Wild Meadows Wind Project

Economic Impact Report

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EXECUTIVE SUMMARY

Iberdrola Renewables LLC., the U.S. subsidiary of Iberdrola S.A., is proposing to construct a 75.9 megawatt (MW) Wind Project (known as Wild Meadows) on private land in the towns of Alexandria and Danbury NH. With more than $10 billion dollars of operating assets totaling more than 5,800 MW of wind and solar generating capacity, it is in a strong position to add to its current wind investments in Lempster (24 MW) and Groton (48 MW).

The project will consist of 23 wind turbine generators, each capable of generating 3.3 megawatts of clean energy. With a total investment of roughly $150 million dollars, the contributions to the NH economy will be substantial.

To evaluate the economic impact of the project, IMPLAN –based multipliers were constructed for the local economy.[1] In conjunction with the widely used JEDI spreadsheet tool, customized project data based on proprietary information was used to estimate economic impacts.

These impacts were divided between the construction and operational phases of the project. During the construction phase of the project, it is estimated that $42.35 million dollars of local in-state economic activity will be created. Constructing the project will require the use of 404 full time equivalent employees who will earn $21.77 million dollars in income.

During the operational phase of the project, the total number of full time equivalent jobs created after accounting for both direct and indirect impacts is 13 leading to an increase in annual local incomes by $770,000. This will contribute to an annual level of economic activity estimated at $2.31 million dollars.

In addition to the benefits identified by regional economic modeling is the contribution of the project toward meeting the State of NH's targeted goal of achieving 25% of its electricity from

[1] IMPLAN is a modeling software that allows the user to calculate the regional economic impacts of a development project. More information about the model can be found at: http://implan.com/v4/index.php?option=com_content&view=article&id=282:what-is-implan&catid=152:implan-appliance-&Itemid=2

renewable sources by 2025. It will either increase the availability of renewable energy which will lower the price of Renewable Energy Certificates (RECs) or will enable those New England States that have Renewable Portfolio Standards (RPSs) to more quickly meet their targeted goals at the same price. The project also affords the potential for significant local property tax reduction or a substantial upgrade in local services; either should have a positive impact on local property taxes.

INTRODUCTION

As part of a larger national effort, in August 2006, Governor John Lynch announced the 25x'25 Renewable Energy Initiative. The goal of this initiative was for the state of New Hampshire to obtain 25% of its energy from clean, renewable resources by the year 2025. As an important step toward implementing the initiative, on July 10, 2007, the NH Legislature enacted RSA 362-F mandating the State's first renewable standard. Commitment to the Renewable Portfolio Standard (RPS) approach was reaffirmed in the 2009 NH Climate Action Plan designed to reduce greenhouse gas emissions to an amount which is 80% below 1990 levels by 2050.[2]

In its 2011 review of the standard, the New Hampshire Public Utilities Commission (PUC) noted that in addition to furthering the goal of developing new sources for clean energy, "The RPS can also have an economic development effect, if generators, generation component manufacturers, or fuel suppliers are located in NH."[3] The purpose of this study is to determine the degree to which the proposed Wild Meadows project initiated by Iberdrola Renewables LLC (IBR) will have a positive economic benefit in the host communities and the State of NH.[4]

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[2] NH DES. The NH Climate Action Plan. March 2009. page 1.

[3] NHPUC. 2011. Renewable Portfolio Standard Review. p. 4. Downloaded from: https://www.puc.nh.gov/Sustainable%20Energy/RPS/RPS%20Review%202011.pdf

[4] With investment projects totaling billions of dollars and tens of thousands of jobs created in the construction, engineering, and transportation sectors, IBR is the second largest wind power producer in the U.S. The company currently operates a 24MW per hour wind farm project in Lempster, NH and another 48MW per hour project in Groton, NH. The proposed Project would be IBR's third in the state.

As wind energy becomes more prevalent in the State of NH, a wealth of information and local expertise has been created surrounding wind projects. For this study, local economic impacts were evaluated using proprietary data provided by IBR, the extensive experience of IBR executives in constructing wind facilities in the State of NH, previous studies that have been generated for various wind projects, the latest IMPLAN multipliers, and peer-reviewed research in the field. The results of this study indicate that there are substantial economic benefits to the proposed Wild Meadows Wind Project that goes beyond the contribution that project will make toward furthering the state's energy goals.

RSA 362-F AND THE MARKET FOR ELECTRICITY

One of the recommendations that emerged from the 2009 NH Climate Action Plan was continued support for implementing the 2007 RPS mandating that 23.8 percent of the retail sales of electricity to in-state customers be met with renewable energy sources by 2025. The numbers underlying the standard are based on the assumption that "New Hampshire RPS demand combined with regional RPS demand is modeled to lead to new in-state development of 960 MW wind, 56 MW biomass, 15 MW landfill gas, and 33 MW solar by 2025.[5]

To promote the development of newly mandated renewable energy standards, the RPS works by requiring that electric providers "meet customer load by purchasing or acquiring certificates representing generation from renewable energy based on total megawatt-hours supplied." RPS classes by percentage can be found in Table 1:[6]

[5] NHDES. 2009. New Hampshire Climate Action Plan Appendix 4.2 p. 3. Of particular note is the contrast that exists between the goal of 960MW of wind in relationship to the 179.65 MW of capacity that currently exists.

[6] Table 1 was downloaded from:
http://www.puc.state.nh.us/Sustainable%20Energy/Renewable_Portfolio_Standard_Program.htm

Table 1

Calendar Year	Class I	*Class I Thermal	Class II	Class III	Class IV
2008	0.00%	0.00%	0.00%	3.50%	0.50%
2009	0.50%	0.00%	0.00%	4.50%	1.00%
2010	1.00%	0.00%	0.04%	5.50%	1.00%
2011	2.00%	0.00%	0.08%	6.50%	1.00%
2012	3.00%	0.00%	0.15%	1.40%	1.00%
2013	3.80%	0.00%	0.20%	1.50%	1.30%
2014	5.00%	0.40%	0.30%	7.00%	1.40%
2015	6.00%	0.60%	0.30%	8.00%	1.50%
2016	6.90%	0.80%	0.30%	8.00%	1.50%
2017	7.80%	1.00%	0.30%	8.00%	1.50%
2018	8.70%	1.20%	0.30%	8.00%	1.50%
2019	9.60%	1.40%	0.30%	8.00%	1.50%
2020	10.50%	1.60%	0.30%	8.00%	1.50%
2021	11.40%	1.80%	0.30%	8.00%	1.50%
2022	12.30%	2.00%	0.30%	8.00%	1.50%
2023	13.20%	2.20%	0.30%	8.00%	1.50%
2024	14.10%	2.40%	0.30%	8.00%	1.50%
2025	15.00%	2.60%	0.30%	8.00%	1.50%

The Standard consists of multiple classes in order to create incentives for the development of ***new*** renewable sources. Hence Class III and Class IV sources apply to generation facilities that were in operation prior to 2006 and their contribution is capped as of 2015. Class I and II on the other hand only apply to facilities in operation after January 1, 2006. Class II captures solar technologies and Class I is a catchall that includes renewables such as: wind energy, thermal energy, hydrogen-based, ocean-based, methane gas, or biomass.

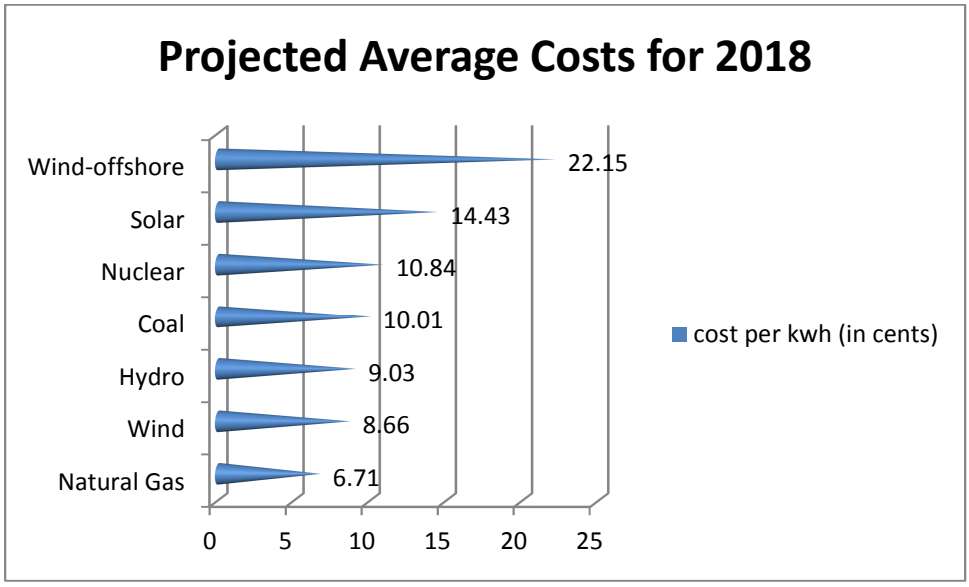
The existence of the standard not only recognizes differences between renewable sources of energy, it is also designed to ensure that a market exists for the purchase and sale of RECs to promote the development of new alternative energy sources. It accomplishes this goal by effectively forcing the creation of two energy markets; one supplied by renewables and the other by fossil fuels. In combination, *both* markets serve the electricity needs of the State of NH.

The reasoning behind a dual market approach is that given the current state of technology, renewables are not often cost competitive with traditional power generation derived from fossil fuels

such as natural gas. Hence by mandating that a certain portion of energy generation come from renewable sources, it ensures that a captive buyer will exist for these higher cost sources of electricity. This approach is needed if the development of renewable energy sources is to be nurtured, encouraged, and a consistent with NH state policy.

Energy prices vary by fuel source, and vary due to market conditions. Recently, the largest utilities in the State of Massachusetts recently signed contracts to purchase wind generated electricity at an average cost of less than eight cents a kilowatt hour. Citing U.S. Energy Information Administration data, relative energy costs were reported as:[7]

Chart 1



Despite what appears to be an emerging cost advantage for wind energy, it is important to note that a direct cost comparison with fossil fuels such as natural gas is not appropriate. While it is the case that currently wind is more expensive than natural gas, the two are not substitutes. Because of state mandates, one megawatt produced from a natural gas plant cannot be substituted for one megawatt from wind and still meet state standards. The legislative body that represents the citizens of New Hampshire has determined that there exists a public benefit to having a portion of the electricity used in

[7] Ailworth, Erin. Mass. Utilities Go for Wind Power. Boston Globe, September 23, 2013.

the state derived from renewable sources. It is the duly elected representatives of the public who have already made the determination that those benefits are at least as large as the difference between the cost of generating electricity from renewable sources and a lower cost alternative.[8]

The benefit of adding renewables (wind, hydro, biomass, solar), to a mix of energy sources (natural gas, coal, oil), is articulated in the purpose section of RSA 362-F:

> Renewable energy generation technologies can provide fuel diversity to the state and New England generation supply through use of local renewable fuels and resources that serve to displace and thereby lower regional dependence on fossil fuels. This has the potential to lower and stabilize future energy costs by reducing exposure to rising and volatile fossil fuel prices. The use of renewable energy technologies and fuels can also help to keep energy and investment dollars in the state to benefit our own economy. In addition, employing low emission forms of such technologies can reduce the amount of greenhouse gases, nitrogen oxides, and particulate matter emissions transported into New Hampshire and also generated in the state, thereby improving air quality and public health, and mitigating against the risks of climate change. It is therefore in the public interest to stimulate investment in low emission renewable energy generation technologies in New England and, in particular, New Hampshire, whether at new or existing facilities.

It is important to note that RSA 362-F does not mandate that the renewable energy must be produced in the State of New Hampshire. Because of concerns related around the Interstate Commerce Clause, it is believed that it is not possible for the NH legislature to mandate that all renewable energy be produced within state borders to meet statutory mandates. Hence, NH electricity providers are only required to purchase electricity or RECs within the New England regional market that has emerged for renewable energy.

What is different about the market for RECs when compared to more traditional markets is that state legislatures, rather than free markets, can influence the demand and supply for this type of power

[8] The relative costs are cited in a study commissioned by the State of NH entitled "Economic Impact of a New Hampshire Renewable Portfolio Standard," authored by Ross Gittell and Mark Magnuson in 2007. The report can be downloaded at: http://des.nh.gov/organization/divisions/air/tsb/tps/climate/rps.htm

generation. For example, a fall in the price of certificates may lead to mandates that increase the percentages that providers must obtain from renewable sources thereby increasing demand. Alternatively, various subsidies might be enacted in order to increase supply. Thus states through their individual mandates along with other conditions in the market for renewable energy can move the price in one direction or another.

That being said, an increase in supply relative to a particular demand would decrease the price of electricity produced by renewable energy and hence reduce the price of electricity purchased by the retail customer all other things being equal. Once again it is important to remember that a megawatt of wind power does not compete against a megawatt of natural gas electricity unless the utility is prepared to pay a penalty for not meeting the requirements as specified by state statute. Presumably, the price of RECs and the associated penalties for not meeting state standards will adjust over the long run so that from the perspective of the electricity provider, the cost of a megawatt of renewable energy is equal to the cost per megawatt generated by fossil fuels.

The need for additional generation will become increasingly important if the projections of a 2010 NREL technical report are correct. The Report predicts a renewable energy deficit for New England, NY and the Mid-Atlantic States by 2015. In New England specifically, deficits are shown historically (years prior to 2008) and increase in size through 2015 with and without offshore wind. Projected shortages are about 3,500 GWh in 2010, and range from 7,500 GWh to more than 9,000 GWh in 2015.[9]

Thus the output from the Wild Meadows project will likely be needed in order to moderate any price increases associated with projected deficits by 2015. Even without a deficit, increases in the supply of renewable energy will, other things being equal, put pressure on the price of RECs to fall. Lower REC

[9] Bird, Lori, Hurlbut, David, Donohoo, Pearl, Cory, Karlynn and Claire Kreycik. 2010. An Examination of the Regional Supply and Demand Balance for Renewable Electricity in the United States through 2015.NREL Technical Report 6A2-45041 p. 24

prices will reduce the cost to providers of meeting existing portfolio standards and will have a positive impact on electricity prices for the consumer.

Of course, state legislatures could respond to the increase in renewable generation capacity not by allowing REC prices to fall, but rather by artificially increasing demand. With growing supplies, legislatures may respond by raising portfolio standards. This would force electricity providers into the market to buy an even larger amount of renewable energy or number of certificates. By increasing purchasing requirements states could maintain a constant price, but alter the mix of renewable and non-renewable generated electricity that eventually reaches the retail customer.

Altering the mix of energy would further foster the goals of NH's Energy Policy as stated in RSA 365-F. Alternatively, keeping the mix the same would, given the laws of supply and demand, eventually lower the price. It is difficult to say therefore which will occur as the result of the Wild Meadows project. However in either case, there is a social benefit; either by increasing the use of renewal resources, or through lower prices.

Methodology and Assumptions

A dollar spent in a local economy generally increases the level of economic activity in a local community by more than a dollar. When a construction worker for example is hired, that person might spend part of their wages at a local restaurant eating lunch, the restaurant in turn would have hired someone to prepare and serve the meal and might have purchased the food that they prepared from local farmers. These individuals in turn would be paid and spend some of their income in the local economy and so on and so on. This is commonly known as the multiplier effect. Hence when exploring the economic impact of a project, it is important to understand how much spending will take place in the local economy and then how many times those dollars are "multiplied" as they are used in a series of subsequent economic transactions.

The use of multipliers is an accepted method for many of the studies that are undertaken at the local or regional economic level. However, developing these multipliers is not an inconsequential task and can be very expensive and time consuming. To satisfy this need, off-the-shelf products have appeared that develop multipliers that can be used at the county level to measure the economic impact of a development project. One of the most popular products was originally developed by the U.S. Forest Service and has been subsequently revised and marketed by the IMPLAN Group as part of their IMPLAN Model. The company has an extensive list of clients that can be found in Appendix A. The multipliers have also been the basis for a number of published research papers. A casual search on EconLit, the premier database for publications in the economics profession, reveals the existence of 52 papers using the IMPLAN multipliers. Also, the IMPLAN multipliers have been used to estimate the economic impact of a variety of projects in the State of NH. A list of some of these projects can be found in Appendix B.

An early comparison between the IMPLAN multipliers and a popular alternative offered by REMI showed that there were not significant differences in the predicated outcomes derived from the benchmarked models.[10] A more recent analysis by Brown et. al. estimating the potential economic impact of a wind facility using an econometric model and then comparing that with the more often used input-output multiplier model concluded:

> Overall, our findings suggest that empirical econometric methods are useful in measuring the ex post impacts of wind power development. Interestingly, despite a number of known limitations to the standard application of input–output models to estimating economic development impacts, our results are of a similar general magnitude to input–output derived estimated impacts. Though the two sets of results are not strictly comparable, this suggests that input–output models that are used to assess the economic impacts of wind energy (at least at the county or local level) may not be unduly impacted by the generic limitations to those models discussed earlier in this paper.[11]

[10] Rickman, Dan S. and R. Keith Schwer. 1995. A Comparison of the multipliers of IMPLAN, REMI, and RIMS II: Benchmarking ready-made models for comparison. *The Annals of Regional Science*. 29: 363 – 374.

[11] Brown, Jason P., Pender, John, Wiser, Ryan, Lantz, Eric, and Ben Hoen. 2012. Ex post analysis of economic impacts from wind power development in U.S. counties. *Energy Economics*. 34: 1753.

To marry the IMPLAN multipliers with the special financial characteristics associated with a particular wind project, the Jobs and Economic Development Impacts (JEDI) spreadsheet tool was developed by the National Renewable Energy Laboratory (NREL).[12] The JEDI tool for developing wind energy models is based on default expenditure patterns derived from a number of studies based on actual wind projects that enables the modeling of the economic impacts without requiring project specific data.[13] Utilizing state-specific IMPLAN multipliers, JEDI calculates the number of jobs, income and economic output associated with a particular project. Utilizing default values, JEDI provides an approximate value of the potential aggregate impacts of a project. However, results can be refined and approximations improved by utilizing actual project data and county level rather than state level multipliers.[14]

It is important to note however that the JEDI tool by itself does not estimate the impact of anything. It is merely a tool that effectively translates specific financial information related to a project so that the corresponding IMPLAN multipliers can be used to actually estimate local economic impacts. Hence the JEDI Model does not really have any economic content associated with it; it merely organizes financial information to reduce the time that would otherwise be needed to effectively utilize the IMPLAN multipliers.

In conjunction with the latest version of the JEDI spreadsheet tool (1.10.03), the IMPLAN Model v. 3.1 was used to construct multipliers that could then be used with the JEDI model. The IMPLAN data consists of 440 industrial sectors. To use this data with the JEDI Model, the complete list of sectors was aggregated into 14 sectors. Within each of the 14 sectors, multipliers were constructed to capture

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[13] The usefulness of the JEDI Model is discussed in the following: 2011 EPA publication: Assessing the Multiple Benefits of Clean Energy: A Resource for States. EPA-430-R-11-014.

[14] A recent application of the JEDI Model along with the IMPLAN multipliers for the purpose of estimating the economic impact of a wind project can be found in Slattery, Michael C., Lantz, Eric and Becky L. Johnson. 2011. State and local economic impacts from wind energy projects: Texas case study. *Energy Policy* 39: 7930 – 7940.

direct, indirect and induced spending for employment, labor income and output. Hence a total of 126 multipliers were constructed. In addition to the multipliers, the JEDI model also requires that the ratio of personal consumption expenditures be constructed for the 14 aggregate categories.

In addition to a user area for entering county level multipliers, the JEDI tool consists of various other default values that can be changed to generate a more robust set of results. As a result, every opportunity to supply project specific data was utilized rather than default values. However, the data format supplied by IBR was more consistent with how a contractor bids a project rather than a reflection of the existing categories utilized in the JEDI Model. Hence a spreadsheet was developed to create a correspondence between the data supplied by IBR and the categories contained in the JEDI Model. Within the model, opportunities for adding project specific information include:

- Project Cost Data
- Annual Operations and Maintenance Costs
- Tax and Lease Parameters
- Payroll Parameters

Project cost data within the JEDI model contains the dollar value of standard cost categories along with the local share (the degree to which it would be supplied in the local region). Having already constructed two projects in the State of NH and as a leading provider of wind energy, IBR was able to provide a detailed estimate of the capital expenditures (CAPEX) associated with the projects. Given past experience with contractors for the Lempster and Groton wind projects, IBR was able to provide local share data with respect to the various cost categories.

IBR was also able to supply a detailed estimate of the operating expenditures (OPEX) associated with the project. Given the ability to achieve some cost savings associated with operating multiple wind farms in fairly close proximity, the number of jobs and annual operating expenditures are lower than if Wild Meadows was a stand-alone project.

Payments in Lieu of Taxes (PILOT) at the time of writing this report have not been finalized. The numbers used were based on PILOTs to the two towns in the amount of $835,000 and lease payments totaling $280,000, using pro-rated actual payments made for the Groton Wind Farm.

The JEDI Model allows the user to change wages and benefits associated with the project. The default values were not used. Rates were derived from the NH Department of Employment Security along with those supplied by IBR.

The Economic Impact of the Wild Meadows Project

Results from the JEDI Model are broken down into three categories. These categories include: 1] Project Development & Onsite Impacts; 2] Local Revenue, Turbine & Supply Chain Impacts; and 3] Induced Impacts. The sum of these three categories generates the total economic effect of the project. Results are calculated and reported for two phases: construction and operation. Tables 2 and 3 taken from Slattery (2011, p. 7933) describe the impacts.

Table 2: Construction Period Impacts

Category Label	Description	Types of Persons and Businesses Impacted
Project Development and Onsite Labor Impacts	Impacts from money spent on labor for persons working to develop and construct wind projects	Project managers, environmental technicians, civil engineers, legal staff, road builders, concrete pourers, crane operators, etc.
Local Revenue, Turbine and Supply Chain	Impacts resulting from equipment and turbine purchases. It includes impacts to OEMs and the array of suppliers providing components or other products for required wind plant equipment. It also includes impacts to the finance and banking sectors.	Turbine, blade and tower manufacturers, gear manufacturers, electrical cable manufacturers, fiberglass and epoxy producers, steel producers, quarries, accountants, etc.
Induced Impacts	Impacts from reinvestment and spending by beneficiaries of spending and economic activity in the top two tiers of impacts.	Local retailers, food and hospitality services, childcare providers, etc.

Table 3: Operations Period Impacts

Category Label	Description	Types of Persons and Businesses Impacted
Onsite Labor Impacts	Impacts resulting from money spent on labor for persons working to operate, maintain and manage ongoing plant operations.	Maintenance technicians, administrative staff and managers, etc.
Local Revenue and Supply Chain Impacts	Impacts from expenditures related to maintenance, repair, and general operation activities. Also includes impacts from land lease payments, property tax payments, insurance costs, and other ongoing expenses.	Repair and replacement parts manufacturers, tool providers, local government, local utilities, insurance providers, welders and metal fabricators, etc.
Induced Impacts	Impacts from reinvestment and spending by beneficiaries of spending and economic activity in the top two tiers of impacts	Local retailers, restaurants, childcare providers, etc.

Within each phase, cumulative results are generated for the amount of economic activity, the number of jobs, and earnings. All job figures are reported as full-time equivalents (FTE). One FTE is equal to a single person working full time for 1 year (2080 hours).

With respect to the Wild Meadows Project, the following, Table 4 provides a summary of the local NH impacts during the construction phase of the project.

Table 4

NH impacts during construction period	FTEs	Earnings ($M)	Output
Project Development and Onsite Labor Impacts	80	$6.10	$6.17
Turbine and Supply Chain Impacts	239	$11.82	$25.74
Induced Impacts	84	$3.84	$10.43
Total Impacts	**404**	**$21.77**	**$42.35**

The total number of jobs is estimated to be 404 with turbine and supply chain impacts creating the majority of employment. Total earnings generated are $21.88 million dollars. The project is estimated to generate $42.35 million dollars of local economic activity during construction.

The economic benefits generated in the operations phase of the project are shown in Table 5.

Table 5

During operating years (annual)	FTEs	Earnings ($M)	Output
Onsite Labor Impacts	4	$0.36	$0.36
Local Revenue and Supply Chain Impacts	4	$0.18	$1.33
Induced Impacts	5	$0.23	$0.62
Total Impacts	**13**	**$0.77**	**$2.31**

With respect to the operations phase, the number of FTEs that result from the project is 13. It would generate $2.31 million dollars in annual economic activity and contribute $770,000 in income on an annual basis.

It is important to note that the ongoing jobs created by the Wild Meadows project are very attractive jobs. Table 6 shows 2012 county level wage rates in Grafton and Merrimack counties for

various industries.[15] The industries chosen represent both the high and low ends of the wage scale. The also include those categories that currently have the highest number of jobs. The employment opportunities that will be created at the Wild Meadows facility would place those employees at the high end of the scale in both counties.

Table 6

	Grafton		Merrimack	
Industry	Annual Average Employment	Hourly Wage	Annual Average Employment	Hourly Wage
Construction	1,275	$22.41	2,861	$25.93
Manufacturing	5,268	$25.23	5,896	$26.55
Health Care & Social Assistance	10,876	$31.25	11,538	$22.36
Professional & Technical Services	1,852	$41.93	2,839	$33.18
Retail Trade	7,302	$13.19	27,330	$14.94
Accommodation and Food Services	5,127	$9.04	4,459	$8.26
Manager of Company/Enterprise	n/a	n/a	436	$47.09

Net vs. Gross Effects

Models by definition are nothing more than abstract representations of the real world. Hence they never perfectly incorporate any and everything found in the actual world. If they did, then by definition they would not be models (abstract simplifications of the world in which we live). The art of using models is to determine when these assumptions create potential problems and when they do not adversely affect the value of the estimates generated. That being said, regardless of how one evaluates a particular project, any model will be subject to limitations. In terms of the JEDI tool, one of the assumptions used to simplify the analysis is that the model looks at gross rather than net effects.

The basic structure of any input-output model is based on the premise that positive expenditures will be multiplied by some other positive number; thereby generating a significantly larger result in terms of local spending and employment. From this perspective, the JEDI tool with the

[15] http://www.nhes.nh.gov/elmi/statistics/documents/county2012.pdf

associated IMPLAN multipliers will always show a positive gross impact on the local economy. However, it may be possible to say that in a full employment economy, the construction of a wind facility will not lead to any net new jobs, but will merely shift the mix of existing jobs as one is substituted for another. The same holds true with capital; every dollar used to construct a wind facility is a dollar that could have been used in a different project that might have generated more jobs or a higher level of economic activity.

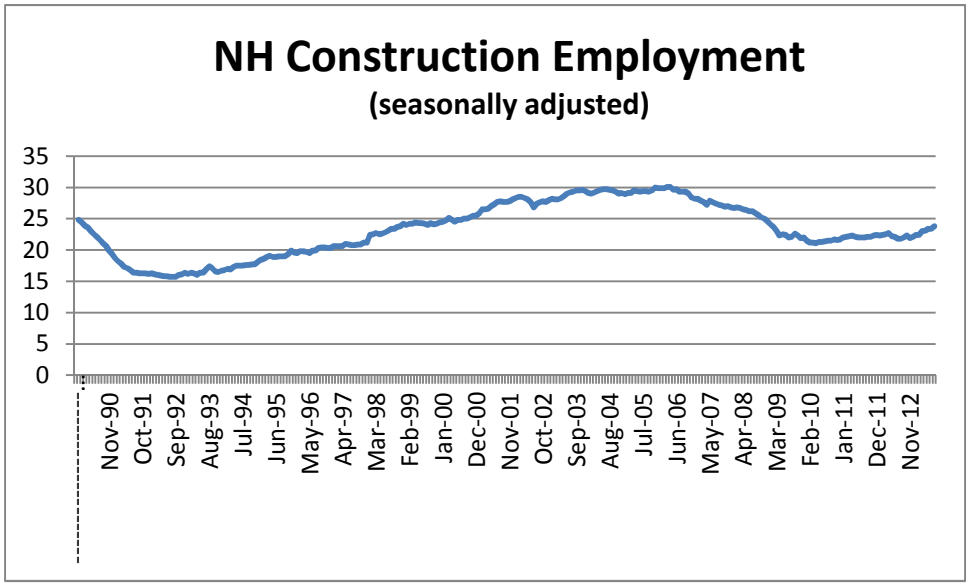
Thus, what is important are the net rather than the gross effects. These net effects would look at the difference between the next best use of workers or capital and the benefits associated with the project in question. From this perspective, the positive effects of a proposed project might be less than the gross effects suggested by the JEDI model and under certain circumstances might even be negative.

When using a model to evaluate the potential economic benefits, results need to be evaluated and placed within the appropriate economic context. Within the context of the proposed Wild Meadows Wind Project, it is important to evaluate whether or not sufficient local capacity exists to construct the facility, unemployed workers exist to operate the plant once it has been constructed, and whether sufficient capital exists to finance the project without crowding out other and potentially more worthwhile projects.

NH Labor Markets

In terms of evaluating whether or not sufficient capacity exists in the local economy to supply workers with the requisite skills to build the wind facility, one can look at the construction sector of the NH Economy. Using data provided by the Federal Reserve Bank of Boston, one can see that construction employment is well under its peak in 2006. This can be seen in Table 7.

Table 7



Of course, one might argue that those jobs are long gone. Workers have found other employment and hence the Wild Meadows Wind Project will not generate net new jobs. However, a look once again at the data for the NH economy shows that while construction jobs have fallen, their loss has been offset by those in the Tourism and Hospitality Industries.[16] This would suggest that some construction workers may be underemployed.

Underemployment exists when workers with particular skill, experiences, or education cannot find employment that matches their qualifications. Instead they must accept employment in jobs or industries that fail to take advantage of their desires or abilities and instead reluctantly accept jobs that they do not want.

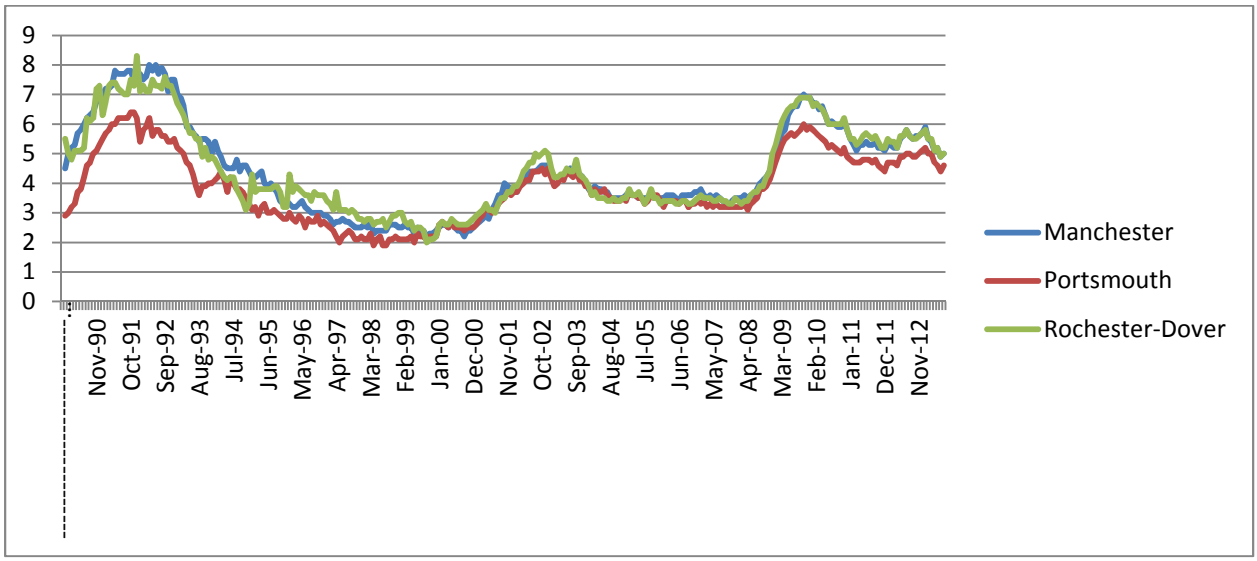
In this case where a large portion of workers are underemployed, the creation of construction jobs would enable workers to leave lower skilled and paying jobs to accept higher paying construction ones. Under this scenario, net new jobs would be created because as construction workers leave the lower paying jobs in which they are currently employed, those who are still without a job would be able

[16] Federal Reserve Bank of Boston. 2012. *New England Economic Indicators: Fourth Quarter*. Downloaded from: http://www.bostonfed.org/economic/neei/back/2012/q412.pdf

to easily enter the market and accept jobs in other industries. Looking at the three major NH Metropolitan NECTAS where the unemployment rate is significantly above its low point, there appears to be sufficient slack in the labor market to accommodate the Wild Meadows Project. The NH unemployment rate can be found in Table 8.

Table 8

Unemployment Rate NH Metropolitan NECTAS (Seasonally Adjusted)



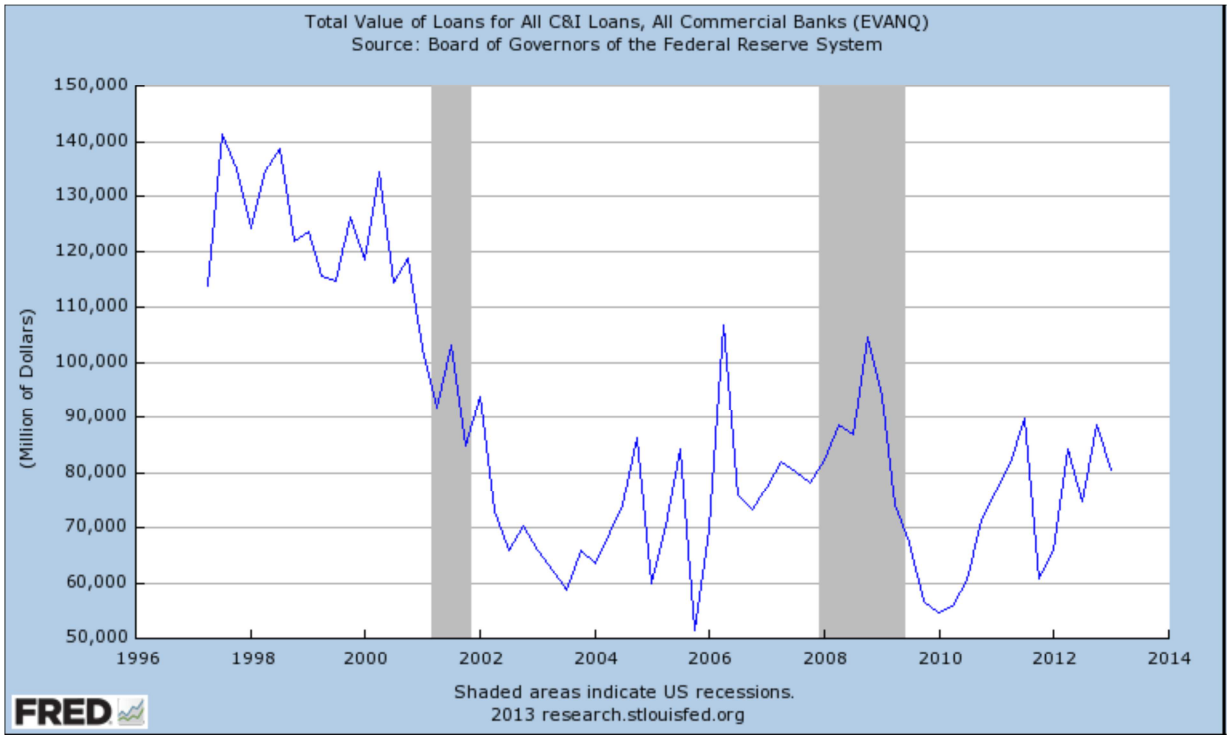
Capital Markets

The other issue when evaluating the gross vs. net effects of the JEDI Model is to look at capital markets. It could be the case that capital is in short supply and hence a project like Wild Meadows could crowd out the market; essentially taking capital that can only finance a single project. This could potentially mean that the construction of the Wild Meadows facility would mean that some other project could not be financed and hence built. Thus the jobs associated with the Wild Meadows Project might possibly be offset by a loss of jobs associated with some other project.

To evaluate whether or not capital markets are constrained, it is important to look at two key economic variables. The first is the amount of commercial loan activity. If commercial banks were

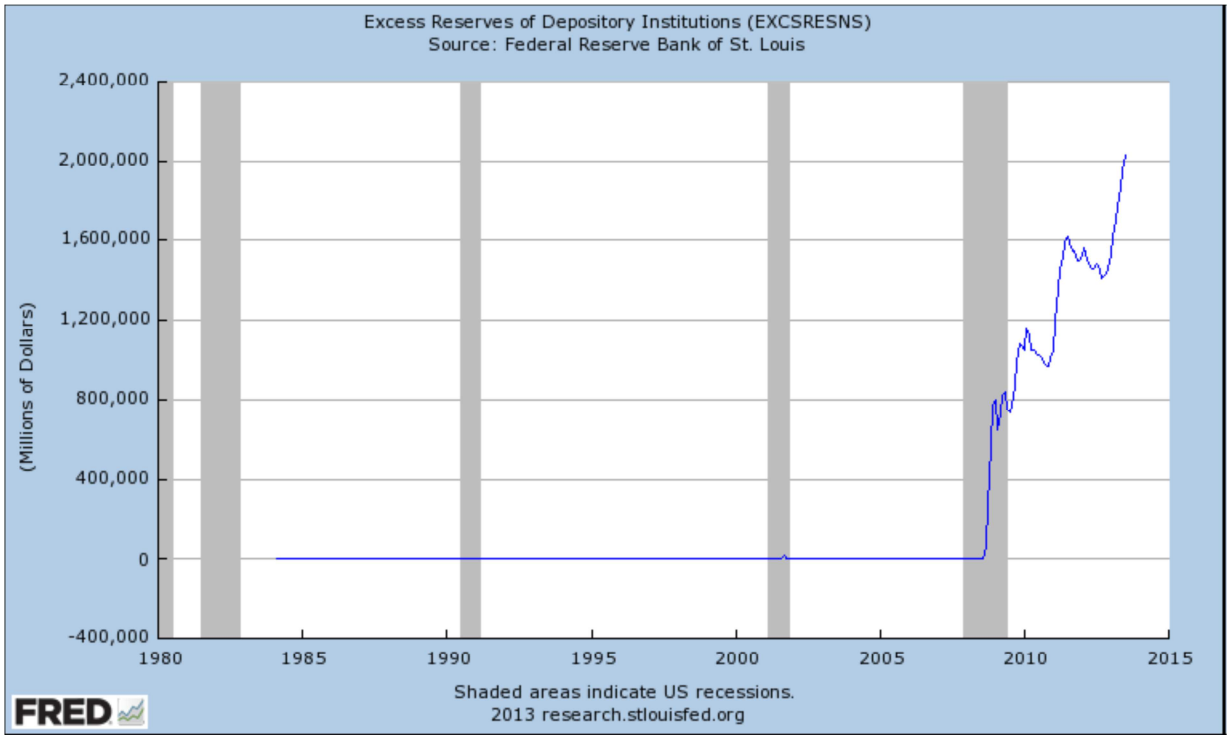
making commercial loans at record rates, this might suggest that substantial crowding out might occur. However, as seen by the data in Table 9, commercial lending is well below the levels set before the 2008 recession.

Table 9



Of course, the ability of banks to make commercial loans depends on the availability of excess reserves. When a customer makes a deposit at the bank, a portion is held in the form of required reserves and the remainder is available for loans. Known as excess reserves, they provide a good measure of whether banks have the capacity to make loans if they choose to do so. The availability of excess reserves can be found in Table 10.

Table 10



After looking at the availability of excess reserves that might be available for bank loans, it is difficult to conclude that credit markets are capital constrained.

Moreover, it is important to realize that IBR is an international company that will be self-financing the project and has a large variety of options for deploying its capital. Hence rather than having a $150 million dollar project generating a large amount of economic activity and creating high paying jobs here in New Hampshire, those dollars could be used to stimulate a different state's economy.[17] Rather than assuming that there is another $150 million dollar project waiting in the wings,

[17] The importance of U.S. subsidiaries of global companies to the NH Economy is substantial. Insourcing 39,400 jobs, these jobs account for 7.3 percent of the state's private sector workforce. On a per capita basis, NH ranks third in the nation in terms of jobs at U.S. subsidiaries. Most important, 44 percent of these jobs are in the higher paying manufacturing sector of the state's economy. http://www.ofii.org/resources/jobs-by-state/new-hampshire

in all likelihood, a similar development will not take its place to the economic detriment of the towns of Alexandria and Danbury.

Municipal Benefits

What sets New Hampshire apart from most other states is the lack of broad-based taxes such as sales and income taxes. However, municipal services must still be provided and in New Hampshire, they are financed primarily at the local level through property taxes. As a result, the property tax burden is higher in NH than in almost any other state.[18] A relative comparison of property tax impacts taken from Tax Foundation data can be found in Table 11.

Table 11

Property Taxes on Owner-Occupied Homes (2006-08 averages)

County	Median Property Taxes Paid on Homes	Median Home Value	Tax as % of Home Value	Median Homeowner Income	Tax as % of Income
NH AVG.	$ 3,801	$ 228,070	1.69%	$ 68,553	5.49%
USA	$ 1,854	$192,400	0.96%	$ 65,088	2.85%

If we look at the property tax burden in the two towns affected by the Wild Meadows Wind Project, we see that Alexandria ranks 91, while Danbury comes in at 126 in terms of tax burden when compared with all of the other municipalities within the State of NH.[19] The respective valuations, tax rates, and tax commitments for 2012 can be found in Table 12:[20]

Table 12

[18] According to the Tax Foundation, NH has the 4th highest property tax burden per capita of the 50 states. http://taxfoundation.org/article/state-and-local-property-tax-collections-capita-state-2006-2010

[19] These rankings cover 224 municipalities in NH where 1 represents the municipality with the lowest tax burden and 224 would have the highest.

[20] 2012 Tax Rate Report downloaded from: http://www.revenue.nh.gov/munc_prop/property-tax-rates-related-data/2012/documents/2012TaxRateReport.pdf

Town	Modified Local Assessed Valuation	2012 Local Tax Rate	Tax Commitment
Alexandria	$201,326,753	$19.96	$4,018,481.99
Danbury	$109,636,331	$23.22	$2,545,934.91

One of the reasons why Alexandria and Danbury are relatively high tax towns is because of their lack of a commercial tax base. They both rely primarily on residential property tax payers to fund almost all municipal services and with relatively small populations and large areas, their density is relatively low. This is shown in Table 13.

Table 13

Town	**Total Property**	**Residential %**	**Commercial %**	**Other %**	**Population**	**Population Density**
Alexandria	43.0	89.1	2.8	8.1	1543	36 ppl per sq mile
Danbury	37.4	89.4	7.7	2.9	1138	30 ppl per sq mile

The Wild Meadows Project proposes that a PILOT will be paid to each town. As of the writing of this report, it is expected that Alexandria will receive $290,000 in the first year and Danbury $545,000 in the first year. The amount of property development that would be required to generate the equivalent amount in tax payments is shown in Table 14.

Table 14

Town	Payment	Property Value	% of Total Property Value
Alexandria	$290,000	$14,529,058	7%
Danbury	$545,000	$23,470,135	21%

To put this in perspective, assuming an average house value of $250,000, and adhering to traditional development patterns, the equivalent investment in Alexandria would see only $406,814 dollars in new commercial real estate development and the construction of 47 homes. In Danbury, with the same assumptions, the town would see an additional $1,807,200 in commercial development and 84 new houses. In both towns the potential impact on town budgets and the need to expand municipal services such as school, police, fire, and road maintenance would be substantial. On the other hand, the expansion of a commercial tax base to support the provision of municipal services would be relatively small.

In contrast, the Wild Meadows project is a commercial project which requires no additional municipal services and hence the funds collected from their respective PILOTS could be used for to lower the tax commitment in each community; thereby lowering property tax rates. The new potential tax rates can be found in Table 15.

Table 15

Town	New Tax Commitment	New Tax Rate	Tax Rate Change	Percentage Change
Alexandria	$3,728,481.99	$18.52	$1.44	8%
Danbury	$2,000,934.91	$18.25	$4.97	27%

For a house assessed at $250,000, this would lead to annual property tax savings of $360.11 in Alexandria and $1,242.71 in Danbury. In the case of Danbury where the savings are about $100 a month, this may be significant enough to have a positive impact on the value of housing in the community.

Property values are in part influenced by the demand for housing. The demand for housing is to a large extent dependent on the income and borrowing capacity of the buyer. Within the market for mortgages, strict standards exist for qualifying borrowers. The sum of the borrower's monthly payment for the mortgage, real estate taxes, and insurance must meet certain income requirements. Since many

buyers are credit constrained, the monthly payment rather than the price of the house determines whether or not they can purchase a particular property. A savings of $100 a month in property taxes represents the equivalent of $10,000 in property value at an interest rate of 4%. In other words, the purchase price can be $10,000 higher and the payment will remain the same when the monthly property tax payment is reduced by $100.

Hence, lower property taxes will create movement for housing prices to appreciate over the long run. However, even if the payments in lieu of taxes are not used for tax reduction, they can still have a positive impact on real estate prices. Potential real estate buyers are attracted by a variety of factors. For example, the quality of the educational system relative to other towns in an area may increase the demand for housing. Thus even if the payments in lieu of taxes are not used for tax reduction, they may be spent in a way that increases the desirability of a town and hence increases the demand for real estate.

Of course this captures the special nature of the NH real estate market that is heavily influenced by real estate taxes. The important question is whether or not the benefit in terms of property tax reduction or an increase in municipal services is offset by a corresponding reduction in property values arising from the construction of the wind facility. Exploring the question of whether or not the construction of wind facilities has an impact on property values, Hoen et. al. (2011) constructed a study using 7459 sales of single family homes between 1996 – 2007 surrounding 24 existing wind facilities.[21] Applying four different hedonic models, and a variety of robustness tests, they determined that neither the view nor distance to facilities had a statistically significant effect on sales prices.[22]

[21] Hoen, Ben, Wiser, Ryan, Cappers, Peter, Thayer, Mark and Gautam Sethi. 2011. Wind Energy Facilities and Residential Properties: The Effect of Proximity and View on Sales Prices. *JRER* 33(3): 279 – 316.

[22] There have not been a large number of studies evaluating the effect of wind facilities on property values. Of those that currently exist, many have not been published in peer reviewed journals. That being said, hedonic valuation models currently represent the "gold standard" because they enable the researcher to control for

An even more recent study by Hoen et. al. (2013) found no statistically significant effects on real estate valued. Their study used the same hedonic modeling techniques with data from over 50,000 real estate transactions among 27 counties covering nine states. Evaluating home sales within a 10 mile radius of 67 different wind facilities (including 1198 homes within one mile of a turbine) they conclude that "the core results of our analysis consistently show no sizeable statistically significant impact of wind turbines on nearby property values."[23]

However, it is important to note that many of the studies exploring the potential effects of the development of a wind facility on property values fail to take into account is the fact that property is not just a physical space, but it is also a bundle of property rights. Land owners have the right to develop their property within the limitations imposed by local zoning ordinances. Hence when calculating the potential effect of a particular development project, the appropriate comparison is not between the proposed project and the value of the attributes associated with an undeveloped plot of land. One needs to look instead at some of the potential alternate development projects that might take place on a particular piece of land.

For example, suppose the next highest and best use of a property would be to construct a mountain top resort with 150 guest rooms and various amenities. This type of commercial development will need to have roads built, parking lots constructed, a building large enough to house and take care of a large number of guests and other amenities such as a pool. Thus when looking at the potential impact of the development of a wind facility, the appropriate comparison is not the consequence of a road leading to a wind turbine versus no road at all. Rather, it would be comparing the incremental effect of

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various potential effects, thereby isolating those particular characteristics relevant to the question being investigated.

[23] Hoen, Ben, Brown, Jason P., Jackson, Thomas, Wiser, Ryan, Thayer, Mark and Peter Cappers. 2013. A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orland Lawrence Berkeley National Laboratory. LBNL-6362E.

that road versus the road and corresponding parking lot that might be built with the development of a resort.

As long as a parcel of land is not in conservation, the owner has the right to develop the property. Hence the appropriate comparison is between one development proposal relative to the next best development opportunity that exists given the set of property rights associated with a particular parcel. This is consistent with the practices followed by professional appraisers. The value of a raw piece of land is not determined by what currently exists, but rather, is valued in terms of its highest and best use. The same holds true when comparing various development scenarios. Thus the true impact is not to evaluate the existence of a wind project relative to undeveloped land, but instead, to what might be otherwise developed on the same parcel.

Conclusion

A characteristic of wind power is that it is very site specific. Small increases in wind speed can lead to large increases in wind energy. In New England, the best locations are typically mountain ridges and shorelines. NREL estimated in 2010 that only 1.78% of the available land in NH is suitable for developing wind power at a capacity factor in excess of 30% at 80 meters.[24]

Despite the physical challenges posed by the geography of the State of New Hampshire, the General Court and previous Governor have decided on multiple occasions that renewable energy is the future of the State and that wind can play an important role in reducing the State's dependence on fossil fuels. The benefits of an alternate energy strategy have already been debated and policy has been formulated to encourage the development of the State's potential to generate wind power.

The benefits to the state are clear. The positive economic impacts will be large and continue throughout the life of the project. These impacts are found first in the construction phase which will

[24] The spreadsheet showing wind potential can be downloaded at http:// **Error! Hyperlink reference not valid.**

create the full time equivalent of 404 jobs, $21.77 million dollars in earnings and $42.35 million dollars in increased economic activity, and second in the operations phase with the creation of 13 full time equivalent jobs, $770,000 in annual income and $2.31 million dollars of increased economic activity each and every year for the life of the project.

The benefits to the host communities are equally impressive. With a small commercial tax base, both Alexandria and Danbury will receive substantial payments in lieu of taxes that can be used to reduce already high property taxes or improve/expand municipal services. While alternative investments may exist for the rest of the state, for these two municipalities, it is the best opportunity for reducing the tax burden on already stressed homeowners.

Appendix A

The following is indicative of the wide range of organizations that use the IMPLAN system, but is not meant to be a comprehensive list.

Agricultural Statistics Service
Animal & Plant Health Inspection Service
Argonne National Laboratory
Army Corp of Engineers
Bureau of Ocean Energy Management
Bureau of Economic Analysis
Bureau of Land Management
Bureau of Reclamation
Department of Agriculture Rural Development
Department of Transportation
Economic Research Services
Environmental Protection Agency
Federal Reserve Bank
Fish & Wildlife Service
Forest Service
Geological Survey
National Marine Fisheries Service
National Park Service
Natural Resources Conservation Service
Pacific Fishery Management Council
Sandia National Laboratories

AK Department of Fish & Game
AR Department of Economic Development
AZ Department of Commerce
CA Department of Fish and Game
CA Department of Transportation
CA Department of Water Resources
CA State Water Resources Control Board
CO Department of Labor & Employment
CT Department of Community and Economic Development
CT Department of Labor
CT Economic Resource Center
DE Economic Development Office
FL Department of Environmental Protection
FL Agency for Workforce Innovation
FL Fish & Wildlife Conservation Commission
FL Governor's Office
FL Labor Market Statistics
FL Legislature
FL Office of Tourism: Visit Florida
IN Department of Workforce Development
KY Cabinet for Economic Development

LA Department of Wildlife & Fisheries
MD Department of Business & Economics
MD Department of Natural Resources
MD Department of Transportation
ME Office of Rural Health
ME State Planning Office
MI Department of Natural Resources- Forest Mgmt Division
MN Department of Agriculture Marketing Section
MN Department of Economic Security
MN Department of Natural Resources
MN Economic Development Center
MN Office of Legislative Auditor
MO Department of Economic Development
MO Department of Health & Human Services
MS Department of Forestry
MS Institutions of Higher Learning
MT Department of Commerce
MT Department of Labor & Industry
NC Department of Commerce
NC Division Marine Fisheries
NE Department of Economic Development
NE Department of Revenue
NM Department of Agriculture
NV Department of Conservation & Water
NY Department of Labor
NY Office of the State Comptroller
OH Department of Development
OK Department of Commerce
OR Department of Forestry
OR Economic Development
SC Employment Security
SC State Office of Rural Health
TX Forest Service
TX Water Development Board
UT Division of Parks & Recreation
UT Office of Planning and Budget
VA Department of Forestry
VA Employment Commission
WA Department of Revenue
WA Department of Transportation
WI Department of Transportation
WI Department of Workforce Development
WV Development Office

Albany State University
Arizona State University
Arkansas State University
Armstrong Atlantic State University

Auburn University
Augusta State University
Bowling Green State University
California Polytechnic State University
California State University, Chico
California State University, Sacramento
Calvin College
Citadel College
Clarion State College
Clemson University
Cleveland State University
Coastal Carolina University
College of William & Mary
Colorado State University
Columbia University
Cook College Rutgers University
Cornell University
Creighton University
Duke University
Eastern New Mexico University
Eastern Washington University
Elon College
Flathead Valley Community College
Florida Gulf Coast University
Florida International University
Florida State University
Gardner-Webb University
George Mason University
George Washington University
Georgia State University
Georgia Tech.
Hamline University
Humboldt State University
Idaho State University
Indiana University, South Bend
Iowa State University
Louisiana State University
Marshall University
Michigan State University
Middle Tennessee State University
Mississippi State University
Montana State University
National University System
New Mexico State University
New School University
Nicholls State University
NLH Agricultural University of Norway
Nord-Trondelag - Distriktshogskole, Norway

North Carolina State University
Northeast Louisiana University
Northern Arizona University
Northern Illinois University
Northwest Nazarene University
Ohio State University
Oklahoma State University
Old Dominion University
Penn State University
Presbyterian College
Purdue University
Rutgers University
Salisbury University
San Diego State University
SE Missouri State University
Shippensburg University
Sonoma State University
South Dakota State University
Southern Illinois University
Southern University
Southern Utah University
State University of New York, Buffalo
Tennessee State University
Texas A&M International University
Texas A&M University
Texas A&M University-Commerce
Texas A&M University-Kingsville
Texas Tech University
Troy State University
University of Alabama
University of Arizona
University of Arkansas, Fayetteville
University of Arkansas, Little Rock
University of Baltimore
University of California, Berkeley
University of California, Riverside
University of California, Santa Barbara
University of Colorado
University of Colorado, Colorado Springs
University of Connecticut
University of Delaware
University of Florida
University of Georgia
University of Hawaii, Manoa
University of Idaho
University of Illinois, Champaign
University of Illinois, Chicago
University of Illinois, Springfield

University of Kansas
University of Kentucky
University of Louisville
University of Massachusetts, Amherst
University of Massachusetts, Dartmouth
University of Memphis
University of Minnesota
University of Minnesota, Duluth
University of Mississippi
University of Missouri, Columbia
University of Missouri, St. Louis
University of Montana
University of Nebraska
University of Nebraska, Omaha
University of Nevada, Reno
University of New Hampshire
University of New Mexico
University of North Carolina, Chapel Hill
University of North Carolina, Charlotte
University of North Carolina, Greensboro
University of North Dakota
University of Northern Arizona
University of Northern Iowa
University of Northern Texas
University of Notre Dame
University of Oklahoma
University of Rhode Island
University of Richmond
University of San Diego
University of South Carolina
University of South Florida
University of Southern California
University of Southern Colorado
University of Southern Indiana
University of Southern Mississippi
University of Tennessee
University of Texas, Austin
University of Texas, El Paso
University of Texas, Pan American
University of Texas, San Antonio
University of Toledo
University of Vermont
University of West Florida
University of Wisconsin Center, Rock County
University of Wisconsin, Madison
University of Wisconsin, Whitewater
University of Wyoming
Utah State University

Virginia Commonwealth University
Virginia State University
Virginia Tech
Washington State University
Washington State University, Puyallup
West Virginia University
West Washington University
Western Carolina University
Western Illinois University
Wingate University
Woods Hole Oceanographic Institute

Alpena Regional Medical Center
Asheville Chamber of Commerce
Association of Bay Area Governments
Center for Labor & Community Research
Chattanooga Area Chamber of Commerce
City of El Paso Economic Development
City of Lubbock
City of Virginia Beach
Greater Austin Chamber of Commerce
Greater Omaha Chamber of Commerce
Greater Phoenix Economic Council
Lower Colorado River Authority
Maricopa Association of Governments
Mass. League of Comm Health Centers
National Indian Gaming Association
Nebraska Public Power District
Neighborhood Reinvestment Corporation
Northeastern Pennsylvania Alliance
Nuclear Energy Institute
Orange County Business Council
Sacramento Area COG
San Diego Association of Governments
Sarasota County Government
Southern California Association of Governments
St. Louis Reg. Commerce & Growth
Suffolk County Legislature
Tampa Bay Regional Planning Council
Tennessee Hospital Association
Union of Concerned Scientists

AECOM
Applied Development Economics
Battelle Pacific NW Labs
BBC Research
Beacon Hill Institute
Booz, Allen and Hamilton
Cambridge Systematics
CC Benefits
CDM Smith
CH2M Hill
Charles River Associates
Chmura Economics & Analytics
CIC Research
Coopers & Lybrand LLP
CSL International
Dames and Moore
Dean Runyan Associates
Deloitte & Touche LLP
Dornbusch & Co
Duke Power Co.
E.D.Hovee & Company
ECO Northwest
Ecology and Environment, Inc.
Economic Development Research Group
Economic Research Associates
Elliott D. Pollack & Company
EMSI
Energy and Environmental Engineering
Environmental Sciences Associates
Ernst and Young LLP
ESI Corporation
Foster Wheeler Environmental Corp.
Hazen & Sawyer
HLB Decision Economics, Inc.
Hobson Ferrarini Associates
HVS Convention,Sport&Entertainment
ICF Kaiser
Jack Faucett Associates
Jones and Stokes, Assoc., Inc.
KPMG Peat Marwick LLP
Mangi Environmental Group

McDowell Group
National Economic Research Associates, Inc.
Neenan Associates
NorthStar Economics
PriceWaterhouseCoopers
Public Sector Consultants
Robert Charles Lesser & Co. Sage Policy Group, Inc.
SAIC
Sparks Companies Inc.
Strategic Advisory Group
Tetra Tech, Inc.
The Concord Group
URS Corporation

APPENDIX B

Selected local studies using the IMPLAN multipliers

New England Cable and Telecommunications Associate Inc. 2011. Connecting New Hampshire: Cable's Impact on the State's Economy.

Defense Technology Initiative. 2012. The New England Defense Industry: Current Profile and Economic Significance.

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NH Manufacturing Extension Partnership (NH MEP). The Economic Impacts of the New Hampshire Extension Partnership Program on the New Hampshire Economy.

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