

**Economic Impact of Granite Reliable Power Wind Power Project
in Coos County, New Hampshire**

University of New Hampshire

Whittemore School of Business and Economics

Ross Gittell, James R Carter Professor

Matt Magnusson, M.B.A.

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1 Executive Summary

Granite Reliable Power, LLC's (GRP) is proposing a 99 MW wind power project in Coos County, New Hampshire (NH). The current project construction schedule is for two seasons starting in 2009 with operations following construction. The Granite Reliable Power wind power project is expected to involve a total investment of approximately \$250 million.

The wind power project represents a potential economic bright spot in an area of New Hampshire – Coos County – that has been struggling. Coos County's average annual wage is 30% lower than the state-wide average and the County's unemployment rate in December 2008 was 6.0% which was significantly higher (1.7%) than the State average.

The U.S. wind energy industry is growing at a significant rate, with investment totaling \$17 billion in 2008. However, New England has not been attracting wind power investment in proportion to its potential. This is unexpected, given that the region has areas of significant wind resources and has also shown commitment to increasing renewable energy resources through the passage of state Renewable Portfolio Standards (RPS). New Hampshire has a chance to benefit economically while at the same time reducing dependency on imported energy and addressing environmental concerns with GRP and other wind power projects.

The economic benefits for Coos County and the surrounding area of northern New Hampshire and parts of northern Maine and Vermont from the GRP wind power project can be significant. GRP's development activities have already begun to bring dollars into the local economy. Consistent with GRP's stated commitment to hire qualified residents and companies from local and regional New Hampshire communities for the project, GRP has, to-date, spent over \$4 million on development with over 40% being spent directly in Coos County and an additional 20% in other NH communities on activities such as: civil engineering, surveying, wetland scientists, and related permitting services.

The construction phase is the period when there will be the greatest economic activity and benefits for Coos County and the surrounding area. The project is expected to contribute \$20.3 million (representing about 2% of the Coos County economy) in both 2009 and 2010. After the construction phase, in the operation phase, the economic and jobs impact of the wind power project are lower, but still significant. The project is expected to contribute \$4.3 million (0.4% of the Coos County economy) annually to the northern New Hampshire and surrounding area economy.

Total benefits, including direct, indirect and induced, to the local economy from the Granite Reliable Power, LLC wind power project are expected to be \$122 million or \$1.2 million per MW over a 20-year period.

During the construction phase, the GRP wind power project is expected to create a total of 550 jobs. This includes employment directly from the project for construction (materials and services) and indirect and induced employment from project investment and wages. Two hundred 200 full time equivalent (FTE) construction jobs would be directly involved in construction with 30 FTE jobs expected to be filled by Coos County resident workers. The

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remaining construction force is expected to come from a 100-mile radius of the project including Northern New Hampshire, Maine and Vermont. The wind farm, in its on-going operations, phase is expected to create 72 jobs in total in the local economy with 6 jobs being direct employees of GRP.

Many of the new jobs created by the wind farm can be termed “Green Jobs”. Green jobs are jobs that involve or employ environmentally sensitive (friendly) practices or technologies including: renewable energy, energy efficiency and smart technologies. These type of jobs tend to be high quality and well-paid. The construction and operations jobs with GRP are expected to pay \$45,000 in annual wages, 50% higher than the County average.

Given the severe economic recession gripping the U.S., this project – with immediate and positive economic impacts – can be particularly valuable to the local area economy.

2 Introduction

2.1 Overview

Granite Reliable Power, LLC (GRP) is proposing a 99 MW wind power project in Coos County, New Hampshire. The power project will consist of 33 (3 MW) wind turbines situated along the ridgelines of Dixville Peak, Owlhead Mountain, Mount Kelsey, and Fishbrook Ridge. The current project schedule is for two seasons starting in 2009. In 2009, construction commences with the development of access roads, installation of overhead and underground power lines, and preparation of the turbine sites. Wind turbine delivery and installation are scheduled for 2010. The Granite Reliable Power wind power project is expected to involve a total investment of approximately \$250 million¹.

Noble Environmental Power (NEP), founded in 2004, is the wind energy company developing the GRP power project. They have 726 megawatts of wind power projects operating in New York and Texas. NEP is majority-owned by JPMorgan Partners Fund, which is managed by CCMP Capital.

GRP contracted with Professor Ross Gittell from the University of New Hampshire's Whittemore School of Business and Economics to independently examine the potential impact of the GRP wind power project on the local economy in Coos County. The GRP project is currently before the New Hampshire Site Evaluation Committee. This study is intended to help inform the members of the Committee as to the expected economic impacts of the project. In conducting the analysis, emphasis was placed on providing conservative estimates of the economic impacts of the project.

In conducting this analysis, the research team drew from their previous research on the economic impact of the New Hampshire Renewable Portfolio Standard and New Hampshire's participation in the Regional Greenhouse Gas Initiative (RGGI), as well as of the economic impact of the development of the Mount Washington Resort and related properties in Coos County. The analysis reported here included evaluation of the local construction and then on-going employment, tax revenue and other economic impacts of the proposed wind power project. The evaluation considered direct and also indirect and induced (the so-called multiplier) benefits on Coos County and the surrounding area economy.

The research reviewed previous studies related to the economic costs and benefits of wind power project developments and conducted an independent assessment of project costs provided by GRP and potential contractors. Detailed analysis was focused on Coos County and the surrounding northern New Hampshire, Maine and Vermont area. The extent to which labor and materials are sourced from New Hampshire will impact the overall state economic impact.

¹ Email correspondence with Pip Decker of Noble Environmental Power, February 2009. Spreadsheet containing expected capital expenditures.

2.2 Coos County

Coos County is located in the northern most area of the State. It is New Hampshire's largest county (land area of 1,800 square miles), accounting for 20% of the total land area of the state. Over 90% of Coos County is forested, 24% of which is either State or National Forest. There are twenty towns, one city and 23 unincorporated places (geographic entities with no formal government) in the County. The County, which serves as the local governing body, oversees the budgets for the 17 unincorporated places that are outside of the White Mountain National Forest.

Coos County has the smallest population in the State and also is the only county in the State with a declining population. The County's declining population is a product of a weak economy and the paucity of economic opportunity for residents. The County's population is also aging rapidly and older than the New Hampshire average, reflective of the younger population leaving the area to pursue economic opportunities in other areas of the State or beyond.

Coos County struggles economically when compared to New Hampshire overall. In 2007, the County Gross Regional Product (GRP) was \$1 billion; the overall NH Gross State Product (GSP) was \$57 billion. Coos County's average annual wage was \$30,500 which is 30% lower than the state-wide average annual wage of \$43,900. In December 2008, the overall workforce was 16,450 with 990 unemployed (6.0% unemployment rate); this is significantly higher than the State unemployment rate of 4.3%². Coos County has an economy that historically has depended on two principal industries, manufacturing and leisure and hospitality.

Lumber and wood products and paper manufacturing are the long-standing, traditional, industries in Coos County. However, there has been a long term downward trend in manufacturing in the North Country, specifically the pulp and paper manufacturing industries as reflected recently in the closing of the Wausau Paper Mill in Groveton, NH, and the Groveton Paperboard Mill and Fraser Paper's Burgess Pulp Mill in Berlin.

² NH Economic data obtained from the Economic and Labor Market Information Bureau, New Hampshire Employment Security, Available online at <http://www.nh.gov/nhes/elmi/econstat.htm>

Table 1: 2007 Coos County Economy

NAICS	Industry	Establishments	Average Annual Employment	Average Annual Wage
101	Goods-Producing Industries	170	2,184	\$39,462
11	Agriculture/Forestry/Fishing	34	186	\$32,059
21	Mining	5	29	\$27,687
23	Construction	90	464	\$36,576
31-33	Manufacturing	42	1,505	\$41,498
102	Service-Providing Industries	728	8,866	\$27,370
22	Utilities	10	99	\$63,352
42	Wholesale Trade	29	219	\$40,819
44-45	Retail Trade	178	2,157	\$23,378
48-49	Transportation and Warehousing	47	416	\$31,328
51	Information	15	80	\$29,162
52	Finance and Insurance	43	329	\$33,121
53	Real Estate and Rental and Leasing	30	114	\$22,436
54	Professional and Technical Services	40	130	\$42,637
56	Administrative and Waste Services	31	177	\$49,452
62	Health Care and Social Assistance	90	2,344	\$34,397
71	Arts, Entertainment, and Recreation	24	471	\$16,109
72	Accommodation and Food Services	114	2,009	\$17,533
81	Other Services Except Public Admin	66	236	\$25,248
	Total, Private plus Government	1,040	13,876	\$30,349

Source: Economic and Labor Market Information Bureau, New Hampshire Employment Security

2.3 Wind Energy and the Economy

The U.S. wind energy industry grew at a strong rate in 2008 with the installation of 8,300 megawatts (MW) of new generating capacity. These new wind installations increased the nation’s wind capacity by 50% and generate enough electricity to serve over 2 million homes. The construction activity brought in over \$17 billion in new investment into the U.S. economy³.

However, even while wind construction is “booming” at the national level, it appears that New England overall is largely not participating significantly in this economic opportunity. New England only has 84 MW of wind energy facilities installed, far below the leading state Texas at

³ “Wind Energy Grows by Record 8,300 MW in 2008,” Press Release, American Wind Energy Association, Jan. 27, 2009, Available online at http://www.awea.org/newsroom/releases/wind_energy_growth2008_27Jan09.html

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7,100 MW. It also pales when compared to next door neighbor New York with 832 MW of wind energy⁴.

Table 2: 2008 Installed Wind Capacity

Top Five U.S. States		Top Five New England States	
Texas	7,116 MW	Maine	47 MW
Iowa	2,790 MW	New Hampshire	25 MW
California	2,517 MW	Vermont	6 MW
Minnesota	1,752 MW	Massachusetts	5 MW
Washington	1,275 MW	Rhode Island	1 MW

Source: American Wind Energy Association

The lack of development is not due to lack of adequate wind resources. For example, estimates for economically developable wind in New Hampshire range from 500 – 2,200 MW⁵; the current capacity of 25 MW is well below New Hampshire's economically achievable potential. The low level of wind development is also unexpected given that every New England state has passed some form of Renewable Portfolio Standard. This is legislation requiring utilities to purchase a certain percentage of customers' power from renewable sources including wind.

One of the main reasons for the lack of development in New England compared to the significantly higher activity seen in other areas of the country is the high density of the New England population. This increase in density drives up the cost of development which is translating into costs that are up to 26% higher than what might be expected for similar installations in other regions of the country. New England has the highest expected costs for on-shore wind installations in the U.S.⁶.

Even though wind development may be more challenging in New England than other areas of the country, there is still considerable opportunity for New England and New Hampshire to develop a significant source of new power capacity from wind. It should also be noted that the majority of new capacity in Maine, New Hampshire and Vermont has come on-line since 2007. This indicates that wind projects in New England are becoming more feasible likely due to a combination of factors including: advances in turbine technology, relatively high regional wholesale electricity prices; federal policies (primarily the production tax credit); wide public acceptance of the need to address climate change and use of fossil fuels; and increased state incentives (predominantly Renewable Portfolio Standards).

⁴ "AWEA – Projects," Web Page, American Wind Energy Association, Available online at <http://www.awea.org/projects/>

⁵ 500 MW is the potential capacity provided by the American Wind Energy Association (AWEA) and 2,200 MW was based on an economic study performed by the University of New Hampshire (UNH) assessing the economic potential of a Renewable Portfolio Standard in 2007. The AWEA estimate is available at <http://www.awea.org/projects/Projects.aspx?s=New+Hampshire> and the UNH study is available at http://www.renewableenergyworld.com/assets/documents/2007/unh_rps_report_final.pdf

⁶ "20 Percent Wind Energy Penetration in the United States: A Technical Analysis of the Energy Resource," Black & Veatch, October 2007, Available online at http://dnr.wi.gov/environmentprotect/gtfgw/documents/Black_Veatch_20_Percent_Report.pdf

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Wind power development offers significant economic benefits from the associated manufacturing, permitting, construction, and on-going operation activities. The economic benefits of wind for rural communities include the creation of local jobs, increased tax revenues, and generation of lease income for land owners. A broader regional economic benefit is diversification of the power generation mix (wind can act as a hedge against fossil fuel price volatility) which helps to provide households and businesses with more stable energy prices.

The impact of wind energy projects on the local economy can be broken down into three distinct aspects.

- Direct impacts,
- Indirect impacts, and
- Induced impacts.

Direct impacts result from the employment of construction workers and payments to contractors for activities such as land clearing, excavation, concrete and steel work, trucking, crane operation and engineering services. There are significant direct economic impacts from the manufacturing of wind turbines and their associated components; however, the manufacturing facilities, as is the case with the GRP wind power project, are not often located in the same areas as the wind power projects.

Indirect impacts result from the increased economic activity attributable to the purchase of goods and services by firms and workers directly benefiting from the wind power project construction and associated activity. For example, the construction of turbine foundations, increases demand for gravel, sand, and cement which in turn increases economic activity at quarries and cement factories. Indirect activity also includes local purchases of machines and parts and services such as banking and accounting.

Induced impacts are the increased economic activity brought on through the expenditure of income and earnings by individuals directly and indirectly impacted by the project in the broader local economy. This can include expenditures in the local retail sector on goods and services, such as food, clothes, utilities, transportation, insurance, recreation, medical and childcare.

3 Methodology & Assumptions

This analysis utilized spreadsheet modeling to determine the job and economic impacts of the GRP project. The project was evaluated in two phases: construction and on-going operations after construction is completed. In determining the job impacts of the GRP project on Coos County, significant literature review was undertaken to find case studies and economic metrics to determine the direct, indirect and induced job impacts of the project on the local economy. While all wind projects have specific features that can change the amount of labor and cost of materials in construction, there is a fairly detailed body of work that can be drawn upon for estimates of job creation benefits from construction and on-going operations. These resources were also used to determine other local economic impacts of wind power project construction including taxes and lease payments.

GRP provided the research team with itemized estimates of labor and material costs, taxes and lease payments for both the construction and on-going operations phases. It was assumed the line item information was accurate. However, to the extent possible, overall project costs and individual line item costs were verified against other case study projects and common ranges documented by other wind power projects and in independent research and reports. None of the GRP costs were out of the norm or extraordinary; costs were at the middle to high end of the range. As previously noted, costs are expected to be at the high end of the range for New England based projects. Confidentiality requirements for this project require that only aggregated categories of expenditures can be presented and discussed in this report.

Interviews were conducted with potential contractors for their estimates of the labor required for the GRP project and also to what extent they would use local labor and materials in the project. While there were limitations in the information provided (due to confidentiality constraints), the interviews were quite useful in confirming conclusions reached by the research team on the broad details of the employment impact of the project.

Literature research revealed a range of between 40 and 160 direct construction jobs per 100 MW of wind construction⁷. The GRP power project is expected to be towards the high end of the range of employment because it also includes significant road and transmission development activity that are not typically part of wind power project projects. Further increasing costs and also employment are the region's mountainous topography and the presence of some environmentally sensitive areas in the power project⁸.

The research team determined that the total direct construction full time equivalent (FTE) jobs for the wind power project would be 168 with an additional 30 FTE jobs required for the system utility upgrade work. This is not the number of jobs that would be expected to be filled by Coos County and surrounding area resident workers. Contractors that were interviewed stated that they expected 10-20% of construction jobs would be filled by workers within a 25 mile radius of the

⁷ Pedden, M., "Analysis: Economic Impacts of Wind Applications in Rural Communities," National Renewable Energy Laboratory, January 2006, Available online at <http://www.nrel.gov/docs/fy06osti/39099.pdf>

⁸ Email correspondence with Pip Decker of Noble Environmental Power, February 2009.

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project and that almost all of the remaining labor would come from New England (97-100%)⁹. This low level of local labor was supported by research that found it can be difficult to source local labor for wind power project construction in rural areas and that as little as 10% of labor can come from local communities¹⁰.

Consistent with the conservative goal of this analysis, 15% of all construction labor was assumed to be sourced from Coos County and the surrounding area. Therefore, Coos County resident and surrounding area workers are expected to hold 30 of the 198 FTE jobs. It is important to note that there may be more than 30 workers from Coos county working on the project but the total labor hours from Coos County workers would not be expected to exceed 62,400¹¹.

Determination of indirect and induced economic impacts was more complicated as the lead contractor, sub contractors and material suppliers have yet to be determined by GRP. Therefore it is difficult to know where labor and materials will specifically be sourced from. In this analysis, conservative assumptions of local labor and materials were used. The contractors stated that they expected to source concrete, gravel and other raw construction material within a 50 mile radius of the project¹². However, based on literature research of the type and amount of construction material that can be expected to be available locally, percentages lower than 100% were used and are listed in the table below¹³.

Table 3 Percentage of Labor and Materials Assumed to be Sourced from Coos County

Construction Activity	Labor	Materials
Roads/Civil	15%	40%
Foundations	15%	40%
Related Facilities	0%	0%
Substation	0%	0%
System Utility Upgrades	10%	10%
Turbines	0%	0%

⁹ Telephone conversations with Patrick A. DeFilipp, P.E., Sr. Project Manager, Reed & Reed, Inc. of Woolwich, Maine and Email correspondence with W. Parker Hadlock, Project Manager, Cianbro Corporation, Portland ME, February 2009

¹⁰ Williams et al., "Arizona Wind Energy Assessment: Cochise County-Developable Windy Land and Economic Benefits," Northern Arizona University, Sustainable Energy Solutions, April 2007, Available online at <http://ses.nau.edu/wind/ArizonaWindEnergyAssessment-April2007.shtml>

¹¹ FTE equivalent is equal to 2080 hours of work.

¹² Telephone conversations with Patrick A. DeFilipp, P.E., Sr. Project Manager, Reed & Reed, Inc. of Woolwich, Maine and Email correspondence with W. Parker Hadlock, Project Manager, Cianbro Corporation, Portland ME, February 2009

¹³ Williams et al., "Arizona Wind Energy Assessment: Cochise County-Developable Windy Land and Economic Benefits," Northern Arizona University, Sustainable Energy Solutions, April 2007, Available online at <http://ses.nau.edu/wind/ArizonaWindEnergyAssessment-April2007.shtml>

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Separately the potential for Coos County and the surrounding area to supply direct and indirect labor for the project was assessed. A list of industries, based on the North American Industry Classification System (NAICS), was developed and classified as being either directly or indirectly involved in wind construction. This list was also developed to determine local wages for the different types of employment expected to be seen in the project. Employment and wage data for 2007 from the U.S. Bureau of Labor Statistics was used. The Bureau of Labor Statistics (BLS) provides timely and detailed industry data in its Quarterly Census of Employment and Wages program for counties, states and national aggregates.

Table 4: NAICS Classifications for Direct or Indirect Industries involved in the Wind Power project Construction Process

NAICS	Category Description	Job Impact
11331	Logging	Direct
21232	Sand, Gravel, Clay, and Ceramic and Refractory Minerals Mining and Quarrying	Indirect
23713	Power and Communication Line and Related Structures Construction	Direct
23721	Land Subdivision	Direct
23731	Highway, Street, and Bridge Construction	Direct
23811	Poured Concrete Foundation and Structure Contractors	Direct
23812	Structural Steel and Precast Concrete Contractors	Direct
23821	Electrical Contractors and Other Wiring Installation Contractors	Direct
23891	Site Preparation Contractors	Direct
42332	Brick, Stone, and Related Construction Material Merchant Wholesalers	Indirect
42351	Metal Service Centers and Other Metal Merchant Wholesalers	Indirect
42361	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	Indirect
48422	Specialized Freight (except Used Goods) Trucking, Local	Direct
54133	Engineering Services	Direct
56173	Landscaping Services	Direct
56199	All Other Support Services	Direct
81131	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	Direct
51791	Other Telecommunications	Direct

In determining the total indirect and induced economic activity (from the direct construction activities and on-going operations) a conservative 1- to-1 multiplier was used. This is consistent with methodology used in past renewable energy and energy efficiency work performed by the research team and is based on researcher experience with the New Hampshire economy. This conservative multiplier is also supported by other studies¹⁴

¹⁴ In Texas, an analysis of a 912 MW wind power project would be expected to generate 2500 direct jobs and 2900 indirect and induced, suggesting a slightly higher than 1:1 multiplier. Flowers, “The \$\$ and Sense of Wind Energy,”

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Indirect and induced jobs from the construction phase in the local economy are expected to be 355. These jobs were calculated by netting lease payments, local taxes and construction wages and from total economic activity and dividing by \$53,320¹⁵.

In on-going operations, it was determined that there would be 6 permanent jobs directly employed by GRP. This is based on project data provided by GRP and review of other wind power project projects and documentation which indicates 6-10 permanent operations and maintenance jobs per 100 MW¹⁶. Purchases, taxes and lease payments were taken directly from GRP project projections. Using a similar methodology to calculate indirect and induced jobs as in the construction phase, with the exception of using the average Coos County wage with benefits (\$36,875), found that the impact would be 66 FTE jobs. This is based on the assumption that after the construction phase most of the indirect and induced jobs would be expected to be close to the regional average in terms of wages.

Power Point, National Renewable Energy Laboratory, Available online at http://www.noblepower.com/faqs/documents/07-09-10_MI-Wind-Dollars-Sense_Flowers.pdf

¹⁵ \$53,320 is the value determined to create a new job in Coos County. This was based on researcher experience with the NH markets and the nature of the types of jobs expected to be indirectly related to wind construction. It includes wages and benefits.

¹⁶ Flowers et al., "Wind Energy for Rural Economic Development," Power Point for Windpower 2005 Conference, National Renewable Energy Laboratory, May 18,2005, Available online at http://www.windpoweringamerica.gov/pdfs/wpa/flowers_windpower_2005.pdf

4 Analysis

4.1 Overall Economic Impacts in Coos County

The construction phase is the period for which there will be the greatest economic activity and benefits for Coos County. The project is expected to contribute \$40.6 million total to the northern NH economy or \$20.3 million for each of the two years. This would represent approximately 2% of the total Coos County economy. Economic activity (specifically employment related) with wind power project construction tends to be front loaded (during the initial construction).

This short term (burst of) activity would have a significant positive effect that would be particularly beneficial to the County and surrounding area during a period of rising unemployment due to the weak U.S. economy. During the construction phase, the impact on employment would be significant, up to 550 jobs. Longer term the employment impacts are lower, but still significant for Coos County and the surrounding area.

GRP’s development activities have already begun to bring dollars into the local economy. Consistent with GRP’s stated commitment to hire qualified residents and companies from the local and regional New Hampshire communities for the project, GRP has, to-date, spent over \$4 million on development with over 40% being spent directly in Coos County and an additional 20% in other NH communities on activities such as: civil engineering, surveying, wetland scientists, and related permitting services¹⁷.

Table 5: Coos County Economic Activity during Construction Phase (Over Two Seasons)

Local Construction Employment (FTE)	30
Local Indirect & Induced Employment	355
Construction Wages & Benefits	\$1,600,000
Purchases & Lease Payments	\$17,500,000
Local Taxes or Tax Equivalent	\$1,200,000
Local Direct Economic Impact	\$20,300,000
Direct Impact + Multiplier Effect	\$40,600,000
Annual Impact (Percent of Coos Total Economy)	2.0%

After the construction phase, in the operation phase, the economic and jobs impact of the wind power project are reduced but still significant. The project is expected to contribute \$4.3 million annually to the Coos and surrounding economy. This represents 0.4% of the total Coos County economy.

¹⁷ E-mail correspondence from Pip Decker of Noble Environmental Services, Feb. 2009. Pip provided detailed expense reports with supplier business locations.

Table 6: On-Going Coos County Economic Activity Due to Granite Reliable Power (Annual Basis)

Local GRP Employment (FTE)	6
Wages & Benefits	\$275,000
Local Indirect & Induced Employment	66
Purchases & Lease Payments	\$1,300,000
Local Taxes or Tax Equivalent	\$560,000
Local Direct Economic Impact	\$2,135,000
Direct Impact + Multiplier Effect	\$4,270,000
Annual Impact (Percent of Coos Total Economy)	0.4%

Total benefits to the local economy from the Granite Reliable Power, LLC wind power project are expected to be \$122 million or \$1.2 million per MW over a 20 year period. This is consistent with other reports that are finding local economic benefits can be up to \$1.6 million per MW over 20 year period from wind power project construction¹⁸.

4.2 Job Impact in Coos County

During the construction phase, the GRP wind power project is expected to employ 30 full time equivalent (FTE) Coos County resident workers paying \$1.6 million in wages and benefits. An additional 168 FTE construction jobs are expected to be held by residents from within a 100 mile range including other parts of northern New Hampshire, Maine and Vermont. The wind power project in operation and on an on-going basis would be expected to provide 6 on-site jobs paying \$275,000 in wages and benefits.

Table 7: Direct Employment Impact of GRP on Coos County

Direct Annualized Employment (FTE) (Construction Phase)	15
Direct Annual Employment (On-going Phase)	6

These types of jobs are consistent with what are being termed “Green Jobs”. Green jobs are jobs that provide and/or employ environmentally sensitive practices or technologies including: renewable energy, energy efficiency and smart technologies. A recent report by the authors of this report on the green economy identified that green jobs tend to pay 40% better than the

¹⁸ Loomis, David, “Economic Benefits and Costs of Wind Farms,” Power Point for the East Central Illinois Economic Development District, Illinois State University, January 30, 2009, Available online at <http://www.econ.ilstu.edu/dloomis/236web/lectures/costbenefitwindfarms.pdf>

national average¹⁹. This appears to be the case for the GRP wind power project as well where the wages attributed to both construction and on-going operations are almost 50% higher than the Coos County average.

Table 8: GRP Wind Power Project “Green Job” Wages

	Annual Average Wage	Average Hourly Wage
Average Construction wages	\$ 44,925	\$ 21.60
On-Site Technician	\$ 45,282	\$ 21.77
Coos Average	\$ 30,350	\$ 14.59

Source: 2007 Bureau of Labor Statistics Quarterly Census of Employment & Wages

In addition, to the direct employment benefits, there are indirect and induced jobs created as a result of the GRP wind power project both during construction and on-going operations. These jobs significantly magnify the employment impact of the project on the local economy. There would be expected to be 178 jobs created each year during the construction phase for a total of 355 jobs. During the on-going operations phase, the annual operations would be expected to support 66 jobs in Coos County and the local economy.

Table 9: Indirect and Induced Annual Employment Impact of GRP on Coos County

Construction Phase (Annualized)	178
On-going Phase	66

4.3 Direct Wind Construction Employment Potential in Coos County

Assessing Coos County for the types of industries and employment required to support the GRP wind power project reveals a limited supply. This is consistent with contractor interviews stating that they expected to source approximately 10-20% of the labor force from within 25 miles of the project. Coos County and the surrounding appear to be well positioned to engage in land clearing and trucking local construction materials. It also appears to have some degree of industry and employment that could assist with foundation construction, utility wiring/electrical work, and engineering.

There does not appear to be any major concrete/structural steel firms present in Coos County, which is a large and essential part of the turbine construction and erection process. This further supports the finding that a significant portion of the construction workforce would be expected to come from outside of Coos County, including other New Hampshire communities. Also choices for merchant wholesalers appear limited in Coos County which may limit the amount of construction material purchased from local wholesalers which, in turn, limits the potential for indirect and induced jobs in the local economy.

¹⁹ Gittell et al., “New Hampshire’s Green Economy and Industries: Current Employment and Future Opportunities,” Whittemore School of Business & Economics, University of New Hampshire, January 2009

Table 10: 2007 Coos County Wind Construction Direct and Indirect Labor Force

Naics	Category Description	Establishments	Employees	Average Annual Pay
11331	Logging	32	147	\$ 33,378
21232	Sand, Gravel, Clay, and Ceramic and Refractory Minerals Mining and Quarrying	5		
23713	Power and Communication Line and Related Structures Construction	3	21	\$ 42,031
23721	Land Subdivision	0		
23731	Highway, Street, and Bridge Construction	0		
23811	Poured Concrete Foundation and Structure Contractors	7	34	\$ 35,249
23812	Structural Steel and Precast Concrete Contractors	0		
23821	Electrical Contractors and Other Wiring Installation Contractors	10	50	\$ 39,001
23891	Site Preparation Contractors	19		
42332	Brick, Stone, and Related Construction Material Merchant Wholesalers	1		
42351	Metal Service Centers and Other Metal Merchant Wholesalers	1		
42361	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	0		
48422	Specialized Freight (except Used Goods) Trucking, Local	17	66	\$ 36,520
54133	Engineering Services	5	5	\$ 56,693
56173	Landscaping Services	6	15	\$ 14,067
81131	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	3	5	\$ 17,644

Source: 2007 Bureau of Labor Statistics Quarterly Census of Employment & Wages

4.4 Economic Costs

Economic costs include potential property value decline and opportunity costs. In terms of property value decline the turbines are to be sited in remote, unincorporated regions of New Hampshire with a limited population. As such, the turbines would not be expected to impact property values negatively due to any “view” changes. In fact, previous studies have not found evidence supporting the claim that wind turbines negatively impact property values.²⁰ In fact, the turbines may attract some degree of “green tourism” which would even further add to the

²⁰ Risch, Christine, “Review of Studies Evaluating the Impact of Wind Farms on Property Values,” Power Point, Center for Business and Economic Research, Marshall University, October 19, 2005, Available online at <http://www.marshall.edu/cber/research/Risch-WindEnergyWorking%20Group.ppt>

economic benefits of the project beyond what is stated in this report. This appears to be the case with the new 24 MW wind power project in Lempster, New Hampshire²¹.

In terms of opportunity cost, there is not expected to be any significant opportunity cost related to land use. With the exception of several high-elevation tracts proposed for conservation protection as part of the project plan, timber harvesting activities can still occur on the land that is being leased²².

An issue that has been raised and that is beyond the scope of this analysis is the opportunity cost of transmission.²³ Given that transmission has limited capacity from Northern New Hampshire, concerns have been raised that certain types of renewable energy may provide higher economic benefit for the transmission capacity and therefore should be given preference over other forms of renewable energy.

Over the past year a Transmission Commission consisting of NH regulators, generators and other parties has been meeting to specifically address transmission from Northern New Hampshire²⁴. Legislation has been proposed in the State Senate to further study the issue or to fund the necessary transmission upgrades, estimated to be \$155 million²⁵. Depending on the outcome of the pending legislation, this issue of transmission opportunity cost may be settled or studied further.

²¹ "Wind Farm in Lempster is Nearly Ready to Go?," Nashua Telegraph, October 8, 2008, Available online at <http://www.nashuatelegraph.com/apps/pbcs.dll/article?AID=/20081008/NEWS01/310089922>

²² Email correspondence with Pip Decker of Noble Environmental Power, February 2009

²³ "Company Wants to Build Wind Farm in Coos County," WMUR, September 17, 2008, Available online at <http://www.wmur.com/green-pages/17494362/detail.html>

²⁴ "Progress Report," Commission to Develop a Plan for the Expansion of Transmission Capacity in the North Country, December 1, 2008, Available online at <http://www.puc.nh.gov/Transmission%20Commission/120108%20Progress%20Report/Progress%20Report.pdf>

²⁵ SB 85 and SB 164, both proposed in the 2009 session, are listed on the NH General Court - Bill Status System as both being active as of the writing of this report.

5 Conclusion

The Granite Reliable Project, LLC 99 MW wind power project in Coos County, New Hampshire is expected to have a positive economic impact on Coos County and the surrounding area with the highest impact during the two season construction phase. During the 2-year construction phase economic activity associated with the wind power project will add over \$20 million to the local area economy (or about 2% of Coos County annual gross product) each year. Given the severe economic recession gripping the U.S., this project -- with immediate and positive economic impacts -- can be particularly valuable to the local area economy. Long term, on-going, benefits will be from the 6 on-site jobs, local purchases by GRP, lease owner payments and tax/tax equivalent payments to the Coos County government resulting in an annual increase of \$4.3 million (or 0.4% of annual Coos gross product).

The construction jobs and direct employees of GRP created by this wind power project will be part of the growing green economy in New Hampshire and are expected to be high quality, paying 50% higher than the Coos County average annual wage. The wind power project provides the opportunity for growth and diversification in a local economy suffering from long term declines in manufacturing and major plant closures. The project is expected to create 355 indirect and induced jobs in the local economy during construction and 66 indirect and induced jobs upon project completion.

The Wausau closure in Coos County removed 7.5% of Coos County's total Gross Regional Product²⁶. While the GRP wind power project does not have the same economic impact as the Wausau plant, it does offer an opportunity to help a post-industrial economy reinvent itself.

²⁶ "Coos County Perspectives: The Groveton Mill Closures," New Hampshire Employment Security, State of New Hampshire, December 2007, Available online at <http://www.nh.gov/nhes/elmi/pdfzip/specialpub/CoosCounty3.pdf>

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