ILLINOIS COMMERCE COMMISSION

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DIRECT TESTIMONY

OF

MICHAEL GOGGIN

SUBMITTED ON BEHALF OF:

WIND ON THE WIRES

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1. Introduction

Q: Please state your name, job title, and business address.

A: My name is Michael Goggin, and I am the Manager of Transmission Policy for the American Wind Energy Association ("AWEA"). My business address is 1501 M St NW, Suite 1000, Washington DC, 20005.

Q: What is Wind on the Wires' interest in this case?

A: Wind on the Wires is a not for profit organization representing a broad range of entities with a common interest in encouraging the development of reliable and environmentally-friendly wind energy resources in the United States. Wind on the Wires' members include project developers, owners and operators, wind turbine manufacturers, energy experts, and tribal organizations. The construction of transmission projects that provide greater access to underutilized wind energy resources, such as the Illinois Rivers Project, further that interest by opening up those resources for development.

Q: What is the purpose of this testimony?

A: I provide facts supporting the finding that the Illinois Rivers Project will allow greater amounts of low-cost wind energy resources to reach Illinois consumers, promoting the development of an effectively competitive electricity market that operates efficiently and thereby lowering both the costs for meeting Illinois consumers' needs for electricity and Renewable Energy Credits (RECs), and that these benefits will be allocated equitably to all consumers.

Q: Please outline your testimony.

A: First, I discuss how the Illinois Rivers Project provides Illinois consumers with greater access to wind energy resources, lowering consumers' electricity costs by facilitating an effectively competitive electricity market that operates efficiently. Next, I explain the benefit that such transmission projects provide consumers by providing a larger supply of RECs for complying with the Illinois Renewable Portfolio Standard (RPS), helping to ensure that the REC market operates efficiently. Finally, I explain that the benefits of high-voltage transmission projects such as Illinois Rivers are inherently equitably allocated to consumers.

A. The role of the Illinois Rivers Project in delivering wind generation to Illinois consumers

Q: What is your understanding of the purpose of the Illinois Rivers Project?

A: As explained in the direct testimony of Ms. Maureen Borkowski, Mr. Rodney Frame, Mr. Dennis Kramer, and Mr. Jeffrey Webb, and Ameren's petition in this case, the Illinois Rivers Project will provide Illinois consumers with significantly greater access to underutilized wind energy resources both in Illinois and in other parts of the MISO (Midwest Independent System Operator, Inc.) footprint, particularly areas to the west of Illinois, in addition to improving reliability and alleviating other congestion on the electric transmission system managed by MISO.

Q: Can you quantify the amount of wind resources available in Illinois and in the parts of MISO west of Illinois?

A: As indicated in the wind resource map in WOW Exhibits 1.1 and 1.2, Illinois and the parts of MISO to the west of Illinois have some of the best wind energy resources in the United States. According to the United States Department of Energy's National Renewable Energy Laboratory's ("NREL") wind resource assessment data, Illinois has 249,882 megawatts ("MW") of developable wind energy resources, Iowa alone has 570,714 MW, and Missouri has 274,355 MW of developable wind energy resources, which together are enough to meet the current electricity needs of Illinois more than 10 times over.[1] That same analysis found that North Dakota possesses 770,196 MW of developable wind energy resources, South Dakota has 882,412 MW, and Minnesota has 489,271 MW.

NREL's data indicates that North Dakota, South Dakota, Minnesota, Missouri, and Iowa combined have a wind energy potential of 2,838,000 MW, around 34 percent of the total onshore potential in the lower 48 U.S states, or enough to meet the current electricity needs of the U.S. at least two times over. Their combined wind resource potential is more than 10 times greater than the resource potential of Illinois, or enough to meet the electricity needs of Illinois around 45 times over.

Q: Are these wind resource assessments accurate?

A: If anything these assessments are likely to be conservative, as they assume the use of wind turbines with a hub height of 80 meters and do not include the use of new low-wind-speed turbines. Many wind turbines being installed today have hub heights of 100 meters or more, providing them with access to significantly greater wind energy resources, and low-wind-speed turbines are also making it economically viable to develop wind resource areas that were not previously viable. Regardless, the data is clear that Illinois and areas to its west have tremendous wind energy resources that far exceed the electricity demands of the region.

Transmission lines are a major factor that determines how much of the potential wind energy in these states can be used. To capitalize on these wind-rich areas, wind plants need cost-effective access to transmission lines. The Illinois Rivers Project is one of the transmission lines that is needed, as it increases the area within Illinois in which wind plants have

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[1] United States Department of Energy's National Renewable Energy Laboratory's ("NREL") wind resource assessment data, *available at* http://www.windpoweringamerica.gov/docs/wind_potential_80m_30percent.xls

cost effective access of transmission and also allows a larger amount of wind output from states adjacent to Illinois and elsewhere in MISO to reach Illinois consumers.

Q: Can you quantify the quality of wind resources in these areas?

A: As indicated in WOW Exhibit 1.1, the quality of the wind resources is high across the region, though it is highest in Iowa, Minnesota, South Dakota, and North Dakota. Importantly, the energy available for wind energy production is proportional to the cube of wind speed, so the difference between the orange and purple areas in the wind speed map in WOW Exhibit 1.1 is actually quite significant. For example, the 8.0-8.5 meter/second area of the map, which is the medium-dark purple area that covers significant parts of Iowa, Minnesota, North Dakota, and South Dakota, has about 47% more energy available in the wind than the 7.0-7.5 meter/second dark orange area that covers parts of Northern Illinois.

Q: How does this translate to the expected output of wind plants that would be developed in these areas?

A: Capacity factor, defined as the amount of electricity produced by a power plant in a typical year divided by the amount of electricity that that power plant could provide if it ran at 100% of its nameplate capacity for all 8,760 hours in that year, is a commonly used metric for the expected output of wind plants. Capacity factor is strongly related to the average wind speed of an area.

As indicated in the Lawrence Berkeley National Laboratory (LBNL) data[2] presented in WOW Exhibit 1.3, the average capacity factor for wind projects recently installed in the “Heartland” region, which as indicated in WOW Exhibit 1.4 consists of Iowa, North and South Dakota, Minnesota, plus Nebraska, Kansas, Oklahoma, Missouri, and Arkansas, was around 37% or 38%, versus just over 30% for the "Great Lakes" region that includes Illinois, Wisconsin, Indiana, Ohio, and Michigan. According to this same dataset, the national average wind capacity factor in 2011 was 33%. MISO's Multi Value Report ("MVP Report") also provides estimates for different zonal regions of MISO, with an estimated capacity factor of 28% for most of Illinois, versus 38% for North and South Dakota and most of Minnesota, 36% for Iowa and part of Minnesota, and 33% for parts of Missouri.[3]

Q: How does capacity factor affect the economics of wind generation?

A: Capacity factor significantly affects the economics of wind generation. As indicated in WOW Exhibit 1.5, wind Power Purchase Agreements ("PPAs") prices in the "Heartland" region have averaged around $50 per megawatt-hour ("MWh"), versus a figure of $65-70/MWh for the "Great Lakes" region. While differences in land and construction costs are likely a partial factor, the higher capacity factors in the Heartland region are almost certainly the major factor for the difference in PPA price between these two regions. As documented in MISO's Renewable Generation Outlet Study ("RGOS") analysis, building wind in a mix of high and low capacity factor regions, relative to building in mostly lower capacity factor regions to be closer to load, achieves the same level of wind energy output with an 11% reduction in the nameplate capacity of wind that must be deployed, with a corresponding 11% reduction in wind energy capital costs.

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[2] Lawrence Berkeley National Laboratory, 2011 Wind Technologies Market Report, at 46, Figure 29 (August 2012). The document can be found at: http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf.

[3] MISO Multi Value Project Portfolio: Results and Analyses ("MVP Report"), at 5 (January 10, 2012).

Q: In addition to wind resource quantity and quality, are there other indicators of where future wind development is likely to occur in MISO?

A: Yes. MISO's interconnection queue[4] provides one indicator of wind project developers' interest in developing wind resources in the future. The MISO interconnection queue currently includes 18,353.2 MW of proposed wind projects, including 2,224 MW of projects that are listed as "under construction." Illinois currently accounts for 1,667.7 MW of the proposed wind projects in the MISO interconnection queue, including 418 MW of projects that are listed as under construction. Iowa currently has 3,507.2 MW in the queue, zero of which are listed as "under construction," while Missouri has 400 MW in the MISO queue, although that interconnection application is currently suspended. Farther to the west and north of Illinois, Minnesota has 3,631.3 MW of proposed wind projects, North Dakota has 1,758.5 MW of proposed wind projects, and South Dakota has 989 MW of proposed wind projects.

Certain caveats apply when interpreting interconnection queue data. First, many proposed projects in the interconnection queue are unlikely to proceed to final development and be placed in service, as many projects in the queue have not yet passed important project milestones such as obtaining a power purchase agreement or project financing. Second, interconnection applications are partially driven by current transmission constraints, so the addition of new transmission can drive new interconnection applications in regions that are currently transmission constrained.

[4] https://www.midwestiso.org/Planning/GeneratorInterconnection/Pages/InterconnectionQueue.aspx (data downloaded on March 29, 2013, sorted to remove projects that have been withdrawn or placed in-service, and then sorted by state).

Nevertheless, the large quantity of proposed wind energy development in Illinois, Iowa, and other parts of MISO indicates that the Illinois Rivers Project will connect Illinois consumers with large quantities of economically viable wind energy resources and significant developer interest in utilizing those resources. This is further evidence that the Illinois Rivers Project will enable the delivery of wind energy that will reduce electricity prices in Illinois and also deliver low cost wind resources from Illinois and adjacent states that can be used for compliance with the Illinois RPS.

Q: Does MISO develop estimates of where future wind development is likely to occur?

A: Yes, MISO's transmission planning processes identifies areas that are likely to see future wind deployment in the region, based on wind resource data, interconnection queue data, state policy requirements, and other factors. As explained in the MISO MTEP and MVP reports MISO worked with stakeholders in the RGOS process to identify zones where future wind development is likely to occur and would most cost-effectively occur. To identify the most cost-effective wind resource mix, the RGOS analysis carefully balanced generation costs and transmission costs to arrive at the optimal mix of wind resources.[5] The resulting RGOS zones are identified in WOW Exhibit 1.2. As explained in the MVP report, "Incremental wind generation was added to the model to satisfy these mandated needs. The amount of incremental generation for each zone was based on the capacity factor, the planned and proposed generation, and existing wind

[5] MVP Report, page 4: "The goal of the RGOS analysis was to design transmission portfolios that would enable RPS mandates to be met at the lowest delivered wholesale energy cost. The cost calculation combined the expenses of the new transmission portfolios with the capital costs of the new renewable generation, balancing the trade offs of a lower transmission investment to deliver wind from low wind availability areas, typically closer to large load centers; against a larger transmission investment to deliver wind from higher wind availability areas, typically located further from load centers."

with power purchase agreements to serve non-MISO load ascribed to each zone."[6]

Q: What estimates have MISO developed for Illinois renewable demand and wind development?

A: As documented in the MVP Report, Ameren Illinois was calculated to have an incremental need for 3,072,047 MWh of renewable generation in 2021 and 4,274,713 MWh in 2026 to meet its Renewable Portfolio Standard ("RPS").[7] In addition, Alternative Retail Energy Suppliers (ARES) in Ameren Illinois were projected to have an incremental need for 2,016,516 MWh of generation in 2021 and 3,046,465 MWh in 2026 to comply with the Illinois' RPS.[8] As far as Illinois' wind supply, the RGOS analysis estimated that by 2026, 415 MW of incremental wind would be developed in zone Illinois F and 449 MW of incremental wind developed in zone Illinois K, with all of that incremental supply except for 15 MW in Illinois F being deployed by 2021.[9]

Q: How does this quantity of Illinois wind generation compare to the quantity needed to meet the state's incremental need?

A: Assuming a 30% capacity factor, consistent with the data for the Great Lakes region described in the LBNL report, this 864 MW of incremental Illinois wind capacity would provide around 2,270,000 MWh/year of incremental generation, approximately 2,800,000 MWh less than MISO'S estimated renewable energy Illinois' total incremental need in 2021 and around 5,050,000 MWh less than its incremental need in 2026. As a result, MISO's analysis indicates that, for the optimized wind and transmission build-out it developed, Illinois' incremental need will be most efficiently met by a mix of in-state and out-of-state wind generation.

[6] MVP Report, page 19.
[7] *Id.*
[8] *Id.*
[9] *Id.*

MISO's analysis indicates that such a mix would result in the lowest cost for consumers, weighing the economic tradeoffs between lower capacity factor wind that requires less transmission versus higher capacity factor wind that requires more transmission. As the MISO MVP report explains, "The goal of the RGOS analysis was to design transmission portfolios that would enable RPS mandates to be met at the lowest delivered wholesale energy cost."[10]

Q: Has AWEA done its own analysis of the likely incremental MWh of wind needed to meet the Illinois RPS?

A: Yes. AWEA's analysis indicates that approximately 3,000-4,000 MW of incremental wind capacity, beyond that installed as of the end of 2012, will be needed to satisfy the requirements of the Illinois RPS through the year 2025. Per the requirements of the Illinois RPS, that capacity would be installed in Illinois or adjacent states, unless the cost cap for the RPS is exceeded.[11] The variables that affect the amount of capacity actually needed include changes in future load growth, the capacity factors of future wind deployments, as well as what percentage of the RPS will be met by wind. Illinois requires utilities to use wind energy resources to provide at least 75% of their RPS requirement. However, wind energy resources could be used to meet as much as 93% of the RPS requirement. Similarly, ARES are to use wind energy resources to provide at least 60% of their RPS requirement, and could be used to meet as much as 93% of their RPS requirement.[12]

[10] MVP Report at 3.
[11] The cost cap and other provisions of the Illinois RPS are explained, with citations, by the Database of State Incentives for Renewables and Efficiency, *available at* http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL04R.
[12] The renewable portfolio standard requires the utilities and the ARES to meet their renewable portfolio standard with solar and distributed generation comprising at least 6% and 1%, respectively. *See* 20 ILCS 3855/1-75(c)(3) and 220 ILCS 5/16-115D(a)(3).

Q: How do the areas where future wind development is expected to occur correspond to the areas where wind development will be facilitated by the Illinois Rivers Project?

A: Because the MISO transmission planning process that produced plans for the Illinois Rivers Project and the other MVP projects was heavily based around facilitating wind energy development in the identified RGOS zones, it is not surprising that the Illinois Rivers Project is positioned to facilitate wind energy development both in Illinois and in MISO areas west of Illinois, as that mix of resources was identified as being the optimal solution for meeting the region's public policy requirements. As explained in the MVP Report, the component portions of the Illinois Rivers Project "will provide an outlet for wind generation in the western region to move toward the more densely populated load centers to the east."[13] In his testimony, Mr. Webb also notes "the Illinois Rivers Project provides for the integration of wind in both Illinois and in areas remote from Illinois with better wind quality to support the satisfaction of the Illinois RPS."[14]

As explained in more detail below, based on MISO's analyses, the Illinois Rivers Project will help cost-effectively fulfill the Illinois RPS by enabling the delivery of wind energy from Illinois and adjacent states. These wind resources, as well as wind resources that the Illinois Rivers Project will allow to be delivered from other states in western MISO, will also decrease electricity prices and benefit Illinois consumers by promoting the development of an effectively competitive electricity market that operates efficiently. As the MISO MVP Report indicates, the Illinois Rivers Project and the broader MVP portfolio greatly reduce consumer energy costs, as "Adjusted Production Cost savings are achieved through reduction of

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[13] MVP Report at 33 and 35.
[14] MISO Exhibit 1.0 at 26.

transmission congestion costs and more efficient use of generation resources across the system."[15]

This is not surprising, as the Illinois Rivers Project was designed by MISO as part of a portfolio to satisfy state RPS requirements at the lowest cost for consumers. As the MISO MVP report explains, "The goal of the RGOS analysis was to design transmission portfolios that would enable RPS mandates to be met at the lowest delivered wholesale energy cost."[16]

Q: What role does transmission play in enabling the development of these wind resources?

A: Transmission is essential, both for allowing wind resources to be developed and enabling already developed wind resources to not have their wind energy output curtailed. In areas where transmission constraints prevent wind energy from being delivered to customers, there is no cost-effective substitute for increasing transmission capacity to alleviate those constraints.

Q: Are there other options for delivering these wind energy resources to electricity demand?

A: As the NREL data in WOW Exhibit 1.1 indicates, the states in western MISO possess wind energy resources that are many times greater than their total electricity needs, so making use of these wind energy resources requires transmission to move that energy to load centers elsewhere. North Dakota and South Dakota are on the western edge of the Eastern Interconnection, and the only Eastern Interconnection state west of Iowa, Nebraska, is in the Southwest Power Pool and also has wind energy resources that greatly exceed its electricity demand. Areas to the south also have wind energy resources that greatly exceed their electricity

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[15] MVP Report at 51.
[16] Id.at 3.

demand. Given the large electricity demand in Illinois and the state's geographic proximity to these high quality wind energy resources, building transmission to deliver these wind energy resources to the state is an ideal solution. As explained in detail in the MISO MVP Report and in the testimony of Mr. Jeffrey Webb, MISO's analysis found that the Illinois Rivers Project was the optimal solution for resolving a number of economic, reliability, and public policy considerations such as state RPS requirements, and was found to be superior to alternative solutions.[17]

Q: What is wind energy curtailment?

A: Wind energy curtailment occurs when the output of operating wind projects exceeds the transmission capacity that is locally available to deliver that energy to customers. When this occurs, wind plants receive a market signal or grid operator instruction to reduce their output to the level that can be carried on the transmission system. Wind turbines can rapidly reduce their output on command by pitching their blades to an angle where they capture less or zero of the energy available in the wind. Of course, there is a significant economic cost, to wind owners, wind purchasers, and consumers, to "throwing away" zero-emission, zero-fuel cost energy that could have been used by consumers if sufficient transmission capacity were available.

Q: How extensive is wind energy curtailment in MISO currently?

A: Data in the Lawrence Berkeley National Laboratory report[18] indicates that in 2011, 657,000 MWh of potential wind energy production in MISO was curtailed, plus another 54,400 MWh of potential wind energy production within MISO's Northern States Power Company's service territory. These 711,000 MWh of total curtailment correspond to about 3% of the total

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[17] MISO MVP Report at 33-35, and Jeffrey Webb testimony at 22-24.
[18] Lawrence Berkeley National Laboratories, 2011 Wind Technologies Report, at 43 (August 2012) http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf.

potential wind production for MISO in 2011. A recent MISO presentation[19] provides a slightly higher tally, showing 824,000 MWh of manual and market-driven wind curtailment in 2010, around 850,000 MWh in 2011, and 849,000 MWh in 2012. These curtailment figures correspond to the annual production of 300 MW of wind capacity operating at 32% capacity factor.

Q: What do MISO's analyses indicate about how the Illinois Rivers Project and other MVP projects will affect wind energy development and curtailment in MISO?

A: As indicated in the testimony of Mr. Jeffrey Webb, "Without the [Illinois Rivers] Project, MISO identified that approximately 34% of the existing and planned wind development within the MISO portion of Illinois would need to be curtailed in addition to curtailment of baseload coal generation in order to maintain reliably system loading levels."[20]

The Illinois Rivers Project is an integral part of the MVP portfolio, as the portfolio will not function without the Illinois Rivers Project. MISO's MVP report found that the overall MVP portfolio of projects was essential for reducing curtailment of planned wind development, stating: "The algorithm found that 10,885 MW of dispatched wind would be curtailed. As a connected capacity, this equates to 12,095 MW as the wind is modeled at 90% of its nameplate. A MISO-wide per-unit capacity factor was averaged from the 2026 incremental wind zone capacities to 32.8%. The curtailed energy was calculated to be 34,711,578 MWh from the connected capacity times the capacity factor times 8,760 hours of the year. Comparatively, the full 2026 RPS energy is 55,010,629 MWh. As a

[19] MISO, Presentation at UVIG Forecasting Workshop, February 2013, *available at* http://www.uwig.org/slcforework/McMullen.pdf.
[20] MISO Exhibit 1.0 at 26.

percentage of the 2026 full RPS energy, 63% would be curtailed in lieu of the MVP portfolio."[21]

The MVP report also examined the amount of wind energy, in excess of the 2026 requirements, that would be enabled by the recommended MVP portfolio. It found that 2,230 MW of additional wind could be enabled, including 678.6 MW of wind in zone Illinois F. In total, "When the results from the curtailment analyses and the wind enabled analyses are combined, the recommended MVP portfolio enables a total of 41 million MWhs of renewable energy to meet the renewable energy mandates."[22]

B. How wind and transmission lower consumer costs by promoting the development of an effectively competitive electricity market that operates efficiently.

Q: What will be the benefits of the Illinois Rivers Project for Illinois consumers?

A: In his testimony, Mr. Frame reports that "The results of my analysis reported in ATXI Exhibit 9.4 show that the Project will lead to substantial reductions in payments by customers in the MISO Illinois region. Under the Business as Usual, Low Demand case, the present value of reductions in wholesale electric energy payments from the Project is $324.7 million (at a discount rate of 8.2 percent.) The present value of transmission payments for the Project is $119.6 million, resulting in a net reduction in energy payments by MISO Illinois region customers of $205.1 million (*i.e*., $324.7 million minus $119.6 million). Thus, there is roughly a three to one ratio of reduction in wholesale energy payments to Project payments."[23]

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[21] MVP Report, at 48.
[22] Id. at 49.
[23] ATXI Exhibit 9.0, at 17-18.

Q: What are the consumer benefits of the overall MVP projects?

A: MISO's MVP Report concluded that "The recommended MVP portfolio allows for a more efficient dispatch of generation resources, opening markets to competition and spreading the benefits of low cost generation throughout the MISO footprint."[24] As explained in the MVP Report, the total package of MVP projects will "Provide an average annual value of $1,279 million over the first 40 years of service, at an average annual revenue requirement of $624 million."[25] The MVP Report explains that benefits were found to exceed costs by a factor of 1.8 to 3.0. The MVP report calculates that the MVP portfolio will produce total net present value benefits of between $15.5 billion and $49.2 billion, and total benefits net of cost of between $6.8 billion and $32.8 billion.[26]

Q: What is the benefit-to-cost ratio in Illinois?

A: Benefits were found to exceed costs in a range of 1.8:1 to 2.8:1, as explained in the MVP Report.[27]

Q: What categories of benefits were included in MISO's analysis, and what range of net present value benefits were calculated for each?

A: As explained in WOW Exhibit 1.6, the categories of benefits identified in the MVP Report were as follows:[28]

Congestion and fuel savings: $12.4 billion to $40.9 billion
Operating reserves: $28 million to $87 million
System planning reserve margins: $1 billion to $5.1 billion
Transmission line losses: $111 million to $396 million
Wind turbine investment: $1.4 billion to $2.5 billion
Future transmission investment: $226 million to $794 million

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[24] MISO Report, page 50.
[25] Id. at page 1.
[26] Id. at page 50.
[27] Id. at page 7.
[28] Id. at Page 50.

Q: What are congestion and fuel savings?

A: This category captures the benefits of providing access to lower cost energy resources. Due to its zero fuel cost, wind energy bids into electricity markets at or near zero, driving the market clearing price down by displacing the most expensive generator that is currently dispatched. The benefit can be quite large, as many parts of the generation supply curve are quite steep.[29]

As explained in the MISO MVP Report, "These benefits were outlined through a series of production cost analyses, which captured the economic benefits of the recommended MVP transmission and the wind it enables. These benefits reflect the savings achieved through the reduction of transmission congestion costs and through more efficient use of generation resources…. The recommended MVP portfolio will produce an estimated $12.4 to $40.9 billion in 20 to 40 year present value adjusted production cost benefits, depending on the timeframe, discounts and growth rates of energy and demand."[30]

Q: Have other Illinois analyses found similar savings resulting from wind generation in the state?

A: Yes. An Illinois Power Agency report from 2012 concluded that: "Renewable resources, in particular wind, have played a dramatic role in reducing electric energy prices in Illinois and the entire Eastern Interconnection, as measured by the impact on Locational Marginal Prices (LMPs). Modeling work commissioned by the IPA and corroborated by similar findings in Massachusetts[31] suggests that for 2011, the integration of renewable resources into the power grid has lowered Illinois' average

[29] PÖyry, Wind Energy and Electricity Prices, at pages 11 and 12 http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/MeritOrder.pdf.
[30] MVP Report at 50.
[31] Recent Electricity Market Reforms in Massachusetts: A Report of Benefits and Costs, at 27-28 (July 2011), *available at* http://www.mass.gov/eea/docs/doer/publications/electricity-report-jul12-2011.pdf.

LMPs by $1.30 per mega-watt hour (MWh), from $36.40 to $35.10 per MWh. The aggregate result is a savings of $176.85 million in total load payment for generation in Illinois. While this does not directly translate to dollar for dollar savings in consumer bills for the same time period, due to the fact that utility consumers are served via a portfolio of resources of different vintage, it points out the magnitude of the benefits accruing to all consumers in lowered underlying electric energy cost drivers. Over time, the effect of lower LMPs due to growing renewable capacity will be reflected in procurement outcomes."[32]

Q: What are the operating reserve savings that totaled $28 million to $87 million?

A: The MVP Report explains the operating reserve savings as: "The recommended MVP portfolio decreases congestion on the system, increasing the transfer capability into several key areas that would otherwise have to hold additional operating reserves under certain system conditions.… This creates the opportunity to locate an average of 690,000 MWh of operating reserves annually where it would be most economical to do so, as opposed to holding these reserves in prescribed zones, creating benefits of $28 to $87 million in 20 to 40 year present value terms."[33]

Q: What are the system planning reserve margin savings that totaled $1 billion to $5.1 billion?

A: The MVP Report explains the system planning reserve margin savings as: "The recommended MVP portfolio reduces transmission congestion across MISO, thereby reducing the system PRM [planning reserve margin] and decreasing the amount of generation required to meet the

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[32] Illinois Power Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts, 2012 ("IPA Report"), at 3 (April 2012).
[33] MVP Report at 56.

PRM. By reducing the PRM, the recommended MVP portfolio defers new generation…"[34]

Q: What are the transmission line loss savings that totaled $111 million to $396 million?

A: The MVP Report explains the transmission line loss savings as: "The addition of the recommended MVP portfolio to the transmission network reduces overall system losses, which also reduces the generation needed to serve the combined load and transmission line losses. The energy value of these loss reductions is considered in the congestion and fuel savings benefits, but the loss reduction also helps to reduce future generation capacity needs. Specifically, when installed generation capacity is just sufficient to meet peak system load plus the planning reserve margin, a reduction in transmission losses reduces the amount of generation that must be built."[35]

Q: What are the wind turbine investment savings that totaled $1.4 billion to $2.5 billion?

A: The MVP Report explains the wind turbine investment savings as: "In the RGOS study, it was determined that 11 percent less wind would need to be built to meet renewable energy mandates in a combination local/regional methodology relative to a local only approach. This change in generation was applied to energy required by the renewable energy mandates, as well as the total wind energy enabled by the recommended MVP portfolio. This resulted in a total of 2.9 GW of avoided wind generation… The low cost wind siting methodology enabled by the recommended MVP portfolio creates benefits ranging from a present

[34] MVP Report at 58.
[35] Id. at 62.

value of $1.4 to $2.5 billion in 2011 dollars, depending on which business case assumptions are applied."[36]

Q: What are the future transmission investment savings that totaled $226 million to $794 million?

A: The MVP Report explains the future transmission savings as: "The recommended MVP portfolio eliminates the need for baseline reliability upgrades on 23 lines between 2026 and 2031. This creates benefits which have 20 and 40 year present values of $268 and $1,058 million, respectively."[37]

Q: Can factors change the value of these benefits?

A: Yes, hence the ranges included in MISO's estimates of the benefits of the MVP portfolio and the Illinois Rivers Project. MISO analyzed future policy scenarios and found that under policy scenarios other than "Business as Usual," the benefits of the MVP portfolio would be even larger. As noted in the MVP Report, production cost benefits alone could total up to $91.7 billion under other policy scenarios.[38] Under policy scenarios that include new environmental regulations, such as potential greenhouse gas emission regulations, consumers would see significant benefit from transmission projects to connect wind plants because those projects would reduce the cost of compliance.

Q: Does transmission help to hedge against uncertainty and protect consumer from risk?

A: Yes. Transmission is an important mechanism to protect consumers against unpredictable volatility in the price of fuels used to produce electricity. Transmission can alleviate the negative impact of fuel price fluctuations on consumers by making it possible to buy power from other

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[36] MVP Report at 66.
[37] Id. at 68.
[38] MVP Report at 50.

regions and move it efficiently on the grid. This increased flexibility in itself helps to modulate swings in fuel price, as it makes demand for fuels more responsive to price as utilities are able to respond to price signals by decreasing use an expensive fuel and instead importing cheaper power made from other sources.

Wind generation itself also provides significant hedging value against fuel prices fluctuations, so the hedging benefit of transmission is even larger for transmission that connects new wind generation, such as the Illinois Rivers Project. A recent Lawrence Berkeley National Laboratory report concluded that “Comparing the wind PPA sample to the range of long-term gas price projections reveals that even in today’s low gas price environment, and with the promise of shale gas having driven down future gas price expectations, wind power can still provide long-term protection against many of the higher-priced natural gas scenarios contemplated by the EIA.”[39]

Going forward, a robust transmission grid can provide valuable protection against a variety of uncertainties in the electricity market. Fluctuations in the price of fossil fuels are likely to continue, particularly if the electric sector becomes more reliant on natural gas. Further price risk associated with the potential enactment of environmental policies place a further premium on the flexibility and choice provided by a robust transmission grid. As a result, transmission should be viewed as a valuable hedge against uncertainty and future price fluctuations for all consumers.

[39] Lawrence Berkeley National Laboratory, Revisiting the Long-Term Hedge Value of Wind Power in an Era of Low Natural Gas Prices, March 2013, page i, at http://emp.lbl.gov/sites/all/files/lbnl-6103e.pdf

Q: How does transmission ensure competitive electricity markets?

A: Transmission infrastructure is also a powerful tool for increasing competition in wholesale power markets and reducing the potential for generators to harm consumers by exercising market power. Just as consumers who have access to one local retailer and lack high quality roads to easily access stores in other regions would be at the mercy of the prices charged by that retailer, a weak grid makes it possible for generation owners in constrained sections of the grid to exert market power and charge excessive prices. In any market, the more supply options that are available to an area, the less likely it is that any one of those suppliers will be in a position to exert market power.

In Order 890, FERC explained how transmission constraints can restrict electricity market competition, discussing how those with incumbent generating assets "can have a disincentive to remedy transmission congestion when doing so reduces the value of their generation or otherwise stimulates new entry or greater competition in their area. For example, a transmission provider does not have an incentive to relieve local congestion that restricts the output of a competing merchant generator if doing so will make the transmission provider's own generation less competitive."[40]

Q: Have other studies documented the benefits of transmission?

A: Several analyses by Charles River Associates ("CRA"), International quantified the value of these broad-based benefits. One study looked at an investment in a high-voltage transmission overlay to access wind resources in Kansas, Oklahoma, and Texas. It concluded the transmission investment would provide economic benefits of around $2

[40] FERC Order 890 at page 238, *available at* http://www.ferc.gov/whats-new/comm-meet/2007/021507/E-1.pdf

billion per year for the region, more than four times the $400-500 million annual cost of the transmission investment.[41] $900 million of these benefits would be in the form of direct consumer savings on their electric bills, with $100 million of these savings coming from the significantly higher efficiency of high-voltage transmission, which would reduce electricity losses by 1,600 GWh each year. The remainder would stem from reduced congestion on the grid allowing customers to obtain access to cheaper power.

Similarly, CRA's analysis of the proposed Green Power Express, which would connect 17 GW of wind to the grid in the MISO region, found that the transmission plan would yield benefits of $4.4 to $6.5 billion per year for the region (in 2008 dollars), well above the annualized cost of the transmission, estimated to be between $1.2 billion and $1.44 billion.[42] In his affidavit, Mr. Stoddard with Charles River Associates noted that "I have confirmed with Dr. Shavel that these energy cost savings are widely dispersed through the study Region, but this conclusion is logically necessary: considering the small amount of load located in the upper Great Plains, savings of this order of magnitude could only be realized if the combination of lowered energy prices in the major load centers to the east."[43]

In addition, a May 2012 report by Synapse Energy Economics found that adding 20 to 40 GW of wind energy and the accompanying transmission

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[41] CRA International, First Two Loops of SPP EHV Overlay Transmission Expansion: Analysis of Benefits and Costs (September 26, 2008) *available at* http://www.crai.com/uploadedFiles/RELATING_MATERIALS/Publications/BC/Energy_and_Environment/files/Southwest%20Power%20Pool%20Extra-High-Voltage%20Transmission%20Study.pdf.

[42] FERC Docket ER09-1431, Protest of NextEra Energy Resources, LLC, Iberdrola Renewables, Inc., Mesa Power Group, LLC, Horizon Wind Energy LLC, Enxco, Inc., Acciona Wind Energy USA LLC, GE Energy, Vestas Americas and the National Resources Defense Council. Affidavit of Robert Stoddard, page 4, *available at* http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12111601

in the MISO region would save a typical household between $63 and $200 per year.[44] As illustrated in WOW Exhibit 1.9, this report found that electricity market prices decrease drastically as more wind capacity is added to the MISO system. As the report explains, "Since wind energy "fuel" is free, once built, wind power plants displace fossil-fueled generation and lower the price of marginal supply—thus lowering the energy market clearing price."[45]

Q: In addition to the IPA report's finding that wind has reduced Illinois LMPs from $36.40 to $35.10/MWh, have other studies documented the tendency of wind energy to reduce electricity market prices?

A: Yes. A European literature review identified a number of studies that have found wind energy tends to drive electricity market prices downward.[46] As that report explains, "Wind power normally has a low marginal cost (zero fuel costs) and therefore enters near the bottom of the supply curve. Graphically, this shifts the supply curve to the right, resulting in a lower power price, depending on the price elasticity of the power demand…. When wind power reduces the spot power price, it has a significant influence on the price of power for consumers. When the spot price is lowered, this is beneficial to all power consumers, since the reduction in price applies to all electricity traded – not only to electricity generated by wind power." In addition, a 2009 analysis for the New York State Energy Research and Development Authority (NYSERDA) found that each MWh of renewable energy produced in the state resulted in $100 worth of

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[43] Id.

[44] Synapse Energy Economics, Inc., The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region, at page 3 (May 22, 2012) http://cleanenergytransmission.org/wp-content/uploads/2012/05/Full-Report-The-Potential-Rate-Effects-of-Wind-Energy-and-Transmission-in-the-Midwest-ISO-Region.pdf

[45] Id.

[46] PÖyry, Wind Energy and Electricity Prices, at pages 11 and 12 http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/MeritOrder.pdf.

consumer savings on electric bills.[47] An analysis in Massachusetts found that the benefits of the state's renewable initiatives "that accrue to electric customers are nearly two and half times greater than $1.1 billion cost of implementing these initiatives."[48]

Q: Have other utilities and states noted the consumer benefits of wind energy?

A: Yes. In early 2012, American Electric Power subsidiary Southwestern Electric Power Co. (SWEPCO) signed long-term power purchase agreements for a total of 358.65 MW from wind projects in Texas, Oklahoma and Kansas. SWEPCO said in a news release that it estimated an average decrease in cost to its customers of about 0.1 cents per kilowatt-hour over a 10-year period starting in 2013.[49]

As another example, Alabama Power, a subsidiary of Southern Company, has made several wind power purchase. John Kelley, Director of Forecasting and Resource Planning, explained that "These agreements are good for our customers for one very basic reason, and that is, they save our customers money."[50]

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[47] New York State Energy Research and Development Authority, New York Renewable Portfoliio standard Program Evaluation Report, 2009, at 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.

[48] Recent Electricity Market Reforms in Massachusetts: A Report of Benefits and Costs, at 29 (July 2011), *available at* http://www.mass.gov/eea/docs/doer/publications/electricity-report-jul12-2011.pdf.

[49] AEP Southwestern Electric Power Company, AEP SWEPCO Signs Wind Power Purchase Agreements for 359 Megawatts, (1/25/2012). https://www.swepco.com/info/news/ViewRelease.aspx?releaseID=1183

[50] Alabama Power, Alabama Power among leaders in SE in wind power, October 2012, *available at* http://www.youtube.com/watch?v=6q6Q0_C1SX0 at 2:25

3. Transmission lowers REC costs for Illinois consumers by facilitating an effectively competitive electricity market that operates efficiently

Q: What are the requirements for a REC to satisfy Illinois' RPS?

A: Renewable energy or a REC used for compliance with the Illinois RPS must come from Illinois or an adjoining state, which would be Iowa, Missouri, Wisconsin, Indiana, or Kentucky.

Q: What happens if sufficient RECs are not available from those states?

A: If the RPS requirement cannot be met with renewable energy or RECs from those states, the price of compliance RECs will go up. If the price increases to the point that the specified benchmark/cost cap set by the Illinois Commerce Commission is reached,[51] then renewable energy or REC's bid from states that do not border Illinois can be used to meet the RPS requirement. However, so far the cost of compliance RECs has been well below the benchmark/cost cap, as documented when the Illinois Power Agency report notes that "The purchases represent a low of 0.05% to a high of 0.83% of the total rates paid for electricity."[52]

Q: What is the likely impact of the Illinois Rivers Project on the cost of complying with the Illinois RPS?

A: As explained in the MISO MVP Report, the Illinois Rivers Project "will provide an outlet for wind generation in the western region to move toward

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[51] The cost cap is set according to the following rules, as explained on the Database of State Incentives for Renewables and Efficiency, *available at* http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL04R . "Renewable energy procurement is limited to "cost-effective" resources. There are two tests to determine cost-effectiveness. … [After 2008] the cost is limited to the greater of 2.015% of the amount per kWh paid in 2007, or the incremental amount paid in 2011. The Illinois Commerce Commission (ICC) is to review the cap in 2011 and report to the General Assembly if it "unduly constrains the procurement of cost-effective renewable energy resources." The second test of cost-effectiveness (established in the Public Act 095-1027) is that cost of procuring renewable resources must not exceed benchmarks based on market prices for renewable energy resources in the region, where the IPA procurement administrator will determine the benchmarks."

[52] Illinois Power Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts(April 2012), at 3.

the more densely populated load centers to the east."[53] More specifically, the project is designed to facilitate wind development in Illinois, Iowa, and Missouri, and deliver that wind energy to load centers in Illinois. Because wind energy generated in these three states is eligible for satisfying compliance with the Illinois RPS, the additional supply will tend to lower the price of renewable energy or RECs that vie for renewable energy contracts with utilities or ARES in Illinois. Because the cost of RPS compliance has remained well below the benchmark/cost cap, we will assume that this trend continues. As a result, lower renewable energy and REC prices will lower the cost of compliance with the Illinois RPS.

This is not surprising, as the Illinois Rivers Project was designed by MISO as part of a portfolio to satisfy state RPS requirements at the lowest cost for consumers. As the MISO MVP report explains, "The goal of the RGOS analysis was to design transmission portfolios that would enable RPS mandates to be met at the lowest delivered wholesale energy cost."[54]

Q: Please describe the current status of the Illinois REC market, including REC prices in recent years?

A: As explained in the Illinois Power Agency report,[55] for the period June 2009-May 2012, the average cost of compliance RECs for the Ameren territory was 0.623 cents/kwh, or $6.23/MWh. Prices ranged from a high of $15.86/MWh in June 2009-May 2010, to a low of $0.92/MWh in June 2011-May 2012. Similar data are reported for ComEd, with a three year average of $7.43/MWh and prices ranging from a high of $19.27/MWh in June 2009-May 2010, to a low of $0.95/MWh in June 2011-May 2012.[56] By reducing these prices even further, the Illinois Rivers Project will lower the cost of compliance with the Illinois RPS, benefiting Illinois consumers.

[53] MVP Report at 33 and 35.
[54] MVP Report at 3.
[55] Illinois Power Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts(April 2012), at 15 and 16

Q: What is the future demand for RECs in the states that border Illinois, and how will this affect REC prices in Illinois?

A: WOW Exhibit 1.10 displays AWEA's analysis of the incremental demand for wind energy that is likely to be created by the RPS requirements for states within the MISO and PJM footprint. These results indicate that there is significant demand for RECs in the states that make up both the MISO and PJM markets. Many PJM states, with the notable exception of Ohio,[57] have RPS requirements that allow renewable energy delivered anywhere within the PJM footprint to qualify. As a result, RPS requirements in states distant from Illinois, not just states adjacent to Illinois, can affect the market for RECs that are eligible for compliance with the Illinois RPS. RPS requirements in Missouri and Wisconsin are also likely to limit the quantity of RECs from those states that will be available to meet the Illinois RPS. Given the amount that RPS demand will exceed existing supply, the Illinois Rivers Project can play an important role in increasing the supply of wind energy from Illinois and adjacent states, helping to keep the cost of compliance with the Illinois RPS low and facilitating an effectively competitive electricity market that operates efficiently.

4. The benefits of transmission are equitably allocated

Q: Is the equitable allocation of benefits a requirement for a transmission project to be included in the MISO MVP portfolio?

A: Yes. The MVP Report explains that "A key principle of the MISO planning process is that the benefits from a given transmission project must be spread commensurate with its costs. The MVP cost allocation methodology distributes the costs of the portfolio on a load ratio share

[56] WOW Exhibits 1.7 and 1.8.
[57] Ohio's RPS requires that "At least 50% of the renewable energy requirement must be met by in-state facilities, and the remaining 50% with resources that can be shown to be deliverable into the state." Documented on the Database of State Incentives for Renewables and Efficiency at http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH14R.

across the MISO footprint, so the recommended MVP portfolio must be shown to deliver a similar spread of benefits."[58]

Q: MISO's policy of broadly allocating MVP project costs was approved by Federal Energy Regulatory Commission ("FERC"). Does FERC have any conditions on how transmission costs should be allocated?

A: Yes. FERC requires costs to be allocated in a way that is reasonably commensurate with the benefits of a transmission project. In approving MISO's MVP cost allocation proposal, FERC indicated that it views the benefits of MVP transmission to be broadly and equitably distributed, hence why it approved a cost allocation methodology that broadly and evenly allocates the cost of MVP projects to all consumers in the MISO footprint. Specifically, FERC noted in its Order that "We find that the MVP methodology will identify projects that provide regional benefits and allocate the costs of those projects accordingly,"[59] noting that "the process allows Midwest ISO flexibility to move forward MVPs in appropriate numbers, at appropriate times, in order to maximize regional benefits and to ensure that the costs of each portfolio are widely and fairly distributed."[60]

Q: Has MISO conducted analysis to determine how equitably distributed the benefits of MVP transmission will be?

A: Yes. As explained in the MVP Report, "Each economic business case metric calculated for the full recommended MVP portfolio was analyzed to determine how it would accrue to stakeholders across the footprint. These results were then rolled up to a zonal level, based on the proposed Local Resource Zones for Resource Adequacy. This level of detail was chosen

[58] MVP Report at 84**.**
[59] Docket ER-10-1791-000, FERC Order at 5 (December 16, 2010), *available at* http://www.ferc.gov/whats-new/comm-meet/2010/121610/E-1.pdf.
[60] Id. at 74, *available at* http://www.ferc.gov/whats-new/comm-meet/2010/121610/E-1.pdf.

to provide stakeholders with an understanding of the benefits spread, without getting into a detail level which may be falsely precise due to the impact of individual stakeholder actions on actual benefit spreads."[61]

Across the zones, the benefit-cost results are remarkably consistent, further indicating that the benefits of MVP transmission are broadly and equitably allocated.

Q: Do higher-voltage, higher-capacity transmission lines tend to see more equitable distribution of their benefits?

A: Yes. This is inherent for high-capacity transmission lines due to the large amount of energy they are carrying that will provide price-reducing benefits across a large area, and the related fact that high-capacity lines resolve transmission constraints across a large geographic area. FERC noted this fact in approving MISO's proposed cost allocation policies for MVP projects and other lines, noting that "the 100 kV voltage criterion that we are accepting, together with the three functional criteria and the $20 million minimum project cost requirement associated with MVP facilities, lends assurance that the facility's benefits will be of sufficient size and scope to be material to the Midwest ISO region as a whole."[62]

Q: Has MISO examined the economic development benefits of the MVP projects?

A: Yes. MISO's MVP Report estimates that "The recommended MVP portfolio supports the creation of between 17,000 and 39,800 local jobs,[63] as well as $1.1 to $9.2 billion in local investment. This calculation is based

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[61] MVP Report at 84.
[62] Commission Order, Docket No. ER10-1791, December 2010, at pages 83-84, *available at* http://www.ferc.gov/whats-new/comm-meet/2010/121610/E-1.pdf .
[63] MISO notes that its job creation estimates are derived from The Brattle Group, Employment and Economic Benefits of Transmission Infrastructure Investment in the U.S. and Canada, May

upon a creation of $0.3 to $1.9 million local investment and 3 to 7 employment years per million of transmission investment. It also assumes that the capital investment for each MVP occurred equally over the 3 years prior to the project's in-service date."[64]

Q: How are the economic development benefits of transmission and wind development typically distributed?

A: Economic development benefits are typically broadly spread around the project area, as indirect economic impacts spread the economic impact beyond local areas and industries that are directly receiving. In addition, the manufacturing jobs associated with building the components of the transmission and wind infrastructure would be broadly distributed around the state as well. The Department of Energy's 2008 report, "20% Wind Energy by 2030," found that the manufacturing jobs associated with deploying large amounts of wind would be broadly distributed across the entire country.[65]

Q: Are there other benefits of building transmission, and how are they distributed?

A: The economic analyses discussed above did not even attempt to quantify some of the most broadly distributed benefits of building the wind and transmission. For example, using larger amounts of wind energy offsets the use of natural gas for electricity production, reducing natural gas prices for all natural gas consumers. DOE's analysis of a proposed 15% federal RPS found that such a policy would reduce consumer natural gas expenditures by a cumulative $1 billion between 2005 and 2030, though

2011, page ii, *available at* http://www.wiresgroup.com/images/Brattle-WIRES_Jobs_Study_May2011.pdf.

[64] MVP Report at 78.

[65] U.S. Dep't of Energy, 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply at Page 208 (Appendix C) (2008), *available at* http://www.20percentwind.org/ .

[66] U.S. Dep't of Energy, "Impacts of a 15-Percent Renewable Portfolio Standard," June 2007, *available at* ftp://ftp.eia.doe.gov/service/sroiaf%282007%2903.pdf, at page v.

notably that was working from higher natural gas prices so the savings at today's gas prices would likely be somewhat lower.[66] These benefits would accrue not just to electricity consumers who benefit from having electricity produced from lower priced natural gas, but also to homeowners using gas for heating, chemical factories using it as a feedstock, and farmers buying fertilizer made from natural gas, just to name a few.

Another benefit of wind that is broadly distributed is wind's role in offsetting water consumption at other forms of electricity generation. Because wind energy requires virtually zero water, while most conventional forms of electricity generation consume hundreds of gallons of water per MWh produced, the DOE report mentioned above found that achieving 20% wind would save 4 trillion gallons through the year 2030.[67] These water savings would produce broadly spread benefits, as all people consume water. These benefits would be particularly large in an agricultural state like Illinois, and the benefit of reduced costs for producing food and other agricultural products would benefit all consumers.

Q: Does this conclude your testimony?

A: Yes.

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[66] U.S. Dep't of Energy, "Impacts of a 15-Percent Renewable Portfolio Standard," June 2007, *available at* ftp://ftp.eia.doe.gov/service/sroiaf%282007%2903.pdf, at page v.
[67] U.S. Dep't of Energy, 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply at 16 (Executive Summary) (2008), *available at* http://www.20percentwind.org/ .

Exhibits 1.1 through 1.10:

Exhibit 1.1: NREL wind resource assessment map of the U.S., *available at* http://www.nrel.gov/wind/resource_assessment.html as of March 26, 2013, downloaded by Michael S. Goggin.

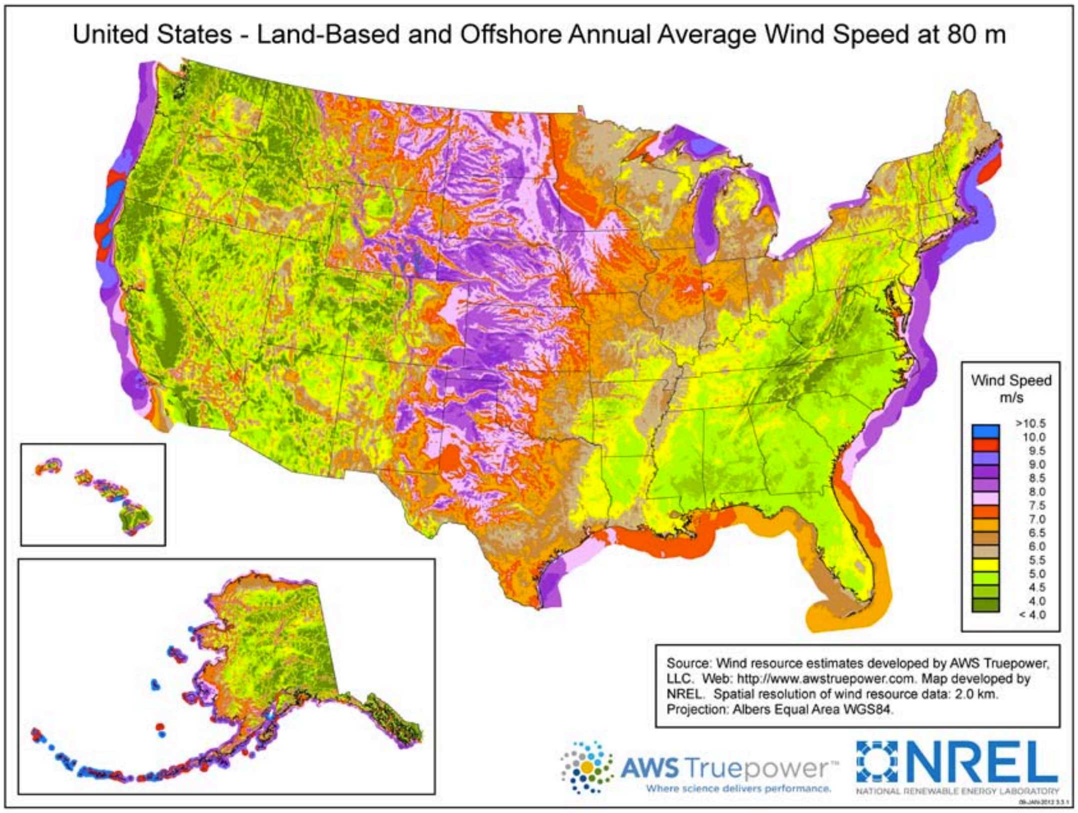
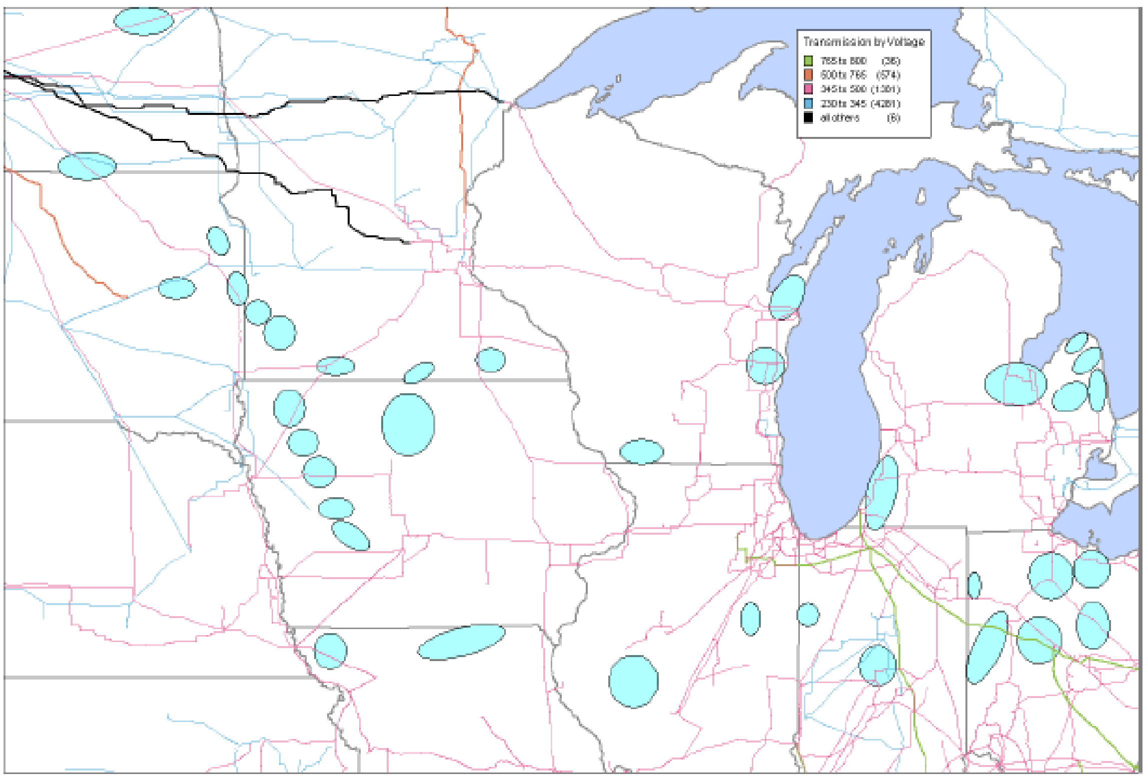
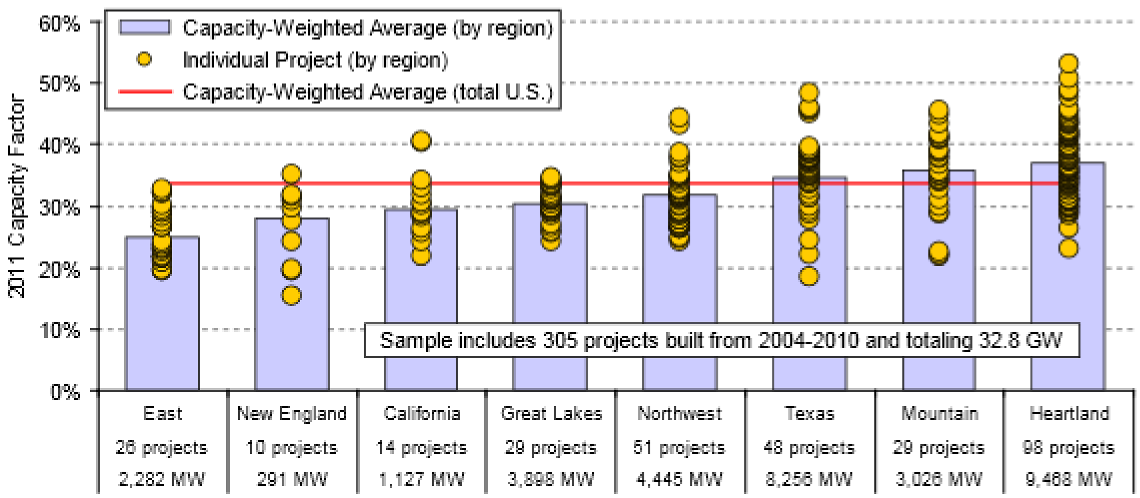


Exhibit 1.2: RGOS wind resources zones, overlaid on existing transmission system, from MVP report[68]



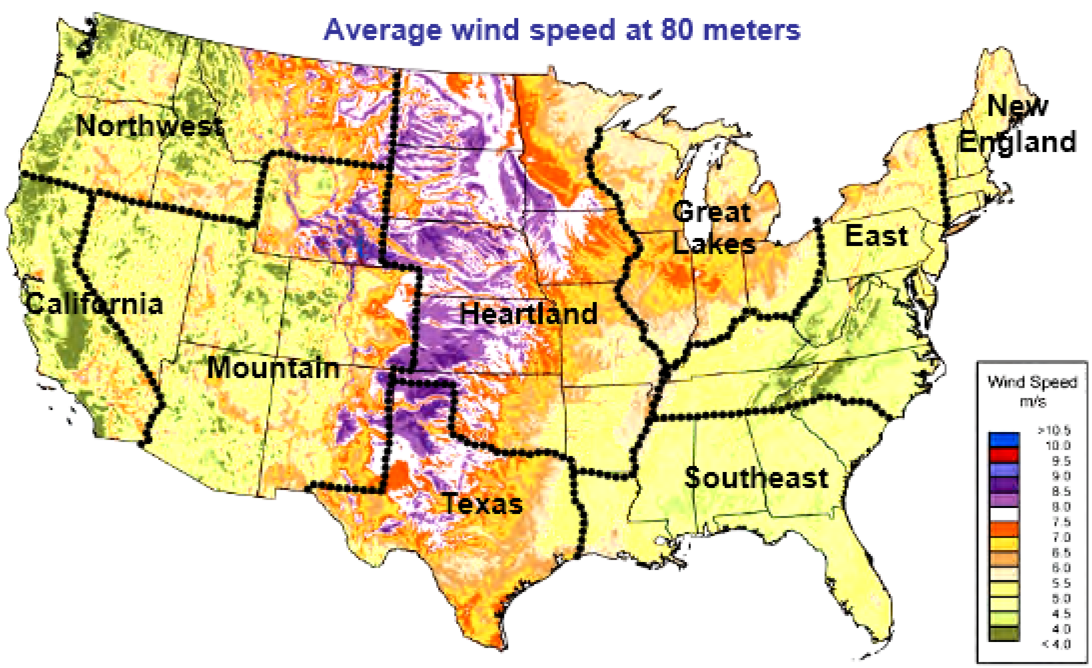
[68] MVP Report at 18.

Exhibit 1.3: Capacity factor by region, from Lawrence Berkeley National Laboratories, 2011 Wind Technologies Report, fig. 29 at 46 (August 2012) http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf



Source: Berkeley Lab

Exhibit 1.4: Region breakdown overlaid on wind speed map, from Lawrence Berkeley National Laboratories, 2011 Wind Technologies Report, fig. 30 at 46 (August 2012) http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf



Source: AWS Truepower, NREL

Exhibit 1.5: Wind PPA price by region, from Lawrence Berkeley National Laboratories, 2011 Wind Technologies Report, fig. 35 at 53 (August 2012) http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf

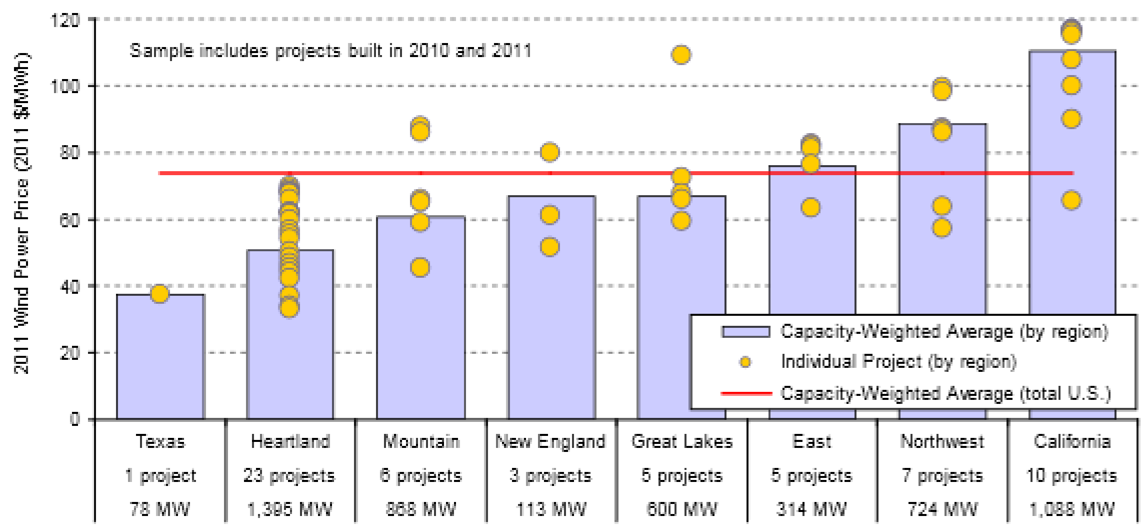


Exhibit 1.6: Cost and benefits of MVP portfolio, by category; from MISO Multi Value Project Portfolio: Results and Analyses ("MVP Report"), fig. 8.1 at 50 (January 10, 2012)

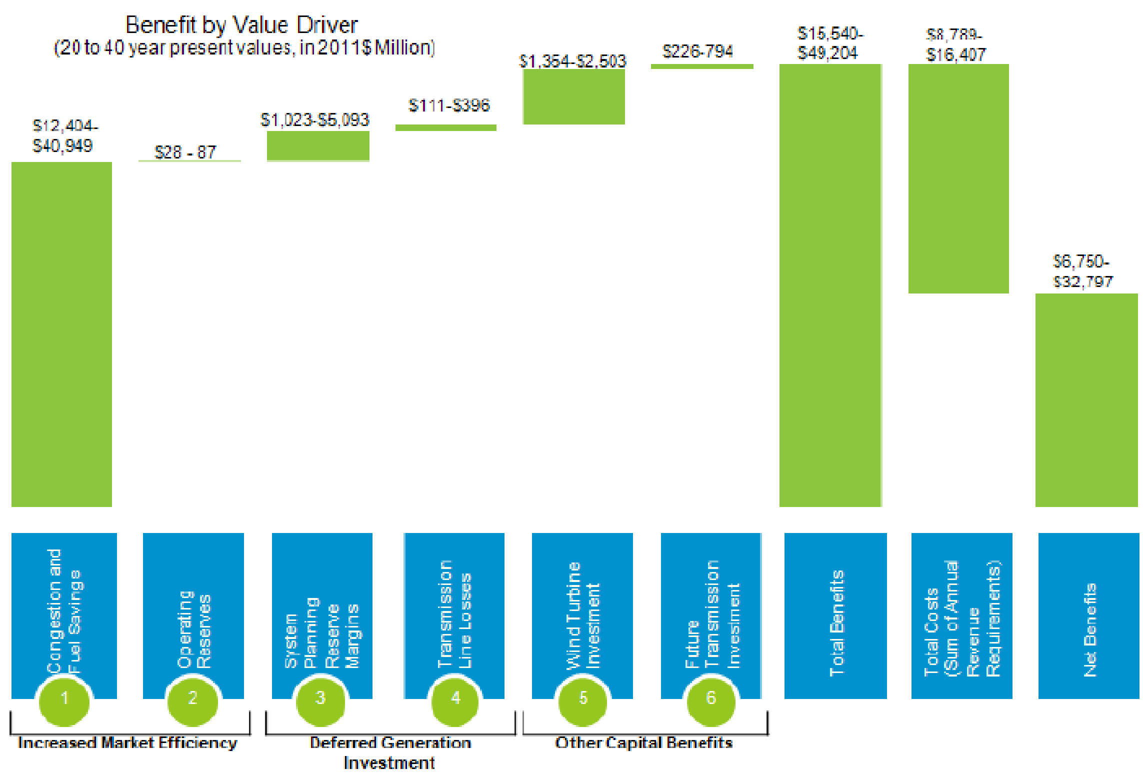


Exhibit 1.7: Cost of RECs for Ameren, from Illinois Power Agency report

Delivery Year	Avg. Cost of RECs Procured by IPA in the Delivery Year (¢/kWh)	Avg. Cost of Conventional Supply Procured by IPA in the Delivery Year[45] (¢/kWh)
June 2009 – May 2010	1.586	3.682
June 2010 – May 2011	0.405	3.114
June 2011 – May 2012	0.092	3.234
June 2009-May 2012[46]	**0.623**	**3.378**
2010 LTPPA[47]	5.044	N/A
2012 Rate Stability[48]	0.343	2.951

Exhibit 1.8: Cost of RECs for ComEd, from Illinois Power Agency report

Delivery Year	Avg. Cost of RECs Procured by IPA in the Delivery Year (¢/kWh)	Avg. Cost of Conventional Supply Procured by IPA in the Delivery Year (¢/kWh)
June 2009 – May 2010	1.927	3.281
June 2010 – May 2011	0.488	3.344
June 2011 – May 2012	0.095	3.684
June 2009-May 2012[41]	**0.743**	**3.412**
2010 LTPPA[42]	5.518	N/A
2012 Rate Stability[43]	0.128	3.257

Exhibit 1.9: Electricity Market Prices Decline as Wind Capacity is Added, from Synapse Energy Economics, Inc., The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region, at 4 (May 22, 2012), available at http://cleanenergytransmission.org/wp-content/uploads/2012/05/Full-Report-The-Potential-Rate-Effects-of-Wind-Energy-and-Transmission-in-the-Midwest-ISO-Region.pdf

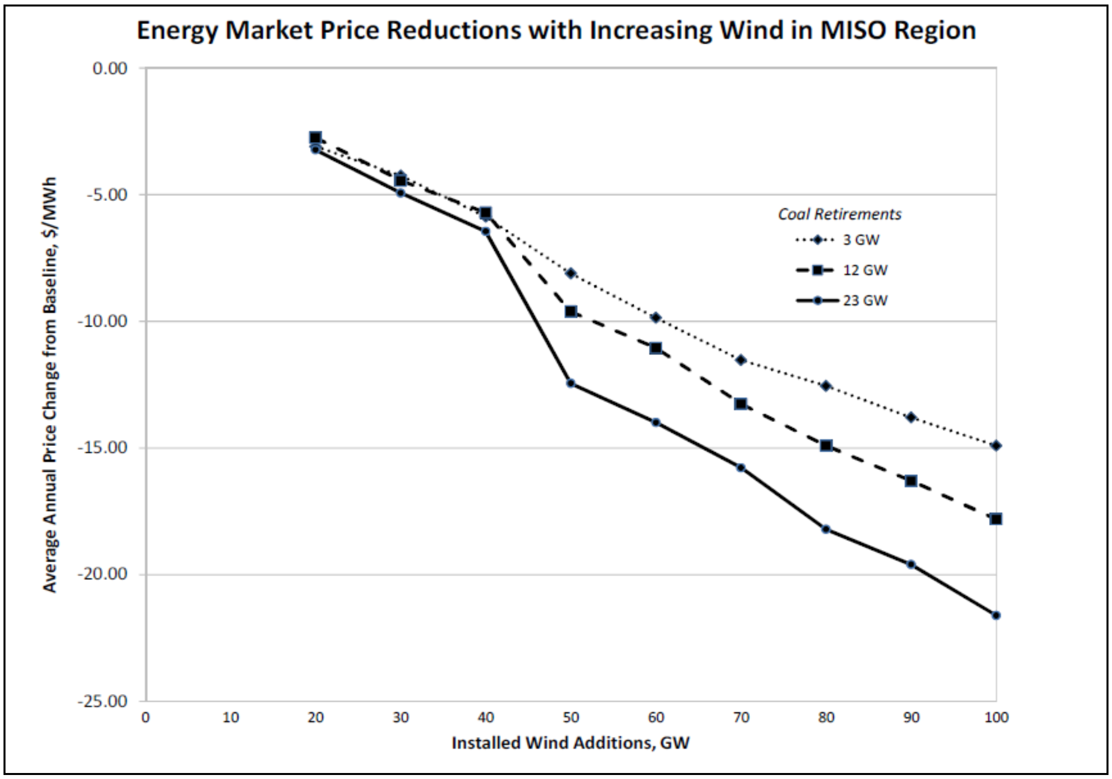


Exhibit 1.10: AWEA Estimates of Incremental Wind Capacity MW (beyond what is installed as of the end of 2012) that will be used to meet state RPS requirements in the year 2025, by state

State	Low Estimate	High Estimate
DC	300	400
DE	100	150
IL	3,000	4,000
MD	500	700
MI	500	1,000
MO	1,200	1,800
MN	1,000	1,500
NJ	1,400	1,800
OH	3,700	4,300
PA	500	700
WI	400	600