wind power.

The intermittent nature of wind power also raises a concern that there will be a hidden cost resulting from the need for reserves or back-up power. In the New England system, however, the amount and operation of reserves are determined as a function of the two largest contingencies in the region (i.e. the largest available resources whose outage would require the maximum need for reserves), which are in the range of 2000 MW and 1100 MW. Thus, even a substantial number of wind projects of substantial size (e.g. in the range of 50 to several hundred MWs) scattered around the region are not likely to have an impact on the cost or operation of regional reserves in New England.[37]

Operator and the New York State Energy Research and Development Authority (Feb. 2004).

[37] The impact of wind power development on reserves depends on the characteristics of the particular system. For example, one study has concluded that a 10% penetration of wind power in Minnesota will increase the cost of reserve power. However, because of the wind patterns in Minnesota, the system must be able to compensate for the loss of all wind power. The situation would be different for a number of wind facilities scattered around New England.

Another concern regarding the nature of wind facilities is their likelihood of tripping off line when voltage drops. This can cause system problems depending on the size and location of the wind facility.[38] However, there are multiple ways to address the low voltage problem (e.g. through equipment additions).[39] In addition, some wind turbine manufacturers are claiming that new machines now have low voltage ride-through capability.

An additional reliability concern is the relative inability of wind facilities to control reactive power (measured in kilovars or vars). Reactive power is necessary to stabilize the grid against voltage swings.[40] A reactive power problem, however, can be readily addressed through the addition of equipment (e.g. capacitors). Moreover, newer wind technology is said to have a greater ability to produce or absorb vars as needed, although the implementation of such newer technology turbines has not yet been significant enough to demonstrate the accuracy of such claims.

2. Energy Market Implications

The nature of wind power as an intermittent resource has some implications for the operation of energy markets. As a general matter, generating facilities in the ISO-NE and northern Maine areas are required to submit a schedule of the amount of power they will deliver into the system a day in advance and an hour in advance, and generators suffer monetary consequences if the actual power delivered deviates significantly from the amount of power scheduled. However, there are exceptions to these requirements for intermittent resources, such as wind power. Nevertheless, current market rules were not designed to accommodate large amounts of intermittent resources. As a consequence, market rules will likely be re-examined as wind power becomes a larger part of the system.

Such a re-examination has already occurred in some areas of the country. The PJM power pool and the California system operator have modified their rules on power deviation charges to accommodate intermittent power. California has also made rule changes with respect to forecasting, scheduling and settlement. New York is in the process of re-examining its

[38] Because tripping off line during low voltage can cause significant system problems as the number of wind facilities increases in New England, the ISO-NE has recently decided to require all wind facilities to have the capability to remain on line in the event of a voltage drop.

[39] The cost of such equipment additions is borne by the wind project developers.

[40] Vars are essential to stabilize voltage at a level required to move power across the grid. The electric grid needs a specific level of reactive power voltage—too much or too little can shut down transmission lines.

market rules, and has also already exempted certain intermittent resources from deviation penalties.[41]

Similarly, the ISO-NE is expected to re-examine its rules as wind power grows in the region.[42] The northern Maine system administrator is likely to consider necessary changes in light of the Mars Hill project.

3. Resource Mix Implications

The growth of wind power, due to its intermittent nature, can have certain impacts on the development of the regional resource mix. As wind power increases, the system would tend to require less baseload generation and more facilities with cycling or quick start capability. Wind power cannot provide system reserves, so reserves would have to come from other facilities. Wind facilities do have a capacity value, but that value is significantly lower than the facility's total capacity due to the inherent uncertainty of wind power.[43] Over time, this could result in the need for more generating capacity on the system than would have otherwise been required.

Assuming the generation resource market works as designed, wind facilities would be developed in amounts that are cost effective and would replace existing facilities that are more expensive. In this respect, wind power is no different from other resources. Over time, the generation resource market should respond to price signals and a least cost mix of resources should develop. However, the existence of renewable resource portfolio requirements in the region is likely to have some impact on the mix of resources in a manner that would increase overall costs relative to a system mix that would develop in the absence of portfolio requirements.[44] This result should

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[41] FERC is currently considering whether transmission service should be reformed to better accommodate intermittent resources and whether current market rules unduly penalize intermittent resources. *FERC Docket No. AD04-13.*

[42] Consistent with its statutory obligations to work on the regional level to promote the generation of electricity from renewable resources when the interests of consumers are not adversely affected, 35-A M.R.S.A. § 3302(3), the Commission will act to encourage the ISO-NE and the northern Maine ISA to develop market rules that take into account the characteristics of wind power and that are fair to all market participants.

[43] The ISO-NE would generally assign a wind facility a capacity value of 25% of the facility's total capacity. This amount could change depending on the actual operation of the facility.

[44] However, a recent study by the New York State Public Service Commission found that although most ratepayers would experience modest bill increases due to the New York RPS, some ratepayers may experience bill decreases from the suppression effect on supply and capacity costs in particular locations. *New*

not be viewed as unexpected in that the purpose of renewable resource requirements is to promote the development of resources that would not otherwise occur due primarily to higher costs than conventional fossil fuel facilities.

A countervailing consideration is the resource diversity benefit of promoting wind power development in the region. Currently, around 40% of the electricity supply in New England depends on natural gas; a situation that creates both price and reliability risks, especially when demand is high and natural gas supplies are low. During such times (e.g. very cold weather), the existence of wind generation (as well as other resources that do not depend on natural gas) would increase system reliability and tend to lower electricity costs. More generally, significant amounts of wind generation on the system could provide some downward pressure on the cost of gas-fired generation by reducing the demand for natural gas and allowing for the build-up of gas inventories.[45]

4. Emissions Impacts

The reduction of air emissions from electric generating plants can be considered a primary benefit justifying the promotion of wind power development. The most direct way to view this benefit is to consider the amount of electricity (and corresponding air emissions) that will not be produced by other generating facilities as a result of the production from a wind facility. In New England, the energy that would otherwise be generated would primarily come from gas and oil-fired facilities.[46]

However, the precise impact of wind facilities on air emissions may require the examination of secondary effects. For example, the addition of a significant amount of wind power to a system could affect the amount of capacity that must be held in reserve. If this results in an increase in generation that must run at sub-optimal levels to provide adequate reserves, the consequence could be a reduction in the air quality benefits from wind power. However, such an impact in New England is unlikely. As mentioned above, the development of a substantial amount of wind power in the New England region is

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York Renewable Portfolio Standard Cost Study Report II, New York Department of Public Service (Feb. 2004).

[45] For these types of reasons, the ISO-NE has expressed the need to consider alternative energy sources such as wind. In addition, a U.S. Department of Energy white paper states concerns about the ability of the natural gas industry to meet current requirements in New England and concludes that diversification through use of renewable resources in the region would improve reliability and lower energy costs.

[46] Based on the "2002 NEPOOL Marginal Emission Rate Analysis" conducted by the ISO New England, each megawatt-hour of wind generation would directly avoid 1,338 pounds of CO_2, 3.3 pounds of SO_2 and 1.12 pounds of NOx.

not likely to affect the operation of reserves. Also, as discussed above, the addition of wind power could affect the overall development of the resource mix in the region. Because the actual impact on system mix cannot be predicted, the secondary impacts on air emissions cannot be determined. However, any significant change in overall system mix would require the addition of a large amount of wind power to the system, which would presumably be accompanied by a substantial direct reduction in air emissions.

5. Impacts On Existing Facilities

Specific concerns were raised during the legislative session that a large wind facility in northern Maine, such as the Mars Hill project, could have a detrimental impact on other generation facilities (particularly biomass facilities). These concerns were driven to some degree by the large size of the Mar Hills project (approximately 50 MW) relative to the total northern Maine load (approximately 150 MW). The MPS system should not, however, be viewed in isolation, but as part of the much bigger Maritimes control area.[47] There is currently 90 MW of available transfer capability between MPS and New Brunswick,[48] and MPS is planning to add additional transfer capability of 50 MW. There is currently 140 MW of generation capacity on the MPS system. As a result, a large amount of additional capacity beyond the Mars Hill project can be added to the MPS system before there is any serious impact on the existing biomass facilities in the area or on the development of additional generation capacity.

In the ISO-NE area of Maine, significant amounts of wind power development could have some impact on existing facilities. Maine is currently a large net exporter of power and the addition of substantial amounts of any new generation in Maine could increase the amount of time that there are transmission constraints in transferring power outside of Maine. The result could be lower power costs inside Maine (an outcome that would be desirable from the perspective of Maine consumers), perhaps causing existing plants to operate in fewer hours or possibly to shut down.[49]

In addition, in either Maine area, it is possible that newly developed wind power would be able to satisfy RPS requirements more economically than biomass facilities and thereby affect their ability to remain viable. However, this is a function of the competitive nature of RPS requirements

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[47] The total generation capacity in the Maritimes control area is in the range of 6000 MW.

[48] The total transfer capability is 200 MW, but only 90 MW is available on a firm basis.

[49] The issue of transmission constraints and the impact on market prices in Maine is discussed further in section VI of this report.

that ultimately results in the fulfillment of state renewable goals at the lowest cost to consumers.

VI. OBSTACLES TO WIND POWER DEVELOPMENT

Similar to most electric generation facilities, wind power development faces a number of obstacles. The primary obstacle to wind power development is the ability to obtain long-term project financing.

A. Project Financing and Long-Term Power Contracts

The most substantial obstacle to wind development in this State (as well as elsewhere) is the difficulty in obtaining project financing on reasonably attractive terms. This difficulty stems from the general lack of willingness of market participants to enter into long-term power contracts. Financing entities are generally reluctant to offer reasonable financing terms unless a project developer has a long-term contract for power or for RECs. In this context, a long-term contract is in the range of 10 to 20 years.

The current reluctance of market participants to enter into long-term contracts is attributable to several factors. One major factor is the restructuring of electric industry on both the State and regional levels. Industry restructuring has resulted in the deregulation of many entities that are now responsible for electricity supply. Unregulated suppliers are less likely to enter into longer-term obligations with a generation facility than regulated entities that have long-term load obligations and for whom there is a greater certainty of cost recovery. In addition, restructuring has resulted in a level of uncertainty about future market rules, creating further hesitancy to make long-term commitments. Moreover, the recent high-profile corporate scandals and the number of bankruptcies of entities in the energy business have added to the perceived risk associated with generating plant investment, increasing the difficulty in obtaining financing. This situation is not specific to wind power; all types of generation facilities face difficulty in obtaining financing in the current market in the absence of long-term power contracts. The general reluctance to finance without long-term contracts could change as electricity markets become more familiar to investors.

It is not the case that project financing could never be obtained in the current market without a long-term contract; however, the terms of such financing may often render a project uneconomic.[50] Moreover, some entities are willing to enter into longer-term contracts. Although unregulated marketers will generally not contract for power for more than 5 years, traditional utilities with load obligations (such as Canadian utilities and municipal utilities in some New

[50] A study done in the 1990s by NREL estimated that wind generators' cost of debt may translate into increased costs of 1.3¢/kWh compared to a gas plant's cost of debt. Currently, wind power facilities are likely to face financing rates that approach those of other generating facilities.

England states) are willing to consider longer-term power contracts.[51] Additionally, end-use customers, looking for price stability over time, may also be willing to enter longer-term contracts.[52] Finally, some entities, primarily for environmental reasons, may be willing to enter contracts to purchase RECs on a long-term basis.

B. Public Opposition

Wind power is generally viewed as environmentally benign relative to other generating sources in that it produces no air emissions and thus does not contribute to global climate change. As such, wind generation has received growing support from environmental organizations (although support of any particular project would depend on its location). However, in many cases, public reaction can be among the most substantial obstacles to wind development. Depending on the particular site, public opposition to a wind project can be severe and can be the major factor in its failure.

Public opposition generally focuses on the potential for harm to migratory birds (and other wildlife) and on visual impacts upon large areas of scenic landscape. Current wind power towers are higher than in the past and wind facilities cover a much larger area relative to other types of generating facilities.[53] Thus, towers can often be seen from long distances and are required to have lights that make them visible at night. Critics of wind power often argue that such facilities take up extreme amounts of land for the amount of power they generate, that they are noisy and dangerous in terms of ice build up, that they have a negative impact on property values, that air emission benefits are often significantly exaggerated, and that they are inefficient in that significant back-up power is required.[54]

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[51] The Daily FERC reported in December 2004 that a group of municipal utilities in Massachusetts agreed to purchase 15 MW of wind power under a 22 year contract for a fixed price of 3.65¢/kWh.

[52] An end-use contract for wind power would be complicated by the need for power from other sources when the wind resource is not available.

[53] The towers of the latest wind facilities are in the range of 200 to 300 feet and the blades are 100 to 150 feet long.

[54] Many of the specific characteristics of wind power are discussed throughout this report. However, as stated in section I, the Commission's charge is not to evaluate the variety of claims regarding wind power or to make a judgment regarding whether State government energy policy should include support of wind power. With respect to the major grounds for public opposition discussed in this report, the State's environmental, land use, and other applicable agencies are better equipped to consider arguments and make the appropriate judgments.

C. Environmental Permitting

The difficulty in siting wind power facilities around the country is sometimes mentioned as a significant obstacle to development. However, wind power developers do not view the environmental permitting process in Maine as unreasonable or unduly burdensome.

The process in Maine can be expected to take six months to a year and the costs can vary. For example, the permitting of the Mars Hill project has cost approximately $300,000, while developers involved in the Redington project have spent in the range of $2 million. Costs in this range, although significant, do not comprise a large portion of total project costs and would not therefore represent a barrier to wind development in the State. Additionally, as more wind projects are permitted in Maine and the standards and requirements become clearer, environmental impacts should become better understood and the cost of permitting should come down.

The process in Maine is made somewhat more complicated by the overlapping regulatory responsibilities of the Department of Environmental Protection ("DEP") and the Land Use Regulation Commission ("LURC"). The DEP is the State's environmental agency, while the LURC has planning and zoning authority for the State's unorganized areas and plantations. When a project is proposed to be located partially in LURC territory, both DEP and LURC have environmental review responsibilities. The DEP must permit the whole project, while LURC has authority only over that portion of the project that falls within its territory. If the project is proposed to be located entirely in unorganized territory, LURC conducts the environmental review in conjunction with its rezoning authority (DEP conducts the environmental review if rezoning is not required). If no portion of the project will be in the unorganized territory, the DEP alone would conduct the environmental review.

In situations of overlapping jurisdiction, the agencies work closely to minimize developers' filing requirements and maintain consistent procedures. The agencies have developed joint application checklists, hold joint application meetings, and communicate regularly regarding projects under their joint review. In addition, discussion has occurred regarding legislation that would remove the requirement for DEP to approve projects in LURC territory provided that LURC is conducting such review. As wind projects become more prevalent, direct experience should allow for continued process streamlining.

D. Grid Interconnection Procedures

The process of interconnecting with the power grid is often mentioned as a barrier to wind power development. The grid interconnection

process is somewhat complex, takes times and has a cost for wind facilities.[55] However, project developers report that the process in Maine to interconnect to the grid is not a barrier to wind power development. In addition, the FERC has recently opened a proceeding to review technical requirements for the interconnection of large and small wind generators and to examine the need to adopt specific interconnection standards for wind projects.[56]

E. Market Prices in Maine

As a consequence of recently adopted regional market rules (referred to as standard market design), wholesale market prices in Maine tend to be less than prices in the remainder of New England.[57] This price impact is due to both transmission constraints that limit the amount of power that can be exported out of Maine at certain times of the year[58] and the ISO-NE's calculation of marginal line losses.[59] Although lower market prices are advantageous from the perspective of Maine consumers, they are detrimental for developers looking to locate a wind project in the State. However, wind facilities are not likely to be required to shut down during times of transmission constraints because of their low cost of operation (i.e. lack of fuel cost expense); during periods of constraint, it is units with higher costs (and thus higher bids) that will not be dispatched.

[55] For example, generation project developers are required to pay for the cost of system impact studies.

[56] In the context of a proceeding to assess the state of wind energy in wholesale markets, the FERC issued a briefing paper that discusses many of the same issues included in this report. The briefing paper is available at http://www.ferc.gov/EventCalendar/Files/20041122142848-ad04-13.pdf.

[57] Generally, market prices in Maine tend to be 0.5¢/kWh less than the rest of New England.

[58] There is currently 2,000 MW of transfer capacity between Maine and New Hampshire and 700 MW of transfer capability between the ISO-NE portion of Maine and New Brunswick.

[59] The line loss calculation is responsible for approximately two-thirds of the price differential; as a result, removal of the transmission constraints would not equalize prices with the rest of New England.

VII. SITING OF WIND POWER ON TRIBAL LANDS

Preliminary evaluations reveal that there may be some realistic potential for wind power development on tribal lands.

The Penobscot, Passamaquoddy, Maliseet, and Micmac tribes are interested in exploring the potential for wind power development on their tribal lands. Wind power development may be particularly appropriate for tribal lands in that clean, renewable power would be consistent with tribal values on the environment and the use of natural resources.

Based on preliminary data, it appears that there is a realistic potential for the development of significant amounts of wind power on tribal lands.[60] The blueberry fields on Passamaquoddy lands are high, open lands with substantial winds and a proximity to transmission lines. These lands could potentially support more than 100 MW of wind power. Preliminary information is also encouraging for wind development on Penobscot lands. The Maliseet and Micmac tribes are in earlier stages of considering wind power potential.

The development of wind power on tribal lands, however, faces the same obstacles as development in other areas of the State.[61] As with any wind power project, the major difficulty is obtaining long-term financing on reasonable terms. This problem is made more complicated in that the applicability of state laws related to financing and contractual remedies with respect to projects on tribal land is less clear than for other projects. This creates some uncertainty that could make financing more expensive or difficult to obtain. Ownership of facilities on tribal lands appears to be a high priority for the tribes. However, the tribes generally do not have the funds for large equity investments. In addition, tribal ownership could negate the benefit of the federal PTC because the tribal projects are generally not taxable; a relatively large taxable corporation would likely need to be involved as an equity owner for at least the 10-year life of the PTC.

Section VIII of this report discusses the use of the Finance Authority of Maine ("FAME") as a means to aid in the financing of wind projects more generally throughout the State. The same considerations would apply to the use of FAME for tribal projects. Any legislative decision to authorize additional public or ratepayer support for FAME financed wind projects would presumably also apply to tribal projects. Alternatively, the Legislature could choose to make such additional FAME authority only applicable to projects on tribal lands, thereby limiting FAME's potential financial exposure.

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[60] Appendix F to this report shows the locations of tribal lands. When compared to the wind maps in Appendix C, it can be seen that wind density is fairly high on some portions of tribal lands.

[61] Obstacles to wind power development are discussed in section VI of this report.

The funding of studies necessary to determine the viability of particular sites on tribal lands can also be a barrier to development. The DOE has some programs specifically for wind power development on tribal lands.[62] These programs can help provide the funds necessary for pre-construction studies. To the extent that support of wind power on tribal lands is a high priority, the State can make funding available for pre-construction studies to supplement those that may be available from the DOE. Such studies should cost in the range of $200,000 to $600,000 and available funds (obtained from taxes or electric rates) could be distributed through the State Energy Program (which is currently administered by the Commission).

The requirements for environmental and land use review on tribal lands may be a source of uncertainty for wind developers. While State environmental and land use review processes apply on their face to tribal lands, the tribes have in the past contested the extent of State jurisdiction. The confusion that may exist regarding environmental and land use review for projects on tribal lands should dissipate to some degree when the first tribal wind project completes a pre-construction review process.

[62] For example, the DOE has an anemometer loan program.

VIII. ALTERNATIVE APPROACHES TO PROMOTING WIND POWER IN MAINE: CONSIDERATIONS AND RECOMMENDATIONS

To the extent that the promotion of wind power development is a substantial policy objective and the Legislature determines that some level of public support or subsidy is warranted, there are several viable mechanisms identified in this section of the report that could be implemented to promote wind generation. As a general matter, the Commission recommends the implementation of mechanisms that employ competitive processes to minimize the cost to Maine's public. Moreover, any wind power promotion mechanism should be designed to carefully balance the costs and risks to taxpayers or ratepayers with the potential for public benefits. The precise determination of how such objectives could be achieved for each promotion mechanism would be a complex matter and are thus described only generally in this report. Finally, any seriously considered promotion mechanism should be examined to determine the applicability of federal law provisions that offset the amount of the federal PTC as a result of certain types of state incentives.

A. Renewable Portfolio Standard

1. General Description

A renewable portfolio standard ("RPS") was discussed at length during the last legislative session as a mechanism to promote wind power development in Maine. Essentially, an RPS requires retail suppliers of electricity to serve a specified percentage of their load in Maine through designated categories of resources.[63] If appropriately designed, an RPS can be an effective means to promote the development of desired resources that are not yet commercially viable. However, a properly designed RPS would come at some cost to electric consumers in that the mechanism is a subsidy to the designated resources. The cost cannot be known in advance, but could be capped through what is referred to as an "alternative compliance mechanism" ("ACM") that provides suppliers with the option of paying into a fund rather than meeting the portfolio requirement. Any money deposited into the fund would be used to provide financial support to the designated renewable resources.

2. Appropriate Design

Several variations of an RPS that would promote wind development were discussed during the last legislative session. In addition, the Commission proposed a mechanism in its recent report on the promotion of renewable power.[64] All the mechanisms were similar in design, one that is

[63] For a detailed discussion of RPSs, their operation and implications, see *MPUC Renewable Report* at 21-23.
[64] *MPUC Renewables Report* at 62-67.

common in other states (e.g. Massachusetts and Connecticut). The approach would be to establish a separate RPS category for particular types of renewables (e.g., new, wind, low-impact hydro). The category could include wind power as one of the resources that would be likely to be used by suppliers to meet the requirement.[65] The percentage requirement would start out small (e.g. 1.0% or 2.0%) and grow by a specified amount for a fixed period of time (e.g. 0.5% or 1.0% each year) until a designated percentage is reached (e.g. 5%). An ACM was included in all of the RPS proposals that ranged from the Commission proposal of 2.5¢/kWh to ACMs approaching 5¢/kWh. For reference, a 2.0% portfolio requirement with a 5¢/kWh ACM would cap electric consumer cost exposure at approximately $11 million for a one-year period, or approximately 0.1¢/kWh if applied across all kilowatt-hours sold within the State.

3. Mitigation of RPS Costs

The major concern with an RPS is its cost to electric consumers. As mentioned above, an effective RPS is essentially a subsidy and should be implemented to promote resources that are desirable from a public policy perspective, but not yet commercially viable (an RPS can be phased out once the targeted resources become commercially viable). As the cost of eligible resources approach market prices, the cost of an RPS to consumers should approach zero (assuming that the RPS works correctly).[66] Because the cost of wind power is approaching market prices, the cost to consumers can be expected to be relatively low over time. However, in the near term, due to the demand for wind power created by the Massachusetts and Connecticut RPSs (and those in other states in the region),[67] the cost to Maine consumers is likely to approach the ACM.

There are mechanisms that can be used to "mitigate" the costs to consumers of an RPS, each of which was discussed during the legislative session. Because an RPS is a means to subsidize specified resources, there will generally be some cost to consumers. Possible "mitigation" mechanisms are:

> **ACM:** The primary mechanism to mitigate the cost to consumers of an RPS is an ACM. This mechanism serves as a cap on consumer cost exposure so that the Legislature can decide in advance the maximum amount of subsidy it desires to authorize.

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[65] The other renewables that were discussed include solar, tidal, wave, geothermal, landfill gas, and fuel cells.

[66] An RPS is designed to use competitive forces to drive prices down towards costs. The existence of any type of market power could frustrate this outcome.

[67] As discussed in section IV of this report, the demand created by RPSs in other regional states is likely to be significantly greater than the available supply for several years.

Consumer payback: Another mechanism that could serve to lower the cost of an RPS would be the inclusion of a "consumer payback" provision. An RPS acts to provide a subsidy to resources at time of relatively low market prices. If market prices rise high enough for a sustained period of time, the subsidy should be reduced to zero and the resource could become very profitable. A customer payback mechanism would provide for some sharing of the resource's high profits for the benefit of consumers under these types of circumstances.[68]

4. Considerations

An RPS can be an effective means to promote a particular resource. However, an RPS does not appear necessary to promote wind power development in Maine at the current time. The RPSs in Massachusetts and Connecticut are having the impact of stimulating wind power development in Maine and can be expected to do so into the foreseeable future (the recent adoption of RPSs in other states in the region may have a similar effect). However, eventually, wind power facilities (and other qualifying resources) will develop and the supply will tend to correspond with the demand created by the regional RPS. In such a case, a revised Maine RPS would stimulate more wind development than would otherwise occur; however, there is no way to know in advance how much of that development would be located in Maine nor what the modified RPS would ultimately cost ratepayers. Conversely, to the extent that eligible generation becomes competitive with other sources of generation and, therefore, naturally enters the system mix, the cost to electricity consumers is inherently decreased. Moreover, an RPS does reflect the benefits of a competitive process as each supplier has the incentive to minimize their costs while meeting their obligations.

Notwithstanding the above, as discussed in section VI of this report, the major barrier to wind power development is the difficulty in obtaining project financing, which is related to the general hesitancy of market participants to enter into long-term contracts for power. The adoption of a revised Maine RPS is not likely to have a direct or significant impact on the willingness of market participants to enter into long-term contracts. Legislative action regarding an RPS can be changed by any future Legislature and thus the necessary certainty is not likely to exist to overcome the risk aversion that is currently preventing market participants, as a general matter, from making long-term commitments. A revised Maine RPS, along with the existence of RPSs in most

[68] The concept of consumer payback mechanisms is discussed in the *MPUC Renewables Report* at 19-20.

states in the region, may have some incremental effect in contributing to a change in attitude regarding long-term commitments over time.[69]

5. Recommendations

To the extent that the Legislature decides to promote wind power development both within the State and the region through some level of public subsidy, the Commission recommends adoption of a revised Maine RPS. The design should be similar to that discussed during the last session: a small percentage portfolio requirement for certain renewables that grows gradually over time and is capped by an ACM. By itself, a revised RPS would do little in the short-term to encourage new renewable development (it is likely that a significant portion of the requirement would be met through the ACM). However, it would signal the State's commitment to wind power and would assure that Maine does its share to promote regional wind development over the long-term, rather than relying on the actions of other states. The Commission does not consider the adoption of a revised RPS to be an effective means of addressing the long-term financing problem, at least not in the shorter term.

B. System Benefit Charge

1. General Description

A system benefit charge ("SBC") is a commonly used mechanism to support renewable resources. The mechanism is a surcharge on the bills of T&D utility customers. The funds are collected and distributed to support specified resources according to previously established criteria. By its nature, an SBC is a subsidy that results in a direct increase in T&D utility rates for electricity consumers.[70]

2. Considerations

An SBC can be an effective mechanism to promote larger grid-scale wind facilities, as well smaller on-site applications and community wind

[69] The reasons for the current hesitancy regarding long-term commitments are discussed in section VI of this report. As the regional market (and associated market rules) become more stable and the likelihood of state and federal policies remaining in place increases, the general reluctance regarding long-term commitments may decrease.

[70] An SBC is the mechanism currently used in Maine to fund energy efficiency programs and support for low-income electricity consumers. The mechanism, its operation and implications are discussed in detail in the *MPUC Renewables Report* at 23-25.

projects.[71] An SBC can be designed so that only facilities in Maine benefit through the receipt of funds and may be able to provide some aid in obtaining project financing through a long-term commitment for assistance. Additionally, an SBC can be structured to aid wind development through the purchase of RECs or the guarantee of REC prices. [72] An SBC can be structured to cap the cost to ratepayers. An SBC does require significant resources to administer.

3. Recommendations

In the event the Legislature determines that larger scale wind power development is a substantial public policy and should be promoted through use of electricity consumer funds, the Commission recommends the adoption of a revised Maine RPS as an efficient, market driven mechanism for the promotion of resources. However, an SBC can also be structured to be effective in promoting larger scale facilities. If the Legislature adopts such a mechanism, the Commission recommends that the SBC be designed so that projects are chosen based on a competitive auction and ratepayers are compensated if markets prices or project profits reach certain levels. If the policy goal is to promote smaller scale, on-site wind power applications through the use of electricity consumer funds, the Commission recommends the adoption of an SBC. A specific recommendation for an SBC was included in the Commission's recent report to the Legislature on the promotion of renewable power. [73]

C. FAME Financing

1. General Description

The basic mission of the Finance Authority of Maine is to facilitate access to capital for business projects that would have difficulty accessing the private capital market and are considered to be in the public interest. FAME generally assists in project financing by providing credit assurances backed by its cash reserves and the moral obligation of the State; private lenders actually make the loan. Thus, if a project is too risky, private financing could not be arranged even with FAME backing. On some occasions, FAME lends money directly to business projects.

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[71] Community wind projects refer to small projects (generally less than 2 MW) owned by local landowners or municipalities. Massachusetts uses funds from its SBC to provide pre-development and development services for such projects.
[72] For example, the Massachusetts Renewable Energy Trust Fund, which is supported through a SBC, has entered longer-term contracts (e.g. for years 6 through 15 of operation) for the purchase or guarantee of REC prices so as to support wind power development. Funds to support such contracts are put into escrow as assurance to those financing the facility.
[73] *MPUC Renewables Report* at 67-70.

As a general matter, FAME is willing to accept a higher level of risk than private lenders. However, a private lender must be found to make the loan. The amount of FAME credit assurances for individual projects is limited by its amount of reserves. By statute, the maximum amount of credit assurance per project is $7 million, but FAME's internal policies result in a practical maximum closer to $5 million per project.[74] Under its current statutory authority, FAME can provide credit assurance for electric generation projects,[75] such as wind power facilities, consistent with its normal review procedures and funding limits.

2. Considerations

As discussed in section VI of this report, the difficulty in obtaining long-term financing on reasonable terms is the largest barrier to wind development in the State. Moreover, because wind projects are so capital intensive, a small change in the finance rate can have a substantial impact on a project's economics. Thus, it is logical to consider the potential for FAME to aid in development of wind facilities. FAME's participation could be especially important if the difficulty in obtaining wind project financing were due to an exaggerated nervousness of the capital markets regarding the restructured electricity markets (especially in the wake of the Enron scandal and other bankruptcies of energy trading companies) and a general lack of familiarity of lenders with wind technology. If this is the case and the encouragement of wind power development in the State is considered a substantial public policy goal, then FAME financing of wind projects would appear appropriate. However, major wind projects such as Mars Hill and Redington have a project cost in excess of $50 million and, assuming a 50% equity investment, a debt financing requirement of more than $25 million. This is significantly beyond FAME's statutory and practical financing limits.

In the event the Legislature determines that wind development is a substantial public policy goal, it can so inform FAME and provide FAME with specific direction to consider wind projects. This would encourage the financing of smaller wind projects, consistent with FAME's current capacity and standards of review. Larger projects would not be aided by such a pronouncement unless the Legislature acted to increase FAME's financial resources in some manner.

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[74] Under specific statutory provisions, 35-A M.R.S.A. § 3156, 10 M.R.S.A. § 1053(6), FAME can finance much larger amounts for the purposes of utility buyouts or restructurings of qualifying facility contracts. The ability to finance large amounts for such purposes results from the utility loan being backed by a ratepayer-funded revenue stream specifically authorized by the Legislature and the Commission.

[75] For example, within the past year, FAME has backed the refurbishing of biomass plants in Maine.

Additional financial resources could be obtained from either public or ratepayer dollars. If the Legislature chose ratepayer dollars as the funding mechanism, the conservation program fund (established pursuant to 35-A M.R.A. § 3211-A) would be a possible source. However, the conservation fund generates in the range of $15 million per year of which approximately half is already committed by contract. This does not leave sufficient funds over the next several years to finance even one major wind project. In addition, any funds diverted from the conservation fund to support wind power projects would leave significantly less support for the intended purpose of encouraging energy efficiency and conservation. This could hamper the efforts of Efficiency Maine, which already does not have enough funds to pursue many of the cost-effective efficiency measures that exist in the State.

An alternative to using Efficiency Maine funds would be for the Legislature to guarantee through specific statements in the law that ratepayers will be an additional source of income if there is a default on a FAME-backed loan. This has the advantage of encouraging wind power development in a manner that would have no cost for projects that do not default on their financial obligations. There could be significant costs if a FAME-backed project did default on its obligations, although it may be possible to recoup some of these costs through a sale of the facility or by the assumption and sale of the output. The Commission could be charged with aiding FAME in its analysis of the financial viability of projects.

Another approach is for the Legislature to direct FAME to administer a program whereby the combined price of energy and RECs is guaranteed through ratepayer funds.[76] Fulfillment of such a guarantee would not be triggered and no ratepayer cost incurred unless the combined price fell below a pre-specified amount. A mechanism could also be included that would have a percentage of revenues paid to the benefit of ratepayers if the combined price rose above a specified amount. As with a loan guarantee program, the Commission could be directed to aid FAME in its effort to administer a price guarantee program.

Finally, FAME can act to insure a relatively small portion of the debt financing (e.g. $4 million out of a $25 million loan). In some cases, the

[76] A similar program exists in Massachusetts in which funds collected through an SBC are used to provide price supports for RECs. However, if such an approach is taken in Maine, the Commission recommends that the guarantee be for the combined price of energy and RECs because the situation can occur in which an increase in the price of energy results in a reduction of the market price of RECs. The ability of a facility to obtain financing should depend on the total revenue stream, not a component of total revenues.

provision of such insurance can be enough for borrowers of relatively less risk to obtain financing. FAME can act in this regard under its existing authority.

3. Recommendations

The Commission recommends that FAME be considered as a means to address the long-term financing issues involved in wind power development if appropriate legislative findings are made. Any decision to provide FAME with additional direction or funding to support wind power development in Maine should be based on a clear legislative finding that such development is not only of substantial public interest, but also worthy of public funding. If so, it would not be inappropriate for ratepayers, as the ultimate users of electricity, to be the source of the public funding.[77] If the Legislature makes the appropriate findings, the Commission recommends that consideration be given to using ratepayer funds as the backup for both loans and price guarantees as described above.

D. Tax Incentives

1. General Description

A common means for states to offer financial incentives for the development of wind power is through tax incentives of some type. Approximately half of the states provide corporate tax incentives or sales tax exemptions as means to support wind power.[78] One approach to providing tax incentives for wind power development in Maine would be to designate all wind facilities as qualified Pine Tree Zone businesses regardless of their location and their status as a manufacturing operation.[79] This would provide wind developers with significant breaks on corporate income tax, as well as other benefits. Another approach would be a reduction in property taxes that would tend to reduce the burden on wind farms on a kilowatt-hour basis relative to natural gas facilities.

2. Considerations

Wind power development already receives substantial tax incentives from the federal government. As discussed in section III of this report, wind projects continue to receive significant federal production tax credits and

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[77] However, the Commission does note that there is not a significant difference between ratepayer funding and taxpayer funding in that it is essentially the same people that provide the support.

[78] *See, MPUC Renewables Report* at 29, Appendix I.

[79] Pine Tree Zone benefits only apply to manufacturing operations and certain other industries specified by law. The generation of electricity is not generally considered to be manufacturing.

are entitled to 5-year accelerated depreciation. As a consequence, further tax incentives or subsidies are not necessary for larger scale wind projects to be viable in the New England electricity market. However, tax incentives could be meaningful in promoting smaller on-site or community wind projects.[80]

As discussed in section VI of this report, the primary barrier to larger-scale wind power development is the difficulty in obtaining project financing, which is tied to the reluctance of market participants to enter long-term power contracts. Tax incentives will lower the cost of the project and could be beneficial to project financing; however, in the absence of a long-term power contract, they are not likely to make a significant difference in the receipt of financing.

3. Recommendations

In the event the Legislature determines that grid scale wind power should be promoted through some type of public funding, the Commission recommends against using state tax incentives, including expansion of the Pine Tree Zone eligibility criteria. An RPS provides an efficient, market-based mechanism to encourage a category of generating resources. Moreover, a program to encourage wind power financing through FAME would be the most direct means to address the primary obstacle to wind power development. Accordingly, the Legislature should prefer those mechanisms over tax incentives. For the promotion of smaller on-site or community wind projects however, the Commission recommends consideration of tax incentives as an appropriate support mechanism.

E. State or State-Mandated Purchases

1. General Description

Another approach to promote wind power development is for the State to directly enter into long-term purchase contracts for the output from wind facilities or by mandating that utilities or standard offer providers enter into such long-term purchase arrangements.[81] One alternative would be for the State to purchase power from wind facilities for its own needs or on behalf of the State's electricity consumers. The other alternative would be for the State to mandate by law that utilities or standard offer providers purchase wind power and either sell the output into the regional wholesale market or use the output to serve Maine consumers.

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[80] Smaller wind facilities are less economically viable and may not be able to take advantage of the federal PTC.

[81] A requirement that State government and universities meet an increasing percentage of their power needs with renewable energy is an option discussed in the DEP's Climate Action Plan provided to the Legislature in 2004.

2. Considerations

The existence of State or State-mandated long-term purchase obligations (e.g. 10 to 15 years) should greatly facilitate project financing. As discussed in section VI of this report, the availability of project financing is the major barrier for wind power development and the difficulty in obtaining long-term power purchase contracts is the greatest obstacle in achieving project financing.

The State already purchases a portion of its retail electricity needs from green marketers under relatively short-term contracts. The State could modify this program by entering into longer-term arrangements for retail service from a wind facility. Such arrangements could serve as a hedge against price volatility and result in overall lower prices, but might also lead to significantly higher retail electricity rates for State facilities than would have otherwise occurred. The arrangements would be complicated by the need for a retail electricity supplier to incorporate the wind power into an all-requirement service for the State. The combined load of State facilities would appear large enough to make some difference in the development of wind projects.

A long-term purchase directly by the State on behalf of electricity consumers would be problematic, because the State is not a participant in the regional market. Since utilities and standard offer providers are market participants, it would be more practical to require them to purchase power from wind facilities that would either be resold into the market or used to serve retail consumers.

A long-term power purchase obligation might serve as protection against market volatility, but would also place Maine's electricity consumers at risk for paying substantial above-market rates depending on market conditions. Such an approach would also move in the opposite direction from that contemplated by industry restructuring in that electricity consumers would again be subject to resource acquisition risks that could translate into new stranded costs.[82] At the direction of the Legislature, the Commission has conducted a rulemaking proceeding to adopt standards and procedures for the incorporation of new renewable resources into standard offer supply as a hedge against price volatility. As required by law, the rule will allow the Commission to require the use of power from new renewable facilities for standard offer supply, but only when doing so would provide an effective hedge against price volatility

[82] Prior to restructuring, utility resource planning and long-term acquisitions were under direct control of the State and the risks of long-term power contracts (e.g. stranded costs associated with qualifying facility contracts) fell upon ratepayers.

while maintaining a competitively-priced standard offer. The adopted rule will be subject to legislative review and modification.[83]

3. Recommendations

The Commission has no recommendation on whether the State should enter into long-term purchases of wind power for its own retail purposes. However, it is reasonable for the State to investigate this option by considering the price impact on Maine's taxpayers and recommendations of the DEP in its Climate Action Plan.

The Commission does not recommend that any additional purchase obligations be imposed beyond that which might be incorporated into the legislatively approved standard offer hedging rule. Beyond the use of new renewable resources as an economic hedge against price volatility, long-term purchase requirements represent a consumer subsidy that cannot be known in advance and is not targeted to minimize public costs. It is preferable to use a promotional method under which the potential cost to customers is known in advance. In addition, long-term purchase requirements are contrary to a primary goal of electric industry restructuring, which was to transfer the market risks of long-term resource acquisitions away from ratepayers. In the event the Legislature decides to require state-mandated purchases of wind power, the Commission recommends the use of a competitive auction for the desired amount of capacity so as to minimize the cost to electricity consumers.

F. Environmental Permitting

1. General Description

As discussed in section VI of this report, under the current regulatory structure, both the DEP and LURC have environmental review authority depending on the location of the project and both can have environmental review authority over the same project. The DEP and LURC have different review procedures and standards for project approval. Currently, both the DEP and LURC have general review procedures and standards, but neither agency has specific procedures for reviewing wind projects.

2. Considerations

The DEP is the State's environmental review agency. LURC does not have the same type of expertise or the resources of the DEP to conduct environmental reviews, but does seek technical assistance from DEP (and other

[83] P.L. 2003, ch. 665 (major substantive rulemaking required); *Public Utilities Commission, Amendments to Incorporate Renewable Resources into Standard Offer Supply,* Docket No. 2004-606.

agencies) for certain aspects of a development project. Because two agencies (with different procedures and standards) have environmental review responsibilities depending on project location, the current regulatory structure appears to have the potential for inconsistent application of environmental policy and inconsistent results across the State. In addition, although the DEP and LURC have made substantial efforts to coordinate and streamline their processes when environmental review of the same project is required by both agencies, developers must interact with and become familiar with the processes of two agencies.[84]

By law, the DEP reviews projects to determine whether they would have an unreasonable adverse impact according to statutory criteria. Thus, the DEP considers the severity of the impact a project would have on the environment and means to mitigate that impact. The DEP is not permitted to balance adverse environmental impacts against any resulting environmental benefit. Consequently, the DEP cannot consider the environmental benefit associated with wind facilities in reducing air emissions as part of the permitting process to offset an adverse impact. LURC appears to have the flexibility to consider environmental benefits through its requirement to assess the "need" for the project.

Neither the DEP nor LURC have specific regulations regarding the permitting of wind facilities. A number of states do have specific filing requirements for wind projects.

As discussed in this report, the suitability of a particular area within the State for wind development is often likely to be a matter of significant controversy. One approach would be to pre-define those areas of the State in which wind power development would either be appropriate or inappropriate from an environmental impact perspective. Such an approach would likely involve significant resources to review sites for which wind developers may never be interested. Another approach would be to provide guidance to developers through a pre-established list of criteria and standards.

3. Recommendations

The Commission recommends that the Legislature discuss with the DEP and LURC the merits of the current regulatory scheme and alternatives that may provide for an improved approach to environmental permitting (while LURC maintains its land use jurisdiction over the unorganized

[84] The Commission notes that dual environmental review is uncommon and only occurs when a project is located in both DEP and LURC territory. Dual "environmental" review should not be confused with a land use or zoning review that would typically occur by a municipality or LURC in addition to the environmental review.

territories).[85] Although the DEP and LURC do act to coordinate their processes, there may be approaches (such as placing all environmental review authority within the DEP or removing the circumstances in which both the DEP and LURC would conduct an environmental review over the same aspects of a project)[86] that could create efficiencies, avoid duplication of effort among state agencies, and make the environmental permitting process more consistent for wind developers.

The Commission recommends that consideration be given to explicitly modifying the DEP's review standard to allow the agency to consider environmental benefits of wind facilities as part of the permitting process. In particular, amendments should be considered that would allow the environmental review process to take into account the benefits of reduced air emissions.

The Commission does not recommend that separate regulations or application processes be adopted for wind power at this early stage of the industry's development. The adoption of separate regulations could be controversial, take a significant amount of time, and cause project review delays. Although the regulations are very general in nature, the current the DEP and LURC processes are quite flexible, involving a number of pre-application meetings to determine in advance the information and studies that would be necessary to support an application for a permit.[87]

The Commission does not view an effort to pre-identify areas of the State as environmentally appropriate or inappropriate for wind development as likely to be fruitful. Any effort to pre-identify environmentally appropriate areas that also have the necessary wind resource and infrastructure would be difficult, take a large amount of time, and be controversial. It should be the task of project developers, at least in the first instance, to consider individual sites for their feasibility for wind development. Additionally, pre-identifying sites would likely remove certain areas from consideration, while not significantly reducing controversy regarding projects proposed for the pre-identified areas. Finally, as wind power technology changes, different type of sites may become feasible for wind development and this might require periodic updates of the appropriate and inappropriate areas. However, the Commission considers efforts of appropriate agencies to provide non-site specific guidelines and

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[85] The Commission does not have the expertise or experience to make definitive recommendations regarding the responsibilities of other agencies, but includes suggestions in this report based on a wide variety of input and observations.

[86] The Commission understands that the DEP has submitted legislation that would eliminate the requirement for it to permit portions of a project located in LURC territory.

[87] The environmental review process and associated requirements for wind facilities is likely to become more certain and predictable as more projects are permitted.

standards regarding wind power development as holding substantial potential in creating a higher degree of predictability with respect to agency decisions.

G. Public Acceptance

1. General Description

As discussed in section VI of this report, public opposition can be one of the major barriers to wind development. Public opposition generally centers around the impact a project will have on the aesthetics of the view or on harm to migratory birds. However, opponents also cite exaggerated air quality benefits, decreased property values, noise, icing issues and light flicker as problems with wind power development.

2. Considerations

There has been no major wind power development in the State or the region, arguably due in part to public opposition. Some public reaction may result from a lack of familiarity with wind power. In addition, the public may not be fully aware of the damage caused by emissions from the current mix of fossil-fuel generation in the region and the potential for wind power to reduce that damage. A campaign aimed at promoting the benefits of wind power could help modify public perception and reduce opposition.

3. Recommendation

During its last session, the Legislature adopted a requirement that the Commission inform consumers of the benefits of renewable power and the opportunities available to purchase electricity generated by renewable resources.[88] The statute specifies that the Commission may not promote any particular renewable resources over others. In the event that the Legislature determines that the promotion of wind development in the State is a high priority, it can amend the law and give the Commission direction to educate the public specifically regarding the benefits of wind power.

[88] P.L. 2003, ch. 665, § 1 (codified at 35-A M.R.S.A. § 3210(7).

IX. CONCLUSION

Whether the State should actively promote wind power as part of its overall energy policy, or should spend public or ratepayer funds to aid wind power development in Maine, are fundamentally legislative questions. This report identifies some environmental and system diversity benefits, as well as other considerations, upon which the Legislature may make policy determinations regarding wind power development. There is substantial potential for wind power development in the State, including development on tribal lands, and sufficient markets exist in the region for the sale of electricity from Maine wind power facilities. Wind power development in reasonable likely amounts does not present any serious or insurmountable system reliability or market operation concerns. The cost of wind power is currently competitive with other generating resources in the region, assuming the continuation of federal tax incentives, and larger scale wind projects do not require further financial assistance or subsidies to allow them to compete on a cost basis. The primary obstacle to wind power development, as with other generating facilities, is the difficulty in obtaining project financing on reasonable terms. There are several viable mechanisms that could be implemented to promote wind power development if the State makes the appropriate policy determinations.