

Minnesota Integrated Distribution System Planning

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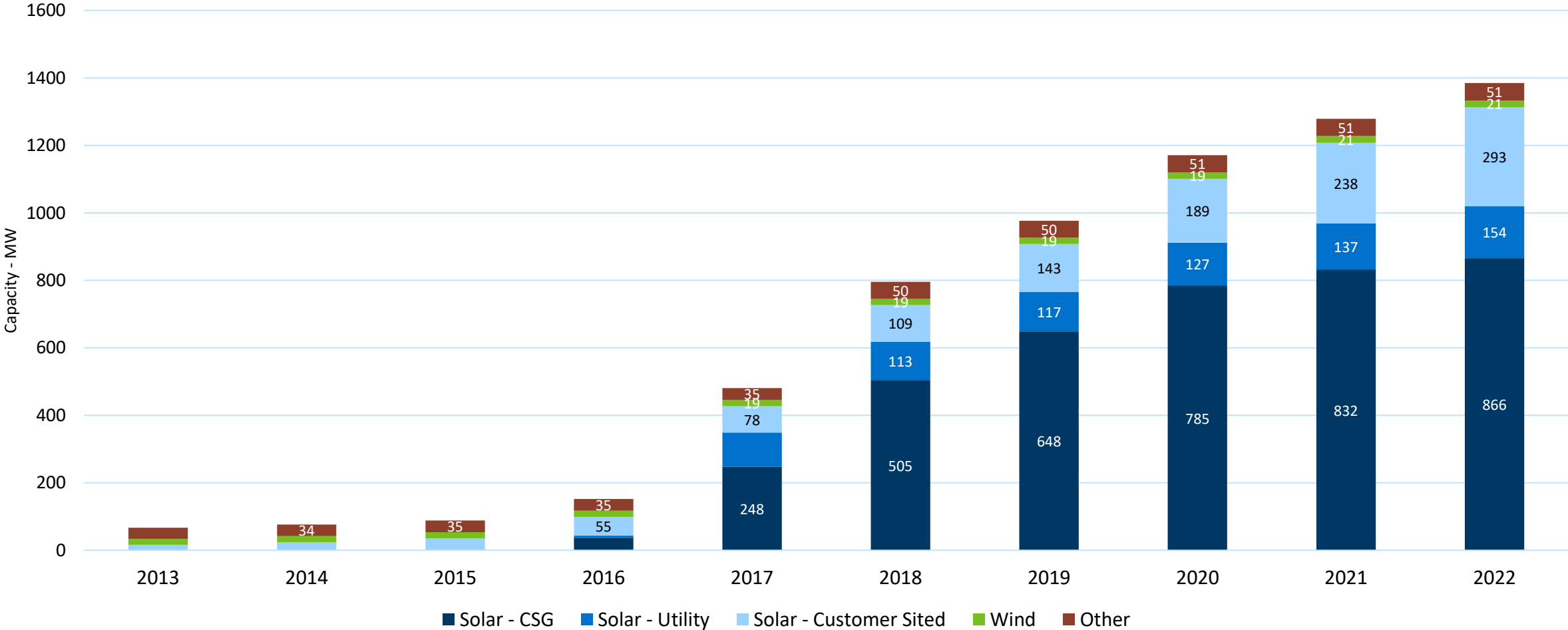
<https://mn.gov/puc>

*The ideas expressed are the views of the presenter, and not the
Minnesota Public Utilities Commission.*

Minnesota PUC Grid Modernization Initiative

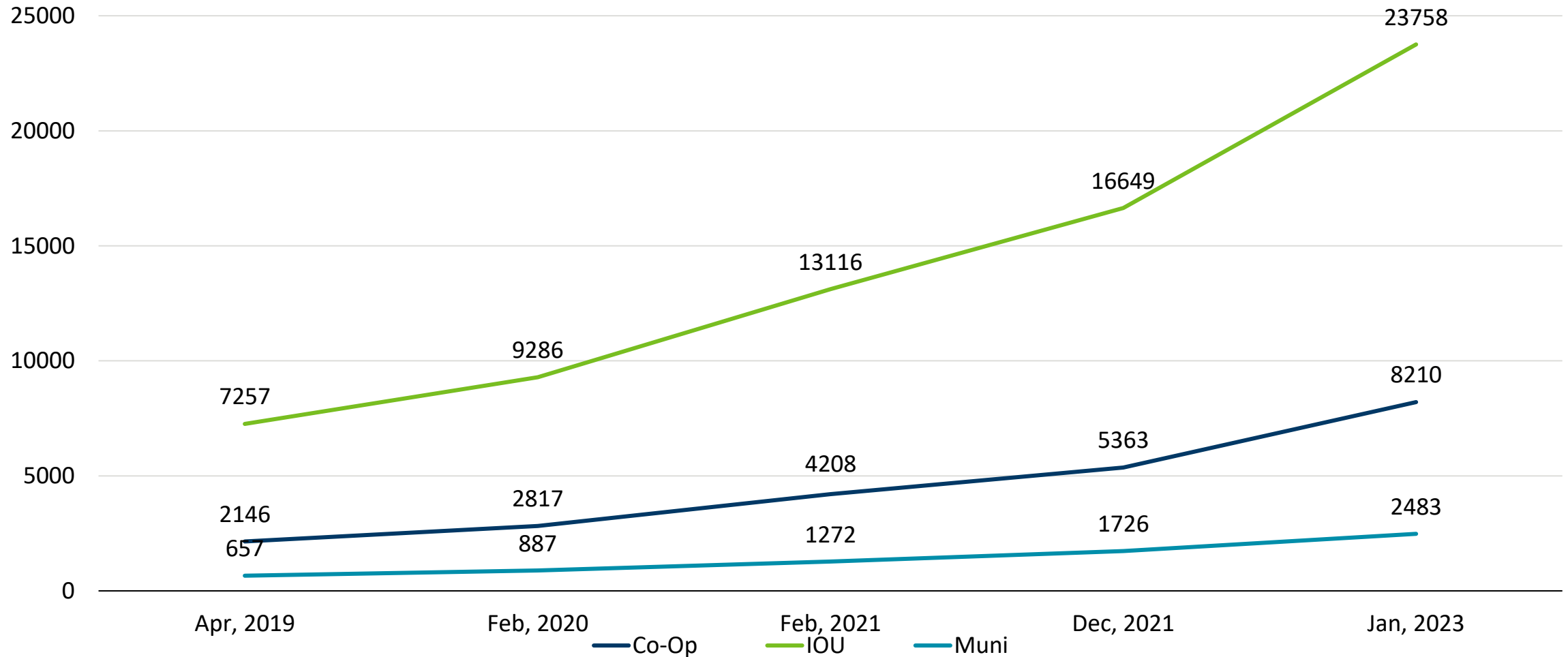
- Three Guiding Questions for Minnesota
 - Are we planning for and investing in the distribution system that we will need in the future?
 - Are the planning processes aligned to ensure future reliability, efficient use of resources, maximize customer benefits and successful implementation of public policy?
 - What commission actions would support improved alignment of planning for and investment in the distribution system?

Minnesota Cumulative Installed DER Capacity (MW)



EVs in Minnesota

EV Registration by Utility Type



Grid Modernization and IDP Development Phased Approach

March 2015	Launch of Grid Modernization Investigation
June 2015	Grid Modernization Report Requirement Enacted (Minn. Stat. §216B.2425)
Sept.-Nov. 2015	Workshops and Comment Periods on Minnesota's distribution systems, national efforts, and recommended next steps
March 2016	Staff Report on Grid Modernization and Next Steps
April 2016	Commission Authorization to Initiate Distribution System Planning
August 2016	DOE/ICF Report on Distribution System Planning in Minnesota
Apr-Sept. 2017	Cms'n Issued Questionnaire to Utilities and Stakeholders
April 2018	Cms'n Approval to Release Draft IDP Requirements for Comment
August 2018	Cms'n Consideration (Approval) of Xcel's IDP Requirements
Late 2018	Cms'n Consideration (Approval) of IDP Requirements for Other Utilities

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Workshops and Reports

Questionnaire

Planning Requirements

Minnesota PUC Integrated Distribution Planning Intended Outcomes

- Proactively address the accelerating change at the distribution level: technologies, customer demands, growth in DERs
- Ensure distribution investments will achieve a flexible, resilient grid and meet customer needs under a range of futures
- Evaluate cost-effective non-wires alternatives to proposed investments, including DER provided services
- Link regulatory processes such as interconnection standards and DER valuation analysis
- Increase transparency of utility investments and grid needs
- Improved Integrated Resource Plan inputs

Distribution System Planning – Staff Lessons Learned

Any distribution system planning process should:

- Be informed by stakeholder input;
- Be iterative and improve with each cycle;
- Create realistic expectations for the utility, the Commission, and stakeholders;
- Bridge knowledge gaps;
- Ensure cost effective solutions by increasing visibility into investment decisions and plans;
- Be tailored to each utility's system and allow for flexibility based on changing factors; and,
- **NOT impede a utility in their need to plan and act on distribution system investments.**

Process for Developing Distribution Planning Requirements

- Distribution System Planning was a Commission-led Investigation (no Statutory or State/Governor-led Mandate)
- Commission/Staff – Opened Individual Investigation Dockets for each of the four rate-regulated utilities (range in size and type: 3 IOU, 1 distribution - coop)
- Create Planning Requirements by Commission Order
 - Allows for flexibility of reporting requirements and process to adapt to each utility
 - Ability to be modified by year, as-needed
- Staff Proposed Draft Requirements for the Four Utilities
 - Staff Released Draft-IDP requirements in June 2018 for Comment
 - MN PUC consideration of the Xcel Draft-IDP requirements in August 2018 and late 2019 for the others

Distribution Planning Objectives

The Commission is facilitating comprehensive, coordinated, transparent, integrated distribution plans to:

- Maintain and enhance the safety, security, reliability, and resilience of the electricity grid, at fair and reasonable costs, consistent with the state's energy policies;
- Enable greater customer engagement, empowerment, and options for energy services;
- Move toward the creation of efficient, cost-effective, accessible grid platforms for new products, new services, and opportunities for adoption of new distributed technologies; and,
- Ensure optimized utilization of electricity grid assets and resources to minimize total system costs.
- Provide the Commission with the information necessary to understand Xcel's short-term and long-term distribution system plans, the costs and benefits of specific investments, and a comprehensive analysis of ratepayer cost and value.

Commission review of distribution system plans are not meant to preclude flexibility for utilities to respond to dynamic changes and on-going necessary system improvements to the distribution system; nor is it a prudency determination of any proposed system modifications or investments.

(Source: IDP Filing Requirements as adopted in 2018)

Timing and Frequency

- Biennial
- Filing Date: November 1 odd numbered years
- Timeframe: 10-year Plan with 5 year action plan
- Stakeholder engagement: Utilities must hold at least 1 stakeholder meeting prior to filing, covering DER Forecasts, 5-Year Investment Plan and System Capabilities (at minimum)

Integrated Distribution Plan Filing Requirements

Content Requirements

- A. Baseline Data
 - System
 - Financial
 - DER
- B. Hosting Capacity and Interconnection
- C. DER Futures Analysis (Scenario Planning)
- D. Long-Term Distribution System Investment Plan (5 & 10 year)
- E. Non-Wires Alternatives Analysis
- F. Transportation Electrification Plans

Each IDP is tailored and specific to each utility and expected to diverge further over time.

Some Staff Lessons Learned on Baseline Data

- Definitions and privacy or security concerns with distribution system data
- Budget categories for financial reporting
- Definitions, tracking, and consistency of data for DERs
- Value of and how data reported will be used

A. Baseline Distribution System and Financial Data

Includes 33 topics for utility to report on. For example:

A. Baseline Distribution System and Financial Data:

System Data

1. Modeling software currently used and planned software deployments
2. Percentage of substations and feeders with monitoring and control capabilities, planned additions
3. A summary of existing system visibility and measurement (feeder-level and time interval) and planned visibility improvements; include information on percentage of system with each level of visibility (ex. max/min, daytime/nighttime, monthly/daily reads, automated/manual)
4. Number of customer meters with AMI/smart meters and those without, planned AMI-investments, and overview of functionality available
5. Discussion of how the distribution system planning is coordinated with the integrated resource plan (including how it informs and is informed by the IRP), and planned modifications or planned changes to the existing process to improve coordination and integration between the two plans
6. Discussion of how DER is considered in load forecasting and any expected changes in load forecasting methodology
7. Discussion if and how IEEE Std. 1547-2018³ impacts distribution system planning considerations (e.g. opportunities and constraints related to interoperability)
8. Distribution system annual loss percentage for the prior year (average of 12 monthly loss percentages)
9. The maximum hourly coincident load (kW) for the distribution system as measured at the interface between the transmission and distribution system. The may be calculated using SCADA data or interval metered data or other non-billing metering / monitoring systems.

Financial Data

19. Historical distribution system spending for the past 5-years, in each category:
 - a. Age-Related Replacements and Asset Renewal
 - b. System Expansion or Upgrades for Capacity
 - c. System Expansion or Upgrades for Reliability and Power Quality
 - d. New Customer Projects and New Revenue
 - e. Grid Modernization and Pilot Projects
 - f. Government Mandates
 - g. Metering
 - h. Other
20. Projected distribution system spending for 5-years into the future for the categories listed above, itemizing any non-traditional distribution projects
21. Planned distribution capital projects, including drivers for the project (e.g. see list in [19.8.](#)), timeline for improvement, summary of anticipated changes in historic spending
22. Provide any available cost benefit analysis in which the company evaluated a non-traditional distribution system solution to either a capital or operating upgrade or replacement

DER Deployment

23. Current DER deployment by type, size, and geographic dispersion (as useful for planning purposes; such as, by planning areas, service/work center areas, cities, etc.)
24. Information on areas of existing or forecasted high DER penetration. Include definition and rationale for what the Company considers "high" DER penetration.
25. Information on areas with existing or forecasted abnormal voltage or frequency issues that may benefit from the utilization of advanced inverter technology.

Some Staff Lessons Learned on Investment Plans

- Budget categories
- Flexibility for the Utility and the Commission
- Spurring investments
- How IDP fits with rate recovery dockets

D. Long-Term Distribution System Modernization and Infrastructure Investment Plan *(modified to fit slide)*

... provide a 5-year Action Plan, as part of a 10-year long-term plan, for distribution system developments and investments in grid modernization based on internal business plans and considering the insights gained from the DER futures analysis, hosting capacity analysis, and non-wires alternatives analysis. The 5-year Action Plan should include a detailed discussion of the underlying assumptions (including load growth assumptions) and the costs of distribution system investments planned.

Some Staff Lessons Learned on Hosting Capacity and Interconnection

- Utility planning tools and data collection
- HCA methodology and use cases
- Interconnection data reporting and consistency in terms

B. Hosting Capacity and Interconnection Requirements

(modified to fit slide)

1. Provide a narrative discussion on how the hosting capacity analysis filed annually on November 1 currently advances customer-sited DER (in particular PV and electric storage systems), how the Company anticipates the hosting capacity analysis (HCA) identifying interconnection points on the distribution system and necessary distribution upgrades to support the continued development of distributed generation resources, and any other customer benefit stemming from the annual HCA.
2. Describe the data sources and methodology used to complete the initial review screens outlined in the Minnesota DER Interconnection Process.

Some Staff Lessons Learned on DER Futures/Scenarios

- How to define medium and high scenarios
- What DER are included and how
- Utility planning tools and data availability

C. Distributed Energy Resource Scenario Analysis (*modified to fit slide*)

1. In order to understand the potential impacts of faster-than-anticipated DER adoption, define and develop conceptual base-case, medium, and high scenarios regarding increased DER deployment. Scenarios should reflect a reasonable mix of individual DER adoption and aggregated or bundled DER service types, dispersed geographically in the locations reasonably anticipated to see DER growth take place first.
2. Include information on methodologies and assumptions. Indicate whether or not these methodologies and inputs are consistent with Integrated Resource Plan inputs.
3. Provide a discussion of the processes and tools that would be necessary to accommodate the specified levels of DER integration, including whether existing processes and tools would be sufficient. Provide a discussion of the system impacts and benefits that may arise from increased DER adoption, potential barriers to DER integration, and the types of system upgrades that may be necessary to accommodate the DER at the listed penetration levels.
4. Include information on anticipated impacts from FERC Order 841 (Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators) and a discussion of potential impacts from the related FERC Docket RM-18-9-000 (Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators)

Some Staff Lessons Learned on Non-Wires Alternatives

- Screening criteria
- DER assumptions and values
- Utility planning tools and data

E. Non-Wires (Non-Traditional) Alternatives Analysis *(modified to fit slide)*

provide a detailed discussion of all distribution system projects in the filing year and the subsequent 5 years that are anticipated to have a total cost of greater than two million dollars... provide an analysis on how non-wires alternatives compare in terms of viability, price, and long-term value. Include the following:

- Project types that work for non-traditional solutions (i.e. load relief or reliability)
- A timeline that is needed to consider alternatives ... (allowing time for potential request for proposal, response, review, contracting and implementation)
- Cost threshold of any project type that would need to be met to have a non-traditional solution reviewed
- A discussion of a proposed screening process to be used internally to determine that non-traditional alternatives are considered prior to distribution system investments are made.

TEP/IDP Merge

MN PUC Docket No. 17-879, Dec 8, 2022, [Order](#)



- Combined Transportation Electrification Plans with Integrated Distribution Plans
- “Combining utility TEPs with IDPs is likely to improve the administrative efficiency of each regulatory proceeding, as transportation electrification and related utility distribution system planning functions are substantially linked to one another, and over time, they are likely to become inextricably linked.”

Xcel Rate Case Order:

- A. Set the forecasts for distributed energy resources consistently in its resource plan and its Integrated Distribution Plan.
- B. Conduct advanced forecasting to better project the levels of distributed energy resource deployment at a feeder level, using Xcel's advanced planning tool.
- C. Proactively plan investments in hosting capacity and other necessary system capacity to allow distributed generation and electric vehicle additions consistent with the forecast for distributed energy resources.
- D. Improve non-wires alternatives analysis, including market solicitations for deferral opportunities to make sure Xcel can take advantage of distributed energy resources to address discrete distribution system costs.
- E. Plan for aggregated distributed energy resources to provide system value including energy/capacity during peak hours.

Thank You!

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