Wind Farm Valuation Issues for Ad Valorem Taxation Purposes

P. Barton DeLacy

The efficient production and distribution of electric power has to overcome an increasingly complex marketplace where public policy and economic reality often conflict. In this challenging environment, utility-scale wind farms have proliferated across the American landscape. The fuel to operate commercial wind farms (i.e., the wind) is free. Nonetheless, the capital to build the commercial wind farm is not free. As the wind energy industry matures and the incentives relied on to develop wind farms evaporate, this discussion considers the market value of such commercial wind farms. In particular, this discussion considers whether commercial wind farms are fairly assessed by state and local property authorities. This discussion explores the implications of how wind farms are project-financed. And, this discussion considers two questions that relate directly to ad valorem property tax assessment: (1) But for the economic inconsistencies of production or investment tax credits, most wind farm projects would not be built. Therefore, do these tax credits increase the market value of the wind farms? Or, are the tax incentives a form of economic obsolescence in the wind farm property tax assessment? (2) The relative productivity of a wind farm is a function of its nameplate electric generation capacity, and the “net capacity factor” measures the efficiency of the wind farm electric generation. Does the latter metric (i.e., net capacity factor) serve as a measure of functional obsolescence in the wind farm property tax assessment? These valuation issues are currently being considered in the matter of Lost Creek Wind LLC v. DeKalb County Assessor pending before the State Tax Commission and the Circuit Court of Missouri.

INTRODUCTION

The modern high-tech 80-meter tall wind turbine owes its function and design to the iconic windmills of Holland. Of course, one important difference is that the modern wind turbine harnesses wind to generate electricity and not to grind grain. The economics of the wind energy industry, as with the production of any commodity, are a function of the amount of capital expenditure and cost of the capital resource.

First, this discussion considers the growth of the wind energy industry and considers its regulatory and other challenges in the coming years. Second, this discussion considers the market value of these wind farm projects within the context of a state and local ad valorem taxation assessment.

In practical terms, wind turbines share characteristics of both real estate and tangible personal property. The turbine tower, constructed of steel sections that are bolted together, is permanently attached to a reinforced concrete foundation. That foundation is poured, beginning 10 feet below grade.

The turbine blades are typically made of composite material and attached to a nacelle atop the 350-foot towers. The nacelle, the size of a boxcar, houses the generator and other necessary mechanical apparatus.
Wind farm developments are often funded through project financing. The anticipated revenue stream from sale of the electricity is used to service the debt principal and interest. However, the amount of project financing rarely covers the total wind farm installation costs. The difference in capital requirements, often up to a third of the total construction cost, is usually made up by some incentive tax credit.

As an operating business enterprise, the market value of any particular wind farm is influenced by the following economic considerations:

- The available investment incentives (to overcome the relatively high construction capital costs)
- The quality of the wind resource in any particular geographic location
- The proximity, availability, and cost to connect to the local power transmission grid
- The amount of revenue expected to be generated by the power purchase agreement (PPA) to an off-loading entity (typically, a particular user or an electricity distributor)

Other economic variables, such as the efficiency of the turbine “machines” and the quantity of electricity generated, are reflected in “net capacity factors” (NCF). Curtailment, caused by either wind turbine downtime for repair or grid capacity constraints, varies by location. Curtailment varies due to the age, design, and performance of individual turbines.

While analysts may develop a formula, or model, to uniformly assess wind-generating facilities, the actual value assessment should be made on a case-by-case basis, much like any other uniquely located real estate parcel.

**AD VALOREM TAXATION VALUATION ISSUES**

This discussion considers the market value of the installed wind farm turbines and what should be the appropriate ad valorem assessment, given project costs, risks, potential revenue, and public policy.

Wind farms are typically appraised on a unit valuation basis. That is, the appraisal includes the value contributions from all asset classes including real estate, tangible personal property, and intangible personal property. Most assessing jurisdictions are limited to assessing only tangible assets (i.e., real estate or tangible personal property). This is because intangible asset value is typically taxed as some form as income.

The metrics of wind energy count the installed “nameplate” power capacity as the best measure of market penetration. This wind turbine power capacity is typically expressed in terms of multiple megawatts (MW), a common unit of energy. Currently, the United States has approximately 60,000 MW (60 gigawatts—or GW) of installed wind power, from Alaska and Hawaii to Maine and south to Texas. It is noteworthy that there are virtually no significant wind installations east of Texas and south of Tennessee. The physical wind resource is simply not very good in the humid southeastern United States.

For perspective, let’s consider that the average wind turbine installed today is rated at between 1.0 and 2.0 MW. Accordingly, there are currently at least 50,000 wind turbines operating at that capacity across the United States. Nonetheless, wind energy accounts for less than 2 percent of all the electrical power generated in the United States.

One could compare a large 250 MW wind farm (e.g., 150+ wind turbines spread over 30,000 acres) with a small 500 MW coal-fired electric generation plant. The electric generation plant may be sited on as few as 10 acres plus a cooling pond. The nameplate capacity suggests the coal plant could barely double the output of the wind farm; in fact, the wind farm would produce far less. Wind blows intermittently and at inconsistent velocity. If the coal-fired electric generation plant has fuel to burn, then it can generate electricity 24/7.

In general, a wind energy power plant (referred to as “utility scale” and typically having sufficient turbines to produce 10 MW or more power) will generate its nameplate capacity 30 to 35 percent of the time. For coal that number is closer to 90 percent. Coal-fired units are only curtailed periodically for servicing. Natural gas “peaker” units, much more
compact and efficient, can be brought online at the flick of a switch.

**THE ADVANCE OF WIND: THE PANACEA FOR RENEWABLE ENERGY?**

Environmental considerations aside, two economic facts generally affect energy policy in the United States:

1. The United States leads the world in energy consumption.
2. The United States is perceived as no longer able to be self-sufficient in meeting our needs.

Our energy policy assumes that energy consumption will only increase over time. Reliance on fossil fuels creates climate concerns and leaves the United States hostage to the vagaries of world oil markets. This energy policy paradigm has been challenged lately by the unforeseen success with industrial gas drilling (hydraulic fracturing or “fracking”).

Fracking promises to unlock natural gas and oil reserves contained in the extensive subterranean shales that underpin much of the North American continent. Abundant shale gas could help the United States to achieve energy independence. Under some scenarios, shale gas could undermine policies supporting subsidies to renewable energy interests.

The issue of government subsidies for energy production is controversial. Observers can argue that all energy resource development has benefited from some form of subsidy. From oil depletion allowances to Depression-era dam-building projects, the federal government has helped fund the building of the U.S. energy infrastructure.

But for enabling federal and state policies, most wind projects would not have been built. Exhibit 1 summarizes the consistent increase in installed energy capacity, driven by two critical incentives:

1. Production tax credits (PTC)
2. State by state renewables portfolio standards

These tax incentives are discussed below.

Exhibit 1 presents two facts: (1) in 2002 and 2004, the annual year-over-year installed energy capacity decreased and (2) virtually no energy capacity was added in 2013. In all three years, the incentivizing tax credit expired. So, in 2012, the wind energy industry suffered a near-death experience, when the U.S. Congress renewed the PTC program only at the last minute and only for one year. Energy industry advocates have long lobbied for a permanent entitlement to better sustain the wind energy business and its domestic supply chain for components and parts.

The American Wind Energy Association (AWEA) explains that the late extension of the PTC and the historic levels of installation during the 2012 fourth quarter led to the anemic levels of turbine installations to date in 2013.

However, the DOE through its Energy Information Administration (EIA) estimates that U.S. wind capacity will increase by 8.8 percent in 2014 to about 66 GW by the end of 2014. Capacity is projected to
increase a further 14.6 percent to total more than 75 GW at the end of 2015. Wind electric generation is projected to increase by 2.2 percent in 2014 and by 11.4 percent in 2015, contributing more than 5 percent of total U.S. electricity generation by the end of 2015.

Given these projections, the current controversies and debate over the appropriate taxation of these power plants are not likely to abate any time soon.

**The Ad Valorem Taxation of “Big” Wind**

Although the first utility-scale wind farms date to the 1970s in Southern California, the proliferation nationwide did not commence until the present century. As with other nascent industries responding to shifting public policies, the “big” wind industry looked to incentives as much as the resource.

Often seen as an economic boon to sparsely populated rural counties, the issue of how wind farms are to be taxed has evolved ad hoc. Wind farm development provides short-term construction jobs, sales and use taxes, but limited long-term employment. Therefore, local governments and school districts covet potential contributions to the property tax base.

As with rural zoning codes, wind farms were not foreseen by most taxing jurisdictions. Many rural planning commissions legislated variances or exceptions to allow electric power generation in farm and pastureland. In addition, taxing jurisdictions had to decide if a wind turbine was some type of farm implement or an industrial power plant.

State and local ad valorem assessment practices have yet to converge on any uniform treatment. One resource describing this variance is the Database of State Incentives for Renewable Energy (DSIRE) maintained by the EIA. DSIRE inventories the 41 states and Puerto Rico where renewable energy incentives have been put in place.

Across the 35 states where utility-scale wind farms (defined as over 10 MW in size) are installed, ad valorem valuation practice ranges from complete exemption to replacement cost new less depreciation (RCNLD). It is noteworthy that wind farms have two unique characteristics:

1. The land they occupy is often leased, not owned outright. Lease terms may vary and include a fixed payment rate, a royalty-type percentage of output from the turbine, or a combination of the two lease payment procedures.

2. The wind turbine is properly characterized as tangible personal property, bolted to its reinforced concrete base and thereby secured to the ground.

Some jurisdictions merely tax the increment in value created by the land lease, particularly in jurisdictions where personal property is not assessed. Other jurisdictions have deferred the ad valorem issue by accepting payments in lieu of taxes (PILOTs). Seldom has the issue been dealt with legislatively.

The following overview of some state assessment practices illustrates this variability.

- In Pennsylvania, for instance, nonrealty assets are not subject to property taxation. A 2006 statute classifies towers, blades, nacelles and all transmission infrastructure as nonrealty. Only the concrete base and the road improvements are subject to replacement-cost-based property tax valuation. Leased land is valued using an income approach, if comparable land sales are not available.

- California, Washington, and Oregon tax both real and personal property and provide no special tax incentives for wind farms. Oregon and California, however, do incentivize distributed renewable energy, where the power produced is consumed on site rather than merely uploaded to the grid.

- Colorado exempts electric generation facilities under 2.0 MW in nameplate capacity, but otherwise applies a template that factors in nameplate rating and the net capacity factor (NCF) to calculate assessed values. Importantly, the Colorado property tax assessment rates are tied to the relative productivity of utility scale wind farms as electric power generators.

- Other states, such as New York, accept so-called PILOTs from developers in exchange for go-forward exemptions limited to a period of years. Otherwise, New York has a 15-year exemption period for property taxes on renewable energy installations. Oklahoma has a five-year exemption period.

- In New York and Pennsylvania, modest income from turbine land leases offsets unrelated declines in small dairies, making small 200–300 acre landholdings marginally sustainable. Township and county assessing authorities in poor taxing districts have been reluctant to discourage wind development by being too aggressive on taxes.
Finally, some states, like Illinois, reached a legislative solution. Prior to 2007, wind energy devices generating electricity for commercial sale were assessed differently depending on where they were located. Some counties assessed the entire turbine structure (tower plus generation equipment) as “real property,” subject to taxation, while other counties assessed only the tower portion as taxable property. This difference varied from county to county, creating different tax loads and complicating wind farm projects that crossed county lines.

Today, the statutory “market value” of a wind farm in Illinois is based on approximately $360,000 per MW, about one-third the total installed cost. A formula is then applied to that “market value” to calculate the assessed value.

The contribution of industrial utility-scale wind projects to local economies is mixed. For example, the property tax receipts in Sherman County, Oregon, a remote wind-swept jurisdiction of 1,800 people in the Columbia River Gorge, have reaped tens of millions of dollars for local governments, a literal “windfall.” The balance between enrichment and the perceived degradation of scenic landscapes varies with population density and the proximity of wind farm to urban area.

Notwithstanding the variable socioeconomic political environment of a particular state, analysts should be ready to advise assessment authorities on best practices for valuing this complex land improvement.

**Application of the Three Valuation Approaches to “Big” Wind**

This section considers the application of each of the generally accepted property valuation approaches. Most assessing authorities will likely rely on the cost approach. As with any special purpose facility (where it may be difficult to demonstrate a discrete property market), assessors either consider actual construction costs or defer to construction cost services like the *Marshall Valuation Service*.

**The Income Approach**

Most utility-scale wind developments are project-financed. This means that lenders associate the debt repayment to the anticipated revenues to be generated by a PPA. The financial model is essentially a discounted cash flow analysis where the project revenue is projected based on wind studies, the efficiencies of the installed turbines, and the price paid for the power to be off-loaded to the grid. This is a business enterprise valuation model, with no relation to the wind farm real estate except for the land lease (an incidental operating cost).

Property tax assessors often assess the land separately, in part because another party typically owns it in fee.

Wind farm net cash flow is discounted to present value at a rate that reflects the minimal return required by utilities for capital investments, plus any surcharge for additional risk. However, this method should not be used by assessing authorities. This is because this method encompasses multiple asset classes, thus functioning as a business enterprise valuation.

The PPA, which drives the wind farm value, is an intangible asset, typically ineligible for ad valorem taxation. While the PPA is modeled like a net lease, it is tied to electricity output and the price of that commodity. The PPA income is not the same as passive rent earned when vacant space is occupied at market rents.
The Sales Comparison Approach

Wind farms do occasionally sell. However, those sales transactions are at the enterprise level, without a clear allocation of value to the tangible asset classes involved. Therefore, the cost approach is often the default wind farm valuation method for taxing authorities. Further, as discussed below, obsolescence analyses can be used to reflect some of the unique attributes of operating wind farms.

The Cost Approach

Whenever transactional market data are limited, assessing authorities typically look to a cost approach analysis to estimate ad valorem market value. In essence, the cost approach is comprised of two components: (1) the market value of the land, as if vacant and (2) the depreciated replacement cost of the improvements.

This valuation method is appropriate for special use properties where use value can approach market value if the case can be made for a viable enterprise within a stable or growing industry.

First, the cost approach analysis starts with replacement cost new or actual costs (if available). Replacement cost new is the estimated cost to construct as of the effective date of value, a substitute, using contemporary materials, standards, design and layout.4

Component costs can be volatile so the analyst should consider construction costs as of the valuation date. Costs may actually decrease as the supply chain mobilizes to serve demand.

Actual construction costs are typically based on an engineering, procurement, and construction contract (EPC) where the contractor designs the installation, procures necessary components and builds the project. Exhibit 2 presents how replacement cost new may be evaluated on a per installed turbine basis.

These costs can then be applied to the entire wind farm project. Exhibit 3 assumes 100 1.50 MW turbines.

These costs include labor, materials, supervision, contractor’s profit and overhead, architect’s plans and specifications, sales taxes, and insurance.

The overall cost per megawatt is a significant indicator here. When compared with the costs to install alternate means of conventional thermal power, wind has typically had a higher installed cost per megawatt of nameplate capacity. When the NCF is included, the up-front cost differential becomes material.

Conventional combined natural gas-fired turbines can cost less than $1,000,000 per MW installed (compared to over $1.5 million per MW for a wind turbine in this example). Natural gas powered turbines have a much higher NCF. This means they can be efficiently operated close to 90 percent of the time, where even the best wind farms struggle to have an NCF over 40 percent.

However, even with the price of natural gas promising to stay low, the wind is free.

The EIA has published a comparison of total system levelized costs that calculates overall costs on a per kilowatt-hour (kWh) basis over an expected 30 year financial cycle and “duty” life of a power plant. This model surcharges coal for creating greenhouse gas externalities and takes into account the relative low fuel costs for wind and solar power. Recent EIA projections are presented in Exhibit 4.

These costs are projected five years out and vary regionally. These projections emphasize the relative economy of wind over time and may not account for sustained low natural gas pricing.

The fact remains that, as of 2014, capital costs for wind development in the United States exceed the present value of the wind farms’ revenue, at an acceptable rate of return. Therefore, wind farm development depends on tax credits and/or on other incentives to help overcome wind’s relative high capital costs. This fact leads to discussion of what

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**Exhibit 2**  
Replacement Cost New

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 MW Turbine cost</td>
<td>$1,700,000</td>
</tr>
<tr>
<td>Installation (per EPC contract)</td>
<td>$510,000</td>
</tr>
<tr>
<td>Soft Costs</td>
<td>$102,000</td>
</tr>
<tr>
<td>Total installed cost/turbine</td>
<td>$2,312,000</td>
</tr>
<tr>
<td>Installed cost/MW</td>
<td>$1,541,333</td>
</tr>
</tbody>
</table>

**Exhibit 3**  
Project Cost Assuming 100 1.50 MW Turbines

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Turbines</td>
<td>100</td>
</tr>
<tr>
<td>Nameplate Rating</td>
<td>1.50 MW</td>
</tr>
<tr>
<td>System Peak Rating (A x B)</td>
<td>150 MW</td>
</tr>
<tr>
<td>Total installed cost/turbine</td>
<td>$2,312,000</td>
</tr>
<tr>
<td>Number of Turbines</td>
<td>100</td>
</tr>
<tr>
<td>Total Project Cost (C x D)</td>
<td>$231,200,000</td>
</tr>
</tbody>
</table>
forms of obsolescence, whether functional and economic, should be applied in a cost approach analysis for ad valorem assessment purposes.

Depreciation Concepts
An important consideration in appealing or modifying the assessor’s wind farm cost estimates is the careful application of depreciation concepts. Application of a cost approach analysis contemplates application of three types of depreciation:

1. Physical deterioration
2. Economic obsolescence
3. Functional obsolescence

Assuming the absence of any incurable defect, most assessors acknowledge a simple straight-line age-life method for physical depreciation. Alternatively, they rely on a published construction cost service or other depreciation conventions.

In the common application of the age-life method, the cost to cure certain curable items (physical and functional) is known and can be deducted before the age-life ratio is applied. This process mirrors what typical purchasers consider as part of the investment decision. Once processed, incurable items (physical and functional) can be estimated via the age-life ratio.

In the case of the wind turbines, the analyst may simply divide their actual age into a 20- to 25-year life. Most wind farms have been installed within the past decade, and the industry lacks data substantiating a longer economic or physical life at this time.

The application of economic and functional obsolescence to the replacement cost new helps bring wind farm assessments into line with other means of conventional power generation. As noted above, installation costs for a wind farm, based on the electric power it generates, are significantly higher than gas-fired alternatives.

The Case for External Obsolescence
External obsolescence is the adverse effect on value resulting from influences outside the property. External obsolescence may be the result of lagging rental rates, high inflation, excessive construction costs, restricted access, the lack of an adequate labor force, changing land use patterns and market conditions, or proximity to an objectionable use or condition. The necessity of a significant tax credit to make a wind farm a viable investment constitutes an externality qualifying as economic obsolescence.

This means the high capital costs to develop wind power capacity can cancel out the benefits to investors, except for financial incentives like production or investment tax credits. The AWEA and the DOE have shown that wind farm development falls off as these credits expire. Our cost model shows that the need for up-front capital incentives should be treated as economic obsolescence. The present value of such tax credits can amount to 30 to 35 percent of total project cost.

It can be argued that but for the PTCs, most U.S. wind projects would not be built. In fact, as AWEA predicted, wind farm development has once again stalled, as it has in the past, because of continued uncertainty over PTC incentives. The incentives were extended through 2013, but are once again in limbo. Hence, this necessary supplement represents a form of inverse economic obsolescence. If the PTC goes away, many planned wind farms will stay on the drawing board pending some other form of subsidy or change in the economics of electric power generation.

An analogous situation is the treatment of low-income housing tax credits (LIHTC), a federal...
subsidy also referred to as Section 42 credits, referencing the applicable section in the Internal Revenue Code. Many (though not all) taxing jurisdictions exempt or deduct tax credits from ad valorem assessments.

The tax credits, created under the Tax Reform Act of 1986, were intended to incentivize private investment in affordable housing. Typically, the all-in cost to deliver qualifying units exceeds any capitalized market value based on net income after allowing for restricted rents. The owner’s value falls well below the cost to build.

While selling tax credits to qualifying investors can make up the difference in construction cost, those benefits cannot be passed on to the next buyer. The argument goes, ad valorem property taxes should be based on an income approach. The amount of the tax credit subsidy would be deducted from any replacement cost estimate to reconcile with the lower net value projected by the income approach (without the subsidies).

In the case of a utility-scale wind farm, we would deduct the outright subsidies offered by the production tax credit as a type of economic obsolescence peculiar to the incentives provided to developers to build renewable energy generation.

Functional Obsolescence

According to the Appraisal Institute, functional obsolescence can be caused by changes in market conditions that have made some aspect of a structure, material or design obsolete by current market standards. Functional obsolescence may also be curable or incurable.

To be curable, the cost to correct the deficiency must be equal to or less than the anticipated increase in value. We discussed the NCF as a relative measure of wind farm efficiency. It is a particularly useful metric to compare the efficiency of one type of power generator with another. Since the price of the electricity derived from wind farm operations is predicated on the cost of alternate fossil fuels, then the cost to use alternative fuels should be balanced against the relative efficiency of its generation. The inverse of the NCF is considered a reliable method to gauge functional obsolescence, as we will calculate in our model.

As mentioned above, individual wind projects can be distinguished from one another by their relative efficiency as measured by the NCF. Essentially, an NCF calculates what percentage of the time a wind farm project is actually generating electricity or how much the wind blows combined with the mechanical proficiency of the model of wind turbine actually installed.

The NCF of a coal-fired power plant may be close to 90 percent because it may be used in continuous operation and can be turned on or off at will. The NCF of a solar farm can be as low as 10 to 12 percent of its nameplate capacity. This is because of cloud cover, night darkness, and so forth.

Hence, the NCF can be used as a measure of functional obsolescence for wind farms, where the NCF can vary from 25 to 40 percent of nameplate capacity based on the wind resource and also the performance of a particular model of turbine. The NCF for wind farms using larger more advanced turbines approaches 50 percent. This suggests this measure of utility can be improved with technology.

Value Calculations

Exhibit 5 calculates a wind farm market value for ad valorem assessment purposes based on the following assumptions:

1. The RCN is based on turbine and wind farm specifications discussed above.
2. The net present value of PTCs and other incentives account for 30 percent of total costs to install the hypothetical 100-turbine wind farm on leased land.
3. Given a leased land scenario, land value or land assessments are not included.
4. The RCN is first adjusted for economic obsolescence; with wind farms this is quantified by tax credit incentives that can average up to 30 percent of project costs.
5. Net RCN adjusted for tax credits is then charged for physical depreciation; here we project 4 percent/year based on an expected 25 year economic life. In this example, the plant is assumed to be two years old.
6. A NCF of 35 percent would mean the plant produces its nameplate output only 35 percent of the time; thus, it is the inverse, or 65 percent impaired by the intermittency of the wind.

The resulting market value for tax assessment purposes is $52,112,480 in this example. That is
equivalent to approximately $521,000 per turbine or $347,000 per MW of nameplate capacity. This value should be compared, on a net capacity basis, with assessed values for alternate means of generating electric power.

Based on these assumptions, not atypical for a utility-scale wind power plant of this size, we have reduced the nominal RCNLD indication by over 75 percent. Absent market sales of wind power plants to challenge this procedure, the analyst may apply the best curb side judgment and ponder, “Is this reasonable?”

**SUMMARY AND CONCLUSION**

Fundamentally, wind farms are electric generation plants. Their fuel is wind. The wind performs the same function that pressurized steam does in a compact gas-fired thermal plant or falling water does in a hydroelectric dam. In each case, the kinetic energy of turning rotors in a turbine spin magnets generating electricity. It can be argued, for perspective, the analyst should look to relative costs or the occasional sale of a power plant in use to test the reasonableness of these adjustments.

The cost value drivers here are the tax credit incentive and the NCF. Both drivers can vary with the wind project. The tax credit provides a subsidy when the negotiated PPA does not provide sufficient income over time to yield an adequate return to the investor. The PPA is typically a 20–25 year contract negotiated with the offloading utility and is based, in part, on avoided costs of electric power generated conventionally. When natural gas or coal prices are high, then the PPA will be higher and wind more competitive.

At the same time, wind farms of identical specification will perform differently depending on the long-term consistency of the local wind resource. In some locations, the NCF approaches 50 percent. Offshore wind can raise the efficiency further. However, when incentives are increased, wind can be built where the NCF is below 30 percent. Finally, the turbine itself can be made more efficient by increasing its height.

The wind energy industry and public policies pursuing renewable energy solutions are still young. The market, electric power infrastructure, and even the consumer have yet to adjust to an evolving phenomenon. This discussion considers issues for further study and debate.

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### Exhibit 5
**Market Value of Wind Farm**

<table>
<thead>
<tr>
<th>Project Nameplate Rating</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A Number of Turbines</td>
<td>100</td>
</tr>
<tr>
<td>B Nameplate Rating</td>
<td>1.50 MW</td>
</tr>
<tr>
<td>System Peak Rating (A x B)</td>
<td>150 MW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Project Cost</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C Total installed cost/turbine</td>
<td>$2,312,000/turbine</td>
</tr>
<tr>
<td>D Number of Turbines</td>
<td>100</td>
</tr>
<tr>
<td>E Total Project Cost (C x D)</td>
<td>$231,200,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depreciation and Obsolescence Factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F Age</td>
<td>2 years</td>
</tr>
<tr>
<td>G Tax Credits as % of RCN</td>
<td>30.00%</td>
</tr>
<tr>
<td>H Net Capacity Factor (NCF)</td>
<td>35.00%</td>
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<table>
<thead>
<tr>
<th>Application of Age and Obsolescence Factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>J Total Replacement Cost New (RCN)</td>
<td>$231,200,000</td>
</tr>
<tr>
<td>K Economic- less TC incentives G x J</td>
<td>-$69,360,000</td>
</tr>
<tr>
<td>L Net RCN less eco. obs. (J + K)</td>
<td>$161,840,000</td>
</tr>
<tr>
<td>M Physical (straight-line/yr.)</td>
<td>-$6,473,600 4.00%</td>
</tr>
<tr>
<td>N Accrued Phys. Dep. (F x M)</td>
<td>-$12,947,200</td>
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<tr>
<td>O RCN less Phys. Dep. (L + N)</td>
<td>$148,892,800</td>
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<tr>
<td>P Functional Utility (1-H)</td>
<td>65.00%</td>
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<tr>
<td>Q Adj. for Functional Obs. (O x P)</td>
<td>-$96,780,320</td>
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<tr>
<td>R MV based on Cost Approach (O + Q)</td>
<td>$52,112,480</td>
</tr>
<tr>
<td>S MV/ turbine (R/D)</td>
<td>$521,125</td>
</tr>
<tr>
<td>T MV/ MW (S/B)</td>
<td>$347,417</td>
</tr>
</tbody>
</table>

**Notes:**

1. This discussion is adapted from the author’s article, “Wind Power and the Tax Base: Reliable as the Resource?” The M&TS Journal (the Journal of the International Machinery and Technical Specialties Committee of the American Society of Appraisers), Vol. 30, No. 1 (1st Quarter 2014).
3. For more information about this database, see http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=PA26F.
4. Ibid., 385.

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Recent Articles and Presentations

Aaron Rotkowski, a manager in our Portland office, authored the article, “Case Study: The Impact of DLOM on an Estate.” This article appeared in the January/February 2014 issue of The Value Examiner.

Aaron reviews the Tax Court decision in John F. Koons III v. Commissioner. An important issue in the case was the amount of effective control of decedent's 46.9 percent voting interest and 51.59 percent nonvoting interest in a soft drink bottling and distributing corporation. The estate's expert assumed the interest had the rights of a 50 percent owner, while the Service's expert assumed the interest had the rights of a 71 percent owner. The issue was the magnitude of the discount for lack of marketability to be applied.

Robert Reilly, a managing director of the firm, presented a webinar titled, “Practical Application of Intangible Asset Valuation Approaches and Methods.” This webinar presentation was delivered on April 29, 2014. The webinar was sponsored and produced by Valuation Products and Services.

Robert’s presentation explored the identification of intangible assets, data gathering and due diligence procedures, generally accepted approaches and methods for valuing intangible assets, and attributes of an effective intangible asset valuation report.

Robert Reilly and Fady Bebawy, a manager in our Chicago office, along with Elena Norman, Esq., a lawyer with Young Conaway Stargatt & Taylor, LLP, delivered a webinar presentation on March 27, 2014. The title of their webinar was “What Business Lawyers Should Know about Intangible Asset Valuation.” The webinar was sponsored and produced by the American Law Institute, ALI/CLE.

This presentation explored the identification of intangible assets, standards and premises of value, generally accepted approaches and methods for valuing intangible assets, and attributes of an effective intangible asset valuation report.

Robert Reilly, authored a white paper that appears on the website of the American Institute of Certified Public Accountants, Forensic and Valuation Services Section. The title of Robert’s white paper is “Intangible Asset Valuation: Cost Approach Methods and Procedures.”

This AICPA white paper explores the various methods and procedures within the cost approach to intangible asset valuation. In the paper, Robert discusses important issues such as remaining useful life considerations and the various forms of obsolescence that need to be considered.

Robert Reilly delivered two presentations at a Business Valuation Resources webinar held on March 4, 2014. Robert’s first topic was “Challenges in Measuring the Fair Value of Intangible Assets.”

This presentation explored relevant GAAP provisions related to fair value accounting. It discussed the generally accepted approaches and methods for valuing intangible assets.

Robert’s second topic was “Valuation of Contract-Related Intangible Assets.”

This presentation explored relevant GAAP provisions related to fair value accounting. It discussed the generally accepted approaches and methods for valuing intangible assets.

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