ILLINOIS COMMERCE COMMISSION

DOCKET NO. 12-0560

DIRECT TESTIMONY

OF

MICHAEL GOGGIN

SUBMITTED ON BEHALF OF:

WIND ON THE WIRES

June 25, 2013

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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 a Senior Electric Industry Analyst at 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 association representing a broad range of entities with a common interest in encouraging the development of reliable and environmentally-friendly wind energy resources in the Midwest. Wind on the Wires' members include wind 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 Rock Island Clean Line ("RICL") transmission project, further that interest by opening up those wind resources for development.

Q: What is the purpose of your testimony?

A: I provide facts supporting the finding that the RICL transmission project will allow greater amounts of low-cost wind energy resources to reach Illinois consumers, which promotes the development of an effectively competitive electricity market that operates efficiently by lowering the cost for meeting Illinois consumers' needs for electricity and reducing the price of renewable energy credits ("RECs"). I will also address how the benefits of the project will be allocated equitably to all consumers.

Q: Please outline your testimony.

A: First, I discuss how transmission projects such as the RICL project provide 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 RICL, are equitably allocated to consumers.

2. Transmission lowers electricity costs for consumers in Illinois

A. The role of the RICL project in delivering wind generation to Illinois consumers

Q: What is your understanding of the purpose of the RICL project?

A: As explained in the direct testimony of Mr. Skelly and other RICL officials,[1] the RICL project will provide Illinois consumers with significantly greater access to underutilized wind energy resources in Iowa, South Dakota, Nebraska, and Minnesota, in an area that RICL refers to as the Resource Area.

Q: Can you quantify the amount of wind resources available in Illinois and in the states near the Resource Area?

A: As indicated in the wind resource map in Wind on the Wires Exhibits 1.1 and 1.2, Iowa, South Dakota, Nebraska, and Minnesota 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, Iowa has 570,714 MW of developable wind energy resources, Nebraska has 917,999 MW, South

[1] Direct Testimony of Michael Skelly on behalf of Rock Island Clean Line, at 6 (Oct. 10, 2012).

Dakota has 882,412 MW, and Minnesota has 489,271 MW.[2] For comparison, Illinois has 249,882 megawatts ("MW") of developable wind energy resources.

NREL's data indicates that Iowa, South Dakota, Minnesota, and Nebraska have a combined wind energy potential of 2,860,000 MW, around 26 percent of the total onshore wind potential in the United 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.[3] In addition, NREL's database assumes that significant amounts of land would be excluded from wind energy development because it is currently used for other purposes.[4] Regardless, the data is clear that Iowa, South Dakota, Minnesota, and Nebraska have tremendous wind energy resources that far exceed the electricity demands of those states and Illinois.

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[2] NREL, Estimates of Windy Land Area and Wind Energy Potential, by State, for areas >=30% Capacity Factor at 80m ("NREL Wind Energy Estimates"), (April 13, 2011). The document can be found at: http://www.windpoweringamerica.gov/docs/wind_potential_80m_30percent.xls.
[3] Lawrence Berkeley National Laboratory, 2011 Wind Technologies Market Report, at 29 (August 2012) *available at* http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf.
[4] NREL Wind Energy Estimates

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, such as the RICL project.

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

A: As indicated in Wind on the Wires Exhibit 1.1, the quality of the wind resources is high across the region, though it is highest in Iowa, Minnesota, South Dakota, and Nebraska. 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 Wind on the Wires 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, Nebraska, 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[5] presented in WOW Exhibit 1.3, the average capacity factor for wind

[5] Lawrence Berkeley National Laboratory, 2011 Wind Technologies Market Report, at 46, Fig. 29.

projects recently installed in the "Heartland" region, which as indicated in Wind on the Wires 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%.

Another source that estimated wind capacity factors in the Midwest is the Midcontinent Independent System Operator ("MISO") Multi Value Project Report ("MVP Report"). It estimates a capacity factor of 28% for most of Illinois, versus 38% for South Dakota and most of Minnesota, and 36% for Iowa and part of Minnesota.[6]

In addition, NREL's wind resource database includes estimates of potential wind energy production for each state, in addition to potential installed wind capacity.[7] The potential wind production can be divided by the potential wind capacity to arrive at an estimated average capacity factor for the total wind energy resources in each state. According to that data, the Illinois wind resource has an estimated average capacity factor of 34.9%, while Iowa has a capacity factor of 40.5%, Minnesota 39.2%, Nebraska 44.0%, and South Dakota 44.1%.[8]

Finally, MISO's Renewable Generation Outlet Study ("RGOS") identified Northwest Iowa, Southwest Minnesota, and Eastern South Dakota, the wind resource area primarily interconnected by the RICL project, as

[6] MISO, Multi Value Project Portfolio: Results and Analyses, (MVP Report) at 84 (January 2012), *available at* https://www.misoenergy.org/Library/Repository/Study/Candidate%20MVP%20Analysis/MVP%20Portfolio%20Analysis%20Full%20Report.pdf.
[7] NREL Wind Energy Estimates.

having some of the best, most cost-effective wind energy resources across the MISO footprint. A map from the RGOS Report identifying the location of those wind zones is provided in Wind on the Wires Exhibit 1.2.

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

A: Capacity factor significantly affects the economics of wind generation. As indicated in Wind on the Wires 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 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.[9]

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[10] provides one indicator of wind project developers' interest in developing wind resources in the future. As of June 2013, the MISO interconnection queue includes 16,097 MW of proposed wind projects, including 1,804 MW of projects that are listed as "under construction." Currently, Illinois accounts for 1,523 MW of the

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[8] Id.
[9] MVP Report, at 65.
[10] https://www.midwestiso.org/Planning/GeneratorInterconnection/Pages/InterconnectionQueue.aspx (data downloaded on June 17, 2013, sorted to remove projects that have been withdrawn or placed in-service, and then sorted by state).

proposed wind projects in the MISO interconnection queue, including 274 MW of projects that are listed as under construction. Iowa currently has 3,956 MW in the queue, zero of which are listed as "under construction." Minnesota has 3,294 MW of proposed wind projects and South Dakota has 989 MW of proposed wind projects. The Southwest Power Pool ("SPP") maintains the interconnection queue for the state of Nebraska, and its queue indicates 1,659 MW of proposed wind projects with active interconnection applications in Nebraska.[11]

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.

Nevertheless, the large quantity of proposed wind energy development in MISOs and SPPs queues for Iowa, South Dakota, Minnesota, and Nebraska indicates that the RICL project will connect Illinois consumers with large quantities of economically viable wind energy resources and that there is significant interest in developing wind resources in those states. To the extent that transmission lines, such as RICL, can be built to access the potential wind development in the Resource Area states, those lines will enable the delivery of wind energy that will reduce electricity prices in Illinois and also deliver low cost wind resources from adjacent

[11] SPP Interconnection queue, as of June 24, 2013, *available at* https://studies.spp.org/SPPGeneration/GI_ActiveRequests.cfm.

states that can be used for compliance with the Illinois RPS, as further explained below.

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 Transmission Expansion Plan 2011 and the MVP Report, 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.[12] The resulting RGOS zones are identified in Wind on the Wires 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 with power purchase agreements to serve non-MISO load ascribed to each zone."[13]

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

A: Yes. AWEA's analysis indicates that at least 6,250 MWs of wind capacity will be needed to satisfy the requirements of the Illinois RPS through the

[12] MVP Report, at 4, *stating* "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."
[13] MVP Report, at 19.

year 2025, or approximately 3,000-4,000 MW of incremental wind capacity beyond that installed as of the end of 2012. Per the requirements of the Illinois RPS, that capacity must be installed in Illinois or adjacent states, unless resources from those areas do not meet the cost-effectiveness tests.[14] While it may appear that the 3,000-4,000 MW of incremental Illinois RPS demand would be fully satisfied by the wind energy delivered by RICL, it is important to understand that most states in PJM allow renewable energy delivered anywhere in the PJM footprint to qualify for compliance with their state RPSs. As a result, it is more appropriate to look at the much larger aggregate RPS demand of all PJM states that allow PJM footprint delivery, as is done later in my testimony.

In addition, variables that affect the amount of wind capacity actually needed to meet the RPS standard in Illinois and other states 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 and other renewable resources. As a result, the need for wind energy for RPS compliance could be higher or lower than indicated by these estimates. 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, Alternative Retail Electric suppliers ("ARES") are required 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.[15]

[14] 220 ILCS 3855/1-75(c)(1).The cost cap and other provisions of the Illinois RPS are also explained by the Database of State Incentives for Renewables and Efficiency, *available at* http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL04R.

[15] 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 RICL project?

A: As documented in the direct testimony of David Berry, the county in Iowa where RICL's western terminal will be located and the eight surrounding counties (the "Resource Area") possess 45,000 MW of wind resources with the potential to produce wind energy with capacity factors of 40% or higher, as documented by the NREL wind resource dataset.[16] Mr. Berry also states that he is aware of 15 wind developers with wind projects in the development phase in the Resource Area.[17]

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: Is it common for transmission development to precede wind development?

A: Yes. AWEA has consistently pointed out that a major difficulty in coordinating wind and transmission development is the mismatch between the relatively short amount of time required to develop a wind project versus the longer time period required to develop a transmission

[16] Direct testimony of David Berry on behalf of Rock Island Clean Line, at 5 (October 10, 2012).
[17] Id. at 11

project.[18] Transmission development that pro-actively plans transmission to interconnect areas with high wind resource areas before wind projects have been built has been recognized as an essential aspect of bringing wind to market.[19] Examples include the Competitive Renewable Energy Zone lines in Texas,[20] which are expected to be completed by the end of this year, and the Regional Generator Outlet Study in MISO,[21] which developed the plan for many of the Multi-Value Projects that have been approved by MISO's Board.

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

A: As the NREL data in Wind on the Wires Exhibit 1.1 indicates, the RICL Resource Area possesses wind resources that are many times greater than its electricity demand, so making use of these wind energy resources requires transmission to move that energy to load centers elsewhere. South Dakota and Nebraska are on the western edge of the Eastern Interconnection, so economically viable opportunities to move that energy westward to load centers are virtually non-existent. Areas to the south of Nebraska also have very large wind energy resources and relatively low electricity demand, so delivering the wind energy to those states is not a viable solution. Given the large electricity demand in Illinois and the state's geographic proximity to these high quality wind energy resources, building

[18] American Wind Energy Association and Solar Energy Industries Association ("SEIA"), Green Power Superhighways, (February 2009) *available at* http://www.awea.org/documents/issues/upload/GreenPowerSuperhighways.pdf.
[19] *See generally*, FERC, Order 1000, at ¶¶ 2, 3, 6, 29, 38, 45, *available at* http://www.ferc.gov/whats-new/comm-meet/2011/072111/E-6.pdf.
[20] Electric Reliability Council of Texas ("ERCOT"), Competitive Renewable Energy Zones (CREZ) Transmission Optimization Study, (April 2008), attachment as part of ERCOT filing with the Public Utilities Commission of Texas, *available at* http://pbadupws.nrc.gov/docs/ML0914/ML091420467.pdf.
[21] MISO, Regional Generation Outlet Study, *available at* https://www.midwestiso.org/Planning/Pages/RegionalGenerationOutletStudy.aspx.

transmission to deliver these wind energy resources to the state is an ideal solution.

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

Q: What impact will RICL have on Illinois electricity prices?

A: As explained in Mr. Moland's Exhibit 3.3, under the Business as Usual scenario, RICL will reduce the total cost of Illinois's electricity demand by $320 million in the year 2016 and $242 million in the year 2020.[22] The 2016 savings represent a 4.6% reduction in Illinois's total electricity costs, and the 2020 savings represent a reduction of 2.7%. The 2016 savings were estimated to be $249 million in the Slow Growth scenario, and nearly $500 million in both the Robust Economy and Green Economy scenarios. The 2020 savings were estimated to be $179 million in the Slow Growth scenario, $289 million in the Robust Economy scenario, and $93 million in the Green Economy scenario. These savings resulted from calculated Locational Marginal Price reductions of $2.56/MWh for PJM Illinois and $0.28/MWh for MISO Illinois in 2016, and 2020 reductions of $1.69/MWh in PJM Illinois and $0.37 in MISO Illinois, all in the Business As Usual scenario.

Q: Are you aware of any reports that analyze or describe wind energy's impact on electricity prices in Illinois?

A: Yes. An Illinois Power Agency report from 2012 concluded that: "Renewable resources, in particular wind, have helped reduce 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

[22] Direct Testimony of Gary Moland on behalf of Rock Island Clean Line, Exhibit 3-3 (October 10, 2012).

Massachusetts[23] suggests that for 2011, the integration of renewable resources into the power grid had lowered Illinois' average LMPs by $1.30 per megawatt hour, from $36.40 to $35.10 per MWh. The aggregate result could have been a savings of as much as $176.85 million in total load payment for generation in Illinois. Legacy hedge contracts serve to reduce the benefit of these LMP reductions to current utility ratepayers. In particular, when utility load is over-hedged (for instance, as a consequence of load departure), utility ratepayers are effectively selling energy and the LMP reduction detracts from their revenue. Still, this points out the magnitude of the benefits accruing to all consumers from lowered underlying electric energy cost drivers. Over time, the effect of lower LMPs due to growing renewable capacity will be reflected in procurement outcomes."[24]

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.[25] 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

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[23] 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.

[24] Illinois Power Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts, 2013, ("2013 IPA Report"), at 3-4 (March 2013) *available at*, http://www2.illinois.gov/ipa/Documents/201304-IPA-Renewables-Report.pdf.

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 consumer savings on electric bills.[26] 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."[27] Finally, a recent analysis in PJM found that doubling the use of wind energy beyond existing RPS requirements would produce net savings for consumers of $6.9 billion per year.[28]

Q: Have other utilities 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.[29]

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[25] PÖyry, Wind Energy and Electricity Prices, at pages 11 and 12 http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/MeritOrder.pdf.
[26] New York State Energy Research and Development Authority, New York Renewable Portfolio standard Program Evaluation Report, 2009, *available 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.
[27] 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.
[28] Synapse Energy Economics, The Net Benefits of Increased Wind Power in PJM, (May 2013), *available at* http://cleanenergytransmission.org/uploads/EFC%20PJM%20Final%20Report%20May%209%20 2013.pdf.
[29] AEP Southwestern Electric Power Company, AEP SWEPCO Signs Wind Power Purchase Agreements for 359 Megawatts, (1/25/2012), *available at* https://www.swepco.com/info/news/ViewRelease.aspx?releaseID=1183

As another example, Oklahoma Gas and Electric estimates that a single wind project will save Arkansas customers $46 million.[30]

As a final example, Alabama Power, a subsidiary of Southern Company, has made several recent wind power purchases. 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."[31]

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 regions and move it efficiently on the grid. This increased flexibility 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 price fluctuations, so the hedging benefit of transmission is even larger for transmission that connects new wind generation, such as the RICL 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

[30] Direct Testimony of Gregory W. Tillman before the Arkansas Public Service Commission, (August 2012), *available at* http://www.apscservices.info/pdf/12/12-067-u_2_1.pdf.
[31] 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.

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 [United States Energy Information Administration]."[32]

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.

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

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

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."[33]

Q: What studies of the benefits of transmission shape your opinion?

A: Several analyses by Charles River Associates ("CRA"), International have 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 billion per year for the region, more than four times the $400-500 million annual cost of the transmission investment.[34] $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 gigawatt-hours ("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 gigawatt ("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

[33] FERC Order 890 at ¶422, *available at* http://www.ferc.gov/whats-new/comm-meet/2007/021507/E-1.pdf

[34] 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_Enviro

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.[35] In his FERC affidavit presenting those results, Mr. Stoddard with CRA 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."[36]

In addition, a May 2012 report by Synapse Energy Economics found that adding 20 to 40 GW of wind energy and the accompanying transmission in the MISO region would save a typical household between $63 and $200 per year.[37] As illustrated in Wind on the Wires Exhibit 1.8, 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."[38]

nment/files/Southwest%20Power%20Pool%20Extra-High-Voltage%20Transmission%20Study.pdf.

[35] 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.

[36] Id.

[37] 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.

[38] Id.

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

Q: What is your understanding of the requirements for a renewable energy credit to be used to satisfy Illinois' RPS?

A: Renewable energy or RECs used by a utility, to comply with the Illinois RPS, are to come from resources located within Illinois or an adjoining state, which would be Iowa, Missouri, Wisconsin, Indiana, or Kentucky. A resource located outside of those states can be used if the utility cannot purchase a sufficient quantity of RECs to meet the statutory cost-effectiveness test from within those states.[39]

RECs used by an ARES, to comply with the Illinois RPS, are to come from a resource verified by either PJM Environmental Information System Generation Attribute Tracking System or Midwest Renewable Energy Tracking System.[40]

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

A: If utilities cannot meet the RPS requirement with renewable energy or RECs from within the adjoining 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,[41] then

[39] 20 ILCS 3855/1-75(c).
[40] 220 ILCS 5/16-115(D).
[41] 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." 20 ILCS 3855/1-75(c).

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 rate impact on single family homes without electric space heat, served by Commonwealth Edison ("ComEd"), was between 0.05% and 0.90%. Similarly, the rate impact on residential customers, served by Ameren Illinois, was between 0.05% and 0.61%[42]; which is down from the range of 0.05% to 0.83% as of the IPAs 2012 report[43].

Q: What is the likely impact of the RICL project on the cost of complying with the Illinois RPS?

A: As explained in the testimony of Clean Line witnesses, the RICL project is designed to deliver large quantities of low-cost wind generation from Iowa, Minnesota, Nebraska, and South Dakota to Illinois customers. Because wind energy generated in Iowa is eligible for satisfying compliance with the Illinois RPS, that 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.

ARES benefit from RECs that are low-cost because it keeps their cost of complying with the Illinois RPS low. ARES make alternative compliance payments ("ACP") into the Renewable Energy Resource Fund. The ACP rate is equal to the dollars per megawatt-hour the utility spends on renewable energy resources, up to the Commission approved maximum

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[42] *Illinois Power Agency,* Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts, at 2-3 (March 2013).

[43] Illinois Power Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts, at 3 (April 2012) ("2012 IPA Report"), *available at* http://www2.illinois.gov/ipa/Documents/April-2012-Renewables-Report-3-26-AAJ-Final.pdf.

alternative compliance payment rate.[44] If the utilities' spend rate increases, or decreases, so does the ARES ACP rate. Increasing the utilities access to low-cost RECs -- as the RICL should do -- keeps the utilities' spend rate low, which keeps the ARES ACP rate low, which keeps the ARES RPS compliance costs low. Thus, the low cost renewable energy and RECs that the RICL project provides to Illinois improves the cost effectiveness of the competitive renewable electricity market in Illinois for utilities and ARES. The savings from the low cost RECs should be passed directly to ARES' Illinois consumers.

In addition, as explained in more detail below, wind energy delivered via the RICL project will be eligible for compliance with RPS requirements in most PJM states. With the notable exceptions of Ohio, Michigan, and Illinois, most PJM state RPSs allow renewable energy delivered anywhere within the PJM footprint to qualify for compliance. Therefore, Commonwealth Edison is competing with utilities from across the PJM footprint for low cost RECs. As a result, RICL's delivery of large amounts of renewable energy to the PJM footprint will tend to reduce the price of RECs across the PJM market and lower the cost of RECs for Illinois utilities. The savings from lower cost RECs would be passed on directly to Illinois consumers.

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,[45] and copied in Wind on the Wires Exhibits 1.6 and 1.7, for the period June 2009-May 2013, the average cost of compliance RECs for the Ameren territory was 0.6908 cents/kwh, or $6.908/MWh. Prices ranged from a high of $15.86/MWh in

[44] *See* 220 ILCS 5/16-115(D).
[45] 2012 IPA Report, at 15 and 16.

June 2009-May 2010, to a low of $0.92/MWh in June 2011-May 2012. Similar data are reported for ComEd, with a four year average of $8.097/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.[46] By reducing these prices by providing access to additional renewable energy, the RICL project will lower the cost of compliance with the Illinois RPS, benefiting Illinois consumers.

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

A: Wind on the Wires Exhibit 1.09 displays the incremental demand for wind energy that is likely to be created by the RPS requirements for states within the MISO and PJM footprint between now and 2025, as calculated by AWEA. 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 exceptions of Ohio,[47] Michigan, and Illinois, 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. Given that the RPS demand in PJM and MISO states will be in the range of 12,600 to 16,950 MWs of wind energy by 2025[48], the RICL project can play an important role in increasing the supply of wind energy to Illinois and other PJM states. In addition, it helps keep the cost of compliance with the Illinois RPS low and helps facilitate an effectively competitive electricity market that operates efficiently.

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[46] Wind on the Wires Exhibits 1.6 and 1.7.

[47] Ohio's RPS states 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." Database of State Incentives for Renewables and Efficiency, *available at* http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH14R.

[48] Wind on the Wires Exhibit 1.09.

4. The benefits of transmission are 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 [Midcontinent ISO] region as a whole."[49]

Q: Has Clean Line examined the economic development benefits of the RICL project?

A: Yes. Dr. Loomis's study estimates that the construction of the Rock Island Project itself will create a demand for approximately 1,450 construction jobs per year for three years in Illinois. Labor income will increase by $86.8 million per year in Illinois for three years, and overall output will increase by $256.3 million per year in Illinois for three years.[50]

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

[49] FERC Order, Docket No. ER10-1791, at ¶217 (December 2010), *available at* http://www.ferc.gov/whats-new/comm-meet/2010/121610/E-1.pdf .
[50] Direct Testimony of Dr. David Loomis on Behalf of Rock Island Clean Line, at 3 (October 10, 2012).

beyond local areas and industries that are directly receiving payments. 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 ("DOE") 2008 report, "20% Wind Energy by 2030," found that the manufacturing jobs associated with deploying large amounts of wind would be broadly distributed.[51] This finding is confirmed by Dr. Loomis's calculation that, even though no wind projects are expected to be built in Illinois as a result of RICL, wind installations in other states that would be enabled by the line would create between 2,800 and 8.400 jobs in Illinois, providing earnings of between $190 million and $570 million in the state.[52]

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 notably that was working from higher natural gas prices so the savings at today's gas prices would likely be somewhat lower.[53] These benefits would accrue not just to electricity consumers who benefit from having electricity produced from lower priced natural gas, but also to homeowners and businesses using gas for heating, chemical factories

[51] 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/ .[52] Direct Testimony of Dr. David Loomis, at 5.

[52] Direct Testimony of Dr. David Loomis, at 5.

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 by other forms of electricity generation. Wind energy requires virtually zero water to produce electricity, while most conventional forms of electricity generation consume hundreds of gallons of water per MWh produced. The DOE has found that producing 20% of America's electricity from wind energy would conserve 4 trillion gallons of water through the year 2030.[54] Mr. Moland's analysis indicates that the wind enabled by the RICL project would reduce water consumption across the eastern U.S. by 3.5 billion gallons in 2016 and 3.1 billion gallons in 2020.[55] These water savings would produce broadly spread benefits across the PJM footprint, because the entire PJM footprint would see less demand for electricity from conventional generation plants that rely on water for its production as a result of the delivery of wind energy via the RICL project. 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.

Finally, the significant air pollution reductions that would be produced by RICL, as identified in Mr. Moland's testimony, would also broadly benefit all Illinois citizens.[56]

Q: Does this conclude your testimony?

A: Yes.

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

[54] 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/ .

[55] Direct Testimony of Gary Moland, Exhibit 3-4.

[56] Id.

<u>Exhibits 1.1 through 1.9:</u>

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

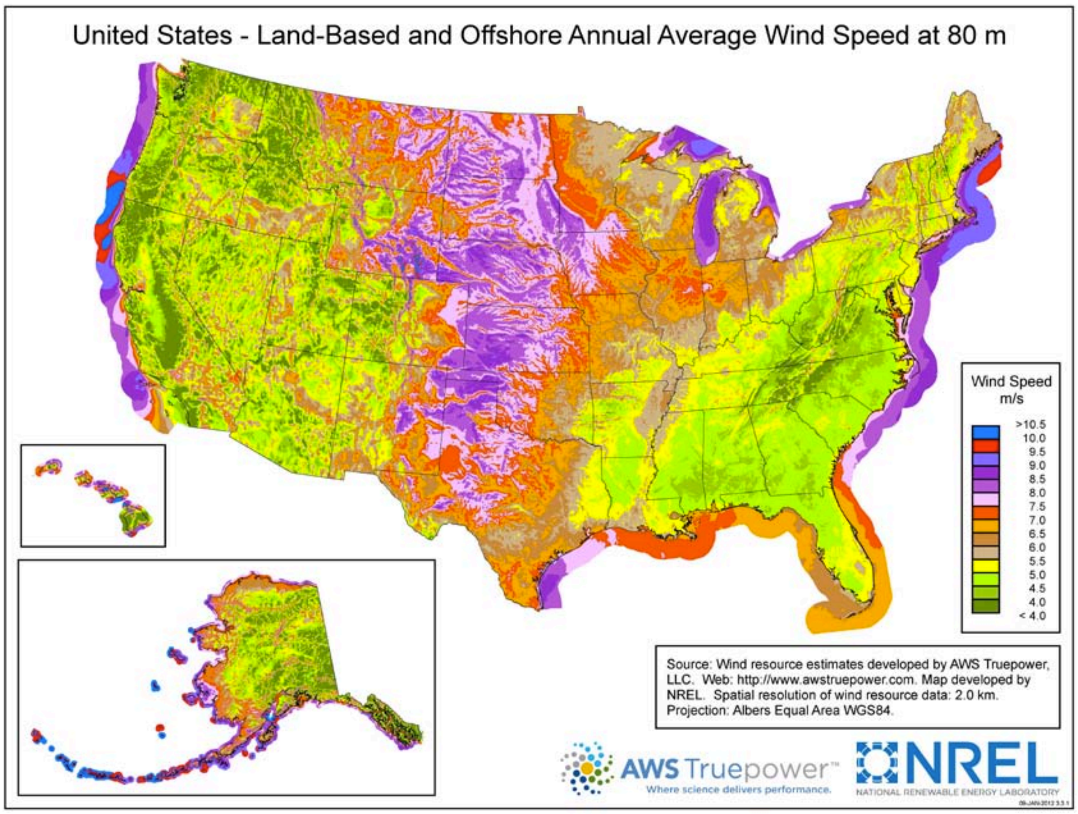


Exhibit 1.2: RGOS wind resources zones, overlaid on existing transmission system, from MISO MVP Report, fig. 49 at page 18,

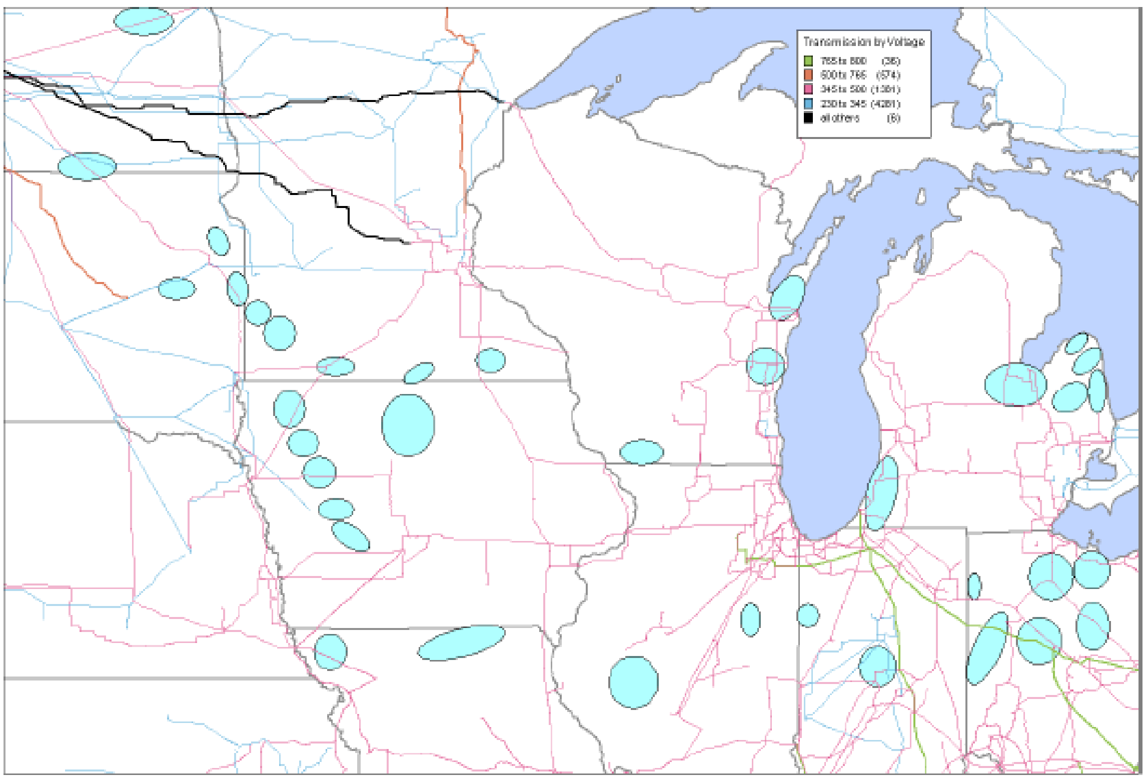
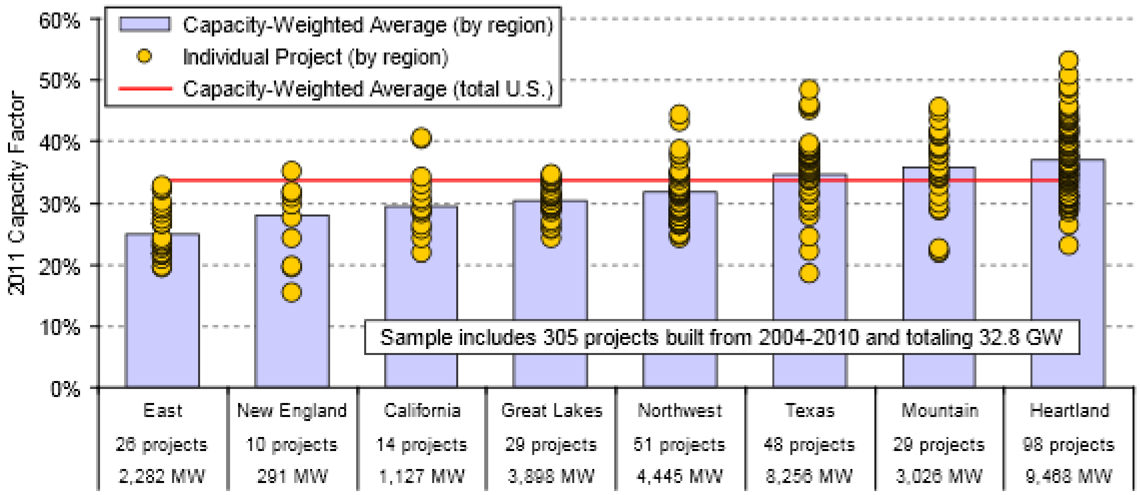
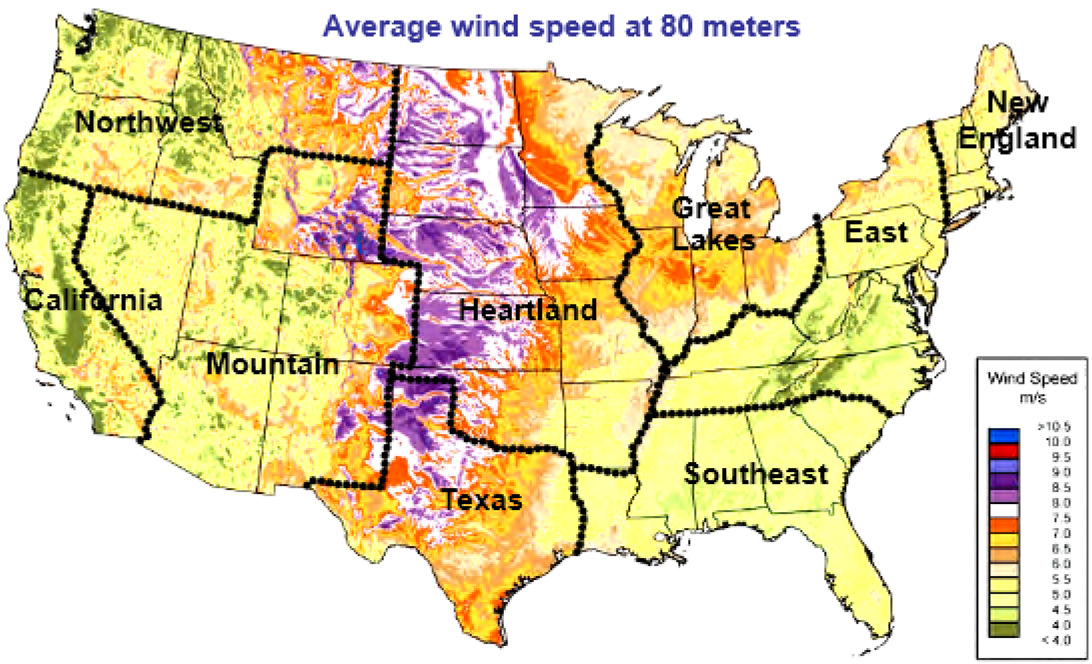


Exhibit 1.3: Capacity factor by region, from *Lawrence Berkeley National Laboratories*, 2011 Wind Technologies Report, fig. 29 at 46 (August 2012) http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf



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) *available at* http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf

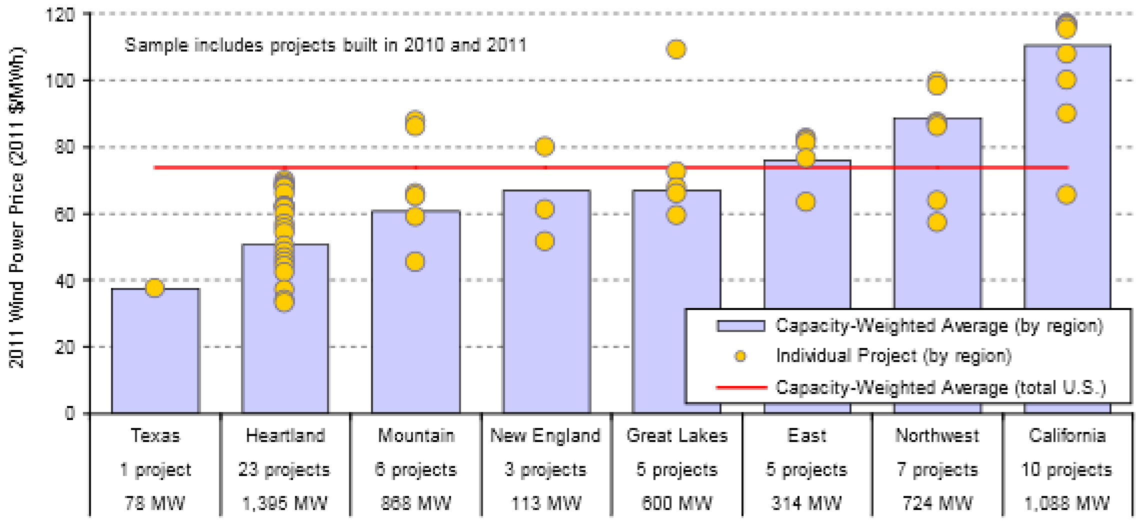


Exhibit 1.6: Cost of RECs for Ameren Illinois, from Illinois Power Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts, 2013 ("IPA Report"), at 10 (March 2013)

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[25] (¢/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 2012 – May 2013:		
2012 Procurement Plan	0.137	2.863
2010 LTPPA Purchases	1.256[26]	3.788
Load-weighted average	0.881	3.321
June 2009 – May 2013[27]	**0.6908**	**3.398**
June 2013 – May 2014:		
2010 LTPPA Purchases[28]	1.303[29]	N/A
2012 Rate Stability[30]	0.343	2.951
Load-weighted average	0.850	2.951

Figure 2: Relative Cost Comparison of RECs and Conventional Supply on a Cent per Kilowatt-hour Basis for Ameren[31]

25 Includes costs of both energy and capacity resources, procured through IPA-managed procurements and required to meet MISO capacity rules.
26 Imputed.
27 Load-weighted average.
28 The entire contract term is June 2012 – May 2032. See ICC Approves Results of Renewable Energy RFP, News from the Ill. Commerce Commission (Dec. 15, 2010).
29 Imputed.
30 Load-weighted average of the first year of delivery, June 2013-May 2014.
31 This is a relative cost comparison and not a calculation of rate impacts. The number of RECs procured is a small percentage of the amount of kWh of energy supplied (determined by the RPS or that particular delivery year). Sections III(C) and III(D) below provide an analysis of rate impacts, which factors in the RPS' effect on volume.

Exhibit 1.7: Cost of RECs for ComEd, from Illinois Power Annual Report: The Costs and Benefits of Renewable Resource Procurement in Illinois Under the Illinois Power Agency and Illinois Public Utilities Acts, 2013, ("IPA Report"), at 9 (March 2013)

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 2012 – May 2013:		
2012 Procurement Plan	0.088	3.058
2010 LTPPA Purchases	1.715[19]	3.803
Load-weighted average	0.970	3.620
June 2009 – May 2013[20]	**0.8097**	**3.422**
June 2013 – May 2014:		
2010 LTPPA Purchases[21]	1.773[22]	N/A
2012 Rate Stability[23]	0.129	3.257
Load-weighted average	1.189	3.257

Figure 1: Relative Cost Comparison of RECs and Conventional Supply on a Cent per Kilowatt-hour Basis for ComEd[24]

19 Imputed.
20 Load-weighted average.
21 The entire contract term is June 2012 –May 2032. See ICC Approves Results of Renewable Energy RFP, News from the Ill. Commerce Commission (Dec. 15, 2010).
22 Imputed.
23 Load-weighted average of the first year of delivery, June 2013-May 2014.
24 This is a relative cost comparison and NOT a calculation of rate impacts. Each year had different volumes of peak and off-peak energy secured in different months and the number of RECs procured is a small percentage of the amount of kWh of energy supplied (determined by the RPS for that particular delivery year). Sections III(C) and III (D) below provide an analysis of rate impacts, which factors in the RPS' effect on volume.

Exhibit 1.8: 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.

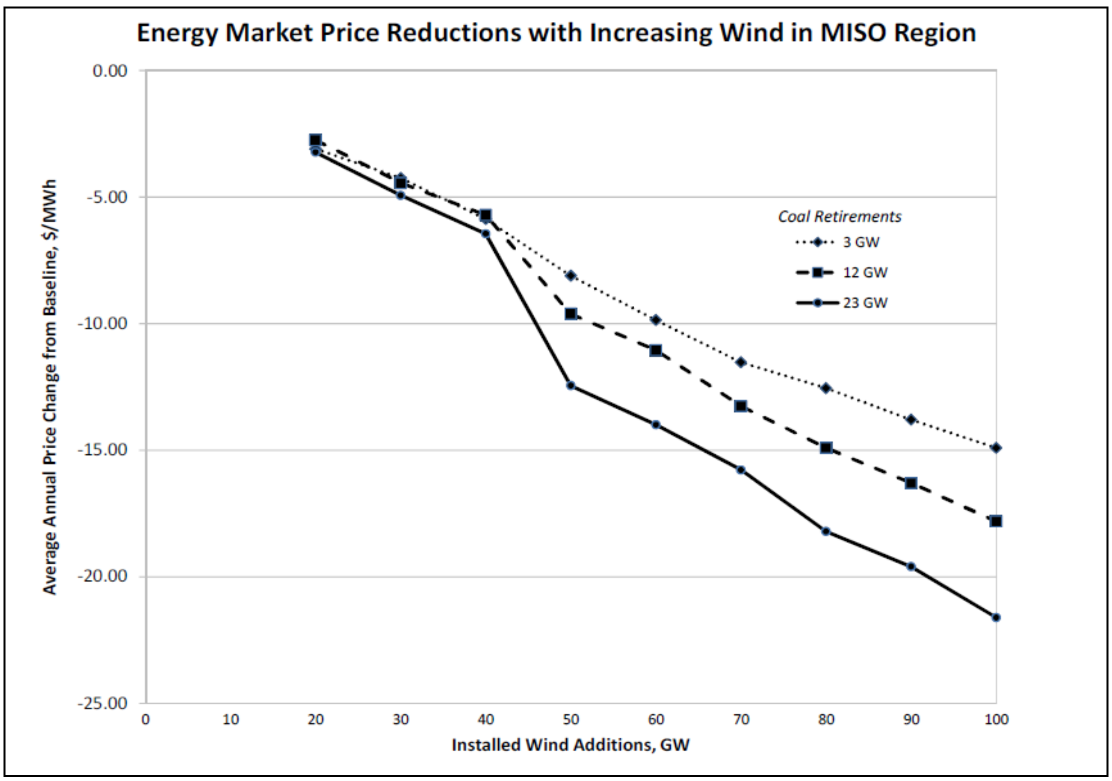


Exhibit 1.9: AWEA's Estimates of Incremental Wind Capacity (MW) (beyond what is installed as of the end of 2012) that will be used to meet state RPS requirements in the year 2025, by state

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