



# MAJOR ECONOMIC IMPACTS

of Utility-Scale Wind Projects in New York

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# An Assessment of the Major Economic Impacts of Utility-Scale Wind Projects in New York

## Executive Summary

A wind project will create and sustain many positive economic impacts, commencing during the development phase and continuing throughout the viable economic life of the project. In New York State the major economic impacts of such projects are likely to be in the range of \$9.71 to \$10.66 per MWh (nominal dollars)<sup>1</sup>.

The potential for New York State to capitalize on the economic effects associated with wind generation is considerable. In the queue at the New York Independent System Operator (NYISO) there are more than 46 wind projects vying for power grid interconnection rights with an aggregate annual production capacity of approximately 14,200,000 MWhs per year.<sup>2</sup> Assuming 30% of those projects are successful; NYS could stand to be the recipient of more than \$827,000,000 in economic benefits.<sup>3</sup>

## Introduction

In its September 24, 2004 order regarding the Retail Renewable Portfolio Standard (RPS), the New York State Public Service Commission (PSC) stated that one of the objectives of the RPS program was to afford New York State residents the economic benefits of attracting renewable resource generators to the state.<sup>4</sup> In an effort to shed light on that objective, this report will rely on nationally recognized studies, current NYS project activity, and past NYS project data to quantify a reasonable estimate of the major economic impacts that will likely result from the development, construction, and operation of in-state wind generation.

## Important Considerations

While many reports and studies conducted in the past have evaluated direct, indirect and induced economic impacts, this report will approximate only the major impacts such as capital infused into the economy and direct employment a result of large scale wind

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<sup>1</sup> This range does not include energy price suppression or economic activity associated with increased personal spending power of those affected by a project (multiplier effect). Preliminary figures indicate that the multiplier for direct spending in rural New York counties can approach 1.3

<sup>2</sup> Data calculated from the NYISO queue as of October 12, 2005 adjusted for an annual capacity rating of 30%

<sup>3</sup> Assumes the minimum economic life of a project (20 years) and \$9.71 per MWh in impacts

<sup>4</sup> Case 03-E-0188, September 24, 2004 Order Regarding Retail Renewable Portfolio Standard, pp. 23

power in New York State. This study will not quantify other impacts such as in-state natural gas and electricity price suppression or economic activity associated with increased personal spending power of those affected by a project. While many experts have concluded these impacts exist, this study will only recognize and discuss them.

It is also important to note that project specific differences can and do impact economic activity. Nevertheless, the figures mentioned in this report have been incorporated into an input/output EXCEL-based model capable of adjusting for project-specific variations. Specific input variables include:

- Number of turbines
- MW per turbine
- Operations and Maintenance (O&M) employees per MW
- O&M salary per year
- Land lease payments per MW per year
- Inflation rate
- Plant capacity rating
- Payment in Lieu of Taxes rate per MW per year (years 1-15 and years 16-20)
- Percent of construction employees in-state
- Construction employment hourly rate

Like any business development, a proposed wind project will create both economic and socioeconomic impacts. In considering whether to permit or support the development of a wind project, one should take into account all such impacts, not just those mentioned in this report.

## Methodology and Data

The Maple Ridge project sponsors provided NYSERDA with current construction costs and expenditures of phase I and phase IA of the project (231 MW) along with Payment in Lieu of Taxes (PILOT) figures, generalized landowner lease payment structures, and project-specific labor composition statistics. The Maple Ridge project is a two-phase project; in phase I, 120 turbines (198 MW) will be installed in 2005 and 20 turbines (32 MW) in 2006. Up to 60 additional turbines will be installed in 2006 during phase II, depending on funding and contracts. The initial 140 turbines involve leases with 61 landowners; the 60 additional turbines will require leases with another 17 landowners. As of December 10, 2005, phase I of the project is more than 90% complete.

Using the data from phase I and phase IA of the Maple Ridge project, we extrapolated the total likely impacts that will accrue to New York State and the affected locales upon full build-out (330 MW) and categorized each major economic impact. A summary of the major categories can be found below:

- Wind data acquisition & analysis, project permitting and engineering

- Land acquisition activities
- Community outreach and marketing
- Local spending on food, services, fuel, lodging, etc. by non-NY workers
- Regional/In-state construction wages
- Regional/In-state spending on construction materials
- Increased commerce activity
- Operations and Maintenance employment (O&M)
- Property tax-related payments to municipalities
- Landowner revenue

To verify information in this report, we spoke directly with some of those parties affected by the project. For example, phone interviews were conducted with the Lewis County Manager, Port of Oswego staff and various local/regional business representatives. Numerous subject area studies and reports were reviewed to validate the assumptions and results found in this report. Specific references can be found at the end of this report.

To arrive at the \$9.71 to \$10.66 per MWh range, we calculated the total nominal economic impacts of the Maple Ridge wind project using a 24-year analysis period; consisting of a two-year development period, a two-year construction period, and a twenty-year operating period. In calculating total landowner revenue and the wages from operations and maintenance, a 3% rate for inflation was applied to each.

Finally, a unitized value on a dollar per MWh basis was derived by dividing the total calculated nominal economic impacts by the estimated 20 year total MWh production of the Maple Ridge project.<sup>5</sup>

*Scalability of the Figures*

Only some economies of scale are lost as projects decrease in size. For example, a 50 MW plant will most likely pay more per unit (ton, yard etc.) for stone and other materials than a project requiring four times (200 MW) that amount of materials. For this reason we believe the \$9.71 to \$10.66 range would be a conservative estimate for projects ranging in size from 50 MW up to 350 MW.

**Assumptions**

- 67% NY-based construction labor
- \$5,100 per MW per year in PILOT property taxes (Y1-Y15)
- \$10,000-\$20,000 per MW per year in post-PILOT property taxes (Y16-Y20)
- \$4,000 per MW per year in land lease revenue
- \$40,000 per year in salary and benefits for operations & maintenance employees
- 20-year production analysis period (minimum useful life of facility)

<sup>5</sup> For analysis purposes, we lowered the actual Maple capacity factor of 32% to 30% which is expected to be the average of a NY-based project.

- 3% annual inflation rate applied to land lease revenue
- 3% annual escalation applied to Operations & Maintenance salaries & benefits
- \$15 per hr. construction employment hourly rate<sup>6</sup>
- 6.79 construction man-hours per MW of installed capacity
- 30% generator capacity rating

## Short Term Economic Impacts

### *Development Activity*

During the early stages of project development, when a site area is being evaluated for suitability, many economic development impacts are created. Typical development expenses include those associated with land lease option payments (e.g., payments for local legal services and the right to use property), wind measurement tower erection, wind data analyses, preliminary environment assessments, and local public outreach and education. In addition to the direct capital infusion associated with the aforementioned site assessment activities, the local community benefits from increased spending on local services such as food, lodging, and fuel by project sponsors. In aggregate, economic activity related to site assessment/pre-development efforts equates to approximately \$.36 per MWh.

### *Construction-Related Employment and Jobs*

To the extent that a locale has sufficient trade and labor resources to support the construction of a wind farm, a significant portion of the workers required can be local and/or in-state. Upstate New York has proven to be rich in skilled labor capable of supporting the construction of a wind project. For example, approximately 200 (67%) of the 300 construction workers involved in phase I of the Maple Ridge project are from in or around Lewis County, New York. It is expected that this composition will remain the same through phase II of the project and for similar projects yet to be built.

To the extent that wind turbine components continue to be manufactured outside of New York, the locale or state can expect to capitalize on increased vessel activity associated with shipping and transporting the components from the manufacturer to the construction site. This commerce activity will employ New York-based longshoreman, truckers, and riggers. For example, James Cloonan of the Port of Oswego stated that the Maple Ridge project has contributed to the employment of 70-75 union longshoreman and 6-10 part-time workers. For the first six months of construction, the port has had an increase in payroll of approximately \$500,000 and is expecting total incremental payroll to exceed \$1,100,000 upon full build-out of the project.<sup>7</sup>

Total NYS-based construction-related employment accounts for approximately \$.45 per MWh.

<sup>6</sup> Source: NYS Department of Labor construction industry profile, Lewis County, NY

<sup>7</sup> October 12, 2005 phone interview with James Cloonan of the Port of Oswego.

*Spending on Local Services and Construction Materials*

Total spending on local services and construction materials accounts for approximately \$3.05 per MWh of the total economic impacts a wind farm can create. This includes spending on locally sourced construction materials such as gravel, concrete, wood, steel rebar, cabling and various other materials. Besides receiving the benefits of spending on materials, locales can benefit from increased economic activity associated with spending on services such as housing, food, fuel, banking and other related services by non-NY workers and employees. By way of example, the 100 non-NY workers on the Maple Ridge project are being housed in regional hotels, inns, and motels. This housing activity alone is estimated to be approximately \$1,400,000 over the course of the construction period.<sup>8</sup>

*Other Short-Term Economic Impacts*

Other economic impacts that are likely to accrue to New York State and/or its locales are derived from land acquisition/use activities by project sponsors. In most cases, during project development, project sponsors provide landowners with payments on the option to enter into land lease agreements at a later date. In addition, project sponsors must pay non-participating landowners whose land will be affected by transmission lines, roads or other project infrastructure with easement payments, or in some cases purchase the land outright. In sum, these economic impacts are approximately \$.38 per MWh.

**Long-Term Economic Impacts**

*Landowner Revenue*

Because wind turbines and access roads only occupy 4% or less of the land area required of a wind project, the previous use of the land (e.g., farming, ranching) typically continues. The continued use of the land essentially creates a “no-cost” option for the landowner to receive additional revenues.

Over the course of a 20-year operational period, landowner revenue is one of the largest components of the economic impacts associated with wind development, accounting for 21% of the total economic impacts or approximately \$2.04 per MWh. Typical land lease arrangements are structured such that a landowner will receive approximately \$4,000 per MW, per year, with an annual adjustment for inflation. This figure was confirmed by the National Renewable Energy Laboratory (NREL) study completed by S. Tegen in August 2005, as referenced at the end of this report as well as direct conversations with various project developers.

*Property Taxes*

Compared to other sources of generation (oil, natural gas, nuclear, etc.), a wind project’s demand for municipal service such as water, sewer, telephone or other services is de minimis. As a result, they offer an almost no-cost revenue source to the local taxing

<sup>8</sup> 14-month construction period x 20 nights per month x 100 workers x \$50/night average rate

jurisdictions. In most cases this revenue is significant compared to other local revenue sources.

In New York, the most common property tax payment relationship between a project owner and the affected taxing jurisdictions (i.e., County, city, town, village, school district) is a contracted Payment in Lieu of Taxes (PILOT). A PILOT is generally used as a tool by local taxing jurisdictions to incent a developer’s interest in a certain area and is most often negotiated at a rate well below full assessment values. A common PILOT structure is an annual payment per MW of installed capacity for a contract term of up to 15 years. Specific guidelines for determining the level of PILOT payments do not exist except for the provision that the payments may not exceed what would have been owed had the equipment been assessed under ordinary tax provisions.

Local taxing jurisdictions have limited wind energy projects from paying certain local taxes to induce the development and the economic diversity of their local economies. For example, based on information from Madison County, New York, PILOT rates for the Fenner and Madison projects have averaged approximately \$5,100 per MW, per year. It is expected that as these discounted PILOT arrangements expire, property tax liability will increase. The NYS Office of Real Property Services (ORPS) is currently developing a wind generation assessment model that could possibly be used to estimate future market values of wind assets. After discussions with ORPS, NYSERDA staff has replicated that preliminary model and estimate that after 15 years, property tax values could be in the range of \$10,000/MW to \$20,000/MW.<sup>9</sup>

Applying the PILOT rate of \$5,100/MW for years 1-15 and the post-PILOT assumption range of \$10,000 to \$20,000/MW for years 16-20, the property tax impact is likely to be \$2.41 to \$3.36 per MWh.

*Operations and Maintenance Employment*

The number of people employed by a wind project during commercial operation depends primarily on the project size. Small projects of less than 25 MW are generally remotely operated and bring in maintenance personnel only when maintenance is schedule or required. Larger projects will have full-time staff, the size of which depends on the turbine type, project size and local labor practices. A 300 MW wind farm is expected to require about 12 to 18 full-time employees to operate and maintain the facility.

Most of the skills required for these positions are usually commonplace in farming communities so local/regional workers are usually hired and trained to fill them. For example, the Maple Ridge project owners plan on employing approximately 15 full-time NYS-based operations and maintenance employees at full build-out, consistent with Larry Flowers and Marguerite Kelly’s figures presented at the May 18, 2005 Wind Power

<sup>9</sup> Assumes the asset is in “good” condition with 60% depreciation and an average taxing jurisdiction rate of 2.6%.

conference and the Department of Energy's Jobs and Economic Development Impact Model (JEDI).

Using the Maple Ridge figures of 15 full-time employees, operations and maintenance employment is likely to be approximately \$1.02 per MWh.

## Other Impacts

The IMPLAN macroeconomic input-output model was used to estimate the “multiplier” or “ripple” effects which could be caused by constructing wind turbines in Lewis County, New York. This model captures the complex interdependencies within the New York State economy. Preliminary modeling results show that a direct investment of \$1 million in turbine construction could result in approximately \$1.3 million in total increased economic output in Lewis County. This suggests a macroeconomic multiplier of approximately 1.3 for the construction category.

There are three components to the “multiplier” or “ripple” effects. The direct effects are the changes in sales, income, and employment in a particular industry where the initial increase in demand occurs. The indirect effects are the changes in sales, income, and employment from the inter-industry purchases as other industries respond to the new demands from the industry whose output is increased initially. The induced effects reflect the changes in sales, income, and employment due to increased consumption by households as their income increases with changes in production. The total economic impact on sales, income, or employment, is the sum of these three separate effects.

A more detailed macroeconomic analysis may be completed in the future that will assess the full impacts of wind activity including those discussed in this report and:

- Economic activity from the multiplier effect
- Quantity of electricity displacement
- Locational electricity and natural gas price suppression
- Total cost savings due to gas and oil consumption reduction
- Natural gas capacity impacts

## Conclusion

Without taking into account energy price suppression or jobs and income created by the multiplier effect, the major economic impacts of a wind project in New York State are likely to be in the range of \$9.71 to \$10.66 per MWh (nominal dollars). This is on the basis of:

- a) Maple Ridge project data;
- b) Other NYS project data;

- c) Reviews of nationally recognized studies and reports; and
- d) DOE's JEDI model

The resulting local and state benefits from a NY based wind farm appear higher when compared to wind farms in western parts of the country for several reasons: (a) higher land values in NYS result in higher land lease payments, (b) smaller parcel size means greater number of landowner negotiations, (c) higher property taxes, (d) more complex permitting requirements, (e) more dense population often results in land-use conflicts and project opposition, (f) stricter labor requirements for construction activity in NYS, and (g) engineering and construction considerations that are unique to building a wind farm in the Northeast topographical environment.

## References

1. Tegen, S.; *Comparing Statewide Economic Impacts of New Generations from Wind, Coal, and Natural Gas in Arizona, Colorado, and Michigan*. National Renewable Energy Laboratory August 2005. <http://www.nrel.gov/docs/fy05osti/38154.pdf>
2. *Property Tax Exemption for Wind Power, Projects and Payments-in-lieu-of-Taxes*; A Part of the NYSERDA Wind Energy Toolkit, August 2005. <http://www.powernaturally.org/Programs/Wind/toolkit/propertytaxexemptions.pdf>
3. *Wind Energy for Rural Economic Development*; Report by the U.S. Department of Energy; <http://www.nrel.gov/docs/fy04osti/33590.pdf>
4. *Energizing the Future: The Benefits of Renewable Energy for New York State*; Report 12-2005 completed March of 2005; NYS Office of the State Comptroller; <http://www.osc.state.ny.us/osdc/renewableenergy.pdf>
5. United States Department of Energy's Jobs and Economic Development Impacts (JEDI) model found at [http://www.eere.energy.gov/windandhydro/windpoweringamerica/docs/jedi\\_wind\\_model\\_100604.xls](http://www.eere.energy.gov/windandhydro/windpoweringamerica/docs/jedi_wind_model_100604.xls)
6. Flowers, Larry & Kelly, Marguerite of the national Renewable Energy Laboratory (NREL). May 18, 2005 presentation at Wind Power 2005 conference, Denver, CO

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