

WindAction Editorial

New York wind: Much ado for so little

(Posted May 9, 2011)

The United Kingdom has long been regarded as having the best wind resource in Europe.

A [2005 analysis](#) of hourly wind speeds collected from sixty-six locations across the UK, identified three characteristics of the wind resource that proponents rely on to justify an expansive build-out of wind energy facilities.

The study concluded that over a 35-year period from 1970 to 2005, there was never a time when the entire country was without wind, the wind always blew enough to generate electricity somewhere in Britain and that the resource tended to blow more strongly when demand was highest, during the day and winter months. The analysis found that wind would operate at an annual average capacity factor of 27% -- above levels found in Germany and Denmark -- and low wind speeds affecting most of the country (90%) would only occur for one hour every five years.

Last month, the 2005 study was put to the test.

The United Kingdom's leading wild land conservation charity, the John Muir Trust, [released a report](#) that examined wind power's actual contribution to the UK's energy supply. The findings, based on real-time energy production, were sobering. Wind generated at substantially below the 27% capacity factor and low wind events (defined as output falling below 10% of capacity) occurred over one third of the time, or almost nine months in aggregate.

The report created a firestorm for those tracking wind development. Legislators and energy policy experts immediately questioned whether the same reality existed in their area. Since preconstruction forecasts for wind power performance are based on wind speed data, what if the modeling overstated actual generation?

New York wind follows the UK's lead

In fact, we need only look to New York State to see an identical story line.

In 2005, the New York State Energy Research And Development Authority (NYSERDA) worked with General Electric to [release a study](#) aimed at assessing the impact of large-scale wind generation on the reliability of the State's bulk power system and to understand the operational and economic effects of deploying 3,300 megawatts of wind (10% of New York's peak load).

The study concluded that New York could support a 10% penetration of wind into its grid system with turbines reliably operating at 30% average capacity factor or better. To its credit, NYSERDA acknowledged that most of the high wind output would occur during nighttime hours with some overlap occurring "late in the day when the wind output is picking up before the loads have fully dropped off."

Several years of wind generation data are now available and we took a look at how well NYSERDA and GE predicted output levels. We were particularly interested in project performance after developers had a year or more to address start-up issues.

By the end of 2010, New York State claimed fifteen wind energy facilities totaling an installed capacity of 1,275 megawatts. The projects are geographically distributed in the northern and western regions of the State but typically away from denser population centers including New York City with the highest demand for electricity.

Twelve of the fifteen projects comprise the bulk of the nameplate capacity (1225 megawatts). These facilities went into service in the years between 2006 and February 2009. Less than 50 megawatts of wind was installed prior to 2006. Since early 2009, wind development in the State has been largely stagnant with only one wind project built in the last two years. Iberdrola's 74 megawatt Hardscrabble project went online in February 2011.

The lull in construction has provided a valuable opportunity to evaluate two full years of wind generation and to assess whether the promises of New York wind have been realized.

The below table, prepared using the [New York ISO's Gold Book data](#), provides an important glimpse at wind performance in New York in the years 2008-2010.

Noble Environmental's projects produced at even lower levels. When the company sought community acceptance of its projects in upstate New York, John Quirke, an officer and founder of Noble, insisted their projects would operate at 30-35% of their nameplate capacity. In the tax agreement signed with Clinton County, New York, Noble went so far as to sweetened the deal by offering to pay a bonus of \$1000/MW every time the annual capacity factor of any of their projects exceeded 35%. Clinton County officials had no way to verify the *sincerity* of Noble's offer since preconstruction wind data was confidential, but Noble certainly knew the truth. Noble's upstate projects operated with a 20% to 22% capacity factor in 2010.

Wind forecasts and project financing

When determining whether a wind energy project is worth the financial risk, a credit analysis is prepared based on conservative wind production. This production amount, known as the annual energy yield prediction, represents the average wind speed forecast for a project with a 90% confidence (P90). In other words, the wind production level that the project is expected to operate at 90% of the time.

The P90 figure needs to be within 12% to 15% of the average production figures in order to catch a bank's attention. If the difference between the average capacity factor (P50) and P90 is off by 20% or better, a project would be considered 'unfinanceable'. We can't know the P90 figures presented to investors for most of New York's wind projects, but our guess is that most of these projects would have been considered unworthy had actual production numbers been available. We'd be interested in knowing whether those who fronted the money for the projects would bother again.

Meeting the public's goals

NY ratepayers who are subsidizing wind development in the State are also receiving considerably less than promised. Square miles of New York's most rural areas have been transformed into industrial power plants, communities and families are split over project opposition, and homeowners have been driven from their homes due to turbine noise, shadow flicker and other nuisances. If tax revenue agreements with communities were negotiated based on inflated capacity factors, actual payments will be lower.

State and local officials have long encouraged wind as an economic development tool for rural areas, but at some point the public needs to know whether the projects are delivering on the primary plan i.e. to see more renewable energy on the grid. At capacity factors in the low- to mid- 20% range, many more wind turbines and related infrastructure (transmission) will be needed to meet State mandates which will increase costs and impacts.

Our review only looked at average annual capacity factors and did not consider the hourly and daily variability of the resource and whether the wind helped meet peak demand needs. But looking at average performance alone is enough to suggest New York's wind is not worth all the fuss.