Enhanced Renewables in the State/RTO Nexus: A Heartland Case Study

Executive Summary

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Introduction

Statement of Purpose and Project Objectives

The purpose of this Capstone was to assess the MISO footprint electricity policy landscape and present the R Street Institute with recommendations to effectively promote the increased deployment of utility-scale renewable energy and distributed energy resources (DERs) across the MISO footprint. This evaluation is centered on the electric power industry's governance framework in the MISO region. The overall research topic has been subdivided into three modules: planning of new generation and transmission, operations of current generation and transmission assets, and the integration of distributed energy resources. Given the interrelated nature of jurisdictions and entities within the MISO footprint, key actors include public utility commissions (PUCs), particularly the Indiana Utility Regulatory Commission (IURC), state legislatures, independent system operators (ISO)/Regional Transmission Organization (RTO), particularly MISO, the Federal Energy Regulatory Commission (FERC), the North American Electric Reliability Corporation (NERC), large industrial and commercial consumers, local regulatory bodies, retail end-consumers, distributed electricity generators, independent operator utilities (IOUs), and environmental advocacy groups. This evaluation is focused on the following major stakeholders: PUCs, state legislators, ISOs/RTOs, MISO, FERC, retail end-consumers, electricity generators, and IOUs.

Framing the Challenge

The impetus for this analysis is the sweeping changes taking place throughout the electricity markets in the United States today. The problem of renewable energy generation and DER integration is not strictly a technical one. This report considers scenarios in which various policy options of factors are implemented. These scenarios involve transmission planning, formalized communication channels between different stakeholders, DER participation in both wholesale and retail markets, and how current and future stakeholders will be impacted from any change in the energy status quo. The primary focus of this research is on how renewable sources of generation will be integrated into wholesale markets to lower wholesale rates of electricity, build resilience and reliability, and reduce the emissions of greenhouse gas.

Analytical Approach and Methodology

Factors: Components to Achieving Desired Outcome

The section describes the framework in which this investigation was conducted and provides descriptions of key elements to this framework. To conduct this research, three research areas or modules (Planning, Operations, and Distributed Energy Resources (DER) were defined, and their attributes compiled. At the core of this compilation was the establishment of a suite of key actionable aspects termed factors. These factors were ranked as to their relative influence and were then used as the basis for the scenarios that were constructed for analysis of possible outcomes.

The **Planning module** explored the potential synergies between state utilities' integrated resource planning (IRP), generation/transmission processes, procurement processes, and MISO's regional future outlook, with the goal of balancing reliability and cost minimization.

The **Operations module** focused on evaluating the interactions between MISO, state-level entities and generators, the influence of market and policy rules on renewable grid integration, and the potential to develop a framework to reduce inefficient generation.

The **DER module** investigated the economic potential of Distributed Energy Resources (DERs), researched best methods for RTO compliance with FERC Order 2222, identified the institutional and policy framework that can assist with increased deployment and integration of the technology.

The factors outlined in their respective modules were ranked by their perceived importance (presented in Figure 1).

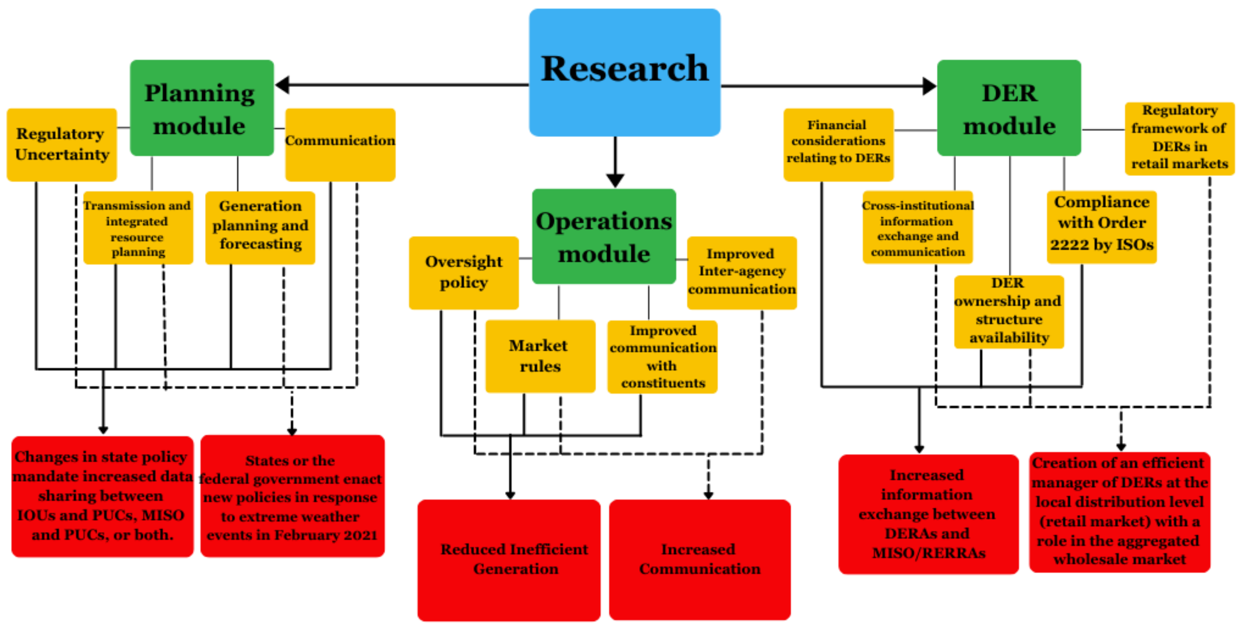

Figure 1. *The investigation was divided into the modules shown in green squares. These modules determined factors shown in yellow squares. From these factors, two scenarios were created from each module. The dotted line shows factors relevant to one scenario and the solid line depicts the factors relevant to a second scenario for each module.*

Scenarios: How Factors Interact

Using the thirteen defined factors, six scenarios depicting possible futures of the Midwest energy market were constructed. The purpose of these scenarios was to identify interactions between factors that would produce ideal outcomes and facilitate the integration of renewable energy resources. These scenarios define areas for change within the stakeholder environment that could facilitate the increased deployment of renewable energy in the MISO footprint.

The final scenarios identified and assessed from the modules are:

Planning module

- Changes in the state policy mandate increased data sharing between IOUs and PUCs, MISO and PUCs, or both
- States or the federal government enact new policies in response to extreme weather events in February 2021

Operations module

- Reduced inefficient generation
- Increased communication

DERs module

- Increased information exchange between DERAs and MISO/RERRAs
- Creation of an efficient manager of DERs at the local distribution level (retail market) with a role in the aggregated wholesale market

Results and Discussion

This section presents the results and discussion in three sections which pertain to the modules: “Planning”, “Operations”, and “DERs”. The discussion includes the implications of scenario outcomes for stakeholders. To this end, the discussion includes several synergies existing and proposed: (1) increased data sharing for stakeholders and improvements in transmission demand forecasting, (2) weather preparedness of the power grid and long-term energy reliability, (3) market rule and regulation reformation to facilitate hybrid renewable and DER market participation and (4) increased cooperation between DERs and RTOs in providing metering data.

Planning

I. Scenario 1: Changes in the state policy mandate increased data sharing between IOUs and PUCs, MISO and PUCs, or both

This scenario was selected because of the significant ability of one factor to facilitate the implementation of other factors to better integrate renewables. Information disparities and the need for communication were key themes from multiple stakeholder meetings with representatives from ISOs, regulatory bodies, utility representatives, and others. Changes in state policy which mandate increased data sharing between IOUs and PUCs, MISO and PUCs will have a domino effect on planning-related issues, especially surrounding renewable energy market penetration. The outcomes of Planning Scenario 1 are (1) increased data sharing, (2) improved forecasting models, (3) improved generation planning, and (4) improved transmission and long-range transmission planning.

This type of policy change and similar initiatives are prevalent in state legislatures (e.g., see Indiana HB 1520 and HB 1220). These outcomes are anticipated to occur for a few reasons. First, data sharing improves transparency and modelling and fosters collaboration among stakeholders. Secondly, improved models support collaboration and promote efficient regulation and generation/transmission planning. Next, effective generation planning enhances system efficiency, flexibility, and resiliency. Finally, improved transmission planning promotes dispersed renewables and minimizes clustering.

Establishing efficient data sharing processes is key to strengthening MISO's transmission planning and a willingness to cooperate from utilities and MISO. Data sharing could benefit regulators. For instance, state regulators would be able to monitor integrated utilities' asset management more effectively and make more informed decisions in prudency reviews such as fuel adjustment clauses ("trackers") and rate cases. Utilities, MISO, and ratepayers could also benefit from higher efficiency and reliability of energy systems. The optimal scenario outcomes also face several barriers such as utilities resistance to data sharing. Utilities will be hesitant to share data if it is inadequately protected or subject to misuse. The utilities may be fearful that the data they share will lead to regulatory penalties. Regulators must ensure that information sharing policies are not arbitrarily burdensome, that policies facilitate improvements to the energy system, and that sensitive information is stored and shared securely.

II. Scenario 2: States or the federal government enact new policies in response to extreme weather events in February 2021

This scenario was selected because it will lead to (1) enhanced interconnectedness between ISOs, (2) increased data sharing and reporting for utilities, (3) coordinated processes and information flows across institutions (i.e., NERC, FERC), (4) reformed cost benefit analysis methods, and (5) improved methods of power generation and transmission planning.

Following the extreme weather events of 2011 in Texas, NERC and FERC developed reliability guidelines and industry best practices but did not institute a reliability standard. This failure contributed to inaction and reliability issues in Texas a decade later, in a 2021 winter storm. A federal policy mandate by FERC would require more data sharing of MISO and consequently IOUs. Weather preparedness and weatherization increase grid reliability in general and reassure stakeholders and ratepayers of the feasibility of transitioning to majority renewable generation, as is the stated goal of many states and the present administration.

Operations

I. Scenario 1: Reduced inefficient generation

This scenario represents a sequence of events intended to bring policies and stakeholders into closer alignment. The optimal outcomes of this scenario are (1) restricting the conditions under which coal plants can self-commit, (2) incentivizing the early retirement of uneconomic plants, (3) seasonally operating more coal plants, and (4) facilitating hybrid market models that include storage. These outcomes will require coordination and negotiations between each stakeholder group to ensure that reformed market rules, securitization terms, and competing priorities among MISO customers are addressed in a mutually beneficial manner. As an example, consider securitization to reduce uneconomic plant operation. IOUs will likely only favor securitization if they can recover the capital invested in coal plants and envision a feasible path forward for investment in renewable generation. State legislatures and consumer advocates are more likely to favor securitization if they are assured that rates will not increase and that portions of the proceeds will be invested in affected communities and achieving renewable energy goals.

II. Scenario 2: Increased communication

This scenario was chosen because increasing communication between all actors and stakeholders in the energy grid system improves long-term system efficiency and eases the integration of renewable energy projects. Further, this scenario elicits (1) increased technical data sharing between MISO and the PUCs, (2) integrated price signals into market designs, (3) enhanced coordination and policy strategizing between legislators and MISO, (4) an established information portal available to state political leaders, (4) an obligation for MISO to respond, adopt, or reject suggestions from the Organization of MISO States, (5) and an obligation to redefine ‘reliability’ in the MISO framework to incorporate the limitations and advantages of renewable energy.

Better communication between all actors in the energy grid system would improve system efficiency, ensure generators are held accountable for imprudent asset management, and increase integration of hybrid generation systems. Increasing the communication between legislators and ISO/PUCs will align policy windows and present more opportunities for federal or state endorsement of legislation and policies. A long-term effect for data sharing between agencies, including OMS, will facilitate informed decision-making and alignment of stakeholder incentives that promote efficient policy. Not all stakeholders will be favorable to information sharing. For instance, IOUs, as corporations, are resistant to open data sharing. A secure network and portal will be essential for protecting information.

DERs

I. Scenario 1: Increased information exchange between DERAs and MISO/RERRAs

This scenario was chosen because it will lead to (1) deliberately increased communication and engagement between these two parties facilitated through planning meetings, (2) an extended compliance timeline for FERC Order 2222 ("the Order"), and (3) a reduction in energy costs and enhanced grid resiliency.

Increased information exchange between DER aggregators (DERAs) and MISO/electric retail regulatory authorities will allow for smoother deployment of DERs. This exchange gives rise to the potential for synergies between factors. Increased cross-institutional information exchange between these two parties will allow for mutual understanding of the financial considerations for DERs, especially from the perspective of DERs themselves. Additionally, the exchange of information between parties will simplify the regulatory framework for DERs. MISO and other ISOs are empowered by Order 2222 to create metering standards for DERs; increasing the voluntary provision of information by DERs to ISOs will expedite this decision-making process. The appropriate levels of data provision by DERs must be preemptively determined along with the development of universally-recognized standards. This will ultimately reduce the bureaucratic "red tape" of DER integration.

II. Scenario 2: Creation of an efficient manager of DERs at the local distribution level (retail market) with a role in the aggregated wholesale market

Utility company representatives have expressed concern over the lack of communication between ISOs and local distribution operators. The lack of communication presents a significant problem for operators and planners to overcome as there is limited visibility of DERs from the perspective of ISOs. This creates a significant opportunity for an entity to gather necessary information from these two stakeholders. This entity is the basis of this scenario.

A Distribution System Operator (DSO) could act as a moderating entity between these two essential functions of the electricity grid (transmission and distribution). A state-level entity, such as a utility regulatory commission, could provide the needed framework for DERs to operate in the retail and wholesale markets. This framework could be utilized by the DSO. It would create communication channels between the actors involved in DER energy generation --precisely DER owners, ISO transmission operators, Municipal agencies, regulated utilities, and local distribution operators. There is no current channel for peer-to-peer communication in the distribution and transmission of electricity, highlighting the absence of an important conduit for regional and sub-regional data sharing. DERs represent a new challenge for both local distribution operators and regional transmission operators since the systems in which they operate were designed for traditional power plants. The establishment of a DSO will result in clear jurisdictional boundaries between ISO operators and distributional operators. This data sharing pathway and jurisdictional clarification lay the foundation for the entity to track both wholesale and retail transactions of specified DERs. The communication channels between ISOs and DSOs, ISOs would have a clearer picture of resources in the network, contributing to efficient planning and LRTP, forecasting, and better weather preparedness. Each of these aspects positively impacts the consumer by providing a more reliable grid.

Conclusions

During the investigation of ways to increase renewable energy integration and DER deployment (the scenarios), it became apparent that there were several overarching themes and interactions that were present in many of the scenarios. The key themes that arose from this analysis are enhanced communication, the role of non-renewable resources and market signals, and the regulatory framework of our energy resources.

Communication plays a major role across all scenarios yet manifests differently within each scenario. Data flows can be thought of as a subset of communication. Data sharing is necessary for various modules and scenarios, but a variety of disincentives currently impede it. These need to be offset with proportionate and appropriate incentives. However, certain stakeholders may perceive transparency as a vulnerability that may put them at a disadvantage. Therefore, it is critically important to include these stakeholders in the decision-making process and find an ideal balance of transparency and privacy, especially in the case of sensitive data. Ultimately, communication is the keystone that ties together all the modules, as every module connects with communication in some way. Addressing these various communication challenges requires better "working relationships" between IOUs, MISO, third-party DERs, and PUCs. In the end, increased communication could enhance LRTP processes.

Another important theme that is closely related to communication is the importance of wholesale/retail market signaling and functionality. PUC monitoring of utilities is hampered by their lack of access to this information. Currently, MISO does not share this information due to concerns over security, distribution of costs to create sharing capabilities, and industry resistance to regulation. This last concern is particularly relevant, given the essential nature of the relationship between MISO and IOUs.

An additional key theme that has been addressed throughout this analysis is the role of fossil fuels. It has already been determined that increased monitoring is necessary to reduce inefficient management of fossil fuel-based generation. In the long term, securing long term investment from non-renewable stakeholders may require investing in fossil fuels. This type of investment incentivizes utility company investment into renewables by reducing risk. Reduced risk allows utilities to shift their funds away from fossil fuels and focus on renewables. Overall, it will be easier to reduce fossil fuel use and facilitate the generation and development of renewable energy through securitization of coal plants. Political and economic barriers to retiring fossil fuel powered plants will also be lowered by using securitization funds to reinvest in communities and provide support for transitioning to renewable energy.

The final key theme that should be addressed are changes in the regulatory framework. Policy reform targeting current regulations will be necessary to drive the sharing of data, increase transparency between stakeholders, and facilitate the integration of renewables. This is especially relevant for the regulation of DERs. DERs are a more decentralized form of energy generation than traditional utilities, and so require a new method of management that is not provided by the current regulatory framework. The framework needs to be updated to manage and monitor DERs' contributions in both wholesale and retail markets. The current regulatory framework has issues that will need to be addressed to better encourage the integration of renewables.

Recommendations

This section will synthesize module research and scenario outcomes to provide recommendations to stakeholders. Recommendations are organized by stakeholder, as each stakeholder has the authority to implement the recommendation or make the suggested policy change. While stakeholders are presented in no particular order, recommendations for each stakeholder are prioritized. It is often the case that relatively minor policy changes are prioritized over larger reforms given that smaller reforms, such as increasing communication, will facilitate the implementation of larger market reforms. The stakeholders receiving recommendations are state legislatures, PUCs, ISOs, IOUs, FERC, and the U.S. Congress. These stakeholder recommendations were selected for the potential of the policy changes to positively impact the energy system efficiency and/or the integration of renewables. The omission of a specific stakeholder from this section does not imply that the individual or group has no role in the future of the energy system. This section is not an exhaustive list of recommendations. Instead, the recommendations provided are those with the greatest potential to achieve the desired outcomes from the module scenarios.

The recommendations fall into categories that can be generalized as changes in the regulatory regime, institutional structural changes, economic incentives, improved communication, and technological or infrastructure changes. For instance, many of the stakeholders (PUCs, ISOs, IOUs, and FERC) recommendations move for improved communication. This highlights areas for cross-institutional collaboration. The communication theme and remaining recommendation themes are presented in Figure 2.

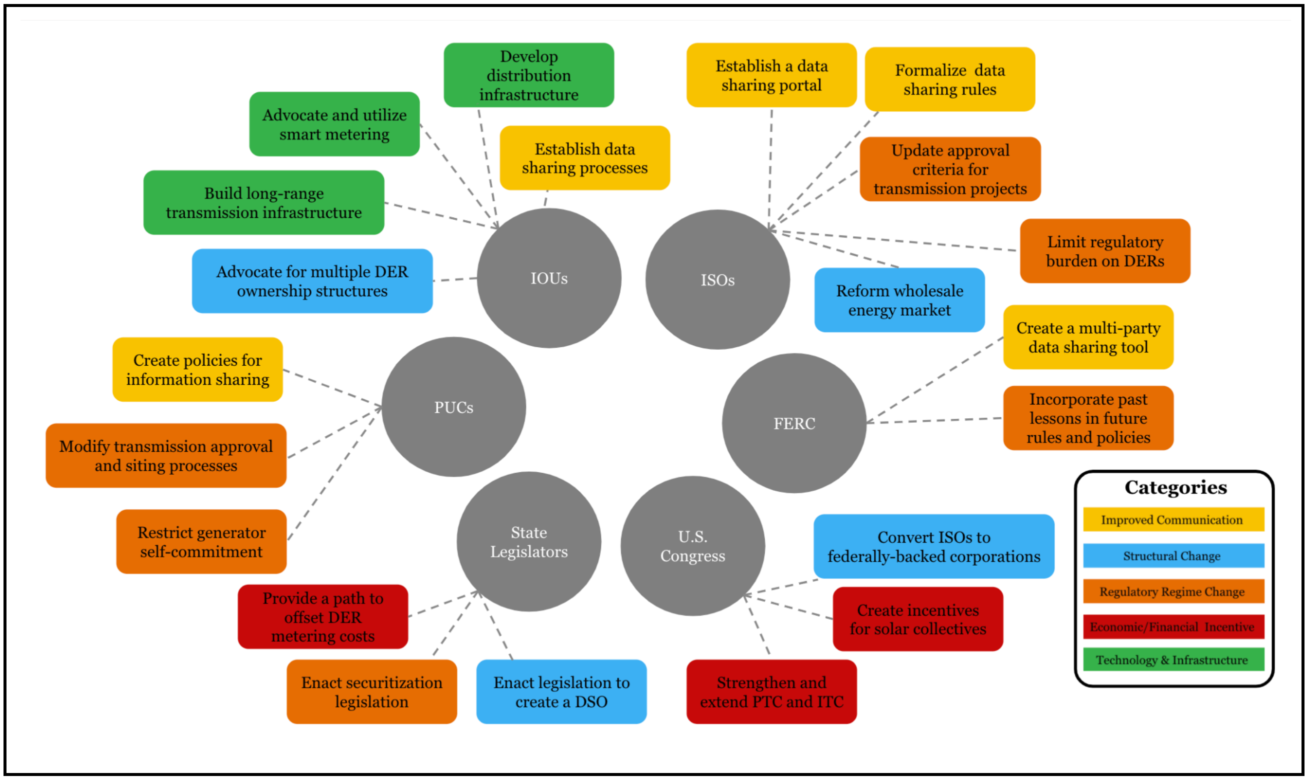

Figure 2. *Stakeholder recommendations fall under five categories: change in regulatory regime, technological changes, improved communication, structural change and economic incentives. Here, each stakeholder is shown with the categories of recommendations proposed.*

PUCs

- Restrict conditions under which generators are allowed to self-commit
  - Restructure prudency reviews/rate recovery
- Create institutional information sharing processes
  - Coordinate regularly through reports and schedule periodic meetings with legislators
  - Create a multi-stakeholder informational portal
- Change transmission approval and siting processes

ISOs

- Formalize processes of sharing data
  - Coordinate regularly through reports and schedule periodic virtual or in-person meetings with legislators
- Establish a portal or venue for data sharing
  - Create a protected real-time update data hub
  - Coordinate up-to-date data transfers for prudency reviews
  - Investigate federated learning software
- Reform the wholesale energy market.
  - Convert to free market functionality with real-time price signals
  - Create a hybrid generation market model

    - Limit battery/electricity storage use to renewable generation
- Modify approval criteria for new transmission projects
    - Reduce efficiency gains requirements to be closer in line with opportunity costs.
    - Adopt a more holistic approach to assessing transmission projects
- Limit the regulatory burden on DER integration from Order 2222 compliance

IOUs

- Establish data sharing processes
- Advocate for and utilize smart metering technology
    - Establish customer data portals
- Advocate for utility-owned or community and utility owned DER potentials
- Build long range transmission infrastructure
    - Increase the time horizon for transmission planning
- Develop distribution infrastructure

FERC

- Create a multi-party information sharing portal
    - Real-time information portal fed directly by independent market monitors (IMM)
    - Require states to upload IOU IRPs to the portal
- Apply lessons learned from Order 2222 implementation reflected in future rules and policies
- Reexamine FERC Order 1000

State Legislatures

- Enact securitization legislation
- Enact legislation to create state-level DSO entity
- Implement a system to offset upfront costs of metering technology
- Promote DER equity

U.S. Congress

- Replace ISOs with federally backed corporations.
- Strengthen and extend the Production Tax Credit and Investment Tax Credit
- Provide incentives to solar collectives and investors