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CHECKING IN ON THE FUTURE OF WIND ENERGY

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Wind energy in the U.S. represents an energy, economic and environmental miracle of development over the past decade. In the face of an entrenched national framework to preserve a dominant fossil energy industry, total wind energy capacity today totals more than 60,000 MW, having grown to roughly 3% of net U.S. generation. This has occurred as a result of U.S. policymakers crafting and sustaining new policies that support renewable energy's cost competitiveness through tax policies, upgrades to the next generation of interconnections, and increased transmission capacity. Yet these shifts in the way that energy and power demand is planned for and regulated must also consider the cost competitiveness of renewables when compared to the full externalities of fossil fuels. A more sustained—stable yet dynamic—public policy framework that focuses on incentives, rules and efficient access to capital in the coming decade will create an environment for wind and other forms of renewable energy to succeed.

A second look

The wind industry heralded a success in December 2012 as the wind energy production tax credit (PTC) that was set to expire at year's end was amended and extended. However, the long-term future of the PTC for wind is uncertain as bipartisan support for it waxes and wanes. The industry needs a clearer overall picture to create strategic investment plans.

As a mature renewables sector, the wind industry must focus on the issues that can challenge its long-term outlook: maintaining current operations, market development, economic viability, and financial sustainability. Other challenges exist as well. For example, financiers may call for the wind industry to correct or improve wind service obstacles such as storage. Electricity regulation, under review in so many states, is being retooled to better incorporate the political, technological and consumer expectations of the antiquated energy system. As such, distributed generation and energy efficiency options abound and will increasingly compete with traditional fossil and renewable baseload options. Additionally, governmental and market monopolies have over time erected barriers to technological innovation at the expense of consumers. Finally, with regard to externalities, the hidden costs of wind—which is both intermittent and has a lower density of power for useful work—need to be better understood by the industry and better explained to consumers.

Wind is not currently an effective replacement for a fleet of retiring coal plants in Ohio or elsewhere. Instead, it is a critical *part* of an electric supply portfolio, useful as a hedge against escalating fuel costs, operating as a price balance to the everyday uncertainty of gas prices, and (often) serving as an environmental and public health offset to fossil fuels. The question in the boardroom of every wind energy company and for their utility customers and grid planners then boils down to this: Understanding wind energy's relative assets and liabilities, how much wind capacity, when, and at what cost creates an effective wind power balance sheet for future reliability and least-cost planning?

Wind issues escalate phantom electric power

Wind is not a pure replacement for coal, nuclear or other historical forms of generation because of its intermittency and lower capacity value. The wind doesn't always blow. But the question that remains on a utility scale is how to capture the power generated by wind and deploy it to the grid when the grid needs it for times of peak demand. Until that challenge of storage is overcome through interactive grid scheduling improvements, utilities are mandated to maintain enough capacity to meet anticipated (and actual) demand. This, in effect, escalates the load of "phantom power" in the system, essentially background electricity constantly at the ready that goes unused. Improvements in infrastructure efficiency and intelligence go hand-in-hand with the ability to further grow wind in the U.S.

Rethinking the next steps

After a seven-year period of growth for wind in the U.S., the wind industry was rattled by the last-minute save of the PTC. And for the sake of continuity and certainty for the

industry, discussion about the future of the PTC never really stopped. Perhaps there are just more options on the table now for discussion. Now is an optimal time for the industry to pause to regroup and confront the ongoing material challenges to their strategic planning efforts.

Financing

1. With the eventual phase out of the PTC, project developers will need to utilize new and different financing structures, such as real estate investment trusts (REITs) and master limited partnerships (MLPs) for larger projects, while better community development financing models may better serve smaller-scale projects.
2. The expiration of tax recapture periods after five years will increase the change in ownership for wind projects.
3. The loss of bonus depreciation at the end of 2012 to accelerate write-offs of investments in new equipment may harm project financing structures moving forward.
4. Differing results from early wind energy resource modeling efforts seem to be impacting the quality of *pro formas*—or closed deals—and the reliability of cash flows to cover debt service.
5. Internal rates of return and coverage ratios for the ability to service debt may not be sustainable in a market with rising interest rates (a likely scenario by 2014).
6. An increased risk of rising transmission costs, in conjunction with cost responsibility, escalates the risks of financing wind projects.
7. The increased risk of regulatory curtailments of purchase power obligations imposed by utilities creates new financing uncertainty, especially in Idaho, Colorado and Texas, and portends national trends of major importance.
8. High and complex transaction costs, coupled with decreased lending capacity from the European Union and Japan, further stunt the attractiveness of an investment in wind.

Regulatory

9. Uncertainty about the PTC's future throughout 2011-2012 threatened up to 37,000 wind industry jobs, nearly half of the U.S. wind workforce. Companies that had laid off workers are now scrambling to revive their operations on an as-needed basis to take advantage of another year of the PTC.

10. Moreover, some skilled wind workers have left the industry to seek more permanent and reliable employment. This stateside "brain drain" means that the U.S. is losing near- and long-term opportunities for offshore wind manufacturing and development to overseas competitors like Europe and Asia.

11. While many states have strong wind advocates in positions of political leadership, others lack sufficient state commission support. And as of late, widespread challenges to renewable portfolio standards (RPS) and feed-in tariff structures create both political and market uncertainty for long-term wind development in U.S. and foreign markets.

12. The inability of wind energy development to penetrate certain regional markets in the Tennessee Valley Authority and certain power marketing administrations impedes natural market opportunities in the U.S. This has occurred in part because renewable supply solutions have not been heavily promoted nor incentivized in these federal markets.

13. Offshore wind has tremendous potential in the U.S., offering *four times* the existing total U.S. generating capacity. However, past public reticence and a complicated regulatory framework governing offshore development has hampered projects. Additionally, offshore projects must compete with advanced coal, carbon capture and storage (CCS) and nuclear projects for government subsidies and loan guarantees to secure the necessary capital and credit support.

Infrastructure

14. An outdated and disjointed transmission & distribution (T&D) system creates costly delays and impedes the growth of wind resources from the Midwest. This unreliability creates havoc when attempting to serve major markets that have both high demand and must now have disaster plans in place.

15. Integration challenges across regional transmission organizations (RTOs) and independent system operators (ISOs) escalate as energy generation resources are diversified and developed. Studies have appeared on this topic, but few solutions have yet been executed.

16. Resource integration plans need to be addressed by states in which wind assumes a significant portion of their future supply portfolio to prepare for any hidden costs which may impede deployment. (For example, Minnesota is in the process of finishing up a massive $2.2 billion infrastructure upgrade that will enable wind resources from Minnesota, North Dakota and Iowa to connect with its larger 11-state RTO.)

17. Insufficient co-location strategies to mitigate intermittency problems have hampered wind. The more efficient co-location strategies of renewables technologies favor teaming wind with solar, biomass, natural gas and combined heat and power for managing intermittency and/or for maximizing the land resources needed for renewable development.

18. Ancillary services, frequency regulation, balancing costs and technical management services provided by the utilities or RTO for connecting wind sources to the grid impact the overall operating costs of wind projects.

19. The challenges presented by an increased supply of natural gas, and the stable, baseload power it provides, will affect overall power purchase pricing and the availability of any capacity payments to be dedicated to wind resources.

Technology

20. Operations & maintenance costs in the past five years have varied significantly for wind installations, in part due to the near expiration of original warranties on equipment. The useful life of an onshore wind turbine is now averaging around 15 years, not the 20-25 years originally projected by manufacturers.

21. Adequate and scalable battery/storage solutions for wind energy are not yet widespread, exacerbating the disconnect between wind availability periods and periods of peak demand.

22. As industry demand shifts towards more sophisticated turbine components, supply chain uncertainty for manufacturing (i.e., where will the supplier/source be located?) exists that delays investment capital for advanced manufacturing.

Broader help

There is no shortage of strategic ideas or policy recommendations for optimizing wind power to be the strongest, most competitive market it can be in the future. Tackling the above challenges will help boost both the onshore and offshore markets in the U.S. Ultimately, the wind industry needs to have the services, financing, technology, manufacturing and workforce capability *in place* to jump at a moment's notice when market and political conditions prove advantageous. The fact that some companies in the supply chain are continuing to invest in wind despite the uncertainty is a positive sign for the health of the industry. Of course, others trying to find a competitive edge have already moved on to the potential of photovoltaic energy projects in 2013.

Without a more balanced, national approach to energy generation, the renewables industry as a whole will struggle to meet its patchwork of existing state-based portfolio standards in a cost-effective manner that actually benefits utilities and customers. Preparing for more diversification in our national renewable (and non-renewable) energy supply—and creating the conditions for long-term renewable industry growth— may help give a fighting chance to the argument for a national renewable energy standard that includes a robust wind industry. Further wind growth and the offshore wind opportunity hang in the balance.

March 2013