

## Schedule MG-1

Michael Goggin

### Education:

Harvard University class of 2004, B.A.

- Graduated *cum laude* in Social Studies
- Wrote thesis “Is it Time for a Change? Science, Policy, and Climate Change”

### Experience:

AWEA Research Director, Senior Electric Industry Analyst February 2008-present

- Provide analytical support and advocacy on transmission and grid integration and issues related to wind energy’s impact on markets
- Communicate with the press, the public, and policymakers about wind energy
- Work with AWEA members to develop the organization’s policy positions

Sentech, Inc. Research Analyst October 2005-February 2008

- Author white papers, feasibility studies, and economic analyses of solar, wind, geothermal, and energy storage technologies for Department of Energy officials
- Model performance and economics of innovative renewable energy and energy storage technologies
- Research and write fact sheets and presentations for DOE clients
- Provide analytical support for DOE’s selection of recipients for renewable energy technology R&D funding

Union of Concerned Scientists Clean Energy Intern May 2005-October 2005

- Worked with the legislative and field staff to promote the inclusion of pro-renewable energy measures in the Energy Policy Act of 2005
- Mobilized clean energy businesspeople and advocates to lobby elected officials
- Prepared fact sheets to support passage of pro-renewable policies

State Public Interest Research Groups Policy Analyst August 2004-May 2005

- Wrote reports advocating pro-renewable energy policies at the state, regional, and federal level
- Gathered and analyzed data to be included in advocacy reports

### Publications:

- R. Gramlich and M. Goggin, “The Ability of Current U.S. Electric Industry Structure and Transmission Rules to Accommodate High Wind Energy Penetration,” October 2008, presented at 7th International Workshop on Large Scale Integration of Wind Power and on Transmission Networks for Offshore Wind Farms
- M. Milligan, et al., “Impact of Electric Industry Structure on High Wind Penetration Potential,” July 2009, NREL Technical Report TP-550-46273
- R. Gramlich and M. Goggin, “What’s Next for Wind Power,” March 2013, Electricity Journal
- Michael Goggin, “Wind Energy’s Emissions Reductions: A Statistical Analysis,” July 2013, presented at IEEE PES annual conference

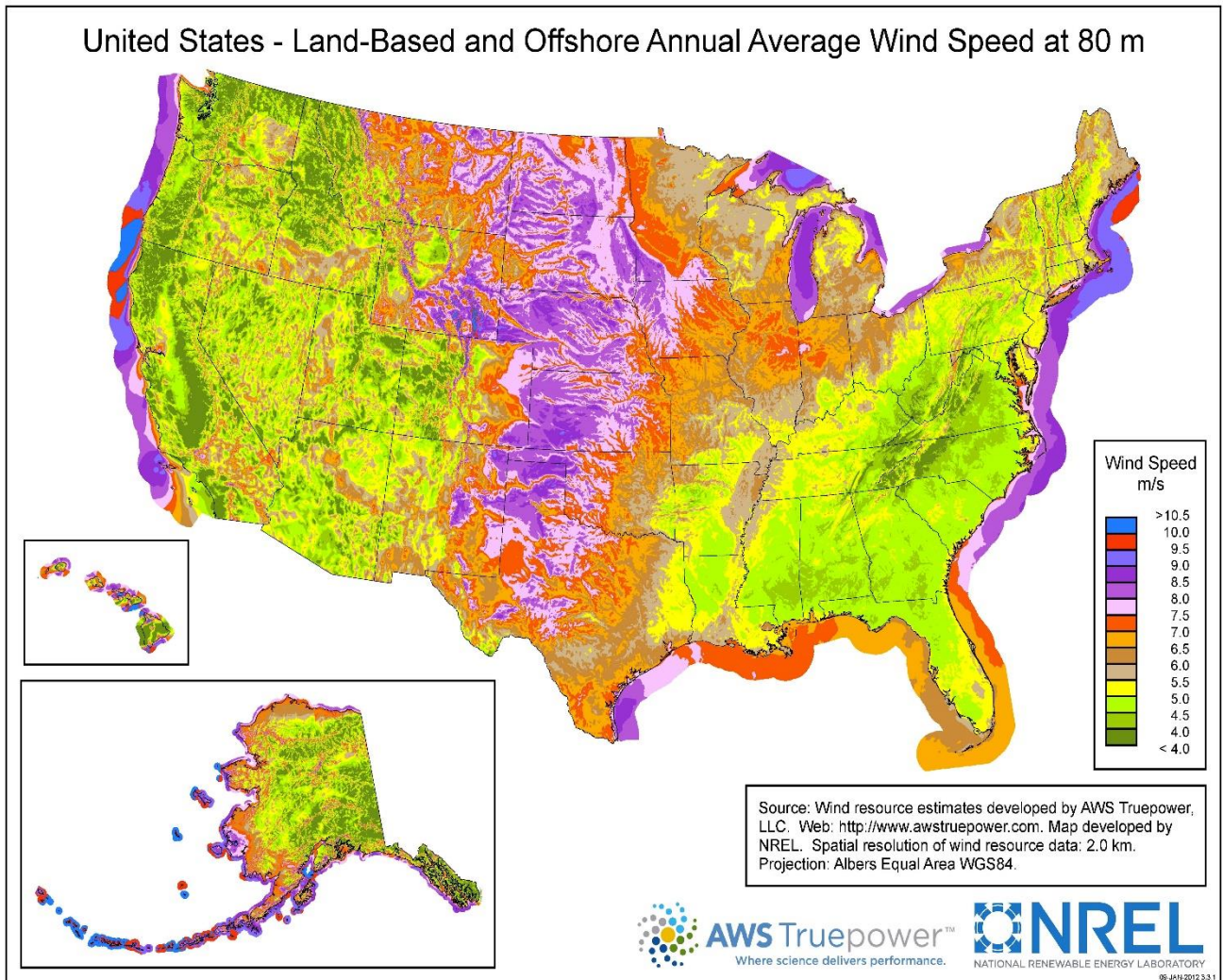
## Schedule MG-2

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
<b>DC</b>	300	400
<b>DE</b>	100	150
<b>IL</b>	3,000	4,000
<b>MD</b>	500	700
<b>MI</b>	500	1,000
<b>MO</b>	1,200	1,800
<b>MN</b>	1,000	1,500
<b>NJ</b>	1,400	1,800
<b>PA</b>	500	700
<b>WI</b>	400	600

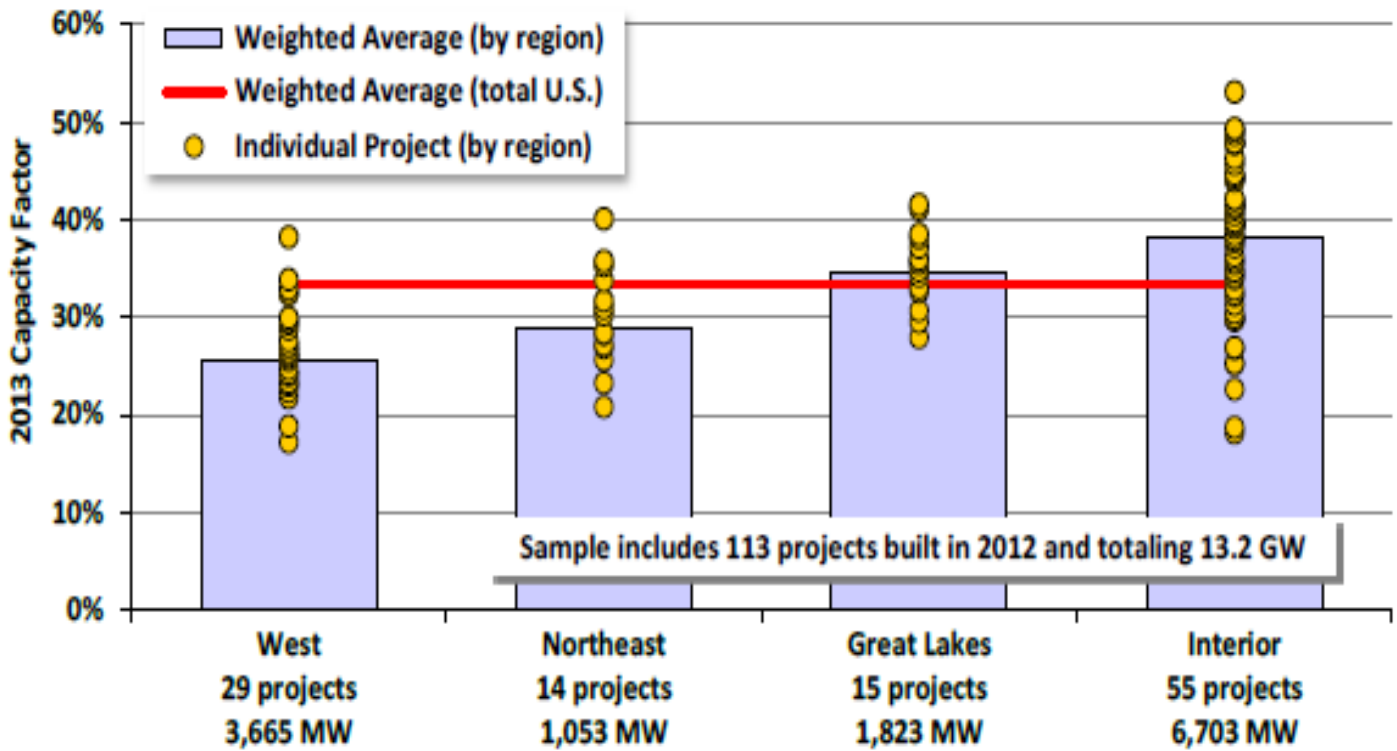
## Schedule MG-3

NREL wind resource assessment map of the U.S. as of March 26, 2013, available at [http://www.nrel.gov/wind/resource\\_assessment.html](http://www.nrel.gov/wind/resource_assessment.html), downloaded by Michael S. Goggin.



**Schedule MG-4**

Capacity factor by region, from Lawrence Berkeley National Laboratories, 2013 Wind Technologies Report, fig. 36 at 45(August 2014), [http://energy.gov/sites/prod/files/2014/08/f18/2013%20Wind%20Technologies%20Market%20Report\\_1.pdf](http://energy.gov/sites/prod/files/2014/08/f18/2013%20Wind%20Technologies%20Market%20Report_1.pdf)

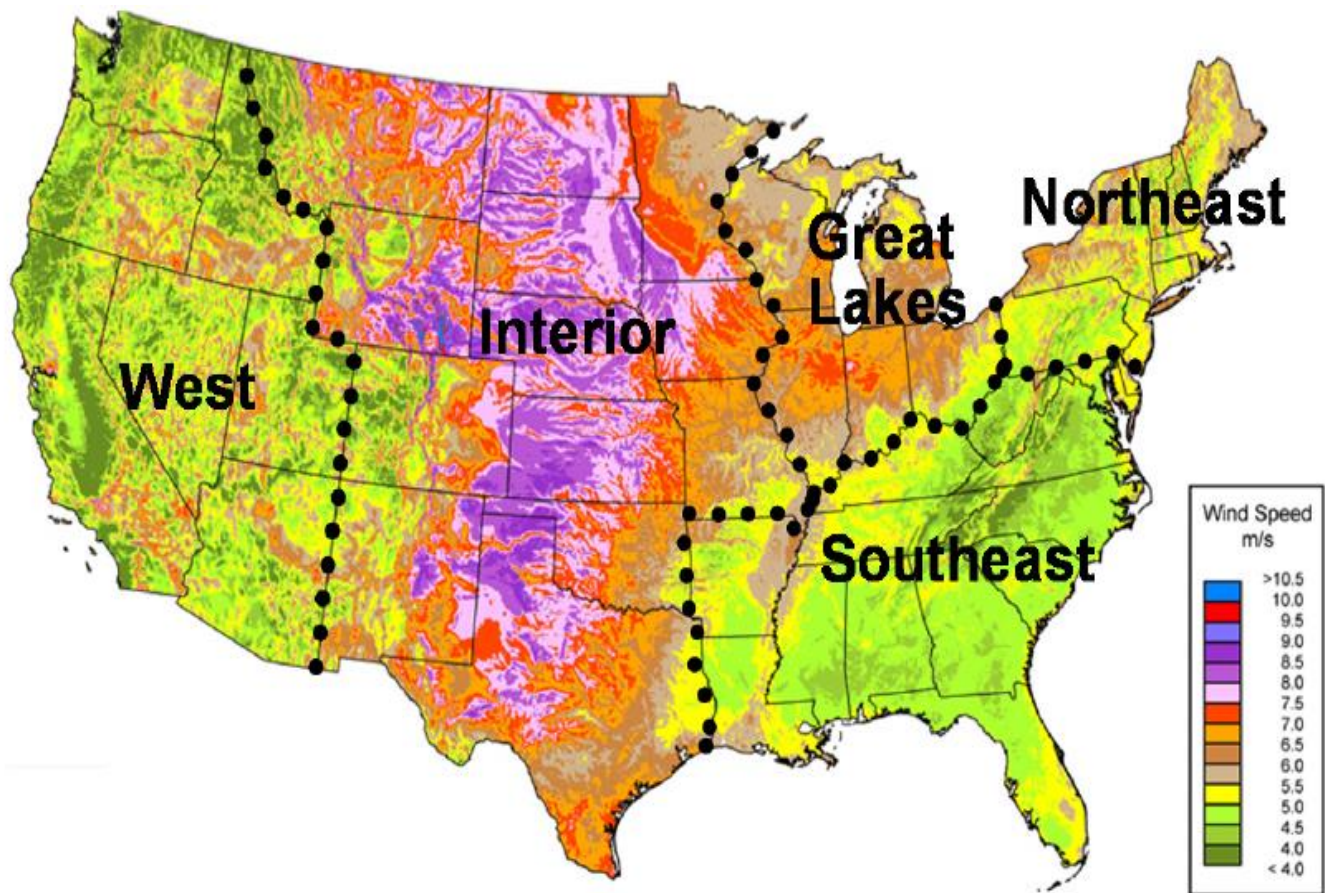


Source: Berkeley Lab

Figure 36. 2013 capacity factors by region: 2012 projects only

## Schedule MG-5

Region breakdown overlaid on wind speed map, from *Lawrence Berkeley National Laboratories, 2013 Wind Technologies Report*, at 79 (August 2014)  
<http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf>



Source: AWS Truepower, National Renewable Energy Laboratory

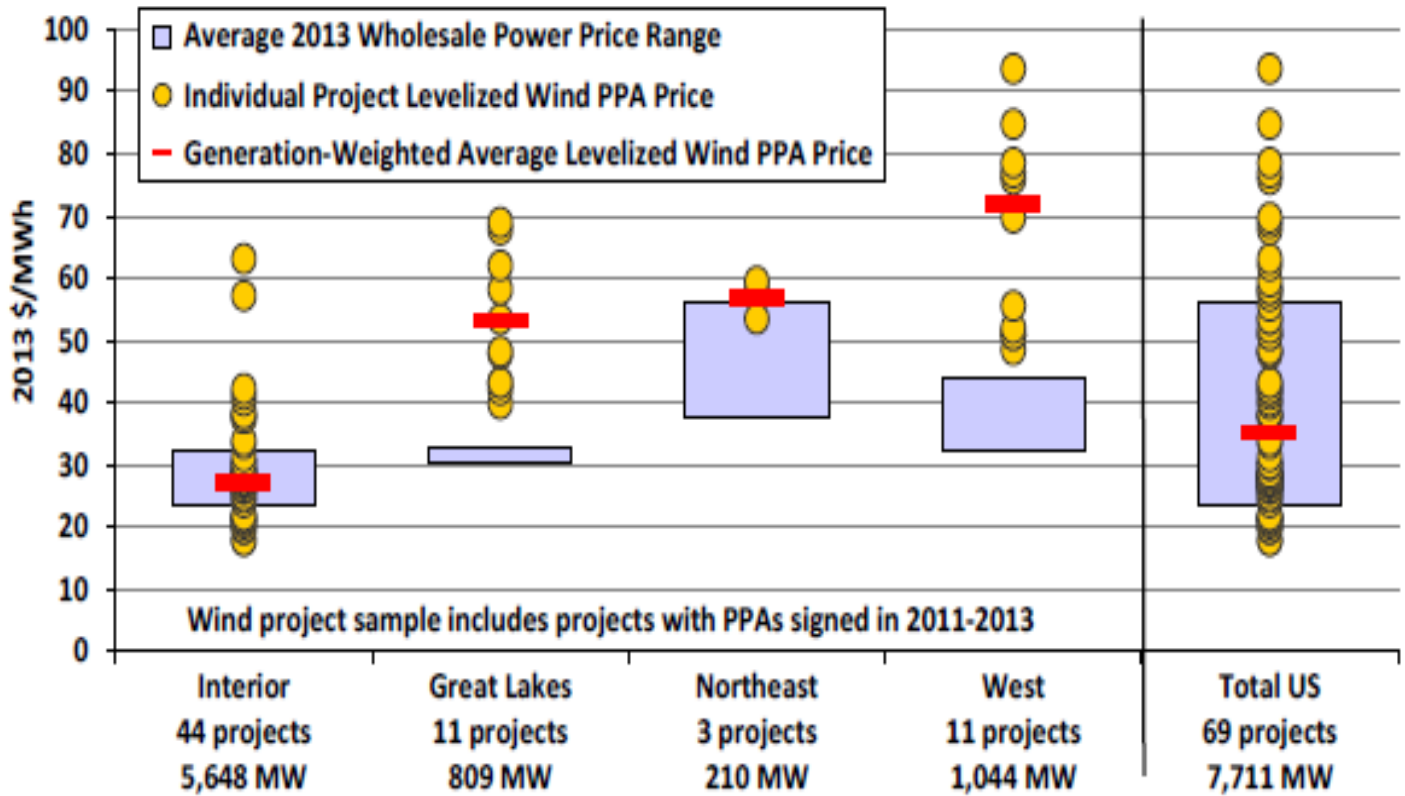
## Schedule MG-6

Kansas wind project capacity factor data. Form EIA-923 detailed data, with 2013 data from EIA-923M and 2012 data from EIA-923, available at <http://www.eia.gov/electricity/data/eia923/>. Wind project capacity and year online data from AWEA's database of wind projects, available at <http://www.awea.org/Resources/Content.aspx?ItemNumber=5728&navItemNumber=5776>.

Plant Name	Year Online	Project Capacity (MW)	2012 Capacity Factor	2013 Capacity Factor
Gray County Wind Energy	2001	112.2	29.4%	7.2%
Elk River Wind	2005	150.0	43.4%	42.1%
Spearville	2006 + 2010	148.5	31.7%	38.1%
Smoky Hills Wind Project Phase I	2008	100.8	39.8%	42.3%
Cloud County Wind Farm	2010	201.0	33.9%	36.1%
Central Plains Wind Farm	2009	99.0	33.8%	34.8%
Flat Ridge Wind Farm	2009	50.0	32.7%	29.5%
Flat Ridge Wind Energy LLC	2009	50.0	33.7%	31.6%
Smoky Hills Wind Project Phase II	2008	148.5	37.4%	43.0%
Greensburg Wind Farm LLC	2010	12.5	39.8%	NA
Ironwood Wind	2012	84.0		39.7%
Cimarron Windpower II	2012	131.1		44.3%
Post Rock Wind Power Project, LLC	2012	201.0		47.4%
Cimarron Wind Energy LLC	2012	165.6		40.0%
Flat Ridge 2 Wind Energy LLC	2012	470.4		44.9%
Caney River Wind Project	2011	199.8	37.8%	42.3%
Spearville 3 LLC	2012	100.8		38.2%
Shooting Star Wind Project LLC	2012	104.0		42.9%
Ensign Wind LLC	2012	98.9		46.1%
Buffalo Dunes Wind Project	2013	249.8		

## Schedule MG-7

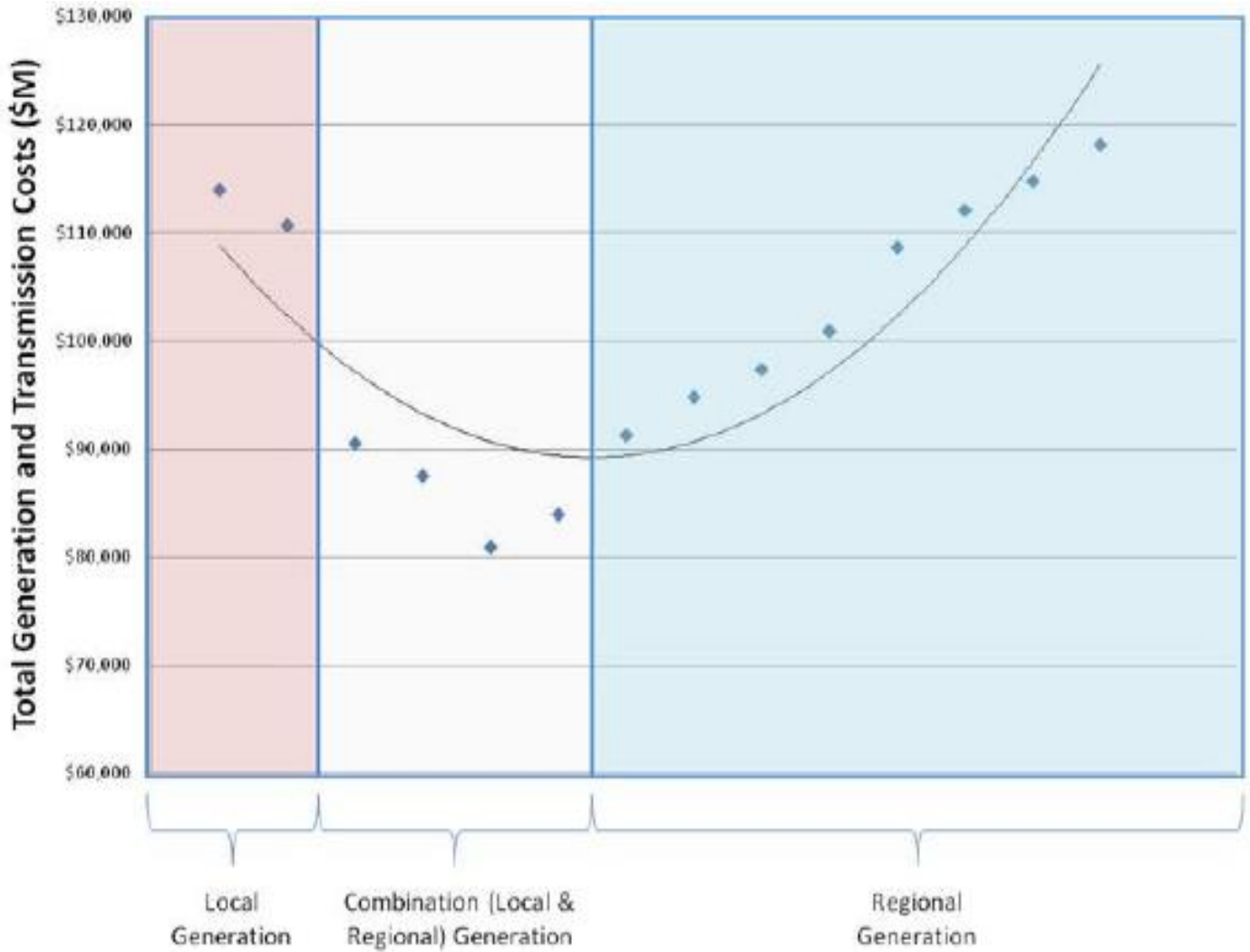
Wind PPA price by region, from Lawrence Berkeley National Laboratories, 2013 Wind Technologies Report, fig. 48 at 60 (August 2014), [http://energy.gov/sites/prod/files/2014/08/f18/2013%20Wind%20Technologies%20Market%20Report\\_1.pdf](http://energy.gov/sites/prod/files/2014/08/f18/2013%20Wind%20Technologies%20Market%20Report_1.pdf)



Source: Berkeley Lab, Ventyx, IntercontinentalExchange

## Schedule MG-8

Renewable Generation and Transmission Infrastructure Costs Dependent Generation's Proximity to End User (Local, Regional or Combination); from MISO Multi Value Project Portfolio: Results and Analyses ("MVP Report"), fig. 4.8 at 18 (January 10, 2012)





## Schedule MG-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>.

