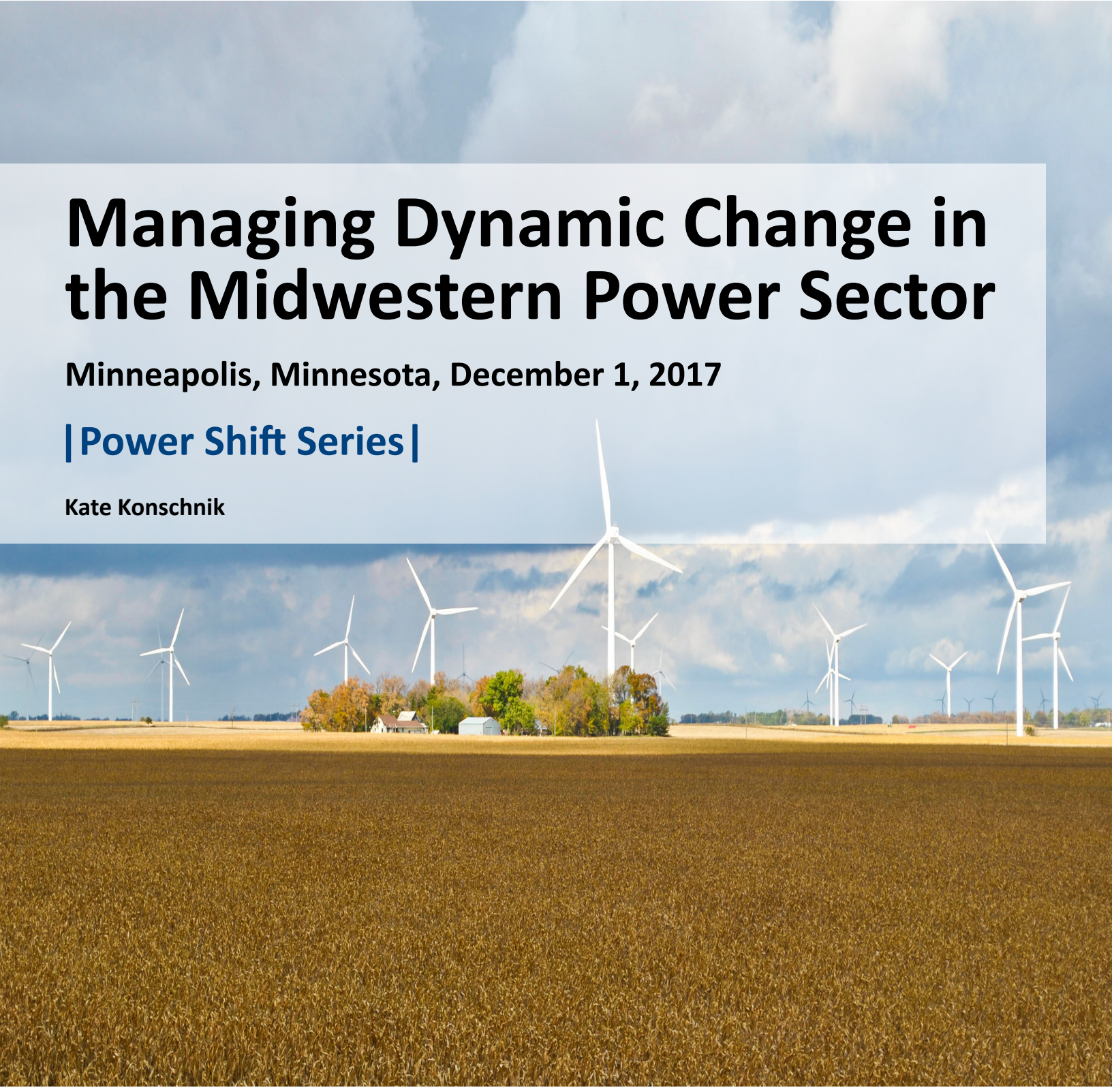
Managing Dynamic Change in the Midwestern Power Sector

Minneapolis, Minnesota, December 1, 2017

|Power Shift Series|

Kate Konschnik



Duke NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS

LAW SCHOOL
UNIVERSITY OF MINNESOTA
Driven to Discover℠

UNC
CENTER FOR CLIMATE, ENERGY, ENVIRONMENT AND ECONOMICS

HARVARD LAW SCHOOL
Environmental & Energy Law Program

Nicholas Institute for Environmental Policy Solutions nicholasinstitute.duke.edu

Managing Dynamic Change in the Midwestern Power Sector

Power Shift Midwestern Regional Workshop

CONTENTS

Author Affiliation
Nicholas Institute for Environmental Policy Solutions, Duke University

Citation
Konschnik, Kate. 2018. "Managing Dynamic Change in the Midwestern Power Sector: Power Shift Midwestern Regional Workshop, Minneapolis, Minnesota, December 1, 2017." NI Proceedings Power Shift Series 18-01. Durham, NC: Duke University. http://nicholasinstitute.duke.edu/publications.

Acknowledgments
Thanks go to Alexandra Klass and the University of Minnesota Law School for hosting the Power Shift Midwestern Regional Workshop.

Review
This proceedings has been reviewed by experts in the field: Edward Garvey of AESL Consulting, Alexandra Klass of the University of Minnesota Law School, Jonas Monast of the University of North Carolina School of Law, and Ari Peskoe of Harvard Law School.

Publication Number: NI Proceedings Power Shift Series 18-01

Cover Photo Credit: Wind turbines in southern Minnesota by MPCA Photos, Attribution-NonCommercial 2.0 Generic.

Summary

Market-shifts, technological innovation, and clean energy policies are driving a fundamental transformation of the U.S. power sector. Yet the grid is largely governed by a decades-old legal framework. New regulatory and market design strategies are necessary to align the power sector with environmental goals while ensuring affordable and reliable service.

That challenge is the focus of Power Shift, a network of energy law professors and practitioners, hosted by the Harvard Environmental and Energy Law Program, Duke University's Nicholas Institute for Environmental Policy Solutions, and the Center for Climate, Energy, Environment, and Economics at the University of North Carolina Law School. Since 2015, the group has convened in conjunction with meetings of the National Association of Regulatory Utility Commissioners to discuss grid changes, pose related legal questions, and foster a research agenda for power policy reform.

The first regional meeting of Power Shift took place in Minneapolis, Minnesota, in December 2017. Participants discussed four critical grid issues in the Midwest: evolving stakeholder processes, power sector fleet transfer, the impact of electric cars on the grid, and responses to changing consumer demand. The range of potential research inspired by their discussion—including whether state regulatory processes help or hinder big shifts underway on the grid, how state climate goals affect regional generation patterns, how stakeholder processes and market trends interact, whether utilities should attempt to spark demand for electric vehicles, and whether customer demands or public policies are driving innovation—points to the sea change in the U.S. power sector.

INTRODUCTION

Participants at Power Shift's December 2017 regional workshop discussed Minnesota and upper Midwestern power sector trends, described management strategies, noted obstacles to innovation, and identified research topics. The workshop featured four sessions:

- The Shifting Midwestern Energy Landscape—Views from Evolving Stakeholder Processes
- Power Sector Fleet Transfer—Where Are We Headed?
- Driving into the Future with Electric Vehicles
- Responding to Changing Customer Demands

Discussions built on presentations but often struck out in new directions.

THE SHIFTING MIDWESTERN ENERGY LANDSCAPE—VIEWS FROM EVOLVING STAKEHOLDER PROCESSES

Several stakeholder processes targeting power sector decision making are underway in Minnesota and in the Midwestern Independent System Operator's (MISO) North region.[1] Participants agree all stakeholders—industry, regulators, NGOs, and others—must engage. A state legislature can facilitate some of the positive changes on the grid, but not all. Each actor brings a different set of tools.

Minnesota's e21 Initiative is an example of a largely successful engagement producing innovative results. It was not directed by government; in 2014, the initiative began organically, with cross-sector conversations between Xcel and local NGOs about state regulatory actions and whether those actions help or hinder big shifts underway on the grid. Some utilities were reacting defensively to change, reflecting the reality that current business models and rate structures might not sufficiently compensate them in an era of flat demand, reduced distributed energy costs, and new market entrants and technologies. The e21 Initiative sought to shed light on regulatory changes that would enable utilities to evolve with the grid.

The e21 Initiative embraces transformative scenario planning—an approach for tackling complex problems that requires collaboration between the principal actors and differently situated stakeholders. The initiative has rolled out in three phases: a year of monthly meetings to generate consensus recommendations for new utility business models and regulatory frameworks, a deeper dive culminating in three white papers (exploring performance-based compensation, integrated systems planning, and grid modernization), and pilot programs to test concepts such as energy efficiency and time-of-use rates. Participants applauded these creative efforts but debated whether utilities and public utility commissions (PUCs) are spending too much time on pilot programs and not scaling up ideas that have demonstrated results. It may be time to mainstream these ideas.

Initially, environmental groups and large industrial users were at loggerheads. Through e21 discussions, industrial users recognized that environmental groups were not advocating for more expensive energy, and environmental groups understood that industrial users were not pushing for coal. These realizations were critical to forging a strategic alliance.

Other Minnesota stakeholder processes have unfolded before the Minnesota PUC in contested resource planning dockets. Xcel's 2011–2025 Integrated Resource Plan (IRP) was a turning point. The process featured dueling comments without direct engagement, followed by challenges, and took two years to complete. During that time, the PUC rejected another utility's IRP for not sufficiently considering environmental issues. For its next IRP, Xcel proposed to engage more proactively, building on e21 talks. This engagement took time up front but narrowed the range of disputes brought before the PUC, ultimately streamlining the process. (One participant referred to this tradeoff as a "pay me now" or "pay me later" proposition.) Discussions focused on time-of-use rates (using customer focus groups), electric vehicle (EV) rates, and interconnections for community solar gardens.

[1] The Midwestern Independent System Operator is the FERC-regulated, regional transmission operator (RTO) for all or part of 15 U.S. states and the Canadian province of Manitoba.

The Minnesota PUC has opened investigatory dockets for grid modernization and rate design, and it hosts working groups on interconnections and utility performance metrics for performance-based ratemaking. Previously, the PUC was more reactive, but now it is embracing this change of practice because of the benefits of cooperation.

All told, Minnesota has had more robust stakeholder processes than neighboring states. In North Dakota, for instance, a utility can complete a filing after speaking to a single PUC staffer. Yet even in Minnesota, residential customers and particularly those in low-income communities have been effectively excluded from discussions about grid services.

Reliability and affordability loom large in midwestern power discussions. Expectations regarding reliability and robust communication during outages have increased. In addition, customer needs are becoming more distinctive. Instead of lumping customers into a few classes, utilities increasingly must provide individualized service. Meanwhile, the region's below-national-average electricity rates are rising, burdening trade-exposed heavy industries, like iron ore and mineral processing. Moreover, some argue that electricity costs fall more heavily on low-income customers.

Minnesota's power sector is on track to meet the state's climate goals, in part because the economics of wind in the Upper Midwest make it possible to maximize utility profits and de-carbonize the grid.[2] A winning decarbonization strategy would combine further carbon reductions in the power sector with electrification of other sectors. Electrification can reverse demand trends and grow a utility's business by aligning interests with low-carbon goals. (Given today's excess capacity, the Midwest power sector could absorb a 50% penetration rate of EVs by 2030 with existing generation.)

Participants expressed concern about creating new obstacles to deep decarbonization. For instance, replacing coal with baseload natural gas locks in fossil power for another 40 years. Some advocates may prefer keeping a coal plant online until lower-carbon power is available.

Successful stakeholder processes appear to share certain attributes:

- Clarity on the scope and level of detail
- Efforts to educate the community about grid issues in advance of conversations
- Independent facilitators trusted by all
- Followup on decisions (including explanations for deviation from the consensus view)
- Engagement of people with appropriate expertise (including operational expertise)
- Civility
- Relationship building
- Understanding that each participant needs to sell proposals to his or her sector/company/peers
- Agreement on small changes first.

POWER SECTOR FLEET TRANSFER—WHERE ARE WE HEADED?

Regional utilities are shedding some of their coal assets. One electric cooperative, with an ownership stake in three base-load coal-fired generators, is decommissioning the one plant that it owns outright by 2020 and replacing it with wind power and a gas peaking plant. Another cooperative is retiring a coal plant and has sold its partnership stake in a Wisconsin coal plant, cutting its carbon profile by 28% in 10 years. An investor-owned utility in the region used coal for 95% of its generation through the early 2000s but then embarked on a modernization effort, retiring nearly 40% of its coal and replacing it with wind.

The Midwest is home to some of the top wind locations in the United States. There is as much wind in the MISO North region as in Texas, and in the spring and fall, more than 50% of the power generated in North Dakota, South Dakota, Minnesota, and Iowa is from wind. In addition, distributed solar is increasing, particularly for rural cooperatives.

[2] Minnesota's Next Generation Energy Act of 2007 set two economy-wide greenhouse gas emissions reduction goals: 30% by 2025 and 80% by 2050.

MISO and its member utilities are learning how to back down coal and dispatch renewables. One local cooperative has a power purchase agreement for hydro-electricity to back up intermittent generation. In addition, participants described MISO as a virtual battery, allowing utilities to buy and sell power as needed. Most MISO utilities self-supply for capacity, but they increasingly rely on the market to diversify their own generation mix or to cover their exposure. The risk of this strategy is that power will be expensive when the utility needs it. At least one utility is building a gas plant as dispatchable power to hedge against the market. "Winter-peaking" utilities with large electric heating loads are partially protected from market price spikes because their peak demand differs from that of the rest of the grid.

Utilities are also ramping up demand-side management. They don't use this resource to hedge against market prices, because the prices are not sufficiently high. More often, utilities use demand-side management as a capacity resource, desiring large industrial customers to sign long-term demand response contracts. Minnesota directs inclusion of demand response (and energy efficiency) in IRPs. Here, energy efficiency has been a policy focus since World War II, but a convergence of market forces, regulatory nudges, and consumer interest drives has renewed interest. Across the border, Manitoba has centralized its demand-response programs in a ministry.

Research Questions for Fleet Transfer

Natural gas and wind generation have gained substantial market share in the MISO footprint. Gas, wind, and solar also dominate the region's interconnection queue, suggesting that the relative importance of these fuels will increase. In a region where demand has been flat or declining since 2007, their growth comes at the expense of coal, which fell 22% from 2014 to 2016. Yet coal still generates almost half of MISO's power, more than in any other RTO market. Meanwhile, an aging nuclear fleet provides 15% of the region's power.

Research questions:

- If utilities retire generation and rely more heavily on market purchases for power, who should pay if market prices are higher than those for self-generation had been?
- How do individual state climate goals affect regional generation patterns?
- What is the interplay between stakeholder processes and market trends?
- Are efforts like the Great Plains Institute's e21 or the 51st State Project helping to design tomorrow's grid and, if so, how can these efforts be replicated across the United States?

Across these contractual resources, MISO market activity has picked up in recent years. The Minnesota Department of Commerce used to cap market purchases at 5% of load because it didn't trust the market. Today, confidence in the market grows even though price swings are increasing as baseload gives way to variable generation. In response, the market is valuing ancillary services for ramping, to follow load. As market reliance grows in a region where utilities are still vertically integrated and rate regulated by the states, questions arise about who bears the risk of high market prices. If a utility retires a plant and pays more to purchase power from the market, do the utility's shareholders or its customers pay the difference? Some participants asked whether lower rates of return on equity can drive utilities to the market rather than build their own generation.

Beyond renewables, two other sources of generation could be important to a carbon-constrained grid: nuclear power and hydropower. But utilities with nuclear assets are pushing for additional compensation to stay online. Meanwhile, market rules based on thermal power do not always match up with the attributes provided by hydro. Moreover, hydro construction costs are rising.

Finally, as utilities retire the generation that transmission was built to support, energy infrastructure needs to adapt. New transmission faces obstacles, including buy-in from "pass-through states" that must agree to lines that may not directly benefit them. For instance, Nebraska opposes a line that connects generators and load outside its borders, but without this line, EVs in the region will charge at night with coal-fired power, not wind or solar. Minnesota's 2025 carbon goal relies on the construction of a transmission line from Canada to bring hydro to the state. The MISO Planning Advisory Committee is active on this issue.

DRIVING INTO THE FUTURE WITH ELECTRIC VEHICLES

Multiple factors are driving EV deployment—vehicle purchase tax incentives, new legislative mandates as other states follow California's lead to require auto manufacturers to sell zero-emission vehicles, Volkswagen settlement money for EV infrastructure, IRP requirements to deploy charging infrastructure, and new EV models (one participant noted the technology is swiftly moving EVs from "golf carts to autonomous vehicles"). EVs may be a key component to a deep decarbonization strategy—at least seven countries have established future bans on combustion engine vehicles. On the domestic front, the Northeast Transportation Climate Initiative is exploring a "RGGI program for cars" referencing the region's utility sector carbon cap-and-trade program.

Yet significant policy barriers prevent broader uptake of EVs, including:

- Building codes barring higher-voltage charging outlets and wiring
- Burdens of obtaining permits and rights of way
- Interstate highways prohibiting services for sale (which could include EV charging stations)
- Pushback from stakeholders concerned that EVs will drain highway funds
- Rate structures that disincentivize placement of charging stations in rural areas (pay based on peak use)
- Large state-to-state differences in charging costs that inhibit the creation of interstate EV corridors
- Patchwork of state rules and policies (no harmonization)
- Regulation of charging companies as utilities
- Obstacles to utility ownership of and rate recovery for charging stations.

Research Questions for Electric Vehicles

Electric vehicles offer enormous upside for utilities, including load growth, distribution system investment opportunities, and a new potential market in charging services. And national projections look strong—the U.S. Department of Energy expects 400% growth in annual sales of EVs by 2023. Yet EVs have not yet taken hold in the Midwest; only Illinois and Michigan rank in the top 20 states for EV sales. EV issues specific to the Midwest are cold weather challenges and potential equity issues inherent in funding EV infrastructure.

Research questions:

- Should utilities attempt to spark EV demand by investing in charging infrastructure or by offering incentives to early adopters?
- Should PUCs require that all ratepayers pay for new investments, or should they enable competition and require EV companies and their customers to bear the cost of new infrastructure needs?
- In this context and more broadly, do rural electric cooperatives or investor-owned utilities have more flexibility to innovate? Is EV charging a "sale of electricity"?
- Does electrification of transport and other sectors of the economy increase cyber and reliability risks and, if so, how can those risks be managed?

In addition, some early policies intended to induce use of EVs are not scalable. For instance, Philadelphia offered a personal parking space to each zero-emission vehicle 10 years ago.

Midwestern states are embracing EV deployment and planning EV infrastructure at different rates. The Great Plains Institute (GPI) has partnered with Chargeup Midwest to model uptake projections across the region and to measure the impact of different policy tools. GPI has also talked with the Mid-Continent Energy and Environmental Regulators Group about EV trends and policies. Group members may not support climate policies per se, but they recognize change is happening, and they want to be able to manage it.

Some EV owners want to know that the electricity charging their vehicle is clean. In response, at least one regional rural cooperative offers renewable energy credits (RECs) for EVs charged by renewables. In addition, a few municipal charging stations retire RECs to cover electricity used to charge EVs.

Charging station locations matter to consumers. People like convenience and aesthetics. One utility learned the hard way that people don't like to charge near wastewater treatment facilities.

Excess capacity on the Midwestern grid could support significant EV deployment. The issue is the timing of demand increase ("lumpy loads"). MISO sees this issue as largely a distribution system issue. Utilities and balancing authorities are feeding load projections into the ISO, which it uses to monitor the situation.

Workshop participants discussed whether time-of-use rates could be helpful—or necessary—to encourage EV owners to charge during low-use times. EV customers appear sensitive to these rates when deciding when to charge. Ontario offers free charging overnight. One participant queried whether outlets could allow charging only during low-rate times. General Motors' CEO has expressed concern that encouraging charging during certain hours could undermine the driving experience.

At present, it may not be economical to use EV batteries as grid storage. The practice would impose a great deal of wear and tear on the batteries, and it could void the manufacturer's warranty. But in the future, EVs might be deployed for demand response. Moreover, EVs could bring battery prices down generally, which might make it affordable for consumers to purchase standalone batteries to store and discharge power from rooftop solar. In this way, EVs could indirectly spur energy storage.

Low-income communities are not adequately represented in EV discussions. Without these communities present in the room, policy tools such as ridesharing and public fleet electrification may not be raised.

Participants also discussed whether electrification of multiple sectors amplifies the risk of grid disruptions. If we end up too reliant on utilities and the electric grid, participants wondered if we might be leaving the United States more vulnerable to power outages and cyber attacks. Some participants touted recent improvements in grid hardening and storm response, pointing, for instance, to the low (2%) outage rate in Hurricane Harvey's path in 2017.

With a sufficiently large increase in EV purchases, a utility's fixed costs can be spread across more megawatt hours, lowering rates across the board. Participants discussed who would pay fixed costs attributable to EV use—all ratepayers or only those customers who own EVs? The cost allocation may depend on whether utilities or third parties are building and maintaining the EV charging infrastructure.

Utilities appear interested in owning and operating EV infrastructure. (In some states, utilities may be prohibited from owning charging stations or from recovering these infrastructure costs.) Third parties may also step into this space as they have in the programmable thermostat and smart meter markets. Some EV advocates prefer third-party ownership of charging stations, because it does not tie the EV owners to the local utility but does allow owners to maintain the relationship if they move out of the utility's service territory. Third-party charging companies are focused on the workplace, hoping to charge vehicles while employees are working.

RESPONDING TO CHANGING CUSTOMER DEMANDS

This discussion distinguished among three types of utilities.

Municipal utilities are non-profit entities governed by elected officials. Some are large and have the capacity to do market research and innovate in climate and energy policy. However, the average municipal utility has 2,500 customers, 60% of whom have a moderate-to-low income.

Rural electric cooperatives are non-profit entities owned by their members, who consume the energy. Rural cooperatives serve about 13% of the electric meters in the United States, and they cover three-quarters of the nation's landmass. They were created to bring electricity to rural communities; today, large industrial consumers purchase much of their power.

Investor-owned utilities are private, for-profit companies regulated by state utility commissions. They serve nearly 70% of people living in the United States.

Regardless of type, all utilities are challenged to maintain reliability and affordability in a time of immense change. Evolving customer demand and advancing technologies are changing the landscape ever more rapidly—one utility discussed how control of smart meters moved from laptops to smart phones just during the course of a small pilot project. Other advances are not so benign, as evidenced by ever-more complicated cyber-security needs. Moreover, as already noted, customers are demanding additional, diverse attributes with electricity provision, including control, cost relief, reliability, communication, and decarbonization. A few regional utilities are offering "green power" to interested residential customers.

Workshop participants discussed the "customer class of 1," highlighting the divergence of consumer preferences. Across states and power markets, it is challenging to find a single solution that satisfies customer need. Even different utilities in the same state vary in consumer responsiveness. Phase 2 of e21 highlighted work to craft customer satisfaction metrics.

Many regional corporate consumers of energy—such as Target, Best Buy, Amazon, and Toyota—have ambitious sustainability goals that include climate and renewable energy sourcing targets. In some instances, they may purchase RECs from projects anywhere in the United States; other companies want the renewable energy delivered to their local distribution system. Google wants to ensure its data centers have "uninterruptable" renewable power (that is, 24 hours a day and 7 days a week). Some companies are asking utilities to meet these targets, or suggesting they will move to another state or leave the grid and self-supply.[3] In Minnesota, a group of large energy consumers and utilities have convened to discuss customer demands and the capacity for utilities to respond. In other states, utilities may not have information about customer sustainability targets.

Workshop participants noted that regulated utilities are moving more slowly than market-based power and could lose large customers as a result. However, not all corporate consumers want to get into the energy business. Large retail businesses may not want to carry the risk of a large generation project if retail growth fails to match projections. Smaller customers may not have the energy demand necessary to make direct power purchases feasible, although they could aggregate demand and go to market together. Public utility commissions are concerned about large consumers going "off grid" (one participant called leaving the grid for renewable energy "REXIT") and leaving other customers to pay a larger share of the utility's fixed costs. As a result, several commissions have sought to encourage bilateral contracts between carbon-conscious consumers and utilities.

Participants discussed the relative cost-effectiveness of self-supplying power. Some noted cost is not the sole consideration—churches, businesses, and homeowners install solar panels, for instance, to express support for self-reliance, for visibility (so customers know a company is taking action), or to socialize the concept of renewable energy.

Research Questions for Customer Demands

Energy consumption is flat in the Upper Midwest. Meanwhile, more customers want to control their energy consumption—and know how their electricity is generated. Demand for electrons is giving way to an appetite for demand-side management, storage and distributed energy, clean resources, and energy efficiency. Investor-owned utilities, rural cooperatives, and municipal utilities are differently situated to respond to shifting customer demands. Large energy consumers may demand cleaner energy from utilities to meet sustainability goals, or, where allowed by state law, may bypass a utility to procure utility-scale renewable energy or bid demand management into MISO. Utilities are exploring various responses to customer demand trends.

Research questions:

- How do customer demands and public policies interact, and is one or the other the driving force for change these days?
- What are the challenges faced by cooperatives, municipal utilities, and investor-owned utilities in this changing world?
- What strategies have utilities employed to meet customer needs? What policies are needed to facilitate the transition to a more customer-centered service model?
- Why are large corporations making sustainability pledges and taking them so seriously, threatening to move or go off grid to achieve renewable energy targets?

[3] Acting on a variant of this concept, Google is investing in its own energy storage infrastructure to meet its "uninterruptible" renewable energy goal.

APPENDIX: WORKSHOP PARTICIPANTS

Ellen Anderson, University of Minnesota Transition Lab

Jon Brekke, Great River Energy

Aakash Chandarana, Xcel

Hugh Cherne, Best Buy

James Coleman, Southern Methodist University School of Law

Leigh Currie, Minnesota Center for Environmental Advocacy

Victor Flatt, University of Houston Law Center

Edward Garvey, AESL Consulting

Bruce Gerhardson, Otter Tail Power Company

Joe Goffman, Harvard Environmental Law Program

Jason Grenier, Otter Tail Power Company

Bob Jagusch, Minnesota Municipal Utilities Association

Alexandra Klass, University of Minnesota Law School

Kate Konschnik, Nicholas Institute for Environmental Policy Solutions, Duke University

Rick Lancaster, Great River Energy

Nancy Lange, Minnesota Public Utilities Commission

Kevin Miller, Chargepoint

Jonas Monast, University of North Carolina School of Law

Rolf Nordstrom, Great Plains Institute

Audrey Penner, Manitoba Hydro

Julie Pierce, Minnesota Power

Melissa Powers, Lewis & Clark Law School

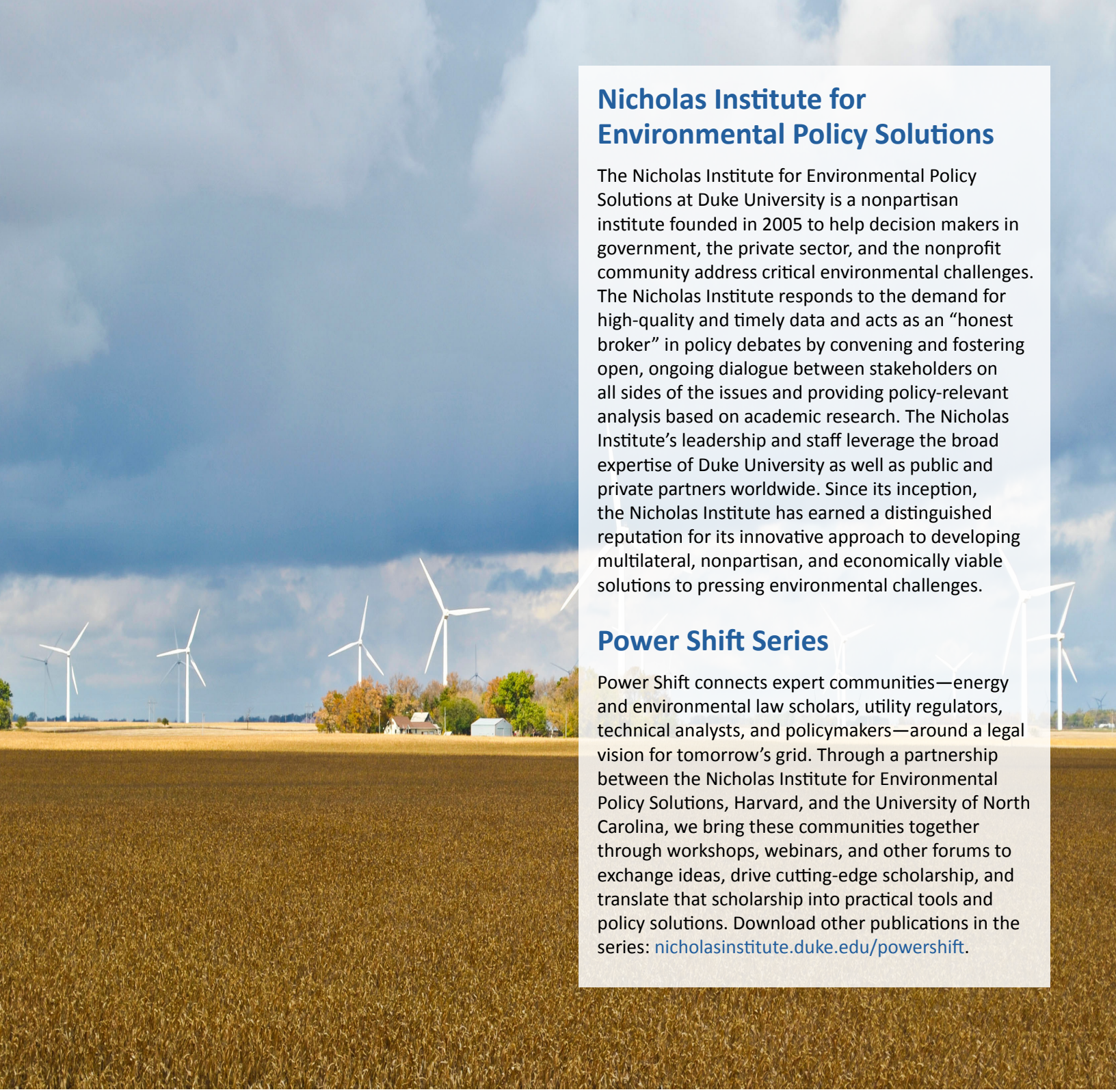
Phyllis Reha, PAR Energy Solutions

Doug Scott, Great Plains Institute

Brian Tulloh, MISO

Shelley Welton, University of South Carolina School of Law

For more information about the Minnesota Regional Workshop, contact Alexandra Klass, aklass@umn.edu, or Kate Konschnik, kate.konschnik@duke.edu.



Nicholas Institute for Environmental Policy Solutions

The Nicholas Institute for Environmental Policy Solutions at Duke University is a nonpartisan institute founded in 2005 to help decision makers in government, the private sector, and the nonprofit community address critical environmental challenges. The Nicholas Institute responds to the demand for high-quality and timely data and acts as an "honest broker" in policy debates by convening and fostering open, ongoing dialogue between stakeholders on all sides of the issues and providing policy-relevant analysis based on academic research. The Nicholas Institute's leadership and staff leverage the broad expertise of Duke University as well as public and private partners worldwide. Since its inception, the Nicholas Institute has earned a distinguished reputation for its innovative approach to developing multilateral, nonpartisan, and economically viable solutions to pressing environmental challenges.

Power Shift Series

Power Shift connects expert communities—energy and environmental law scholars, utility regulators, technical analysts, and policymakers—around a legal vision for tomorrow's grid. Through a partnership between the Nicholas Institute for Environmental Policy Solutions, Harvard, and the University of North Carolina, we bring these communities together through workshops, webinars, and other forums to exchange ideas, drive cutting-edge scholarship, and translate that scholarship into practical tools and policy solutions. Download other publications in the series: nicholasinstitute.duke.edu/powershift.

Contact

Nicholas Institute, Duke University
P.O. Box 90335
Durham, NC 27708

1201 Pennsylvania Avenue NW
Suite 500
Washington, DC 20004

Duke Marine Lab Road
Beaufort, NC 28516

919.613.8709
nicholasinstitute@duke.edu