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House Committee on Energy and Commerce
Subcommittee on Energy and Power

Hearing on American Energy Security and Innovation: Grid Reliability Challenges in a Shifting Energy Resource Landscape

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Thank you Chairman Whitfield, Ranking Member Rush, and Subcommittee Members. It is a pleasure to be here today on behalf of America's wind industry. The American Wind Energy Association represents over 1,200 member companies, including project developers, manufacturers, and service providers.

Wind energy production has grown dramatically in recent years, lowering energy costs for consumers while keeping the grid reliable. Over the past five years, wind energy has accounted for more than 35 percent of all new electric generating capacity in the U.S. Last year alone, $25 billion in private investment went into building new U.S. wind projects, providing 80,000 American jobs. The wind industry now has 550 manufacturing facilities in 44 states, and wind projects in 39 states and Puerto Rico. Nearly 70% of the content used in U.S. wind turbines is produced here in America, up from 25% just a few years ago.

Last year, wind energy reliably provided more than 20% of the electricity in Iowa and South Dakota, and more than 10% of the electricity in nine states. At times, wind energy has reliably provided more than 55% of the electricity on the main utility system in Colorado, and 35% on the main grid in Texas.

Dozens of studies by independent grid operators and utilities have examined wind energy's impact on electric reliability, and all have concluded that our use of wind energy can increase many times over without any negative impacts on reliability.[1] This is possible because the grid takes power from many sources that vary over time, just like the Mississippi River takes water from many tributaries and keeps a steady flow into the Gulf of Mexico.

Since the days of Thomas Edison, grid operators have had to constantly adjust the output of power plants to respond to fluctuations in electricity demand and the sudden failures of large conventional power plants. The grid operator does not care if you turn on electric appliances because that is almost always canceled out by someone else turning theirs off. Similarly, changes in output at one wind plant are almost always canceled out by an opposite change somewhere else on the grid, sometimes at another wind plant. In some regions, such as coastal areas, wind output is typically highest when electricity demand is highest.[2] Because wind turbines are spread across a large area, it typically takes many hours for a weather event to affect a large share of a region's wind output. Moreover, weather forecasting makes these changes predictable.

[1] http://www.uwig.org/opimpactsdocs.html

[2] For example, analysis by the Texas grid operator indicates that all of the typical energy output of the state's approximately 2,000 MW of coastal wind energy plants can be relied on for providing dependable capacity to meet electricity demand, "due to the increased coastal winds that occur in summer afternoon." http://www.ercot.com/content/news/presentations/2013/ERCOT%20Loss%20of%20Load%20Study-2013-PartII.pdf

All energy sources underperform from time to time, and no power plant operates predictably 100% of the time.[3] The lights stay on because all power plants have always been backed up by all other power plants. Wind energy follows the same market rules as other resources, and only gets paid for the services it provides.

Compared to wind energy, changes in electricity demand and failures at conventional power plants are far larger contributors to grid variability and the need for the flexible reserves, or backup, that grid operators use to keep supply and demand in balance.[4] Grid operators that use efficient practices have found that they can reliably add large amounts of wind energy with virtually zero need for backup power beyond what is already needed.[5] Even if additional backup is needed, it is much cheaper to accommodate the slow and predictable variations in wind output than the instantaneous loss of conventional power plants that can occur at any time.

Data from the Texas grid operator indicate that the additional cost of backup for obtaining almost 10% of its electricity from wind energy accounts for about six cents out of a typical household's $140 monthly electric bill.[6] In contrast, other data indicate that the cost of reliably

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[3] For example, in February 2011, around 50 conventional power plants in Texas abruptly failed in the cold, while wind energy earned accolades from the grid operator for helping to keep the lights on. http://www.texastribune.org/2011/02/04/an-interview-with-the-ceo-of-the-texas-grid/

[4] As an illustration, one can look at data from PJM, the grid operator for parts of 13 Mid-Atlantic and Great Lakes states and the District of Columbia. Over the last year, the largest hourly changes in electricity demand were more than ten times larger than the largest hourly changes in wind energy output, even though PJM has over 6,000 MW of wind energy on its system. http://www.pjm.com/~/media/committees-groups/task-forces/irtf/20130417/20130417-item-05-wind-report.ashx, http://www.pjm.com/markets-and-operations/energy/real-time/loadhryr.aspx

[5] http://www.uwig.org/san_diego2012/Navid-Reserve_Calculation.pdf

[6] Based on a calculated wind integration cost of $0.50 per MWh of wind energy, which equals $.046 per MWh of total load served in ERCOT at 9.2% wind energy use (http://www.uwig.org/slcforework/Ahlstrom-Session1.pdf),

accommodating instantaneous outages at other power plants is forty times higher, at around $2.50 per monthly bill.[7] A study by utilities in Nebraska calculated that the whole region could reliably obtain 40% of its electricity from wind energy at an additional backup cost of around 80 cents per monthly bill.[8]

These costs are a small fraction of the benefits wind energy provides for consumers. Wind energy drives down electricity prices by displacing higher cost, less efficient power plants.[9] Second, wind energy offers the stability of a long-term fixed energy price, which is offered by

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based on reserve data presented by David Maggio, ERCOT (http://www.uwig.org/San_Diego2012/Maggio-Reserve_Calculation_Methodology_Discussion.pdf), multiplied by the 1.262 MWh used per month by the average Texas household (http://www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf)

[7] $2/MWh of total load served (http://www.eipconline.com/uploads/Phase_1_Report_Final_12-23-2011.pdf, page 61), multiplied by the 1.262 MWh used per month by the average Texas household

[8] http://www.uwig.org/ne_study.pdf

[9] While wind energy does drive down electricity market prices, this impact is not caused by the wind production tax credit (PTC). While the PTC is important for facilitating wind energy development, the PTC has no direct impact on electricity market prices except under extremely rare and isolated circumstances. With or without the PTC, wind energy enters the electricity market with one of the lowest operating costs because it has no fuel costs, and grid operators use wind energy to displace the power plants with the highest operating costs. Both wind and nuclear energy drive electricity market prices down because their low fuel and operating costs allow them to displace more expensive forms of generation, not because of the incentives they receive. Even though both wind and nuclear energy receive incentives, there is no merit to the argument that these incentives negatively affect the economics of other generators. That is because neither wind nor nuclear energy sets the clearing price in electricity markets except under extremely isolated circumstances, so these incentives are not reflected in the market clearing price that all generators see. For example, in ERCOT, the power system that has by far seen the most instances of wind energy setting a localized market clearing price, wind energy set the marginal electricity price for only 2% of price points in 2011. The impact on conventional generators was even more limited because those instances were confined to ERCOT's West zone, which contains only 5% of ERCOT's conventional generation. Moreover, those already isolated instances will be virtually eliminated when long-needed transmission upgrades are completed by the end of 2013. To sum up, even though both wind and nuclear energy receive incentives, those incentives have virtually zero direct impact on investment or operational decisions for other power plants because neither resource sets the electricity market clearing price outside of extremely rare occurrences in isolated pockets on the grid.

very few other energy sources. This protects consumers from fluctuations in fuel prices much like a fixed rate mortgage protects homeowners from interest rate spikes.[10]

Synapse Energy Economics is releasing a report today that indicates doubling the use of wind energy in the Mid-Atlantic and Great Lakes states would save consumers a net $2.6 billion per year.[11] Similarly, the New England grid operator calculated that obtaining 20% of the region's electricity from wind would reduce electricity prices by more than 10%.[12] Numerous other studies confirm that finding.[13]

Utilities understand that wind energy is a good deal for their customers. At least 74 utilities bought or owned wind power in 2012, up 50% from a year ago. Southern Company recently made its third wind energy purchase, explaining that wind energy reduces its customers' electric bills.[14] Similarly, Oklahoma Gas and Electric estimates that a single wind project will save Arkansas customers $46 million.[15] Finally, the Colorado Public Utilities Commission found

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[10] http://emp.lbl.gov/publications/revisiting-long-term-hedge-value-wind-power-era-low-natural-gas-prices

[11] Synapse Energy Economics, "The Net Benefits of Increased Wind Power in PJM," to be released on May 9, 2013. The study found $2.6 billion in net annual benefits from doubling wind energy production beyond existing requirements, after accounting for all wind costs and without even accounting for the value of reduced pollution.

[12] http://www.uwig.org/newis_es.pdf

[13] http://www2.illinois.gov/ipa/Documents/April-2012-Renewables-Report-3-26-AAJ-Final.pdf, http://www.mass.gov/eea/docs/doer/publications/electricity-report-jul12-2011.pdf, http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/MeritOrder.pdf, http://www.crai.com/uploadedFiles/RELATING_MATERIALS/Publications/BC/Energy_and_Environment/files/Southwest%20Power%20Pool%20Extra-High-Voltage%20Transmission%20Study.pdf, http://www.synapse-energy.com/Downloads/SynapseReport.2012-08.EFC.MISO-T-and-Wind.11-086.pdf, http://www.nyserda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/~/media/Files/EDPPP/Energy%20and%20Environmental%20Markets/RPS/RPS%20Documents/rps-performance-report-2009.ashx

[14] http://www.georgiapower.com/about-us/media-resources/newsroom.cshtml, April 22, 2013 press release

[15] http://www.apscservices.info/pdf/12/12-067-u_2_1.pdf

that a single wind purchase by Xcel Energy "will save ratepayers $100 million" while providing the opportunity to "lock in a price for 25 years."[16]

In short, wind energy is playing a critical role in providing American homes and businesses with reliable, homegrown, low-cost energy.

Thank you for inviting me, and I look forward to answering your questions.

[16] Colorado Public Utilities Commission, Decision No C11-1291