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Wisconsin Energy Distribution and Technology Initiative

Stakeholder Recommendations to Accelerate the Clean Energy Transition and Optimize the Energy System for the Benefit of All

July 2020

Co-convened by the Midwest Energy Research Consortium (M-WERC)
and the Great Plains Institute (GPI)

About this Report

ABOUT THE WISCONSIN ENERGY DISTRIBUTION AND TECHNOLOGY INITIATIVE

The Wisconsin Energy Distribution and Technology Initiative (WEDTI) was a year-long effort co-convened by the Midwest Energy Research Consortium (M-WERC) and the Great Plains Institute (GPI) to explore changes happening to and within the electric energy sector, and to develop Wisconsin-specific approaches to addressing them, with a focus on technology deployment and innovation. M-WERC and GPI assembled a stakeholder group that represents a broad spectrum of interests in grid modernization and technology, including investor- and consumer-owned utilities, regulators, consumer advocates, environmental advocates, state and local governments, businesses, economic developers, and academic researchers.

This report documents the process that the group followed and the consensus recommendations that resulted from that process.

ATTRIBUTION OF COMMENTS

This document summarizes the consensus recommendations coming out of 10 monthly day-long meetings with a diverse group of Wisconsin energy system stakeholders. The viewpoints stated in this document represent the collective thinking of the group. No view should be attributed to any specific individual or organization.

The stakeholder engagement process and the resulting recommendations are intended to complement but not replace important discussions that happen within formal regulatory proceedings and Governor Evers' Task Force on Climate Change.

ABOUT THE CO-CONVENERS

Great Plains Institute: The Great Plains Institute (GPI) is a nonpartisan, nonprofit organization with a mission to transform the energy system to benefit the economy and environment. Working across the US, we combine a unique consensus-building approach, expert knowledge, research and analysis, and local action to find and implement lasting solutions. Learn more at www.betterenergy.org.

Midwest Energy Research Consortium: The Midwest Energy Research Consortium (M-WERC) uses science and technology-driven innovation to spark economic development and growth for Wisconsin's Energy, Power, and Controls (EPC) sector, a $28 billion industry made up of 900 Wisconsin companies that employ 100,000 people. More information is available at www.m-werc.org.

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Executive Summary

Background

The electrical energy sector is rapidly evolving. Across the United States, electrical systems that were built to provide affordable and reliable power are now being asked to provide new products and services that enable customer choices and to reduce or eliminate carbon emissions. Meanwhile, many utilities are seeing changes that impact their business models, including flat or declining loads, increasing influence from distributed generation, and rapidly changing costs and risk profiles among generation resources. This evolution is creating the need in many states, including Wisconsin, to collaboratively identify necessary changes to both utility business models and regulatory frameworks to meet 21st century demands.

Technology is increasingly important to this evolution. At its core, grid modernization is about the effective use of technology to support an electrical system that produces little to no carbon, maintains reliability and affordability for consumers, and offers an increasing range of products and services that meet consumers' needs.

This Process

Beginning in July 2019, the Midwest Energy Research Consortium (M-WERC) and the Great Plains Institute (GPI) worked together to initiate a comprehensive stakeholder process to:

- define the role that technology can play in the Wisconsin energy distribution system of the future, and
- make recommendations to policy makers on changes to the system that would best position Wisconsin businesses and utility customers to thrive as part of that system.

M-WERC and GPI assembled a stakeholder group that represents a broad spectrum of interests in grid modernization and technology. The group was later augmented by assistance from subject matter experts as the stakeholders broke into subgroups to develop and discuss individual recommendations.

The group convened monthly for in-person, all-day meetings designed to first understand the scope of issues that the stakeholders wished to explore, and then to devote meetings to a deeper dive on these subjects. In March 2020, the process shifted to virtual meetings due to the coronavirus.

During the course of the stakeholder meetings, the impacts of the coronavirus on the electric sector caused the group to re-evaluate any potential recommendations. Factors such as reduced demand, shifting usage, and the potential for long-lasting impacts even after the virus has subsided, were considered.

As part of its initial two meetings, the group developed a set of organizing principles to act as parameters for the discussion and a lens through which all recommendations would be viewed. The organizing principles were as follows:

The electrical energy sector is undergoing a transition, and with this come opportunities and challenges. Among the opportunities are:

- significant economic development gains,
- reductions in the carbon impacts on and of Wisconsin's economy,
- energy security and community resilience, and
- equity for all customers.

Given these opportunities, we wish to:

- accelerate the transition to allow Wisconsin to take advantage of economic development opportunities;
- accelerate utility deployment of new technologies for the benefit of all customers, including residents and businesses; and
- optimize the energy system for the benefit of all (state, customers, and utilities), while enabling first-movers to advance the adoption of beneficial technologies.

In the process of pursuing this, we wish to:

- maintain affordability, efficiency, and reliability for customers;
- recognize that solutions will require flexibility and being technology-neutral; and

  acknowledge that the outcomes from this change need to fit into Wisconsin's regulatory construct and maintain balance between customers and utilities.

In the initial meetings, the group also discussed the current state of the electric sector and technology opportunities in Wisconsin, resulting in a list of topic areas to further explore. These topic areas became the focus of the next series of meetings, with a combination of group members and outside experts brought in to more deeply explore the various issues. Following these discussions, facilitators summarized comments and questions from the group on each topic area. These comments are found in this report as Appendix A.

To further refine the discussion towards recommendations, the group established four subgroups to draft recommendations around each of the topic areas. These subgroups were chaired by group members and included both group members and their colleagues with specific technical expertise. The four subgroups were:

- Behind the Meter—Accelerating Deployment of Distributed Energy Resources (DERs) and Electrification Technologies
- Utility and Regulatory Innovation
- Customer Consumption—Accelerating Efficiency and Demand Response
- Wholesale Market and Transmission

The subgroups were charged with making recommendations on policies, regulations, or legislation to the full group. These recommendations were to conform to the organizing principles of the group, as laid out above. In addition, the group made their recommendations in

consideration of the coronavirus, and its impacts on the electric sector in Wisconsin. The subgroups met as needed during March-May 2020 to develop their recommendations.

Recommendations

This group reached consensus on the following 14 recommendations, divided amongst five categories, that are intended to define the role that technology can play in the Wisconsin electricity distribution system of the future, and identify changes to the system that would best position Wisconsin businesses and utility customers to thrive as part of that system. Moreover, the recommendations are intended to align with the group's organizing principles. The remainder of this report provides additional context for and details on these recommendations.

Behind the Meter

- #1: Position Utilities as Conductors
- #2: Update Interconnection Rules

Utility and Regulatory Innovation

- #3: Establish an Innovative Technologies Initiative
- #4: Encourage Utility-Stakeholder Collaboration
- #5: Foster Innovation for Low-Income, Multifamily, and Renters

Customer Consumption

- #6: Align Focus on Energy with Carbon-Reduction and Clean Energy Goals
- #7: Advance Clean Energy through Enhanced Energy Efficiency
- #8: Shape Energy Consumption to Achieve Utility and State Goals

Wholesale Market and Transmission

- #9: Improve MISO Visibility and Dispatch of DERs
- #10: Improve DER Operator Visibility into MISO Markets
- #11: Participate in Developing Changes to MISO Market Rules
- #12: Improve the Use of DER Data in Transmission Planning

The Need for Action

- #13: Act Quickly
- #14: Provide Economic Stimulus

Background

The energy sector is rapidly evolving. Across the United States, electrical energy systems that were built to provide affordable and reliable power are now being asked to provide new products and services that enable customer choices and to reduce or eliminate carbon emissions. Meanwhile, many utilities are seeing changes that impact their business models, including flat or declining loads, increasing influence from distributed generation, and rapidly changing costs and risk profiles among generation resources. This evolution is creating the need in many states, including Wisconsin, to collaboratively identify necessary changes to both utility business models and regulatory frameworks to meet 21st century demands.

Technology is increasingly important to this evolution. At its core, grid modernization is about the effective use of technology to support the energy system that produces little to no carbon, maintains reliability and affordability for consumers, and offers an increasing range of products and services that meet consumers' needs.

Innovation in Wisconsin's Regulated Market

Reliable, universal, safe, and cost-effective: these are the foundational principles of the mission of both the Public Service Commission of Wisconsin and the electrical utilities serving the citizens of Wisconsin for over 100 years. That system has relied upon a capital-intensive, highly planned, and controlled collaboration between regulators, utilities, customers, and affiliated stakeholders. Large power generation facilities, supported by dedicated transmission and distribution companies working through complex and detailed regulations, have served the people, institutions, and commerce in Wisconsin well.

However, Wisconsin is changing in ways both recognizable and not. Environmental, technological, political, demographic, and commercial factors all have profound influences on our electrical energy system and the stakeholders it serves. Electricity was once viewed as a simple, monolithic commodity, flowing from generator via transmission and distribution to customers, and accessible at the flip of a light switch. It is no longer quite that simple. While the fundamental physics remain, the attributes accompanying energy have become increasingly important to many Wisconsin stakeholders.

The challenge presented to the participants in the Wisconsin Energy Distribution and Technology Initiative was to respect the core of Wisconsin's regulated system, while investigating, debating and recommending approaches that would encourage innovation, reflect the changing expectations of the market, encourage sustainable and equitable economic development, and reward environmental stewardship. The desired result is a positive-sum game, in which the former core mission is maintained, but the system is better, nimbler, and encourages on-going optimization. Ultimately, these changes seek to personify Wisconsin's motto: Forward.

Utilities as Change Agents

Wisconsin's electrical power utilities, their customers and their investors/members have, for the most part, enjoyed the historic relationship of its regulated market, in which parties understand the important link between the financial health of the utility and high reliability of service for customers.

Change happens slowly within large, capital-intensive industries and bureaucracies. The courage to adapt and evolve is countered by resistance to real and perceived technical and financial risks. Yet Wisconsin's utilities have begun to change, in some ways quite robustly. The most apparent change has been the shift to carbon-free sources of energy, including the pursuit of investment in large-scale solar systems throughout the state. This shift in power generation resources (away from coal thermal plants to renewable energy), along with participation in the regional transmission organization, remains a utility-driven, regulator-sanctioned, large-scale process in most aspects.

However, to fully embrace grid modernization requires developing new ways of meeting the mission. It requires that legacy utilities recognize an opportunity, even when the short-term drivers may not require a change in course. Most of all, it takes courage and foresight.

This report demonstrates the results of the WEDTI effort. What may not shine through to the reader is the commitment and ingenuity that all stakeholders, including Wisconsin utilities, have brought to the table in this effort. Most notably, the WEDTI members offer in Recommendation #1 an introduction to a new concept of "The Utility as a Conductor," including recognition of both the rationale for adoption and a framework for execution. With that background, the detailed elements and recommendations of the overall report will, hopefully, demonstrate enhanced meaning, merit, and consideration to readers.

Impact from COVID-19

The remainder of this report describes the participants involved, the group process, and the recommendations that were collaboratively developed and agreed to. Importantly, the COVID-19 pandemic began to impact Wisconsin during this process. In response, the group evaluated any potential recommendations in light of the pandemic's impacts. Factors such as reduced demand, shifting usage, and the potential for long-lasting impacts even after the virus has subsided were taken into account with respect to the recommendations.

Process

Initiation

The Midwest Energy Research Consortium (M-WERC) and the Great Plains Institute (GPI) worked together to initiate a comprehensive stakeholder process to define the role that technology can play in the Wisconsin energy distribution system of the future. M-WERC is a membership-based organization that uses science and technology-driven innovation to spark economic development and growth for Wisconsin's Energy, Power, and Controls (EPC) sector, a $38 billion industry made up of 900 Wisconsin companies that employ 100,000 people. GPI is an organization of leaders and experts dedicated to engaging and collaborating with people, organizations, and communities to craft energy solutions that benefit the economy and environment.

M-WERC members had previously identified the utility industry as an important "big application area" for advancing its Market Insights Initiative, which seeks to assist members' understanding of the following key questions around emerging markets:

- Which technology or technologies are likely to prevail in the marketplace and why?
- When are the markets likely to emerge and who will the customers be?
- What are the research gaps that stand in the way of new markets emerging?
- What are the economic or regulatory and policy barriers that inhibit new market development?

Meanwhile, GPI had worked in several states to initiate comprehensive stakeholder engagement processes to identify how best to align utility business models and regulatory frameworks with the public interest.

M-WERC and GPI sought to initiate a robust stakeholder process to collaboratively define the role of technology in the Wisconsin energy distribution system of the future; and further, to make recommendations to policy makers as to changes to the system that would best position Wisconsin businesses and utility customers for the future.

Participants

M-WERC and GPI assembled a stakeholder group that represents a broad spectrum of interests in grid modernization and technology, including investor- and consumer-owned utilities, regulators, consumer advocates, environmental advocates, state and local governments, businesses, economic developers, and academic researchers. The stakeholder group was later augmented by assistance from subject matter experts, as the stakeholders broke into subgroups to draft recommendations.

The original stakeholder group was comprised of the following individuals:

- Tim Baye, University of Wisconsin
- Scott Blankman, Clean Wisconsin
- Tom Content, Wisconsin Citizens Utility Board
- Dennis Derricks, WEC Energy Group
- Tari Emerson, Charter Steel
- Deb Erwin, Xcel Energy
- Joe Fontaine, Public Service Commission of Wisconsin
- Art Harrington, Godfrey and Kahn
- Pat Henderson, Quad Graphics
- Tyler Huebner,[1] RENEW Wisconsin
- Andy Kellen, WPPI Energy
- Bob McKee, American Transmission Company
- Stephen Memory, A.O. Smith
- Maria Redmond, State of Wisconsin
- Keith Reopelle, Dane County
- Jeff Ripp, Alliant Energy
- Brian Rude, Dairyland Power Cooperative
- Erick Shambarger, City of Milwaukee
- Scott Smith, Madison Gas and Electric
- Carrie Templeton, Public Service Commission of Wisconsin
- Dan Tarrence, Franklin Energy
- Elizabeth Thelen, Milwaukee 7
- Dan Winter, Faith Technologies

Organizing Principles

At the beginning of the process, the group collaboratively developed and agreed to a set of organizing principles to act as parameters for the discussion and a lens through which all recommendations would be viewed. The organizing principles were as follows:

> The electrical energy sector is undergoing a transition, and with this come opportunities and challenges. Among the opportunities are:
>
> - significant economic development gains,
> - reductions in the carbon impacts on and of Wisconsin's economy,

[1] Governor Evers appointed Tyler Huebner to the position of Commissioner of the Wisconsin Public Service Commission in March 2020. Huebner was replaced in the stakeholder group at that time by Heather Allen and Michael Vickerman of RENEW Wisconsin.

- energy security and community resilience, and
- equity for all customers.

Given these opportunities, we wish to:

- accelerate the transition to allow Wisconsin to take advantage of economic development opportunities;
- accelerate utility deployment of new technologies for the benefit of all customers, including residents and businesses; and
- optimize the energy system for the benefit of all (state, customers, and utilities), while enabling first-movers to advance the adoption of beneficial technologies.

In the process of pursuing this, we wish to:

- maintain affordability, efficiency, and reliability for customers;
- recognize that solutions will require flexibility and being technology-neutral; and

  acknowledge that the outcomes from this change need to fit into Wisconsin's regulatory construct and maintain balance between customers and utilities.

Meetings

GPI and M-WERC convened the stakeholder group for 10 all-day monthly meetings from July 2019 to June 2020. Meetings were held alternately in Madison and Milwaukee through February 2020, at which point all meetings switched to a virtual format in response to the COVID-19 pandemic.

During the first two meetings, the group developed the organizing principles and discussed the current state of the electric sector and technology opportunities in Wisconsin, resulting in a list of topic areas to further explore. These topic areas, which are listed below, became the focus for meeting 3-7, with presentations from both group members and outside experts to more deeply explore each topic. Following these discussions, facilitators summarized comments and questions from the group on each topic area, included in this report as ppendix B.

Finally, for meetings 8-10 the group shifted its attention to developing the recommendations that are the heart of this report. As noted above, the impacts of the coronavirus on the electric sector began to take shape around meetings 7-8, causing the group to incorporate this changing dynamic into its thinking and recommendations. Factors such as reduced demand, shifting usage, and the potential for long-lasting impacts even after the virus has subsided, were discussed and taken into account.

- **Meeting 1: July 26, 2019 (Milwaukee)**
  - Discussion of meeting process, organizing principles
  - What do participants believe to be the state of Wisconsin's energy system?
  - Issues to be considered
  - How are issues being discussed in other jurisdictions?
- **Meeting 2: September 27, 2019 (Madison)**
  - Finalize organizing principles for the group

    - How are Wisconsin utilities approaching innovation and grid modernization? (WEC Energy Group, Alliant Energy, WPPI Energy, American Transmission Co., Xcel Energy, Madison Gas and Electric)
- **Meeting 3: October 25, 2019 (Milwaukee)**
    - FERC Order 841 (Michaela Flagg, MISO)
    - MISO issues, including response to Order 841
    - Energy storage (Troy Miller, GE Renewable Energy)
- **Meeting 4: November 22, 2019 (Madison)**
    - Distributed generation technologies (Steve Nieland, Faith Technologies)
    - Energy efficiency (Paul Schuller, Franklin Energy)
- **Meeting 5: January 31, 2020 (Milwaukee)**
    - Demand response and beneficial electrification (Deb Erwin and Shawn White, Xcel Energy; Scott Smith, Madison Gas and Electric)
- **Meeting 6: February 28, 2020 (Madison)**
    - National trends in resource and distribution planning (Dan Lipschultz, former Minnesota PUC Commissioner)
    - Local trends and issues around resource planning and reliability (Tom Content, Wisconsin Citizens Utility Board; Jeff Ripp, Alliant Energy; Joe Fontaine, Wisconsin PSC)
- **Meeting 7: April 3, 2020 (Virtual)**
    - National trends in utility and regulatory innovation (David Littell, Regulatory Assistance Project)
    - Local approaches to utility and regulatory innovation (Deb Erwin, Xcel Energy; Scott Smith, Madison Gas and Electric)
- **Meeting 8: April 24, 2020 (Virtual)**
    - Check in on overall progress of group, subgroups
    - Detailed report from Customer Consumption subgroup
    - Discuss impacts of COVID-19 pandemic on this group's work
- **Meeting 9: May 29, 2020 (Virtual)**
    - Review and discuss all draft recommendations from subgroups
- **Meeting 10: June 26, 2020 (Virtual)**
    - Finalize all recommendations

Subgroups

To further refine the discussion towards recommendations, the group established four subgroups tasked with (1) developing recommendations around the key issues that the larger group had discussed, and (2) bringing those recommendations back to the full group for consideration, modification, and approval.

Participation in the subgroups was voluntary and each was co-chaired by two individuals with knowledge of the specific topics being discussed and representing different perspectives on

those topics (e.g., a utility perspective and a consumer perspective). In addition to the stakeholder group members, subgroups could utilize the expertise of others, either from the entities represented in the larger group or from outside the process. The four subgroups were as follows:

- **Behind the Meter—Accelerating Deployment of Distributed Energy Resources and Electrification Technologies.** Co-Chairs—Scott Smith, Madison Gas and Electric and Tyler Huebner, RENEW Wisconsin (replaced by Michael Vickerman, RENEW Wisconsin after Huebner's appointment to the Public Service Commission of Wisconsin).
- **Utility and Regulatory Innovation.** Co-Chairs: Deb Erwin, Xcel Energy and Tom Content, Wisconsin Citizens Utility Board.
- **Customer Consumption—Accelerating Efficiency and Demand Response.** Co-Chairs: Scott Blankman, Clean Wisconsin and Dan Tarrence, Franklin Energy.
- **Wholesale Markets and Transmission.** Co-Chairs: Bob McKee, American Transmission Co. and Andy Kellen, WPPI Energy

The subgroups were charged with making recommendations on initiatives, policies, regulations, or legislation to the full group. These recommendations were to conform to the organizing principles of the group, as laid out above. In addition, the group made their recommendations in consideration of the coronavirus, and its impacts on the electric sector in Wisconsin. The subgroups met as needed from March-May 2020 to develop their recommendations.

Recommendations

As described above, the full stakeholder group broke into four subgroups to draft recommendations that would address the opportunities and challenges raised in the organizing principles and in the group's monthly discussions. The recommendations from the subgroups were brought to the full group for modification as needed, followed by consideration for consensus support. In the end, 14 recommendations earned consensus amongst the full stakeholder group.

Throughout these recommendations, distributed energy resources or DERs are defined broadly, using the Midcontinent Independent System Operator's (MISO) definition, as "power generation, storage, or demand-side management connected to the electrical system, either behind the meter on a customer's premises, or on a utility's distribution system."[2]

READING THE RECOMMENDATIONS

The 14 recommendations are split up into the following five categories:

- Behind the Meter
- Utility and Regulatory Innovation
- Customer Consumption
- Wholesale Market and Transmission
- The Need for Action

Each recommendation includes a short name for ease of tracking (e.g., "#1: Position Utilities as Conductors") followed by a more complete description. In many cases, recommendations have multiple sub-components. Each recommendation also states to whom it is directed.

Importantly, these recommendations should be taken as a package, such that all participants agreed to this full set of recommendations but may not have been comfortable with a single recommendation by itself.

Behind the Meter

This group's organizing principles acknowledge that the electric system is changing and that those changes come with a variety of both opportunities and challenges. From the behind the meter perspective, this includes changes on several of fronts:

- More actors on the system, with the ability to both consume and produce energy.
- More technology options that can enable system optimization to a degree that wasn't previously achievable.

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[2] *MISO and DER: Framing and Discussion Document* (Midcontinent System Operator, November 1, 2019), https://cdn.misoenergy.org/DER%20Framing%20Report%202019397951.pdf

- Changing consumer expectations, including the desire for power that is increasingly reliable and high-quality, yet also affordable and offering choice.
- Changing expectations around environmental performance, including a shift from expecting adherence to federal and state laws around localized pollution towards expecting both adherence to those laws and measurable goals and progress towards reducing carbon emissions.
- Increasing pressure to electrify sectors and end uses that are currently served by fossil fuels in order to achieve environmental and carbon reduction goals, while also reducing system and customer costs.

In the process of discussing these changes, this group found consensus in the notion that DERs are important resources that should be used to optimize the electric system and meet these changing expectations. Moreover, the group felt that in order to make these resources as effective as possible, it is important to have coordination and organization across the system, and that utilities operating in a sanctioned and regulated market such as Wisconsin are currently better positioned than any other actor to enable that coordination.

Recommendation #1 speaks to a new paradigm in managing the electric distribution system, where utilities act as the conductors (i.e., like the conductor of an orchestra) of many distributed actors, serving to optimize the system towards meeting the changing expectations of the 21st century.

Recommendation #2 speaks to the need to update rules and standards for distributed energy resources to improve the process for adding resources to the electric distribution system and enable utilities to have more granular control to optimize the system.

Together, these recommendations lay the foundation for addressing the organizing principle to "optimize the energy system for the benefit of all (state, customers, and utilities), while enabling first-movers to advance the adoption of beneficial technologies."

#1: Position Utilities as Conductors

RECOMMENDATION: The Public Service Commission of Wisconsin (PSC), utilities, and stakeholders should work to position utilities as conductors of the system and as aggregators of DERs on behalf of all customers. This paradigm will allow utilities and customers alike to harvest the most value from DERs system-wide. Accordingly, this stakeholder group envisions a new obligation for utilities to not only serve all customers but to beneficially optimize the system.

Rationale: The electric grid is a shared resource for the benefit of everyone, providing for the safety and security of communities through safe, reliable electricity. Just as we share streets and highways, cell towers and satellites, and the wells that supply our water, we also share the electric grid that supplies our power.

The more than 100-year-old electric system has made modern life possible, but what worked in the past is changing rapidly. The simple system that moved electricity in one direction from central power plants to homes and businesses now has DERs, including rooftop and utility-scale solar, demand response technologies, smart thermostats, and electric vehicle charging stations.

As technologies such as battery storage increase in market penetration and generation sources evolve, the electric grid is becoming more advanced and complex, with the thousands of energy producers and millions of users on the system. This more complex system requires a conductor to ensure the system develops and operates in a coherent way that keeps electricity safe, reliable, and affordable for everyone, especially as our world grows increasingly digital.

When the utility serves as the conductor of the electric grid, these new technologies and resources can add value to the system because the utility is able to dispatch generation and balance demand as needed. This role benefits the utility as well as customers because it serves to help ensure the system operates efficiently and is sized appropriately. The utility as conductor can optimize the efficiency and use of the electric system's assets to help control costs over time, which leads to lower costs for all customers. The benefits of grid resiliency, reliability, and a more efficiently managed power system are also captured for all customers, individually and collectively, with the utility in the conductor role.

For the electric grid to work efficiently and remain reliable, load and generation must be balanced at all times. Utilities are providing this essential service now by constantly adjusting the amount of power coming from large generators. For this balancing service to work as more customer-owned and small generators, battery storage and demand response technologies are added to the grid, a conductor, such as the utility, must make sure these systems are all in alignment and working together so the overall system load and system supply remain perfectly balanced.

This is even more critical since so much of the new generation on the grid is solar. Solar generation is inverter-based and, unlike large rotating generators, can have little to no ride-through capability if there is a sudden disturbance or loss of system supply. As more solar systems are added to the electric grid, it becomes even more critical that all generation systems on the grid are working together as a system and managed by a single conductor.

Today's customer expects a grid that integrates all sorts of energy technologies in a way that gives them choice, flexibility, and value. Even customers who install their own sources of electric generation need the grid. The vast majority of those installing their own generation continue to rely on the grid for power during peak usage, when the sun isn't shining, or when their system is being maintained or otherwise unavailable. With more sources of two-way power flows—power flowing to the customer from the grid and power flowing from the customer's generation back onto the grid—having an entity in a conductor role provides efficiency in coordinating the different sources of power and the various needs of the grid in real-time to maintain a safe and reliable power supply. As technology continues to develop and costs decrease, more customers are adding generation to their homes and businesses to offset their usage, which in turn reduces overall demand on the system. With the utility as conductor, it can ensure electricity producers and demand reducers are being appropriately compensated in a way that lowers costs for all customers.

New technology is changing how we plan for the energy grid of the future; however, the obligation to serve customers and communities 24-hours a day, seven days a week, 365 days a year remains unchanged. A single conductor efficiently managing the electric system will ensure

the constant flow of electricity needed—dynamically matching generation and load—to serve all customers seamlessly and reliably, as they expect to be served.

Framework:

The concept of utilities taking on the role of conductor and optimizer requires a framework to enable accountability and innovation. Below, we have outlined a series of key components that this group believes will create a framework for success.

- **Clear desired outcomes**: In recognition of the increasing importance that utilities optimize the system, we recommend that the Public Service Commission establish the key outcomes that utilities should optimize for and a process for determining how to measure performance on these outcomes. We suggest the PSC consider the following six outcomes, while acknowledging that these encompass a mix of both established and emerging expectations of the electric system:
    - Safety
    - Affordability
    - Reliability and resiliency
    - Customer service quality and a robust set of options
    - Environmental performance
    - Cost-effective alignment of generation and load
- **Customer incentives**: Utilities should motivate customers to participate in load shaping, load control, and distributed generation programs by offering incentives regardless of the originator. Effectively operating a system with many different generation resources will require having these complementary distribution-side resources. The incentives should seek to accomplish the following:
    - Provide value that is appropriate for the quantity and types of services being provided, motivate ongoing participation, and minimize overall costs to the system over time.
    - Acknowledge that the frequency of use (e.g., calling upon a demand response resource) is important.
    - Recognize the value of services beyond energy, including capacity and ancillary services such as frequency regulation.
    - Provide the same or better level of service.
    - Find the sweet spot between optimization and convenience.
- **Utility incentives**: Utilities should be incentivized to optimize the system through a variety of methods established by the Public Service Commission through a docketed process. This could include the following:
    - Changing accounting treatment to allow putting some things in rate base that haven’t traditionally been included yet can provide the same services/benefits as

a more traditional infrastructure investment. In allowing this, regulators should consider the following:

        - Reliability—the services/benefits being provided by DERs need to be able to be reliably called upon when needed.
        - Improvement upon current accounting treatment—in some cases, traditional investments may already have the same financial outlook as non-traditional investments, so a change to accounting treatment would not be needed.
    - Incentivizing the utility to employ competitive procurement processes like RFPs to provide new energy solutions and innovative technologies and approaches.

- **Operation**: We acknowledge that this framework requires allowing utilities to operate DERs with appropriate granularity, responsiveness, and control. This would partly be addressed through updating the interconnection rules as outlined under Recommendation #2.
- **Communication**: In order to increase DER participation to optimize the system, we need more communication between DERs and the utility acting as conductor. This will require investment in grid communication technologies such as advanced metering infrastructure to allow measuring and billing usage at a more granular level, meter data management systems to collect and manage that granular data, and field area networks to support communication between meters, DERs, and the utility. Recommendation #4 outlines a process for collaboration between utilities and stakeholders to support effective distribution system investments.
- **Technology diversity and neutrality:** Incentives and rules should be technology-neutral to allow for a variety of technology solutions to enable an optimized and resilient system; however, technologies need to meet the minimum criteria of interoperability. The Wisconsin Public Service Commission (PSC) should take action to uphold this.
- **Demand response:** This group recognizes that demand response has an important role to play in optimizing the system and supports demand response programs that allow direct utility load control (including potentially paired with dynamic rates), such as managed EV charging. This is further outlined under Recommendation #8.

#2: Update Interconnection Rules

RECOMMENDATION: The Public Service Commission should appoint a committee, consisting of stakeholders actively involved with the Wisconsin Distributed Resources Collaborative and other relevant stakeholders as appropriate, to develop consensus recommendations for modifying Wisconsin's current interconnection rules.

Rationale: As noted above, optimizing the electric distribution system will require clear rules and standards for interconnecting and operating distributed energy resources. The Wisconsin Distributed Resources Collaborative (WIDRC) is a voluntary collaborative committed to facilitating and promoting the successful deployment of economic, efficient, and environmentally

responsible distributed resources in Wisconsin. It is a 501(c)3 organization with origins that pre-date Wisconsin's current distributed generation interconnection procedures.

One of the group's first tasks almost 20 years ago was to make recommendations on updating Wisconsin's distributed generation interconnection rules. In 2001, Wisconsin Act 16 required the commission to form an advisory committee to develop new interconnection rules. Because the WIDRC group was already working on drafting guidelines for interconnection, most of these WIDRC members were appointed to the Public Service Commission's Distributed Generation Interconnection Advisory Committee. The administrative rules for interconnection developed by the committee were adopted by the commission as Wis. Admin. Code ch. PSC 119 and became effective on February 1, 2004. WIDRC has continued to meet regularly in the years since then, discussing current issues, projects, and challenges for distributed generation in Wisconsin.

This recommendation seeks to follow that process again, drawing on WIDRC's expertise and input from other stakeholders to develop well-informed updates to the rules. Moreover, consensus recommendations developed through a committee will support a smooth, streamlined rulemaking process at the PSC.

Goals: The committee's consensus recommendations should seek to accomplish the following:

- Ensure rules and processes are fair to and address the needs of electric providers, DER installers, and end-use customers.
- Address the need for simplicity for a category of small DERs (i.e., residential customers), while allowing electric providers to address reliability and safety considerations that may be raised by even small DERs due to their location.
- Require more functionality for larger DERs to address both positive and negative impacts of increases in DER penetration.
- Specifically address energy storage in the interconnection rules.
- Lay the foundation for future opportunities to use DERs to reduce cost or provide value to the electric provider for the benefit of all customers, including through the ability for electric providers to control DERs as appropriate (e.g., through inverters).
- Preserve reliability and resilience of the electrical grid and lay the foundation for future opportunities to enhance reliability and resilience through the use of DERs.
- Improve communication between electric providers and interconnection applicants.
- Establish a process for increased information sharing between electric providers and DER applicants throughout the interconnection process.
- Establish a process for information sharing prior to the start of a formal interconnection process that does not place unnecessary administrative burden on electric providers and addresses legitimate concerns about security, data privacy, and the limitations of the information provided.

- Address adoption of revisions to industry standards (e.g., IEEE-1547).[3]
- As much as possible, future-proof the administrative code requirements.
- Address the need for standards that can evolve over time as technology changes by establishing a process for addressing technology change or other technical issues.

Timing: The committee's recommendations should be submitted to the PSC within a reasonable timeframe following the committee's appointment. Moreover, the PSC could open a docket to begin the process of making changes to Wis. Admin. Code Ch. 119 while the committee is developing its recommendations. There is a strong consensus around a sense of urgency amongst the WEDTI group to update the interconnection rules.

Utility and Regulatory Innovation

This group's organizing principles speak to a desire to balance accelerating changes on the electric system with maintaining components of the current system that are working well. Specifically, the principles seek to "accelerate utility deployment of new technologies for the benefit all customers, including residents and businesses," yet "maintain affordability, efficiency, and reliability for customers." In addition, the group acknowledges "that the outcomes from this change need to fit into Wisconsin's regulatory construct and maintain balance between customers and utilities."

The group spent much of its time in monthly meetings discussing this balance, including how existing programs, regulatory processes, and utility business models could change to maintain key outcomes while addressing new challenges and opportunities. Ultimately, the group achieved consensus on two key complementary concepts:

- Utilities should be afforded flexibility and cost recovery when testing new technologies and approaches that can meet goals in the public interest.
- For broader and longer-term technology deployment and investments, utilities should collaborate with stakeholders to ensure that decisions and investments are transparent, well-conceived, in line with best practices, and have a high likelihood of earning stakeholder support when brought forth for regulatory consideration.

Recommendation #3 speaks to the first concept by seeking to establish a pathway for rapid utility innovation within a set of established goals and limits.

Recommendation #4 speaks to the second concept, proposing that the best innovation will come out of voluntary collaboration between utilities and stakeholders.

[3] IEEE 1547 is the "standard for interconnection and interoperability of distributed energy resources with associated electric power systems interfaces." More information is at https://standards.ieee.org/standard/1547-2018.html

Finally, Recommendation #5 addresses the need to develop innovative solutions specifically for the most vulnerable customers, to meet the guiding principle that innovation should be "for the benefit of all."

#3: Establish an Innovative Technologies Initiative

RECOMMENDATION: The Public Service Commission should implement a new initiative designed to encourage the advancement of innovative technologies amongst utilities. We encourage the commission to use its authority to request proposals from the utilities consistent with this recommendation.

Rationale: This initiative would intend to facilitate and encourage utility investment in innovative solutions that have the potential to cost-effectively address the goals of Wisconsin's energy industry, would apply to all Wisconsin utilities, and would provide benefits for a range of customer classes. The group envisions that this would be based in part on a similar initiative in Colorado, in which the utility has the ability to work with customers to initiate pilot programs that are designed to achieve at least one of a number of goals. In exchange, the utility has greater certainty of cost recovery.

Notably, Wisconsin utilities have already successfully implemented innovative technologies and will continue to do so. This initiative is intended to encourage significant expansion of innovative technologies but is not meant to be the only pathway for innovation.

Goals: The pilot programs that this new initiative would support are intended to provide a learning opportunity prior to broad deployment and need to be designed to meet at least one but ideally multiple, of a variety of goals including, but not limited to the following:

- Advance innovative technology, such as battery storage or new types of carbon-free generation.
- Support increasing deployment of electric vehicles.
- Assist customers who have been hurt by the coronavirus crisis with energy-related needs.
- Advance a goal of the Governor's Task Force on Climate Change.
- Manage peak loads, including peak shifting and optimization to match availability of low-cost and low-carbon generation resources.
- Integrate energy efficiency and demand response programs.
- Increase efficient use of utility assets.
- Support beneficial electrification.
- Address cybersecurity concerns.
- Reduce overall system costs.
- Other goals identified that are approved or accepted by the PSC.

Process: Pilot projects that address energy efficiency should utilize existing processes for utility voluntary energy efficiency programs under Wis. Stat. § 196.374(2)(b)2. For other pilots, the following process is recommended, drawing in part on experience with the voluntary energy efficiency program process; however, this process should not constrain the ability of utilities to bring forward innovative proposals at any time (acknowledging those proposals will be considered on a case-by-case basis):

1. Some form of early stakeholder engagement is encouraged.
2. A standardized, streamlined, and up-front process should be used to gain PSC pre-approval, modeled on the approval process for utility voluntary energy efficiency programs, which includes certainty on future cost recovery as required by the needs of the individual project or program.
3. There should be clear reporting requirements after implementation of the pilot. Moreover, there should be a standardized data collection instrument for collecting the results of all pilots advanced under this initiative, and a periodic PSC report on results of the initiative as a whole. At minimum, the reporting should include an interim report approximately two years after the initiative begins and a final report after the initial five-year period is complete.
4. Cost recovery should be granted for the utility so long as the project adhered to the goals of this initiative as described above. Cost recovery should not be contingent on the pilot successfully achieving a cost/benefit threshold after-the-fact. Cost recovery for these programs may be accomplished through mechanisms such as escrow or deferral treatment.
5. The proposing utility should include in its proposal a discussion of which questions would need to be answered in order to consider expanding the pilot to broader implementation, including cost-effectiveness. Where appropriate, pilots should identify the need for consideration of utility performance incentive mechanisms.

Duration: The group recommends the initial tranche of pilot programs under this initiative would last five years and the PSC should conduct an evaluation to determine continuation of the initiative after that. It is anticipated that the initiative will ramp up over time during the initial five-year period to allow time for projects to be conceived.

Cost: Pilots advanced under this initiative should be paid for on a utility-by-utility basis. To indicate the desire to foster innovation at scale, the PSC could establish an annual statewide target for investment under this initiative, however this should not be construed as an expectation of spending on innovation for any particular utility. The target could be communicated as a dollar figure (perhaps up to $100 million per year, which is roughly 1.2 percent of annual revenues of all regulated utilities in the state).

In addition to ratepayer funds, the investment target could be met with private dollars from participating customers or other companies through partnerships. Moreover, having a transparent structure for pursuing these types of innovative technology projects would be helpful for utilities trying to pursue matching funding, including from agencies like the US Department of

Energy, and would ultimately make Wisconsin more competitive with others in trying to secure this funding.

#4: Encourage Utility-Stakeholder Collaboration

RECOMMENDATION: There is consensus among this group that utilities should voluntarily collaborate with stakeholders on developing their distribution planning and grid modernization visions, plans, and investments, and that following these specific collaboration activities, utilities should submit a concise (e.g., 5-10 pages) report to the PSC summarizing the key discussion items and any outcomes. An example template for structuring the report is included in appendix A. Additionally, we recommend that all applicable utilities launch such a collaboration process by June 2021.

Rationale: The group discussed this recommendation at length, including whether collaboration itself should be mandated and whether it should be supported by specific utility filings to ensure transparency. While all group members agreed that collaboration was desirable, some participants felt that mandatory collaboration and informational filings could ensure timeliness and accountability, while others felt that more structure could cause collaborative processes to become extensions of onerous regulatory proceedings, hampering innovation and adding additional resource burdens on all parties involved. Ultimately, there was consensus support for voluntary collaboration between utilities and stakeholders.

Benefits: In the course of discussing different forms of collaboration, this group reached agreement that when collaboration is effective, it can yield the following benefits:

- Improved utility decisions, plans, and filings that have a higher likelihood of earning stakeholder support and commission approval.
- Development of innovative, context-specific approaches to address challenges that don't have established or time-tested solutions.
- Efficient use of resources for all parties involved in regulatory proceedings, as a result of clarifying perspectives and identifying key areas of agreement and disagreement in advance of formal regulatory proceedings.
- Identification of regulatory policies that utilities and stakeholders agree should be reviewed or updated to align utility performance with the public interest.

Best Practices: The group also discussed a number of best practices that can support effective collaboration. The following emerged as shared best practices that all parties agreed are helpful:

- Effective collaboration should be a multi-directional conversation, where all parties come to the table seeking to understand other perspectives, desires, and capabilities. Honesty and transparency can support understanding.
- In order to use resources as efficiently as possible, utilities should start any conversation by asking stakeholders what they want to discuss and be transparent about their willingness and ability to discuss those things.

- The process and outcomes should be documented but should not bind any participating party to a position in any formal regulatory process without its consent. A binding process can adversely impact the ability of various parties to consider innovative solutions.

Proposed Topics: In its discussions around utility-stakeholder collaboration, this group identified the following topics as ripe for collaboration:

- In the first round of collaboration, identify effective procedures for conducting future collaborative processes.
- How best to position utilities as conductors, consistent with Recommendation #1 in this report.
- Utility distribution system visions, plans, and investments, including new technologies and how those technologies can be used to enable system, customer, and environmental benefits, including meeting utility carbon reduction goals.

#5: Foster Innovation for Low-Income, Multifamily, and Renters

RECOMMENDATION: Regulators, utilities, and stakeholders are encouraged to consider innovative programs for residential customers to help reduce overall costs, and in particular for low-income customers, multifamily customers, and renters. This could be achieved through the Innovative Technologies Initiative as described under Recommendation #3 or through additional initiatives or programs as described below.

Rationale: In seeking to meet the organizing principles listed previously in this report, which state that innovation and system optimization should benefit all customers, the group felt it was important to highlight the need for innovation specifically for low-income customers, multifamily customers, and renters

Examples: The group proposes the following initiatives or programs as examples of innovative efforts to reduce costs for residential and low-income customers (though innovation should not be limited to only these examples):

- Innovative financing programs for energy efficiency projects, similar to Property Assessed Clean Energy programs, that would allow customers to “pay as they save,” letting them pay for energy-saving upgrades over time on their monthly bills.
- Consideration of performance incentives for pilots for utilities whose projects produce overall savings for customers.
- Allocation of a portion (e.g., 10-20 percent) of the Focus on Energy residential budget to benefit low-income customers, so that low-income initiatives do not have to compete with other initiatives for funding.
- Consideration of addressing the rental low- to moderate-income housing market and best management practices in adopting innovative approaches for at-risk populations and low- to moderate-income customers.

Customer Consumption

As described in Recommendation #1, this group found that optimizing the system requires the ability to not only control electricity generation, but also to shape customer demand for electricity. In addition, this group's organizing principles speak to the need to "maintain affordability, efficiency, and reliability." The following recommendations seek to enable optimization of the electric system with respect to customer loads while maintaining affordability, efficiency, and reliability.

In looking at energy efficiency in particular, the group discussed the causes and impacts of Wisconsin's falling rating in the "State Energy Efficiency Scorecard" produced by the American Council for an Energy-Efficient Economy (ACEEE).[4] Wisconsin was rated #9 nationally in 2008, dropped to #25 in 2019, and lags behind many other states, as the state's energy efficiency policies have not changed while other states' policies have evolved.

In response, Recommendation #6 seeks to align Focus on Energy, the statewide energy efficiency program, with recently established state policies on clean energy, and Recommendation #7 seeks to increase energy efficiency funding in Wisconsin to capture available opportunities.

Recommendation #8 is directed at enabling the load shaping that is necessary for utilities to optimize the system in order to achieve public interest outcomes as described in Recommendation #1.

#6: Align Focus on Energy with Carbon-Reduction and Clean Energy Goals

RECOMMENDATION: Bring Focus on Energy goals into alignment with utility and state carbon reduction/clean energy goals. As part of this effort, the commission's Quadrennial Planning Process should consider long-term targets, such as goals for 2050, while staying focused on the next 12 years and detailed for four years at a time.

Rationale: There was strong consensus among the group that carbon-reduction/clean energy goals should be incorporated into Wisconsin's energy efficiency and demand response programs. A 30-year outlook (to 2050) will help determine the role and potential of energy efficiency and demand response programs in meeting long-term carbon reduction/clean energy goals. The PSC should evaluate how carbon reduction/clean energy benefits can be incorporated into both existing and new programs and could consider this as part of the Quadrennial Planning Process.

#7: Advance Clean Energy through Enhanced Energy Efficiency

RECOMMENDATION: Utilize enhanced energy efficiency to meet utility and state carbon reduction and clean energy goals. This can be accomplished by supporting statutory changes

4 "The State Energy Efficiency Scorecard," American Council for an Energy-Efficient Economy, accessed July 17, 2020, https://www.aceee.org/state-policy/scorecard. The website includes scorecards going back for more than a decade.

that would allow the PSC to authorize increased utility contributions to Focus on Energy's energy efficiency and customer-sited renewable programs beyond the current statutory caps (1.2 percent of investor-owned utility revenue and $8/meter for participating municipal utilities), supporting expansion of utility voluntary programs, and by allowing utilities to earn on those investments. We make this recommendation understanding the difficult economic circumstances due to the COVID-19 pandemic and that energy efficiency programs can enable bill savings for customers to help address these circumstances.

Rationale: Currently, Wisconsin spends about 1.2 percent of annual energy costs on energy efficiency and customer-sited renewables, and in return saves 0.72 percent on annual electricity usage and 0.6% on annual natural gas usage. While Wisconsin's energy efficiency programs are among the most cost-effective in the nation, there is evidence that much greater energy efficiency potential exists.

Currently, the total amount of energy efficiency savings in Wisconsin lags behind neighboring states. Based on 2018 information published by ACEEE in The 2019 State Energy Efficiency Scorecard, table 1 shows how Wisconsin's electric and natural gas savings and spending percentages for 2018 compared to our neighboring states of Minnesota, Illinois, Michigan, and Iowa.

Table 1. 2018 Neighboring States Energy Efficiency Savings and Spending Comparison

	Wisconsin	Neighboring States (MN, IL, MI, IA)		
Category	**Level**	Average	Low	High
Net incremental electricity savings (% of 2017 retail sales)	**0.72%**	1.38%	1.08%	1.66%
Net incremental natural gas savings (% of commercial and residential retail sales)	**0.60%**	0.95%	0.40%	1.47%
Electric efficiency spending (% of statewide electricity revenues)	**1.24%**	2.59%	2.19%	3.23%
Natural gas efficiency spending ($ per 2017 residential customer)	**$13.08**	$33.66	$14.19	$52.60

Source: Based on data from the American Council for an Energy-Efficient Economy's 2019 State Energy Efficiency Scorecard.[5]

[5] Berg, Weston. Shruti Vaidyanathan, Eric Junga, Emma Cooper, Chris Perry, Grace Relf, Andrew Whitlock, Marianne DiMascio, Corri Waters, and Nadia Cortez. *The 2019 State Energy Efficiency Scorecard,* (October, 2019): 29-37, https://www.aceee.org/sites/default/files/publications/researchreports/u1908.pdf.

The 2017 Focus on Energy Potential Study[6] indicated that Wisconsin could achieve electric and gas savings levels consistent with the averages of these neighboring four states if constraints on Focus on Energy spending levels were lifted. The study also indicated that Wisconsin could do so at spending levels lower than the average spending of these neighboring four states.

Using current spending and saving ratios, catching up to nearby states' energy savings levels would require approximately doubling current spending levels in Wisconsin. On the program's standard planning timeline, the Focus on Energy program recently initiated a new potential study to provide an up-to-date assessment of available savings opportunities. When that study is completed in 2021, the results can provide further guidance for identifying an appropriate funding level that captures available savings while maintaining cost-effective programs.

#8: Shape Energy Consumption to Achieve Utility and State Goals

RECOMMENDATION: Integrate efficiency and peak programs to help shape energy consumption to increase efficient use of the electric system and support achieving alignment with utility and state carbon reduction/clean energy goals. Coordinate the implementation of energy efficiency, demand response, and peak shaping programs to enhance the value of savings potential and increase cost-effectiveness of implementation. Beneficial electrification initiatives should be aligned with these goals to enable maximum benefits with electrification of transportation and heating sectors, avoid unnecessary increases in system peak, and minimize costs by shaping loads.

Rationale: The value of a kWh saved will increasingly be determined by when and where it is saved. For this reason, it will be more important in the future to pursue three different types of programs approaches to shape energy consumption.

First, energy efficiency programs managed by Focus on Energy should be updated to place greater emphasis on offerings that achieve demand savings. The Focus on Energy potential study and the Public Service Commission's quad planning process can serve as vehicles for efforts to quantify the demand savings opportunities from Focus on Energy offerings and develop programs to effectively achieve those savings.

Second, utilities should expand and enhance demand response programs that manage customer loads during peak periods. Utility leadership in this area is consistent with the concept of utilities as conductors as described under Recommendation #1. Utilities should also be mindful of the potential intersection of their demand response offerings with Focus on Energy programs as appropriate. To maximize cost-effective demand response, the commission could establish a framework for supporting and tracking demand response programs.

Third, Focus on Energy and utilities should both consider developing initiatives to support beneficial electrification through incorporation into existing programs or new offerings where

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[6] *Focus on Energy 2016 Energy Efficiency Potential Study*, (prepared by Cadmus for the Public Service Commission of Wisconsin, June, 2017), https://focusonenergy.com/sites/default/files/WI%20Focus%20on%20Energy%20Potential%20Study%20Final%20Report-30JUNE2017.pdf.

appropriate. The group adopted the Regulatory Assistance Project's definition of beneficial electrification: "For electrification to be considered beneficial, it must meet one or more of the following conditions without adversely affecting the other two:

1. Saves consumers money over the long run;

2. Enables better grid management; and

3. Reduces negative environmental impacts."[7]

Wholesale Market and Transmission

While developing the concept of the utility as conductor, this group discussed how there are two sides of that concept on the electrical system—the retail side and the wholesale side. This grouping of recommendations speaks to what is needed to enable utilities as conductors on the wholesale side of the electric system.

One of the themes that frequently arose in this group's discussions was giving DERs appropriate value for providing services to the system. Recommendation #1 addresses this in part on the retail side by stating that utilities should "provide value that is appropriate for the quantity and types of services being provided." However, DERs can earn additional value through their contributions to the wholesale market.

The recommendations below seek to address this dynamic by advancing market rules that better utilize the services that DERs can provide and make improvements in the use of information to ensure that transmission planning processes take the capabilities and future scale of DERs into account. In addition, these recommendations seek to make it easier for large customers to shape their usage in response to real-time market prices.

These recommendations were developed after consulting with the Midcontinent Independent System Operator (MISO) and are intended to work within the existing MISO stakeholder processes.

#9: Improve MISO Visibility and Dispatch of DERs

RECOMMENDATION: Through MISO's existing stakeholder engagement processes, improve the quality of information MISO has about registered DERs to enable the following: (1) more targeted dispatch, including the amount of DER dispatched and lead time for dispatching it; and (2) improved capabilities to project future DER adoption.

Rationale: It appears to this group that MISO has information about registered DERs' capacity amount and address, but most of these resources are not included in MISO's commercial model. Accordingly, when MISO dispatches load modifying resources (LMRs), its current

[7] David Farnsworth, Jessica Shipley, Jim Lazar, and Nancy Seidman, *Beneficial Electrification: Ensuring Electrification in the Public Interest* (Regulatory Assistance Project, June 19, 2018), https://www.raponline.org/knowledge-center/beneficial-electrification-ensuring-electrification-public-interest/.

practice is to dispatch all LMRs in a broad planning region rather than targeting the use of the resource to where it is needed.

This is problematic, as it leads to DER resources not being used efficiently or cost-effectively. It is possible that DERs are being dispatched less often than they might otherwise be if the use was more targeted. It is also the group's understanding that MISO must provide a 12-hour notice before LMRs are used, which creates limitations of the resource's value to address issues that emerge in real-time.

In addition, this group feels that MISO should be encouraged to use new analytical tools such as artificial intelligence to estimate unregistered DERs and to project future DER adoption in order to achieve an enhanced understanding of the total capacity of this resource in the MISO footprint now and in the future.

#10: Improve DER Operator Visibility into MISO Markets

RECOMMENDATION: Through MISO's existing engagement processes, improve the quality of information that DER operators have about MISO markets, including real-time load.

Rationale: Relative to other regional transmission organizations, owners of DERs in MISO have less information, such as real-time coincident peak load, that could be used as market signals for whether to invest in/use DERs. This information is important to customers, especially commercial and industrial customers, in deciding where to make investments to reduce energy costs. This information also could improve value for utilities that choose to act as aggregators of DERs.

#11: Participate in Developing Changes to MISO Market Rules

RECOMMENDATION: The PSC, utilities, and other Wisconsin stakeholders should participate and take a leadership role in advancing key market rule changes related to DERs.

Rationale: We anticipate that MISO will soon be addressing several rule changes related to DERs, including the following:

- Implementation of the Federal Energy Regulatory Commission's (FERC) Order No. 841 related to enabling demand-side storage to participate in MISO markets. Issues to be considered include ensuring MISO hits (or beats) its June 2022 timeline for implementation and addresses concerns about, among others, metering and accounting for storage resources in retail and wholesale market.
- Implementation of the anticipated FERC order related to DER participation in markets, including aggregation.
- MISO's anticipated "reliability imperative" effort related to enhancing LMR accreditation.

These rule changes will impact the viability of DERs in Wisconsin. Therefore, this group recommends taking an active role in shaping these rule changes to the benefit of Wisconsin stakeholders.

#12: Improve the Use of DER Data in Transmission Planning

RECOMMENDATION: Make enhancements in MISO's data use and analytical tools to better enable planners to understand the potential impact on the transmission system from DERs and to identify any potential enhancements that need to be made to the transmission system to support DER adoption.

Rationale: As described above, there are opportunities for MISO to leverage existing DER data and adopt new analytical tools to better project future DER and its location in the MISO footprint. This information could be used by transmission planners to identify infrastructure needed to facilitate the adoption and use of DERs. This group, therefore, recommends that MISO work with stakeholders to identify opportunities for enhancements in use of DER data and adoption of new tools for forecasting DERs for use in transmission planning.

The Need for Action

The final recommendations from this group speak directly to the organizing principles to "accelerate the transition to allow Wisconsin to take advantage of economic development opportunities" and to "accelerate utility deployment of new technologies for the benefit of all customers, including residents and businesses." Accelerating the transition will require action at a more rapid pace and may necessitate creativity and strategic thinking in how to enact these recommendations. The recession caused by the COVID-19 pandemic underlines this urgency and highlights the need for the energy system, including associated technology investments, to aid in economic recovery.

#13: Act Quickly

RECOMMENDATION: It is important to act quickly, potentially including negotiations between stakeholders and utilities.

Rationale: All key parties in Wisconsin should act quickly on these recommendations. In particular, the PSC should consider establishing processes to support action on these recommendations where applicable. Additionally, this group encourages all parties to take part in early, upfront negotiation before proposals are brought to the commission for consideration. This will likely be the fastest way to make progress.

#14: Provide Economic Stimulus

RECOMMENDATION: Leverage program spending expansion to provide economic stimulus benefits. Any increases to program spending, whether to existing or new programs, should look to accelerate job growth and reduce customer costs during the energy transition.

Rationale: In 2019, clean energy businesses employed 76,000 Wisconsinites, up 2.4 percent from 2018.[8] In addition, according to a new study, Focus on Energy programs add more than $500,000,000 annually in net economic benefits to Wisconsin, by promoting investment in Wisconsin's energy efficiency and renewable energy industries.[9] In a post-pandemic environment, spending on energy efficiency and peak management programs will be an excellent tool to manage customer costs by investing in programs with strong benefit-cost ratios. Managing the expensive system peak will provide job growth opportunities for technologies to be part of the solution, improving the overall return on investments already made. Innovative rate design pilots and tariffs that benefit low-income customers, funded through savings generated by utilities from shifting toward cleaner energy resources and technologies, can provide benefits for all.

[8] *Clean Jobs Midwest: Wisconsin, Executive Summary* (Clean Energy Trust and Environmental Entrepreneurs, 2019), https://www.cleanjobsmidwest.com/wp-content/uploads/2019/04/Wisconsin_CJM-Exec-Summary-FINAL.pdf.

[9] *Focus on Energy 2015-18 Quadrennium Economic Impact Analysis*, (prepared by Cadmus for the Public Service Commission of Wisconsin, July 3, 2020), https://www.focusonenergy.com/sites/default/files/WI%20Focus%202015-18%20Quad_Econ%20Impacts_final.pdf.

Conclusion

Across the United States, electrical systems that were built to provide affordable and reliable power are now being asked to provide new products and services that enable customer choices and to reduce or eliminate carbon emissions. Meanwhile, many utilities are seeing changes that impact their business models, including flat or declining loads, increasing influence from distributed generation, and rapidly changing costs and risk profiles among generation resources. This evolution has created the need in many states, including Wisconsin, to collaboratively identify what changes need to be made to both utility business models and regulatory frameworks to accommodate the needs of the 21st century.

The Wisconsin Energy Distribution and Technology Initiative (WEDTI) was co-convened by the Midwest Energy Research Consortium and the Great Plains Institute to explore these system changes and develop a Wisconsin-specific approach to addressing them, with a focus on technology deployment and innovation. M-WERC and GPI assembled a stakeholder group that represents a broad spectrum of interests in grid modernization and technology, including investor- and consumer-owned utilities, regulators, consumer advocates, environmental advocates, state and local governments, businesses, economic developers, and academic researchers. The stakeholder group was later augmented by assistance from subject matter experts as the stakeholders broke into subgroups to draft recommendations.

The group developed a set of organizing principles that acknowledge that this transition is occurring, and with it come both opportunities and challenges. From the perspective of the WEDTI stakeholders, those opportunities included significant economic development gains, reductions in the carbon impacts in and of Wisconsin's economy, energy security and community resilience, and equity for all customers.

Over the course of 10 monthly all-day meetings, participants developed 14 recommendations that could accelerate the transition by positioning Wisconsin to take advantage of economic development opportunities, deploying new technologies, and optimizing the system for the benefit of all customers. Importantly, participants also sought to maintain the core tenets of affordability, efficiency, and reliability for customers, recognize the need for flexibility and technology neutrality, and ensure that any changes fit into Wisconsin's regulatory construct, maintaining balance between customers and utilities.

A key component of these recommendations is a new paradigm of the utility as a conductor, in which the traditional responsibility of utilities to provide safe, affordable, and reliable electric service is augmented by a new responsibility for utilities to optimize the system for the benefit of all. The full package of recommendations provides a comprehensive framework for this new paradigm.

While economic development was an original part of the group's desired outcomes, the COVID-19 pandemic brought increased attention to the need for economic stimulus. In response, the group reviewed and modified its recommendations to ensure they would support the regrowth of Wisconsin's economy coming out of the pandemic.

Collectively, this group of stakeholders looks forward to advancing these 14 recommendations in collaboration with the Public Service Commission of Wisconsin, Governor Evers' Task Force on Climate Change, and other leaders, actors, and stakeholders across Wisconsin.

Appendix

APPENDIX A: Template for Utility-Stakeholder Collaboration Reports

As a supplement to Recommendation #4, the following outline is intended to serve as a generic template for what information utilities, either directly or through third-party neutral conveners, could file with the commission to concisely report and summarize collaboration efforts with stakeholders.

The idea is to answer the following questions in 10 pages or less. Utilities should consider providing attachments as applicable, such as meeting notes and slides, however any notes should not attribute comments or questions to individuals or organizations without their consent.

Examples of how this template has been applied to collaboration processes in Minnesota follow the questions.

Questions:

1. Why was this process needed?
    a. (describe the context for why the process was needed)
2. Who participated?
    a. (list participants and describe levels of participation, if applicable)
3. What did the process look like?
    a. (describe # of meetings, where they were held, and ground rules)
    b. (describe who facilitated and their relationship to the client, as well as who funded the process)
4. What were the key outcomes?
    a. (describe areas of agreement and disagreement)
5. What still needs to be resolved?
    a. (describe what should be addressed in any future convenings or formal regulatory process that will follow)

Examples:

- Minnesota Power 2019 Residential Rate Design Stakeholder Process Summary: http://e21initiative.org/wp-content/uploads/2020/07/MP-Rate-Design-2019-Summary-Final.pdf
- Xcel Energy Electric Vehicle Solutions, Summary of Stakeholder Meetings: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7b90A1A968-0000-CA1B-AF47-24D6EC828FED%7d&documentTitle=20191-149887-01

APPENDIX B: Issue Sheets by Subject Matter Grouping

This portion of the appendix includes summarized stakeholder comments and questions from the discussions that took place during the WEDTI monthly meetings, *before* the recommendations were developed.

The commentary has been organized into six topics that frequently arose as discussion themes: aggregation, data access, innovation, planning, pricing, and standards. These are listed in alphabetic order; the order does not indicate priority amongst the group.

These have been attached to show the breadth of considerations and discussion that were taken into account before developing the recommendations.

TOPIC 1: Aggregation/Utility as the Conductor

Overall Rationale:

- Who is in the best position to act as storage aggregators? Utilities, or non-utility orgs?
- Utility aggregation vs. third party aggregation – you get the most value out of operating system-wide, with full granularity, rather than operating in lumps.
- Portfolio aspect of DERs is important – need a diverse set of assets to be able to provide the functions that the system needs. Need to look at DER portfolios as a system, not just as individual assets that we need to be plan around.
- Utilities moving from an obligation to serve to an obligation to optimize -- acknowledge that they have an obligation to do both.
- As an aggregator, utilities can act to avoid system costs, rather than customers acting to avoid rates.

Opportunities/Solutions:

- We can learn how to manage DER's effectively to avoid unnecessary system investments.
- Data – AMI would create data to understand the effects of different programs.
- The residential distribution system wasn't built to accommodate everybody having two EV's and charging whenever they want, but if usage can be managed, then perhaps there's an opportunity to save everybody money.
- We have charges that aren't always associated with cost. Likely the system will become more time-based, so you want the utility to be able to help manage inverters rather than asking customers to respond to the price signal.
- When is the right time for the utility to own a DG asset, versus when is it best for the customer to own it? (e.g., affordable or LMI housing units – not likely the residents will be investing in on-site solar, so may be a good opportunity for utility ownership).

Challenges

- What needs to be done about jurisdictional issues in the context of storage aggregation, if anything?
- What if a set of large customers wants to pool together to provide a service (or set of services) that's valuable to the utility? OR what if large customers want to band together to provide reliability to one another, in return for a lower level of reliability from the utility?
- Utilities are in the best position to understand the system needs. But, are there 3rd party opportunities to provide the services that utilities are looking for? For example, utilities used to manage their own construction projects. Now, they hire developers to do the work under a set of requirements established by the utility at lower cost. Are there similar opportunities for 3rd parties to provide services (e.g., via RFP)?

- BTM generation is untapped potential because it's money that utilities don't have to put forth. Aggregated BTM generation could create system benefits, but it's currently seen as competition with the utilities – they would sell less electricity.
- Customer side (production schedules) versus utility side – it's a reliability issue. Need to be able to call on resources when they're needed in order to make them valuable.
- DER's could potentially improve loading on a circuit or degrade it, depending on how they're managed.

TOPIC 2: Data Access

Overall Rationale

- It's difficult for customers to access their own interval usage data to identify optimization opportunities. Who owns customer usage data and how should it be transmitted? Should we have a standard data access policy?
- Are we going to have an apple or a Microsoft system when it comes to information? E.g., closed source or open source information?

Opportunities/Solutions

- Example of CA making data available in an anonymized format.
- Especially for more sophisticated customers, easier data access is going to facilitate innovation. Can also be useful to companies developing new products and services.
- Interest in using data to test/evaluate program effectiveness
- As we're piloting, that's where we need to have these (data access) conversations.

Challenges

- Asking for interconnection should not be a lead generation activity for utility DG projects.
- Customer data – not universally accepted that customer data should be easily available due to security concerns and sensitivity about how data might be used.
- Concern around monetizing data
- Large customers are still very concerned about data security for competitiveness/trade secret reasons.
- If you were to open source distribution data, you'd have chaos. Utility has the responsibility to manage the system. However, if you want non-wires alternatives, how do you incentivize the utility to do something other than investing in the system the way it was (versus an NWA)?
- Another reason to avoid making data public is the security risk.

TOPIC 3: Utility/Regulatory Innovation

Opportunities/Solutions

- The goal should be to pay for outcomes. If you're successful in reducing peak, then the whole system will be more efficient, and looking at some performance incentives would be reasonable. Part of this is a shift away from only interruptible DR programs to other program approaches to shaping/shifting/shedding peak.
- Utility business model – thinking about performance metrics and carbon reductions in the context of rethinking Focus on Energy. What would it look like to make the program more performance-based to achieve specified outcomes?
- Consider allowing utility to earn on rebates for charging infrastructure. Would help to provide a financial incentive to utilities to take action in the public interest, because those actions may compete with other things that earn the utility money.
- These (load management) programs have a lot of administrative overhead. Would help to give utilities a set of cost limits within which to operate, but need a back of forth of review and information sharing to make this work. Might make sense to memorialize this into rate cases by allowing a certain degree of R&D.
- Regulatory safe harbor to run pilots faster. We need to experiment without relying on the same way of doing cost benefit analysis. Perhaps we can establish cost limits to allow the utility to innovate.
- What can we learn from rural cooperatives? More nimble (but action varies)
- Would help to have freedom on cost recovery – idea is to get where you want to be in 5 years, not to achieve perfection in year 1.
- Could incent action through performance ratemaking. Has to be done in a sophisticated way to ensure shared costs and benefits. Need to be careful about designing a system that will increase costs for customers over the long term. Also consider how performance-based metrics are set – for example, if set by policymakers rather than by the market, then policy could rapidly change at the expense of customers.
- Opportunity for efficiencies with rules around individually metering multifamily premises.
- FERC AD-1919. GETs – Grid Enhancing Technologies. What incentives do we throw out there? E.g., shared savings.
- Question of what customers care about in the realm of grid modernization. Maybe we prioritize around customer needs/concerns, including…
    - Power quality and resiliency
    - Pricing terms, such as moving to real-time pricing, that would support load shaping
    - Optionality for DERs – self-operated DERs, utility-operated DERs, mixed/blended management, and implications for fixed costs.

    - Role of ancillary services
    - Access and ownership of information – as a customer, can I get access to my interval level data, and who owns the data?
- What sort of incentives might be of interest to enable this?
    - Reliability is one – if you can achieve cost savings through a non-capital investment or avoided cost, those dollars are good for customers. Can that somehow be shared with investors? Need to think about where the benefits go when you're doing something non-traditional. E.g., improving load factor.
- Big goal is to accelerate deployment – we need to do more projects, faster. Different pilots could all report to the commission, and then the PSC can aggregate the information into lessons learned across pilots. Collecting lessons learned will help us move forward as a state.
- There's a value in transparency to the investor community. Would like to see a metric on carbon reductions.
- How do we take advantage as a state of best practices, emerging tech., etc., we should recognize innovation is likely to come from customers and stakeholders, so should find a pathway to encourage that to happen.
- Electrification – opportunities to experiment. Utilities need help around prioritizing the three goals (e.g., can probably do any two, but three is difficult without help to pilot/innovate).
- When we collaborate, then we have a higher likelihood of avoiding settlements. We can build on the collaboration that we have here.

Challenges

- Let's develop market solutions that incent the right behavior without tying financial incentives to metrics that could be strongly affected by technology or policy changes.
- How do utilities do all of these things without putting their business model at risk? Need to modernize without "sinking the titanic."
- How can utilities that are doing innovative things be incentivized to share the results for the greater good?
- What is the value of clean technology for a pilot project? To customers, it can sound good, but what are the metrics?
- Performance metrics are important, but also need to think carefully about how they're structured.

TOPIC 4: Resource Planning

Overall Rationale

- Resource planning is happening every day, but what's challenging is that the public and commission doesn't always get to see the bigger picture and the context. If we get the bigger picture it helps everybody.
    - The transparency of having these plans out there helps advance innovation. Right now we have pledges to decarbonize by 2050, and collaboration that happens all the time.
    - In the regulatory world, you go from case to case. Without the bigger picture, left in a position waiting for the next shoe to drop. Have a sense of foreboding about what's around the corner that we can't see.
- Distribution side tends to be circuit-by-circuit as opposed to on the transmission side. What are the opportunities for partnership on a circuit-by-circuit basis? Utility has lots of expertise, but also can have tunnel-vision.
    - How do you appropriately incorporate outside perspectives in distribution planning or pilots?
    - Also, how might the commission be able to put out some goals or incentives to enable innovation?
    - And how do we encourage third parties being a partner with you?
- What is the "big picture" that's needed around resource planning?
    - Load forecasts under different growth scenarios, DER penetration scenarios, and how utility sees its resource mix evolving. Also, forecasting for what's coming on the distribution system.
    - Some of this is captured in the SEA. It gives the numbers, but not the modeling and assumptions behind it. PSC staff doesn't perform analysis on numbers, just takes and reports them. Trying to get a little more into what the numbers mean, but SEA only allows going so far in that direction.

Opportunities/Solutions

- Need to be thoughtful about the role of MISO in all of this – what do we want MISO to be doing for us?
- Need to not get tunnel vision to the point where we don't anticipate where the puck is going. Need to build things like cost of carbon into our incentives or accounting.
- Managed EV charging is an example of a utility initiative that would help to avoid distribution system investments, in the future case of customers having two electric vehicles (e.g., avoid infrastructure to charge two vehicles at once by managing charging effectively).
- Is there a way to get at transparency on the distribution system through the SEA?

- Could have a narrative on the vision/outlook for distribution planning.
- It's the folks in the field who know the circuits the best, so it's getting them to think about problem solving differently. Wanting to drive innovation to the folks in the field.
- Good news -- average age of a planner is changing, so interest in technology is increasing. Workforce is an important part of this.
- Would like to manage rates as best as possible, so would like to avoid an extensive distribution system rebuild. Therefore it's worth exploring non-wires alternatives. Don't want to mandate load control programs, but want to offer it along with a rebate for those who want to participate.

Challenges

- The PSC doesn't necessarily have the tools needed to do some of this. Worth acknowledging that even states with IRP processes are wrestling with these same issues.
- As we're thinking about resource planning for the future in WI, caution against trying to create a process that will take several years, because the system is changing so fast that by the time the process has completed, the system will have changed.
- Challenge – how do you think about distribution level resources in planning the overall system? How can utilities gain visibility into those resources, predict them, and dispatch them to better manage the system. Need to think about how to do this or will end up with over supply. YET still have the resource adequacy obligation, so need to know the resources will be there when needed.
- Thinking differently about distribution planning -- are there non-wires alternatives that are possible? It's a big undertaking to have this be a public process. Not sure how much value there is to having this be a statewide distribution planning process. Public distribution planning will be troublesome.
- Timing of this is important – distribution planning happens on a different time scale than resource planning. Concern about somebody making an investment based on outdated information. Need to be able to evaluate for investments – did we avoid any costs in the end, or did we add to costs? Sharing all of the information without a ton of context is concerning for what people will do with that.
- Bad news – age of infrastructure in distribution system and need for replacement is greater on the distribution system than on the transmission system. The concern of many distribution engineers is budget going to accommodating renewables rather than maintaining necessary equipment on the system. Also need to size distributed generation to the load.

TOPIC 5: Pricing

Overall Rationale

- Today customers can use when and whatever they want, and push onto the system when and whatever they want. It's not a very sophisticated way of operating the system. How do we get to a more sophisticated future state?
- Pricing-wise, if you don't have a system that can be integrated with the grid, then you don't get as good of pricing – you get appropriate value for providing value to the system. In order to do this, need to address value/pricing in an unbiased way.
- Most important thing is to give customers the appropriate benefit for providing services to the system.
- Think about how we can reward market behavior. In the current system, customers are price takers – they don't get to negotiate th e price. But with more DERs, there's an opportunity for customers to bid in services (production or consumption) and affect the price.
- Pricing -- location matters, and so does the timing of consumption.
- DERs are critical components AND we need to get the pricing right so that the utility can act as the conductor, making decisions on which asset to deploy (whether a conventional power plant or portfolio of DERs). This requires having standards, because the price would be based on a standard of service.

Opportunities/Solutions

- Should Wisconsin run a targeted study and assessment to identify if there's value for things for which we don't have price signals today?
- Storage
    - What's the value of on-site load management that battery storage can provide (i.e., behind the meter), for the benefit of both customers and utilities?
    - Should we have some tariffs to provide the right signals for customer-sited storage?
- Customers should receive benefits also based on the risk that they bear from ownership – for example, a customer should get more benefit for owning something themselves versus something that the utility owns that they buy into.
- Wouldn't it help to have transparency (to customers) around peaking on the transmission system? Example: In PJM, customers can see the load online to know if they're coincident with peak, but can't see it in MISO. Customers can use timing and weather to estimate this, but the more information you get, the more accurate you can be.
- Today, customers pay a peak demand charge, but is there a pricing signal around peak?
- In terms of affecting peak, where's the biggest bang for your buck? Industrial load.

- Opt-in versus opt-out time varying rates – with opt-out, you can achieve much higher levels of participation without having to market the program.
- Why can't there be a sweet spot that acknowledges the value that customers can provide to the system, and pays them in terms of benefit to the utility? Xcel example with Fort McCoy – testing out shared investment in infrastructure.
- Geo-targeting – strong statutory requirement for equity – customers should get out what they put in, by rate class.

Challenges

- Challenge is around (not) disrupting value for existing actors on the system.
- What we understand to be the "peak" and "off peak" hours today will shift as the system changes to rely more on renewables. Likely the system will become less predictable.
- Don't want to market TOU today, because today's time-based prices will not match tomorrow's time-based prices.
- Risk and assignment of risk – when we look at something like the polar vortex, the variability in performance discounts the value. You get reliable value from power plants, but you can't rely as much as demand management programs. Need a way to manage outlier events.
- The regulatory world that utilities live in – took many years for MISO to move to a seasonal capacity construct. In order for the utilities to be able to do a program where it's ok for customers to participate during certain parts of the year, then the utility's obligation to the market ALSO has to be variable over the year.
- Embedded costs – how are they shared?
- Different needs for commercial and industrial customers – their load management would depend on their business schedule. However, businesses DO respond to pricing (e.g., will shut down the entire business temporarily if it's cheaper to do that than to be open/in production). Continuous process manufacturers (i.e., 24/7) will adjust production to keep costs low.
- Concern about customer sophistication – in a more complicated market, the most sophisticated actors will benefit and less sophisticated actors will lose.

TOPIC 6: Standards for DER Interconnection and Operation

Overall Rationale

- Concept of DERs "pushing" onto the utility system – raises issues of standards for DERs. Not all technology is able to provide all of the services that DERs can provide. Standards can help to ensure DERs are useful for utilities, and that the services can be relied on by the utility.
- Concept of the distribution utility as a mini RTO. Allows a systemic approach to maximize value to all customers. Challenge is that we have a system today that maximizes value to certain customers, and those customers will oppose changes. Standards would help with this – e.g., if you want to participate as a virtual power plant, here are the standards you need to meet to be able to do that.
- DERs are critical components AND we need to get the pricing right so that the utility can act as the conductor, making decisions on which asset to deploy (whether a conventional power plant or portfolio of DERs). This requires having standards, because the price would be based on a standard of service.

Opportunities/Solutions

- Developers would support standards. They understand that today's DERs aren't providing reliable capacity, and standards could help them to do that. Plus, standards can enable DERs to be aggregated.
- Suggestion to design standards around the functionalities of existing assets on the system (e.g., a portfolio of DER assets should look just like whatever it's replacing, in terms of functionality on the system)
- Rules can be designed in sets and applied based on level of contribution (e.g., if a small contribution, this set of rules applies; if a larger contribution, a different set of rules applies).
- Suggested standard design criteria:
    - Standards should be built around the common system interface, which could have a single inverter or could have many inverters.
    - Standards should apply to both the technology and operation and maintenance of the technology
- There should be an election period of time. If you're going to put together a program for DER aggregation, it has to be based on additionality -- you need to add something to the system.
- What are the technologies that need to be in place to allow utilities to control them?
    - Inverter – utility needs to have control
    - Shift to buying grid services, rather than just energy.

- Even if something is very complicated, it may be possible to package it for a customer in a way that makes it simple and accessible
- Some developers/installers have run into a situation where they propose a project, it goes to the engineering study process, and then they get a result that just says they can't build it here. Developers/installers would benefit from more transparency into why a project can or can't go in a specific location. Who is the neutral arbiter who helps bridge the divide between utilities and developers/installers?

Challenges

- Communications and contractual/transactional relationship with DER – how do the utility and grid operator know it's going to be there?
- If we're going to develop standards, why not develop standards that move us in the right direction (e.g., aligned with the system we want, not the system we have). Need to be clear about the services that we want DERs to perform/provide.
- Complexity should be sized to the sophistication of the customer (e.g., a small customer should have an easy process; larger customers may be able to handle a more complex process to provide more services).
- There's pressure to avoid changes to the rules in the short term because projects are being developed around those rules, and changes might limit those projects.
- Grandfathering – need to think through what this looks like in order to avoid disruptions to existing actors. Don't want to pull out the rug from under them, so need to decide on an agreeable timeframe (e.g., X# of years grandfathered in).
- What is the best jurisdiction to deploy standards?
- Concern on the utility side that if too much information is shared, it could be used against them in the future.
    - On the physical engineering side you have that challenge, but what about the business model side of the challenge?
- If developers don't know what they're getting into with MISO (e.g., they don't fully understand how to comply with MISO rules), they could have a bad experience, which could ultimately be bad for expanding storage. Who should police, and who should enable?

APPENDIX C: Project Facilitation Team

Midwest Energy Research Consortium (M-WERC)

The Midwest Energy Research Consortium (M-WERC) uses science and technology-driven innovation to spark economic development and growth for Wisconsin's Energy, Power, and Controls (EPC) sector, a $28 billion industry made up of 900 Wisconsin companies that employ 100,000 people.

In addition, M-WERC partners with top scientists at the University of Wisconsin-Madison, the University of Wisconsin-Milwaukee, Marquette University and the Milwaukee School of Engineering in a public-private research model that helps our member companies solve the toughest problems our industry faces in this new industrial revolution. This innovative approach to research will help us tackle the biggest obstacles facing the EPC industry and the state economy. It will also make Wisconsin a national leader in science and technology-driven innovation and forge a reputation that is a magnet for investment, job creation and talent.

DAN EBERT

As Executive Director, effective January 2019, Dan brings more than 25 years of experience in utility, management and regulatory and policy development. He helps clients navigate the dramatically changing energy landscape in Wisconsin and the Midwest.

Ebert's experience includes time as the Senior Vice President of Government Affairs and External Relations for WPPI Energy. He was responsible for managing oversight of regional energy markets, legislative and regulatory relations in the Midwest and nationally, and corporate communications for the Sun Prairie based electric utility serving 51 municipal members in three states.

From 2003-2008 he served on Public Service Commission of Wisconsin (PSC) — serving as Chairman of the agency from 2005-2008. The PSC is the independent regulatory agency responsible for the regulation of Wisconsin utilities. Prior to that, during a 15-year career in Washington DC, Ebert served in many public and private sector policy roles, including both the United States Senate and the United States House of Representatives, ultimately serving as the Legislative Director for Senator Maria Cantwell.

EMILY OTT

Emily recently joined M-WERC's Milwaukee office as a program assistant. She is an Appleton, Wisconsin native and recent graduate from UW-Platteville with a B.S. in Sustainability and Renewable Energy Systems and a minor in Business Administration. In Platteville, Emily served as the Treasurer from UW-Platteville's WAEE collegiate level chapter. She's excited to have an undergraduate research paper being published in the near future.

Great Plains Institute (GPI)

The Great Plains Institute (GPI) is a nonpartisan, nonprofit organization with a mission to transform the energy system to benefit the economy and environment. Working across the US, we combine a unique consensus-building approach, expert knowledge, research and analysis, and local action to find and implement lasting solutions. Our work strengthens communities and provides greater economic opportunity through creation of higher paying jobs, expansion of the nation's industrial base, and greater domestic energy independence while eliminating carbon emissions.

TREVOR DRAKE

Trevor joined the Great Plains Institute in 2013 and is a program manager. His work is focused on engaging diverse groups of stakeholders to enable innovation and collaborative problem-solving around utility initiatives and state regulatory proceedings. Trevor has run stakeholder engagement processes to support new time-varying rates, utility investments in electric vehicle infrastructure, distribution system planning, demand response programs, and performance-based utility regulation.

In prior work, Trevor staffed the energy efficiency working group for the RE-AMP network, which convened clean energy advocates and their funders to co-develop strategies for maximizing energy efficiency in the Midwest. He also worked for several years as a staff member of Minnesota's Clean Energy Resource Teams (CERTs), where he helped local governments implement clean energy projects through collaborative procurement networks. Trevor received his bachelor's degree in Environmental Studies from Saint John's University in Minnesota.

DOUG SCOTT

Doug joined the Great Plains Institute in early 2015 and is vice president of electricity and efficiency. Doug focuses on GPI projects related to his work as a former state official, including the Midcontinent Power Sector Collaborative, state energy and environmental regulator groups, the Carbon Capture Coalition and State CO_2 Work Group, and utility business model/grid modernization, including the e21 Initiative.

Doug was Chair of the Illinois Commerce Commission from 2011 to 2015. During his tenure with the commission, he served as a member of the Energy, Resources, and Environment Committee for the National Association of Regulatory Utility Commissioners (NARUC) and on the Task Force on Environmental Regulation.

Doug also previously served as director of the Illinois Environmental Protection Agency from 2005 to 2011. During those years, he chaired the Illinois Governor's Climate Change Advisory Committee and represented Illinois in the development of the Midwestern Governors' Association's energy and climate accords. He was also elected and served as mayor of Rockford, IL from 2001 to 2005, after serving as a state representative in the Illinois General Assembly between 1995 and 2001.

Doug received his undergraduate degree with honors from the University of Tulsa in 1982 and a juris doctorate with honors from Marquette University, Milwaukee, WI in 1985.