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MIDWESTERN BRIEFING ON AMERICA'S POWER PLAN

Summary Report

September 2013



Introduction

America's Power Plan is a policy roadmap for dealing with disruptive challenges in the power sector and achieving a high-renewables future. Curated by the Energy Foundation in partnership with Energy Innovation, it features a series of eight white papers. As part of the rollout for *America's Power Plan* (APP), the Great Plains Institute hosted and facilitated a meeting in St. Paul, Minnesota on September 26, 2013 to brief stakeholders on the project and gather input on how components of APP could be most effectively applied to the Midwestern region. Meeting participants consisted of key decision makers, thought leaders, and subject matter experts in utility regulation and the electricity sector. A list of attendees is provided in Appendix A.¹ In addition, the briefing featured authors from three of the whitepapers:

- **New Regulatory and Utility Business Models**—*Ronald Lehr, former Public Utilities Commissioner of Colorado*
- **Distributed Energy Resources**—*James Newcomb, Rocky Mountain Institute*
- **Policy for Distributed Generation**—*Joseph Wiedman, Interstate Renewable Energy Council*

APP was inspired in part from analysis done by the U.S. DOE National Renewable Energy Laboratory entitled the *Renewable Electricity Futures Study (RE Futures)*, which investigated the implications and technical challenges of meeting various high-renewable electricity scenarios. The study concluded that commercially available renewable energy technologies in combination with a more flexible electric system are more than adequate to supply 80% of total U.S. electricity generation by 2050. The purpose of America's Power Plan is to identify policy and regulatory barriers and paths forward to meeting such a future.

Given recent policy developments, these topics are timely and relevant to the Midwestern region, particularly in Minnesota. The following report sets the discussion in the relevant regional context, highlights key points raised by stakeholders, and presents one utility's experience integrating and managing variable wind in the region. It consists of a blend of presented material from APP along with stakeholder feedback and discussion. Meeting participants stressed the importance of having a clear policy direction while collectively building off of past experience and lessons learned.

Presentations from the briefing can be found here: <http://bit.ly/MWAPP>

The Midwest and Minnesota Context

The Midwestern region is made up mostly of regulated vertically-integrated electric utilities. A few areas offer retail choice (segments of Illinois and Michigan), and there are a small number

¹ This summary report reflects the observations of meeting facilitators, and is not offered as a consensus view of the participants nor a reflection of opinions of the listed individuals or organizations.

of transmission-only development companies. Most energy comes from traditional generation arrangements whose dispatch is optimized in MISO's energy markets.

Wind power in the region has scaled up drastically in recent years—As of May 2013, there was 12,238 megawatts (MW) of installed wind capacity in the MISO region, a ten-fold increase over the last five years. Xcel Energy's portfolio contains roughly 5,000MW of wind generation, with about 2,000MW on the Northern States Power system. System operators in the Midwest have gained significant experience and shown success in employing novel strategies to integrate variable wind energy.

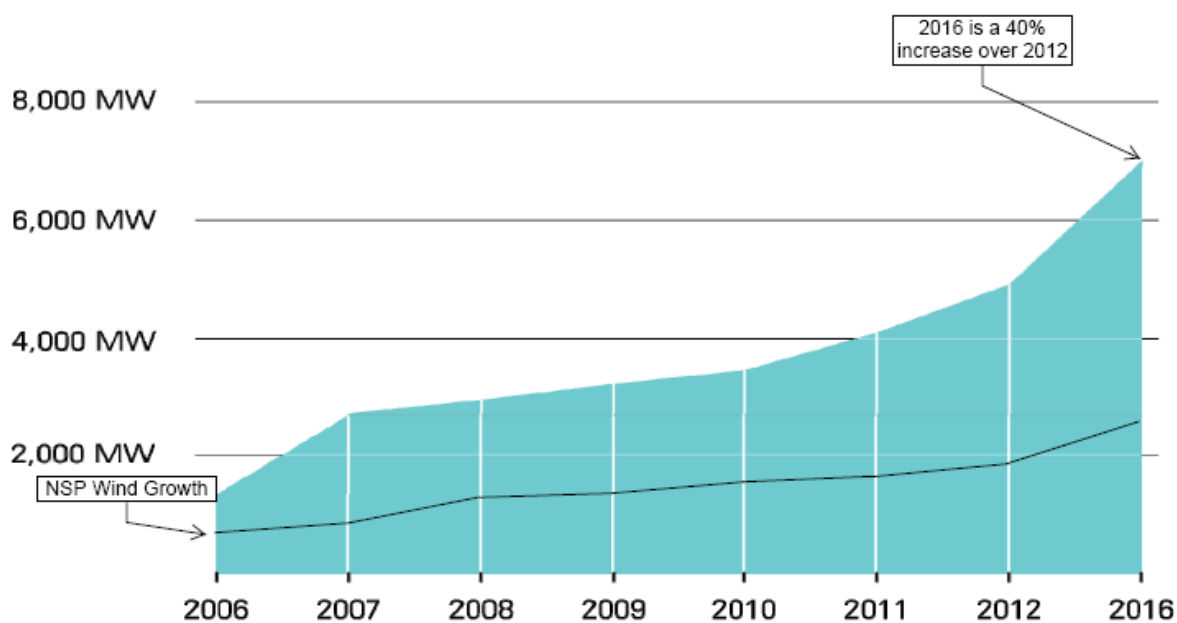


Figure 1 Xcel Energy Wind Growth

Minnesota has a rich history in terms of energy policy. In 2007 the legislature passed the Next Generation Energy Act, which established a Renewable Electricity Standard of 25% renewable generation by 2025 (30% for Xcel), and an Energy Efficiency Resource Standard consisting of a 1.5% annual reduction in retail sales. Recently in 2013, the state passed omnibus energy legislation that included, among other things:

- A Solar Energy Standard which adds 1.5% of generation from solar to the state RES. (includes 10% of solar requirement be met with distributed generation)
- Establishment of a “value of solar” tariff that credits solar customers for the value of operating distributed PV systems, including the value of energy, capacity, T&D line losses, and environmental benefits.

- Conducting an engineering study that looks at the feasibility of increasing the state RES to 40% by 2030 and higher proportions thereafter, while maintaining system reliability. A separate scoping process is being conducted for a study looking at a fossil fuel-free energy future for the state.

This new Minnesota energy legislation contributes to timely stakeholder interest in the aspects of *APP* related to distributed resources and utility regulation. Furthermore, the Midwest's rich experience in utility-scale wind integration can inform developments on the distribution side, and drive discussion and exploration of futures with higher renewable penetration. It is within this policy and regulatory context that stakeholders came to the Midwestern briefing on *America's Power Plan*.

New Utility Business Models

Electric utilities are confronting new pressures to change the way they conduct business. These pressures include aging power plants, tougher environmental requirements, declining electricity sales, changing consumer demands, new distributed technologies, and weakened utility financial metrics. To instill proper incentives for 21st century utilities, legal and regulatory regimes must be proactive in responding to disruptive forces.

Of particular interest is how today's pressures on the electric industry compare to the restructuring of telecom that occurred in decades past. Telecom restructuring was driven by a theoretical belief in retail choice and markets, but also by the advent of new technologies and business models. The movement toward electric market restructuring, started in the mid-1990s, has slowed, especially in the Midwest. *America's Power Plan* argues that new drivers for change are emerging, including the push to decarbonize, the environmental and economic benefits of renewable energy, and consumer empowerment with new IT-enabled distributed technologies. There is concern that without a unifying theme and direction, industry and regulatory changes in response to various pressures could potentially work against each other. In an interconnected system, actions taken by one area will affect other areas, whether intended or not.

APP does not, however, advocate for a single regulatory solution such as deregulation. Instead, it offers a set of policy changes that can be applied to both regulated and deregulated markets.

Another area of concern to stakeholders (particularly regulators), is how to treat customers for providers of last resort (POLR) and not let them get left behind. These include customers who cannot afford or choose not to participate in new services and program offerings, and can lead to cross-subsidy issues where POLR customers end up paying for services provided to other customers. This could lead what some call a "utility death spiral" where utilities lose business as

they are forced to raise prices for POLR customers.² New finance mechanisms and program options can expand offerings to these customers.

APP presents three utility regulatory models³ as possible paths forward while accommodating new distributed technologies. This includes a minimal role where the utility would only operate the wires, a middle-ground role where the utility is a “smart integrator” that coordinates and integrates energy services, and a maximum role where the utility owns and operates all the necessary systems to deliver energy services to customers.

A key question surrounding 21st utility regulation is how to fairly compensate utilities while providing incentives to pursue society’s broader policy goals. This includes balancing the challenges of encouraging fleet decarbonization, improving efficiency, and serving customers in new ways, all while maintaining reliability and low cost. *APP* research reports that Utility CEO’s are saying today’s cost-of-service regulatory structure offers few incentives for corporate efficiency and innovation.

APP presents regulatory models as possible paths forward, including examples from the United Kingdom and Iowa. One possibility is to move towards performance based incentive regulation, which would consist of a system of rewards and penalties tied to performance on desired outcomes. This has the potential to link utility financial success to achievement of public policy goals. Another important aspect is long-term stability in regulation and incentives. There currently is little incentive for a utility to become more efficient since any financial gain from innovation and efficiency can be “taken away” in the next rate case. Regulatory terms that last beyond a few years can promote utility incentives for efficiency and innovation.

In moving towards a renewable future, it is almost certain that these utility and regulatory models will play out in different degrees and forms across regions. Certain models and outcomes will be preferable to some areas and not others. This will depend on the existing framework and relationships between utilities, regulators, and stakeholders.

Distributed Energy Resources

Declining technology costs and shifting customer demand are pointing to an increased role of distributed energy resources (DERs) in the electricity mix. These include energy efficiency, demand response, distributed generation, small-scale storage, and electric vehicles. In addition to saving money for consumers, these resources can provide significant supply and flexibility necessary to integrate higher levels of renewables. In the Midwest there is significant opportunity to advance development of DERs through a combination of state planning processes and wholesale market opportunities. Because many DER deployment decisions are made by consumers, they can happen outside the planning process of regulators and utilities. If

² See for example *Disruptive Challenges* by the Edison Electric Institute, at <http://www.eei.org/ourissues/finance/Documents/disruptivechallenges.pdf>.

³ See *Utility and Regulatory Models for the Modern Era* at <http://americaspowerplan.com/the-plan/utility-business-models/>.

they enjoy the same rapid uptake of other IT technologies like smart phones and Wi-Fi, they could cause a rapid shift in the utility sector.

NREL's *RE Futures* study optimized a least-cost portfolio of large-scale renewable investments and associated bulk power assets to meet electricity demand in a high renewables future. A complementary set of assumptions for distributed resources was included, but not as part of the core analysis. This left unaddressed the question of what the "correct" mix of distributed versus utility-scale energy resources is in a high renewables future.

The Midwestern electricity sector is unique in that it consists of mostly regulated states with integrated resource planning processes in a region with established wholesale energy markets. While DER penetration in the region is currently small, established state planning processes combined with wholesale markets present a framework capable of fostering rapid growth.

America's Power Plan explores policies to support DER.⁴ Incorporating distributed energy resources into state integrated resource planning (IRP) processes is one area of opportunity. In "integrated distribution planning," stakeholders can identify how best to utilize resources like DR, storage, and other flexibility options. It can also reveal areas on the distribution system with voltage issues or "hot spots" with available capacity, providing greater transparency for the location-specific value of DER. Furthermore, a coordinated forward-looking approach can identify areas on the system that are expected to have DG added in the near future. This is in contrast to a reactive approach where distribution system upgrades are triggered by individual projects, which can produce delays and issues in allocating costs to those who benefit. (This is similar to earlier "cost causation" debates about integrating wind into the wholesale transmission system.) Establishing robust cost-benefit methodologies that take into account the novel characteristics and services of DERs is essential for cost effective deployment. Minnesota's Value of Solar Tariff, which is currently under development, is a promising example.

Designing wholesale markets to allow participation of distributed resources is another area of opportunity. This can allow distributed resources to compete and provide energy, capacity, and ancillary services required to support grid operation in a RE Future. For example, in PJM more than 14,000MW of demand response and energy efficiency resources have cleared in forward capacity auctions over the past five years. In the Midwest, MISO does not have a robust capacity market, and while rules are in place for DERs to aggregate and compete in energy and ancillary service markets, resource additions are driven through state planning processes and to date there has been few DERs participating in wholesale markets. Thus, for the Midwest it is important that state IRP processes remain mindful of wholesale market opportunities as they develop, and coordinate closely with regional planning efforts.

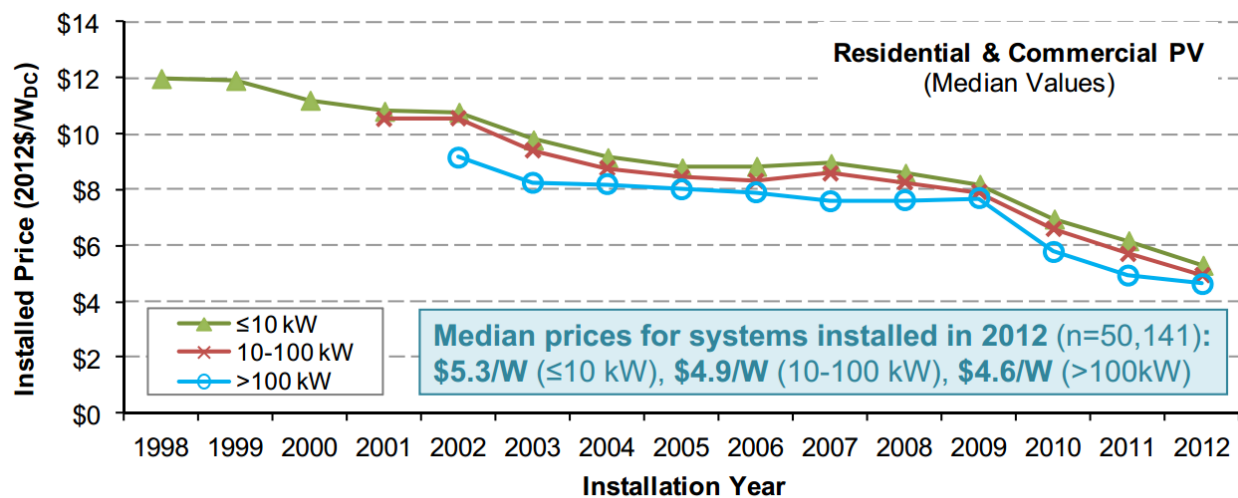
In summary, declining cost trends and changing consumer requirements are quickly bringing DERs onto the scene and proving their effectiveness in supplying future energy and flexibility needs. Increasing the transparency of distribution system impacts from increased DERs will help optimize deployment. Many Midwestern states have well established integrated resource

⁴ See *Policy Implications of Decentralization* at <http://americaspowerplan.com/the-plan/distributed-energy-resources>.

planning processes that can increase their focus on distribution system planning. These plans should coordinate and be compatible with wholesale market opportunities as they develop so that DERs can compete on a level playing field to supply valuable grid flexibility services needed in a RE future.

Distributed Generation

Installation prices for solar PV generation in the U.S. have fallen drastically in recent years, from over \$10/W in 2000 to currently under \$5/W. This has occurred in spite of decreased rebate offerings and renewable energy credit prices. It is possible that PV cost trends will continue to decline; Germany, for example is currently seeing system costs around \$2/W.



Note: Median installed prices are shown only if 15 or more observations are available for the individual size range

Figure 2 Installed PV System Prices. Source: *Tracking the Sun VI*, LBNL & DOE

This cost decline has been driven largely by falling module prices, which are now well under \$1/W. Balance of system (BOS) costs now constitute 80% or more of total system cost. "Soft costs" make up a significant portion of remaining costs that are ripe for further reduction. These involve customer acquisition, installation labor, permitting, inspection, and interconnection. Streamlining interconnection standards and local permitting requirements for small PV systems can have a beneficial impact on soft costs.

America's Power Plan looked at approaches for reducing soft costs, as well as new ownership structures and financial mechanisms.⁵ Shared renewables programs are one such example and allow participation by customers who don't have the option or preference to build a system on-

⁵ See *Supporting Generation on Both Sides of the Meter*, at <http://americaspowerplan.com/the-plan/distributed-generation/>.

site. They involve larger, off-site renewable projects with energy distributed to subscribers or community members, who receive benefits via a check or credit on their electricity bill.

Third party ownership of systems can enable new financing mechanisms like power purchase agreements or PV leasing that can overcome barriers associated with ownership or initial capital costs. In Minnesota, current statute is vague with respect to third-party ownership, which presents a risk and barrier to potential owners. There is an exemption that allows third-party ownership at a limited scale, if it produces service for less than 25 people. Another option is on-bill financing, where a utility loans capital to a customer, to be paid back on the utility bill. On-bill financing historically has been effective for energy efficiency investments and is more recently being applied to distributed generation. This could be expanded to include utility-enabled third-party financiers to provide structures for the customer to repay on their utility bill, a concept known as on-bill repayment.

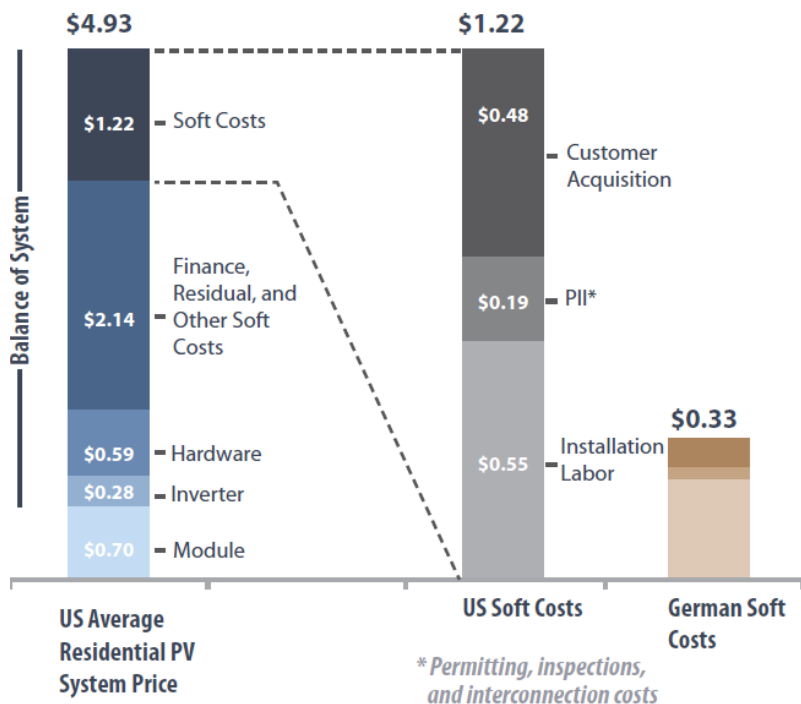


Figure 3 Residential Solar "Soft Costs" in U.S. and Germany. Source: RMI

Wholesale procurement programs can complement retail programs and allow utilities and system operators to buy distributed generation (DG) directly, creating opportunities to locate projects where they maximize benefits while minimizing costs. These types of programs could provide incentive payments for projects that locate in higher-value areas ("hot-spots"). Treatment of renewable energy credits (RECs) produced by DG facilities is a complex and important consideration in designing successful wholesale programs. The Midwest Renewable Energy Tracking System (M-RETS) has begun taking steps to accommodate DG in their system, largely spurred by DG carve-outs in RPS laws in Illinois and now Minnesota, as well as voluntary activity in Wisconsin. This has included establishing micro- and small-generator project accounts with lower fees than standard projects. M-RETS has also established an aggregator working group to look at various DG drivers across their footprint and identify additional steps to streamline the registration and tracking process for small generators.

To sum up, distributed solar costs have declined rapidly in past years, causing growth in distributed generation as a resource that can make significant contributions to a RE future. Streamlining procedures to reduce "soft costs," along with innovative program design and financing can promote cost effective DG deployment.

Wind Power Development Challenges and Successes—Xcel Energy

Xcel Energy has significant experience owning and operating wind generation and other renewable energy on their system. Nationwide, they are ranked first among wind providers, third in green pricing programs, and fifth in solar capacity. Xcel has three operating systems. Their Northern States Power (NSP) territory covers a large portion of Minnesota's energy load, and includes portions of Wisconsin and the Dakotas. Their southern system covers parts of New Mexico and Texas, while their third system serves much of Colorado. As of December 2012, Xcel has about 5,000MW of wind on their system, equally divided between the three regions, and 250MW of solar PV, mostly in Colorado.

Figure 5 is a complicated chart that demonstrates the characteristics of wind on Xcel's NSP system. The straight green line represents the average annual percentage of energy contribution from wind (12%). The yellow lines represent monthly averages, showing the seasonable variability of wind. Finally, the blue dots represent hourly averages of load percentage served by wind. In 2012 this varied between 0% and 40%.

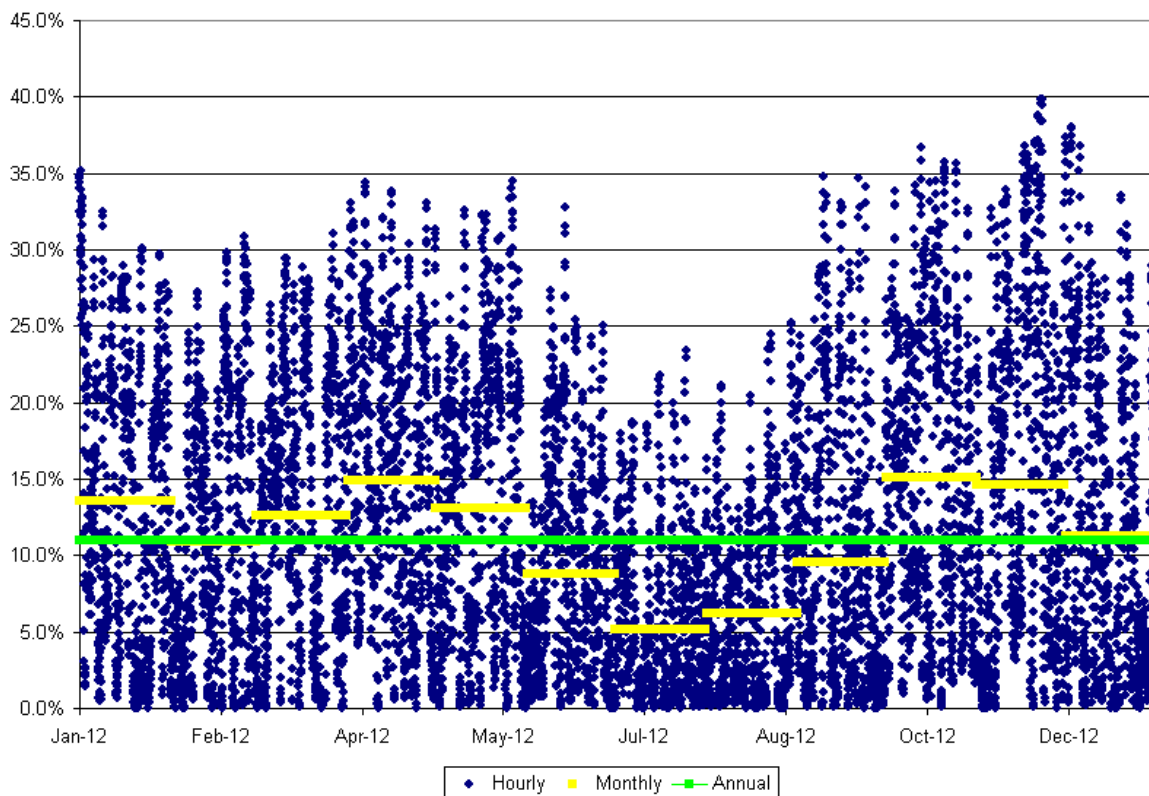


Figure 4 NSP Wind as a Percentage of Load (2012)

Xcel reports a number of initiatives that have allowed them to effectively integrate and manage significant levels of variable wind. Participating in regional energy markets has allowed them to pool assets while providing greater access to flexible resources across a wide geographic footprint. Their northern and southern territories participate in large regional markets, (MISO and SPP, respectively), while their territory in Colorado does not. Xcel is supportive of the

development of wholesale markets in the west, including the creation of an “energy imbalance market” with PacifiCorp and the California ISO. The company is also working on an initiative with the National Center for Atmospheric Research to develop an advanced wind forecasting system, which will result in more accurate decisions for generation commitment and dispatch.

Conclusions

Midwestern stakeholders expressed significant interest in distributed resources, how modern business and regulatory models are changing, and how to build off initial success in bulk wind integration. *America’s Power Plan* provides a policy roadmap with respect to how these areas can contribute to a high renewable energy future.⁶ Changes will need to be made to the traditional utility model and the accompanying regulatory regime to accommodate 21st century customer demands and technologies, including improving efficiencies and decarbonizing the electricity sector. This will not be a one-size-fits-all approach but will vary across the country, depending on a given region’s regulatory and market structure. In spite of this regional variation, it is important to have a consistent policy direction and shared understanding of the underlying drivers forcing industry changes, so that developments do not work against or contradict each other.

Distributed generation and other distribution resources are ramping up, and stakeholders are recognizing the important role these technologies will play in a renewable energy future, both in supplying clean generation and increasing system flexibility. Innovative ownership and finance models can overcome barriers to greater DG deployment. Furthermore, increasing focus on distribution systems in utility planning processes can proactively identify upgrade needs to accommodate distributed resources and promote greater adoption. Midwestern utilities and system operators are employing cutting-edge strategies to deal with significant amounts of variable generation on the bulk power system, which is leading to greater levels being contemplated in high renewable future studies. Initial successes have been the result of clear policy direction and accomplished through learning by doing. These lessons can be applied to distributed resources as we grow a collective understanding of the various components necessary to enable a sustainable energy future.

⁶ It also covers transmission policy, market design, finance policy, and siting. See <http://www.americaspowerplan.org>.

Appendix A—Meeting Attendees

1. Allen Gleckner, Environmental Law and Policy Center
2. Ben Paulos, Energy Foundation
3. Beth Soholt, Wind on the Wires
4. Betsy Engelking, Geronimo Energy
5. Beverly Heydinger, MN Public Utilities Commission
6. Bill Grant, MN Division of Energy Resources
7. Bob Eleff, Legislative Analyst, MN House of Representatives
8. Brendon Slotterback, City of Minneapolis
9. Brian Ballinger, MI Public Service Commission
10. Burl Haar, MN Public Utilities Commission
11. Dennis Ahlers, MN Division of Energy Resources
12. Ed Garvey, Consultant
13. Ellen Anderson, Senior Advisor to Governor Dayton
14. Emily Marthaler, Midwestern Governors Association
15. Erin Stojan Ruccolo, Fresh Energy
16. James Newcomb, Rocky Mountain Institute
17. Janet Gonzalez, MN Public Utilities Commission
18. Jim Alders, Xcel Energy
19. Joe Sullivan, Wind on the Wires
20. Joe Wiedman, Interstate Renewable Energy Council
21. Laura McCarten, Xcel Energy
22. Lola Schoenrich, Great Plains Institute
23. Mack Thompson, IA Utilities Board
24. Matt Schuerger, Energy Systems Consulting Services, LLC
25. Michael Noble, Fresh Energy
26. Mike Bull, Center for Energy and the Environment
27. Mike Gregerson, Great Plains Institute/Midwestern Governors' Association
28. Nancy Lange, MN Public Utilities Commission
29. Peter Strohmeier, MN House of Representatives
30. Rick Evans, Xcel Energy
31. Rolf Nordstrom, Great Plains Institute
32. Ron Lehr, Consultant
33. Steve Beuning, Xcel Energy
34. Steve Clemmer, Union of Concerned Scientists
35. Steve Dahlke, Great Plains Institute
36. Will Seuffert, MN Environmental Quality Board
37. Yvonne Prettner Solon, MN Lieutenant Governor

Appendix B—Additional Resources

America's Power Plan | Changing the Power System and Utility Businesses at Their Core. Energy Foundation and Energy Innovation, 2013. <http://americaspowerplan.com/>

Market Transformation Pathways for Grid-Connected Rooftop Solar PV in Minnesota. Fresh Energy, 2013. http://mn.gov/commerce/energy/images/Solar_report_9-20-13_single%2520pages.pdf

Minnesota Renewable Energy Integration and Transmission Study. Minnesota Department of Commerce, 2013. <http://mn.gov/commerce/energy/topics/resources/energy-legislation-initiatives/minnesota-renewable-energy-integration-transmission-study.jsp>

NREL: Renewable Electricity Futures Study. http://www.nrel.gov/analysis/re_futures/

Sharing Success: Emerging Approaches to Efficient Rooftop Solar Permitting. Interstate Renewable Energy Council, 2012. <http://www.irecusa.org/wp-content/uploads/Sharing-Success-final-version.pdf>

Value of Solar Tariff Methodology. Minnesota Department of Commerce, 2013. <http://mn.gov/commerce/energy/topics/resources/energy-legislation-initiatives/value-of-solar-tariff-methodology%20.jsp>