Risk Rating Wind Generation Assets

by Erik Andersen, Economist; 12 January 2006

Although lauded as an integral part of any long-term solution to the global energy and environmental conundrum, wind turbine investments have, to date, been feasible only when tax and other financial inducements are featured as components of projects. This represents a classic subsidy strategy used by governments to support the development of a socially desirable outcome. “Nascent industry” and tax-driven mechanisms have been integral to the promotion of such investments, but these support devices cannot be sustained or used on a large scale indefinitely. Until recently, the wind power industry could best be described as “ad-hoc”, “cottage”, “on the first level of the learning curve” or “a marginal curiosity”. The predominance of these “nascent industry” supports have tended to obscure basic economic and operational realities to the extent that premature equipment failure, excessive insurance claims and elusive profitability have become hallmarks of the industry. In short, it has not, in the past, been an industry able to attract the interest of serious institutional investors on an arm’s length basis for the long term.

The difficulty experienced by the wind power industry in finding financing on a grander scale was featured in a November 2004 article in “Windpower Monthly”, written by Sara Knight. In support of her observation, she cites a report outlining the experience in the German market by funds analyst Stefan Loipfinger. He stated “that private investment in closed-end wind funds was down 20.6% to €343 million in 2003, compared with €432 million in 2002.” He went on to estimate the 2004 level as falling even farther behind, at €250 million. Ms. Knight further chronicles the difficulty in obtaining asset insurance renewals due to excessive equipment failures after the run-out of manufacturer warranty periods. Her article confirmed just how much this industry has been operating at the margins of the global energy industry.

On a more positive note, the wind turbine manufacturing industry has not been complacent. Where wind turbines in the past typically had rated capacities of no more than a megawatt at best, manufacturers are now testing and installing machines capable of 5 MW and above, resulting in a sharply reduced capital cost per installed MW of generation capacity. Since the capital amount (re-captured as depreciation) represents the lion’s share of the ongoing expenses from wind power plant operations, this is hugely important to the economics of such investments. The prominence of the physical asset in any economic model of the industry cannot be under-stated; it is its very core.

By comparison, in the commercial aviation industry, depreciation of the airframe, like the wind turbine in the wind power industry, is also a large component in the annual statement of operating expenses. For example, in the introduction years of the Boeing 737-200, the typical depreciation schedule was 15 years straight-line, leading to a 10% residual. At annual utilization rates of about 2,500 hours per aircraft, this suggested an economic life expectancy of 37,000 hours and 15+ years. However in practice, the rugged nature of this particular airframe, when coupled with best practice maintenance and new generation engine upgrades, combined to keep this aircraft in safe and economic service for, in some cases, over 30 years and 50,000 hours. This experience and knowledge enabled the original depreciation schedules to be extended, resulting in real financial benefits to owners of these aircraft, since, among other benefits, residual values were higher than anticipated.

If the wind power industry is to make a real breakout and become a mainstream energy provider, there will need to be a similar dramatic attitudinal shift in how these capital assets are sited, operated and maintained, and in the realization of the relationship between these issues and asset lifecycle, depreciation time horizon and economic profitability. Unlike the commercial aviation industry, where annual capital re-capture (ie., blended ownership expense, including airframe, engines and spares) is less than 30% of total direct operating expenses before interest and overhead, the wind power industry exhibits a depreciation expense approaching 90% of total annual direct operating expenses. Accordingly, these issues assume even greater importance in the wind power industry, with the result that good or bad operating practices, which either prevent or result in premature destruction of asset values, will translate quickly into good or bad investment experiences for owners and investors.

The recent entrance to the wind power industry of large institutional investors, will require, in return for providing the huge sums of capital they have available for investing, that the same disciplines be applied by the wind power industry as are applied to the other asset classes that these investors historically invest in, such as commercial aircraft portfolios. Fortunately, there are new players entering the wind industry with knowledge-based tools derived from the experience in other, more mature industries that can greatly aid this transformation. Considerable money, time and knowledge has been invested by these new entrants in the development of, for example, technically detailed appraisal programs which enable insurers to more accurately gauge and further define their risks, while at the same time helping owners, operators and financiers improve operating practices so vital to the economic feasibility of their wind power assets.

As previously noted, the wind power industry has the opportunity to benefit from lessons learned by the commercial aviation industry, lessons which are directly transferable. One example that serves to illustrate the point that all operators are not created equal is taken from the operating experiences of two Canadian airlines. Both airlines operated the Boeing 767-300er aircraft, powered by identical Pratt & Whitney turbine engines. The airlines deployed their identical aircraft in similar markets, indeed, even to and from many of the same airports, but with one important difference. Flight crews at airline A were given guidance on the optimum ways to manage their engines as flight circumstances permitted, while flight crews at airline B were given no such guidance. By employing this proactive approach to turbine management, airline A was able to increase engine operating hours before required overhaul to between two and three times that of airline B, with obvious significant positive impact on airline A’s financial performance.

Operations and maintenance strategies are therefore extremely important, and it flows from this that a sophisticated technical appraisal and risk rating system is an essential cornerstone to understanding how wind turbines should best be operated, thus leading to a more accurate identification of the actual risks of ownership and operation, a better understanding of real project values, and enhanced profitability. Such a risk rating system would be principally designed to meet the needs of institutional owners/investors, financiers, insurers and carbon credit buyers. The system would translate technical and operations data into objective and standardized categories with rankings that could then be readily integrated with relevant financial performance data such as revenues and depreciation schedules. From this type of rigorous appraisal, an objective and independent turbine investment-rating guide would follow, patterning itself on the rating model for government and corporate bonds, but being heavily based on a deep understanding of operational issues and machine performance, rather than on a purely financial basis as in the case of bond ratings. With the prescription for excellence in operating and financial disciplines that such a risk rating system would facilitate, the wind power industry would be much better prepared to step up to the challenge of this century in delivering on its promise to be a mainstream participant in the global energy industry.

As actual returns for wind plant installation investments in many key jurisdictions begin to fall to the 7% level, the implementation of far more sophisticated risk management techniques, which such a ratings system would foster, must become a priority. The variability of wind as a “feeder stock” has always presented peculiar challenges to debt and equity providers in this sector and the recent problems regarding the wind index system used in northern Europe for the establishment of wind power projects will bring little solace to the financiers involved. Although more sophisticated means of calculating wind regimes are being offered by new entrants to the space, it is incumbent on the industry to provide more reasonable assurances that even these single digit returns can be realized. An objective, standardised and universal risk rating system, which heavily scrutinizes all aspects of wind plant operations, including wind data and the methods of its collection and interpretation, would go a long way in providing the comfort needed by institutional grade investment providers who are being asked to proffer billions of euros and dollars to an industry that has not had a great track record of meeting its projections in the past.

Such a universal risk rating system, if devised in a sophisticated enough manner, will, for example, allow high quality developers and owners to avail themselves of a cheaper cost of capital. Given a higher level of assurance that cash flows will not be impinged by equipment breakdowns and interruptions not covered by warranties or insurance, lenders will be prepared to carve basis points off loan pricing, as well as reduce onerous loan covenants and guarantees, leading to smaller project reserve account requirements. From an insurance standpoint, a risk rating system that rewards the utilisation of the diligent maintenance disciplines followed in the traditional power plant industry would result in fewer claims and thus lower premiums to be paid by the owner. In addition, onerous power purchase agreement requirements, such as those often included where hydro reserves or other power sources are used as a backup for wind at the cost to the wind asset owner, would be softened if there is an objective assurance, from the presence of a risk rating for the project, that power flow would not be interrupted as regularly as has been the case in the past.

The burgeoning carbon credit trading market is another area that would be a direct beneficiary of a universal risk rating system for wind power plant installations. In essence, these carbon credit transactions are merely a form of forward contract for the purchase of credits derived from the generation of electrons from renewable sources. If the integrity, “bankability” and deliverability of that electron flow and the associated carbon credits can be risk rated, it is clear that those who engage in this market, projected to be in the trillions of euros/dollars over the next few years, will be able to gauge their risk profiles more accurately and price their trades more finely to reflect the actual risks associated with the deliverability of the underlying credits being contracted for. Purchasers of such credits under these trades will, if the underlying wind assets giving rise to them are risk rated, therefore also have confidence that their accounting treatment of the trades (including, for example, the quantum and timing of delivery of the credits being paid for and being brought to account in their financial statements) is accurate and defensible, which is especially important in the post-Sarbanes-Oxley world.

Further, turbine lifecycle issues have become a sticking point for both manufacturers and owners, as well as those who finance wind power plants. Returns on investment are typically calculated based on a 20-year plant design life, but for many technically savvy industry participants, this assumption has been called into question. Perhaps it is unfair to say that kW-scale technology drives these multi-MW giants, but many questions still remain as to the viability of yields derived from spreadsheets using a 20-year period as a benchmark when so many examples of components not meeting this design life are coming to light. An independent, engineering and operations focused risk rating system as proposed here will enable real-world assessment of the likely actual turbine lifecycle to be gauged in the context of the individual wind asset in question (taking account of both engineering design and operations and maintenance practices), instead of the present situation where one must merely rely on the manufacturer's turbine design life projections in the absence of real world operations data. In this way, such a risk rating system will also materially assist owners, investors and financiers in forming a more accurate, risk-weighted assessment of the projected yields contained in the spreadsheets presented to them by developers and project proponents.

The political and commercial storms gathering around access to energy have only just begun. Calpine Corporation is among the first big insolvencies arising directly from serious miscalculations of price risk from a primary energy input, in this case natural gas. The price of natural gas is also the central issue in the geopolitical dispute between Russia and the Ukraine. From an economic perspective, it is clear that the massive demand for hydrocarbon resources will begin to reduce in response to higher unit prices and diminishing reserves. Wind energy is among the alternative energy options available to make up a good part of this growing hydrocarbon energy shortfall.

The challenge and opportunity for the wind industry in this regard is huge. The wind industry needs to shake off "nascent industry" practices and embrace technically rigorous, risk-management based operational strategies, like its brethren in the mainstream power industry, recognising that the costs associated with deriving energy from wind are totally driven by the care and preservation of capital assets. Before the wind generation industry can realistically attract the enormous capital needed from institutional investors, much is to be done. Proposed here, as a part of this transformation, is the development of a sophisticated wind asset risk rating system. Such a rating system would serve to facilitate asset investment and insurance, balance sheet valuations, and monetization of both physical assets and intangible assets such as carbon credits. These are just a few of the direct benefits to be derived from a more comprehensive approach to wind plant development and operation, whereby an objective and standardised, "apples to apples" appraisal of systems, technology and facilities management, together with the various risks associated with each of them, can be applied to a sector badly in need of more sophisticated rigor.

About the author:

Following six years as a fighter pilot in the RCAF, Erik Andersen studied commerce and transport economics at the University of British Columbia. This led to several years working with the Canadian Transport Commission in Ottawa. He was recruited to the position of Corporate Economist at Canada's leading regional air carrier, Pacific Western Airlines. He also spent a year working with the United Nations on an assessment of civil air transport in the Caribbean and South America. For the past twenty years he has been active in guiding individuals with their investments and sourcing investment funds for new ventures.