STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

Dan Lipschultz	Commissioner
Matthew Schuerger	Commissioner
Katie J. Sieben	Commissioner
John A. Tuma	Commissioner

February 22, 2019

In the Matter of the Distribution System Planning for Xcel Energy **Docket No. E002/CI-18- 251**

Initial Comments of Fresh Energy

Fresh Energy submits these initial comments in response to the Commission's November 19, 2018 Notice of Comment Period on the initial Integrated Distribution Plan ("IDP") of Xcel Energy ("Company").

Introduction

Fresh Energy continues to be very supportive of the Commission's objectives to establish a more comprehensive and transparent distribution planning process. Fresh Energy also appreciates Xcel Energy's effort with its initial IDP and is strongly supportive of the Company's commitment to an 80% reduction in carbon emissions from generation by 2030 and zero-carbon electricity generation by 2050. This is a critical step to support the state's goals for carbon reduction.[1] With the Company's commitment, Minnesotans can more rapidly decarbonize our energy systems and minimize the economic and health impacts of climate change through beneficial electrification. This entails converting end-uses powered by gasoline, diesel, propane, fuel oil, and/or natural gas to electricity in the transportation, buildings, and industrial sectors.

This transition won't be easy. Electrification requires disruptive change and a careful consideration of how all Minnesotans will be impacted. Leading the way on transportation electrification, the Commission's February 1, 2019 Order[2] requires Xcel

[1] https://www.revisor.mn.gov/statutes/cite/216H.02

[2] https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={10BBAA68-0000-C413-9799-DF3ED0978E75}&documentTitle=20192-149933-01

Energy and other investor-owned utilities to develop plans for accelerating the adoption of electric vehicles. The Minnesota Department of Transportation's Vision calls for the powering of 20 percent of all light-duty cars in the state with electricity by 2030.[3] This will result in cleaner air and allow for overnight charging rates when electricity usage is naturally low and wind generation is high, exerting downward pressure on rates.

Minnesota has made less progress in electrifying our buildings sector, however. Only 18 percent of Minnesotans rely on electricity for space and water heating.[4] Most homes utilize natural gas or delivered fuels, like fuel oil or propane. As we increasingly electrify our heating load, peak demand for electricity will likely undergo a seasonal shift from summer peaking (driven by cooling) to winter peaking (driven by heating).

Minnesotans need a smart, flexible electrical grid to power the additional demand during the summer and winter peaking seasons with wind and solar electricity. Dynamic load management, including demand response and storage, will also be essential to aligning peak demand with the availability of solar energy during the day and wind energy at night. Equally as important is a continued effort to prioritize energy efficiency to reduce unnecessary infrastructure even as beneficial electrification increases electricity use in new sectors of the economy. Our comments on Xcel Energy's IDP in response to the Commission's questions are therefore primarily focused on the Company's need to prepare for rapid beneficial electrification.

1. ***Should the Commission accept or reject Xcel Energy's Integrated Distribution Plan (IDP)?***

   Given the short turnaround time from the Commission's August 30, 2018 IDP Order ("Order") to the required filing date, the IDP is an acceptable first step. Fresh Energy recommends that the Commission accept the IDP with the requirement to answer additional questions, provide additional information, and modify future IDPs as described below.

2. ***Does the IDP filed by Xcel Energy achieve the planning objectives outlined in the filing requirements approved in the Commission's August 30, 2018 Order in this docket?***

   In its Order, the Commission reiterated that it 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

[3] http://www.dot.state.mn.us/sustainability/docs/mn-ev-vision.pdf
[4] https://www.eia.gov/state/data.php?sid=MN#ConsumptionExpenditures

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.

Xcel Energy's IDP and approach to planning fall short of achieving these objectives in several ways.

Low Asset Utilization – Xcel Energy has adopted very conservative planning and design criteria for loading of its feeders and substations. To maintain operating flexibility, the Company requires typical feeders to be loaded to less than 75% of rated capacity (50% of capacity for 34.5 kV feeders)[5]. These design guidelines result in average feeder utilization of 66%,[6] significant underutilized distribution capacity, and potentially unnecessary capital expenditures. As demand increases from beneficial electrification, the Commission should more closely scrutinize the Company's planning criteria to ensure that ratepayers are not burdened with unnecessary capital investment.

Fresh Energy also notes an apparent inconsistency in the Company's application of these design criteria. The Company explains later in its IDP that it develops plans to mitigate overload conditions only when the overload exceeds 106 percent.[7] The Commission should require the Company to clarify this apparent inconsistency and more clearly explain how projected feeder or substation overloads trigger its investment in system upgrades.

As described later in these comments, Fresh Energy also recommends that the Commission require the Company to make the development of enhanced load and DER forecasting capabilities a high priority in 2019 and include a detailed description of its progress in the Company's next IDP.

Limited Consideration of Non-Wires Alternatives ("NWA") – Xcel Energy provides an extensive explanation of its difficulties evaluating NWA, largely driven by the lack of integration of its various operating systems. The Company states, "Without integration across different systems, this makes the facilitation of NWA a custom,

[5] IDP, p. 43
[6] *Id.*, p. 47
[7] *Id.*, p. 56

one-off solution that requires extensive oversight and management".[8]

The Company also states that it "must make significant investments to support system capacity needs due to increased loads from existing or new customers."[9] Much like the conservative planning criteria described above, the rapid transition to electrification significantly increases the importance of NWA to ensure the deployment of least-cost solutions to address capacity needs and fair and reasonable costs for ratepayers.

The Company indicates that it needs "about three years to appropriately consider and incorporate an NWA solution".[10] This seems excessive, particularly when considering alternative NWA sourcing methods[11] such as geo-targeted demand response ("DR"), an approach the Company acknowledges as a potential way to reduce load growth and lower the cost of NWA deployment.[12]

Rocky Mountain Institute's recently published paper titled *The Non-Wires Solutions Implementation Playbook: A Practical Guide for Regulators, Utilities, and Developers*[13] provides helpful recommendations and best practices for evaluating and deploying NWA. The Commission should require the Company to incorporate these best practices into its next IDP and prioritize the integration of its organization, processes and systems to make the evaluation and deployment of NWA less burdensome. Additionally, the Commission should require the Company to answer the following questions.

- The Company states that its "systems to administer DSM programs are separate from systems that support the planning and operations of our distribution system" and "we are not able to provide the distribution system location for current energy efficiency and DR".[14] What steps is the Company taking to address this lack of integration? How will its proposed investments in a Demand Response Management System (DRMS)[15] help address this need?
- The Company describes its pilot with The Center for Energy and Environment (CEE) called the Geo-targeted Distributed Clean Energy Initiative, which began in June 2017.[16] What has the Company learned from the pilot and how will the lessons learned help improve its process for evaluation and deployment of

[8] *Id.*, p. 77
[9] *Id.*, p. 9
[10] *Id.*, p. 83
[11] The three most common NWA sourcing options are 1) customer programs such as demand-side management offerings, 2) pricing mechanisms such as time-of-use rates or critical peak pricing, and 3) procurement through competitive solicitations.
[12] IDP, p. 87
[13] https://www.rmi.org/insight/non-wires-solutions-playbook/
[14] IDP, p. 185
[15] *Id.*, p. 164
[16] *Id.*, pp. 88-89

NWA?

- The Company's most recent IRP in Docket No. E002/RP-15-21 calls for 400 MW of incremental DR by 2023.[17] What steps is the Company taking to ensure that the new DR programs achieve the required system-wide load relief while maximizing deferral/avoidance of distribution capital investment?
- The Company's IDP describes battery storage demonstration projects in Xcel Energy's Colorado service territory only.[18] What battery storage demonstration projects are the Company planning in Minnesota, and what are the objectives of these projects? If no battery storage demonstration projects are planned in Minnesota, why?

Incomplete Detail for the Cost/Benefit Analysis – The planning objectives require the inclusion of "the costs and benefits of specific investments, and a comprehensive analysis of ratepayer cost and value". The Order states, "For each grid modernization project in its 5-year Action Plan, Xcel should provide a cost-benefit analysis".[19]

The Company states, "we are not proposing any specific grid modernization initiatives at this time"[20] and ""all costs and numbers we provide for this effort in this IDP are intended to be directional and used as a point of context and are thus subject to change as we continue to refine our strategy and investment plans."[21]

The Company also states:

> "We currently estimate that the total capital and O&M costs for AMI, FAN, and FLISR is between $632 and $822 million. While these projects are in the early phases of planning, these costs were identified on the basis of benchmarking, internal expertise, and appropriate contingency. Further, these costs are offset by benefits, such that we estimate a range of benefit-to-cost ratios of approximately 0.50-0.80 for AMI (of which FAN is a component) and 2.50-3.00 for FLISR, with a total quantitative benefit-to-cost ratio somewhere between .70- 1.10."[22]

Despite the fact that Xcel Energy's grid modernization plans and strategy are still under development, the Company has failed to provide the required detail to support its high level benefit-cost analysis. The Commission should require the Company to provide all supporting data, analysis, and assumptions supporting the

[17] *Id.*, p. 233
[18] *Id.*, p. 223-225
[19] Order IDP Requirements, p. 6
[20] IDP, p. 232
[21] *Id.*, p. 231
[22] *Id.*, p. 148

purported 0.70-1.10 benefit-cost ratio for AMI, FAN and FLISR as part of its 2019 IDP filing or other future filings.

3. What, if any, adjustments should be made to future filing requirements?

Fresh Energy notes that the Company's 2018 IDP reflects results from its Q4 2017 annual planning process[23] (not its Q4 2018 process). We recommend that the Commission adjust the required IDP filing date such that the Company can incorporate its most current information in the IDP.

Fresh Energy also recommends the following adjustments to enable easier comparisons of past and future Company expenditures:

- The graphics of historic capital and O&M expenditures in Figure 3 on p. 14 and Figure 5 on p. 18 do not provide insightful information. Fresh Energy recommends that the Company provide this historic spending information in the same format and level of detail as IDP Attachment B.
- In addition to historic and forecasted expenditures, Fresh Energy recommends that the Company provide historic and forecasted work volumes or units of work (e.g., number of new services, miles of line extended, number of new street lights installed, etc.) for each expenditure category.
- For ease of analysis and comparison, Fresh Energy recommends that the Company provide this detailed level of historic/future expenditures and work volumes in a spreadsheet format with all links and formulas intact.

4. Are there other issues or concerns related to this matter?

Fresh Energy has several additional concerns that the Commission should require the Company to address now or in its next IDP.

No Urgency – Xcel Energy appears to be taking a slow and overly conservative approach to developing new IDP capabilities. The Company states, "The good news – from a distribution planning perspective – is that Minnesota is presently at comparatively low levels of DER penetration that can reasonably be expected to remain stable in the near-term. Further, our present tariffs require interconnecting parties to mitigate adverse impacts identified in the interconnection application process. This means that we have time to take the measured approach that is necessary to properly address this issue – and develop or acquire the necessary

[23] *Id.*, p. 55

capabilities, methodologies, and tools that will facilitate this type of complex analysis."[24]

Fresh Energy believes that the growth in CSGs, plummeting cost of DER technology, and the rapid transition to beneficial electrification require more urgency by the Company in developing new IDP tools and capabilities. As described above, we recommend that the Commission require the Company to prioritize actions to make the evaluation and deployment of NWA less burdensome. As described in more detail below, we also recommend that the Commission require the Company to prioritize the following in 2019 and provide detailed descriptions of its progress in the Company's 2019 IDP:

- More realistically reflect the impact of existing and future DER in its planning processes
- The development of enhanced load and DER forecasting capabilities, particularly for electric vehicles
- The tracking and updating of actual feeder daytime minimum loads

Underestimating DER Growth and its Impact – The Company's IDP paints a very modest picture of existing DER in its service territory, projected DER growth, and the impact on system planning and operations.

For example, the Company states, "Minnesota's DER penetration is substantially lower than other states, such as California and Hawaii. Much of the recent and expected DER growth in Minnesota is from CSG."[25] Fresh Energy believes that with the surge in community solar garden ("CSG") installations beginning in 2017, Minnesota is no longer substantially behind other states. In fact, the attached December 2018 Solar Spotlight from the Solar Energy Industries Association ("SEIA") indicates that Minnesota ranks thirteenth among states in installed solar capacity, and the 437 MW added in 2017 ranks sixth.[26]

The Company is forecasting a significant decline in new CSG additions, projecting 259.1 MW in 2018 and only 6.2 MW per year beginning in 2022.[27] The Company offers no explanation for this drop-off, and the decline is inconsistent with the Company's own recent experience with CSG development. In its January 14, 2019 CSG monthly update in Docket No. E002/M-13-867, the Company states, "Earlier in 2018, we had heard from developers and concerned stakeholders that we should expect the Solar*Rewards Community program to continuously shrink. This concern stemmed from the project size requirement of one megawatt and the

[24] *Id.*, p. 188
[25] *Id.*, p. 180
[26] All data from SEIA/GTM Research U.S. Solar Market Insight: https://www.seia.org/us-solar-market-insight
[27] IDP, Table 21, p. 192

continued decline in the VOS rate used to determine the bill credit customers receive under the program. Despite these factors, the Company received 205 applications in 2018 compared to 62 in 2017, over a three-fold increase."[28]

The Company also dismisses the impact of CSGs and other DER on its distribution system stating, "DER is not expected to impact system operation" because the Company requires "interconnecting parties to mitigate potential system issues prior to interconnecting."[29] The interconnection application process affords the Company the luxury of addressing impacts to system operations on a case-by-case basis, where beneficial electrification will not provide that same level of control. For example, a customer has no obligation to inform the Company of their purchase of an EV.

Finally, the IDP does not fully reflect the Commission's recent order for utilities to enable acceleration of electric vehicle ("EV") adoption.[30] The impact of EVs and other forms of beneficial electrification will have a significant impact on the Company's feeder and substation loads, and the associated changes to the Company's planning processes must be addressed in its next IDP in order to maximize the benefits of EV and other DER adoption.

Simplistic and Unsupported Load Forecasts - Figures 16, 18 and 19 on pp. 47, 51, and 52 respectively of the IDP clearly illustrate the Company's simplistic and deterministic[31] approach to load forecasting. The Company acknowledges this deficiency, stating, "planners are only able to apply a nominal, continuous growth rate to peak loads into the forecast years."[32]

The load forecasts in Figure 67 and in Attachment G of the IDP all reflect a similar, questionable pattern – flat to declining load growth prior to 2017, followed by an unexplained jump in demand in 2018. The load forecast for the Keystone area is particularly egregious and shown below to highlight Fresh Energy's concern.

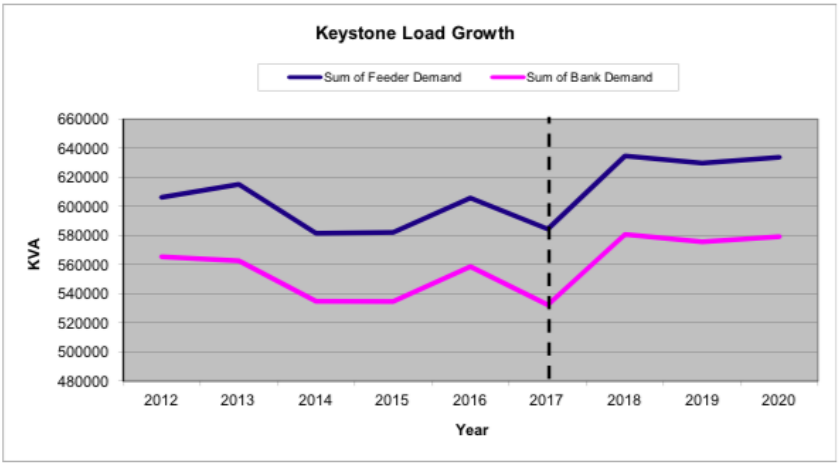
[28] https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7bF0DF4D68-0000-CB19-9FF8-4791CCF68ADF%7d&documentTitle=20191-149171-01

[29] IDP, p. 187

[30] https://fresh-energy.org/fresh-energy-statement-public-utilities-commission-makes-sweeping-commitment-to-electric-vehicles/

[31] Deterministic methods assume 100% certainty and no randomness

[32] IDP, p. 76



The Company also acknowledges that it does not include the impacts of CSGs, other distributed solar PV, electric vehicles, energy efficiency, or demand response in its feeder- and substation-level load forecasts. The Company explains that it is "not able to forecast DER in terms of its expected geography (because) tools to perform or services available to purchase forecasts such as this are very limited at this time."[33]

Load forecasts are a critical input into the Company's capital expenditure plan and directly impact costs to ratepayers. Artificially high peak load forecasts, combined with the very conservative planning criteria for feeder loading and limited consideration of NWA as described previously, can lead to unnecessary capital spending. Furthermore, as DER adoption grows and the transition to beneficial electrification accelerates, the Company's distribution system will increasingly experience variability of loading, voltage and other attributes of system performance that the Company must plan for.

New approaches to enhanced forecasting in a high-DER future include probabilistic planning and DER adoption scenario analyses. Probabilistic planning, as opposed to the Company's deterministic approach, accounts for uncertainties introduced by factors such as increasing DER penetration and weather variability. Scenario analyses consider a range of possible futures where varying levels of DER are adopted on the system.[34]

Fresh Energy agrees with the Company that the methodologies for DER forecasting are evolving and the necessary techniques and software tools are still under development. However, many leading utilities are using customer-adoption models to forecast expected quantities of DER, and analysis of individual customers' propensity to adopt based on demographics or load to forecast locations of DER

[33] *Id.*, p. 187

[34] "Rhode Island Power Sector Transformation – Phase One Report to Governor Gina M. Raimondo." November 2017, p. 48 http://www.ripuc.org/utilityinfo/electric/PST%20Report_Nov_8.pdf

deployment.[35] Customer-adoption models explicitly use historical DER deployment, location-specific DER technical potential, various DER economic considerations, and end-user behaviors as predictive factors.[36]

Ultimately, the Company must determine what impacts the adoption of various DER types will have on individual feeder load profiles throughout the year. It is important to know the extent to which DER input or output is coincident with peak load on each feeder, as well as expected DER input or output at times of minimum feeder loads.

The Company acknowledges its need to improve its forecasting capabilities, stating, "We are in the process of evaluating and procuring the next generation of distribution planning tools, which are needed to increase our forecasting and analysis capabilities and impact the integration of planning processes."[37]

Fresh Energy recommends that the Commission require the Company to make the development of enhanced load and DER forecasting capabilities a high priority in 2019 and include a detailed description of its progress in the next IDP. Additionally, the Commission should require the Company to answer the following questions.

- What is the rationale for the projected jump in demand from 2017 to 2018 in the Company's load forecasts? How do the actual 2018 peak demands compare with those depicted in Figure 67 and Attachment G?
- What actions is the Company taking in 2019 to develop more realistic load forecasts?
- The Company explains how multiple FLISR devices across each feeder will provide more granular load measurements.[38] How does the Company intend to use this information to improve its feeder- and substation-level load forecasts?
- How does the Company intend to use information from AMI to improve its feeder- and substation-level load forecasts?

Daytime Minimum Loads - Xcel Energy explains that it currently requires a manual effort to calculate actual feeder daytime minimum loads, and the Company does not currently track and update minimum loads.[39]

The Company also explains that it assumes the daytime minimum load is 20% of feeder peak demand in its Hosting Capacity Analysis ("HCA").[40] The Company's

[35] "Planning for a Distributed Disruption: Innovative Practices for Incorporating Distributed Solar into Utility Planning." Lawrence Berkeley National Laboratory and National Renewable Energy Laboratory, August 2016, p. 45. https://emp.lbl.gov/publications/planning-distributed-disruption

[36] *Id.*, p. 7

[37] IDP, p. 231

[38] *Id.*, p. 144

[39] *Id.*, p. 34

2018 HCA results now include a new "Reverse Power Flow" threshold, which is a dominant factor in the results – 84% of the Company's feeders have a maximum limiting factor of Reverse Power Flow.[41]

Fresh Energy believes this severe constraint in the HCA is directly related to the Company's conservatively low assumptions for daytime minimum loads. In other words, assuming a lower-than-actual daytime minimum load results in an exaggerated risk of reverse power flow at the substation feeder breaker and artificially low hosting capacity on the feeder. We also believe that, as beneficial electrification accelerates, feeder daytime minimum loads will increase.

Fresh Energy recommends that the Commission require the Company to make the tracking and updating of actual feeder daytime minimum loads a high priority in 2019 and include a detailed description of its progress in the next IDP.

Reliability Investments - The Company's IDP includes $213 million from 2021-2023 for "Incremental Customer Investment"[42], a new reliability improvement program. Additionally, the Company's planned $66 million investment in FLISR is intended to "reduce the numbers of customers who experience a sustained outage and will shorten the duration of certain sustained outages."[43]

Yet according to its IDP, the Company's system reliability has significantly outperformed its targets over the last nine years[44], raising questions as to the need for new costly reliability improvement expenditures.

Fresh Energy expects the Company to provide in future IDPs or other future filings a comprehensive and detailed cost/benefit analysis unequivocally demonstrating the net benefits to ratepayers of these proposed investments.

IVVO and CVR - The Company's IDP provides a detailed explanation of the various operating modes and associated benefits of Integrated Volt VAR Optimization ("IVVO"), including the customer energy efficiency savings and peak demand reductions from Conservation Voltage Reduction ("CVR").[45]

The Company also states, "we will invest in expanding existing (energy efficiency) opportunities and bringing new energy efficiency opportunities to market."[46] Fresh Energy strongly supports CVR as an energy efficiency ("EE") measure and notes that several utilities, including Ameren and ComEd in Illinois, include Voltage

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[40] Xcel Energy's Hosting Capacity Report, November 1, 2018, p. 12

[41] In Fresh Energy's analysis of the 2018 HCA results, 884 out of 1049 feeders (84%) have Reverse Power Flow as the max limiting factor.

[42] IDP, Attachment B, p. 5 of 5

[43] *Id.*, pp. 9, 141

[44] *Id.*, pp. 97-99

[45] *Id.*, p. 167

[46] *Id.*, p. 232

Optimization and CVR as significant parts of their EE portfolios. A 2018 statewide EE potential study found a cumulative achievable potential of 207,669 MWh by 2039 from CVR for the IOUs in Minnesota, representing 0.4% of sales.[47]

The Company, however, concludes, "we do not believe that the benefits of CVR are significant enough to justify the cost of implementing IVVO in the near term beyond our existing SmartVAr program."[48] This statement suggests that the Company has conducted a cost-benefit analysis for IVVO and CVR. We recommend that the Commission require the Company to provide all supporting data, analysis, and assumptions supporting the IVVO and CVR cost-benefit analysis as part of its 2018 IDP filing.

Smart Inverters - The Company's IDP explains the local grid support and bulk system stability capabilities required of inverter-based DER under the recently revised IEEE Standard 1547-2018. The Company also explains that it currently uses a non-unity fixed power factor approach for mitigating DER-caused voltage issues but is evaluating the use of other real and reactive power control modes.[49]

Fresh Energy strongly encourages the Company to consider volt/VAR mode[50] as the default setting for smart inverters (as required by utilities in California and Hawaii), since it allows for the injection or absorption of reactive power only when needed. Fresh Energy notes that both Ameren and ComEd in Illinois now require volt/VAR with reactive power priority as the activated mode for PV systems to be eligible for a smart inverter rebate.[51]

The Company also explains the interoperability requirements of IEEE 1547-2018 and how future DER will have a standardized communication interface for exchanging data and performing remote operations. The Company states, "A Communication network would be necessary for making use of the interoperability interface. The Company is evaluating pathways for implementing the interoperability interface in the future."[52] Fresh Energy requests clarification that the Company's proposed FAN can and will function as this DER communications network and, if not, what modifications to the FAN deployment would be required for it to serve such a function.

[47] https://www.mncee.org/getattachment/MNsupplystudy/Project-resources/Slide-Deck.pdf.aspx, p. 45
[48] IDP, p. 169
[49] *Id.*, p. 218
[50] Volt/VAR mode means the autonomous control of reactive power as a function of voltage
[51] See Illinois Commerce Commission's Dockets 18-0537 and 18-0753
[52] IDP, pp. 221-222

Conclusion

Fresh Energy applauds Xcel Energy for their ongoing efforts with its IDP. We appreciate the opportunity to comment and look forward to continuing to support this exciting work.

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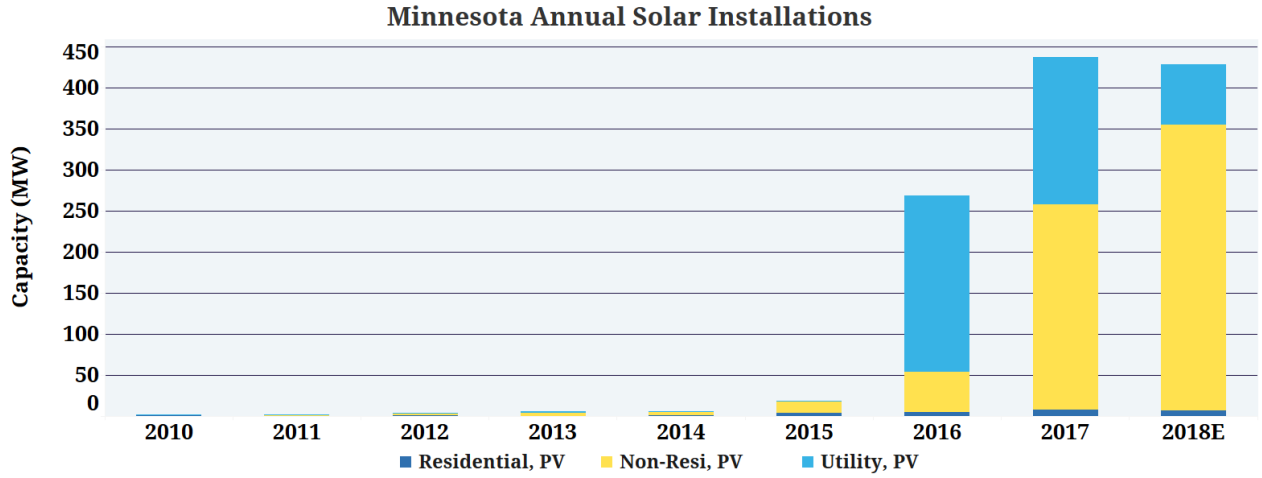
Solar Spotlight – Minnesota

At A Glance

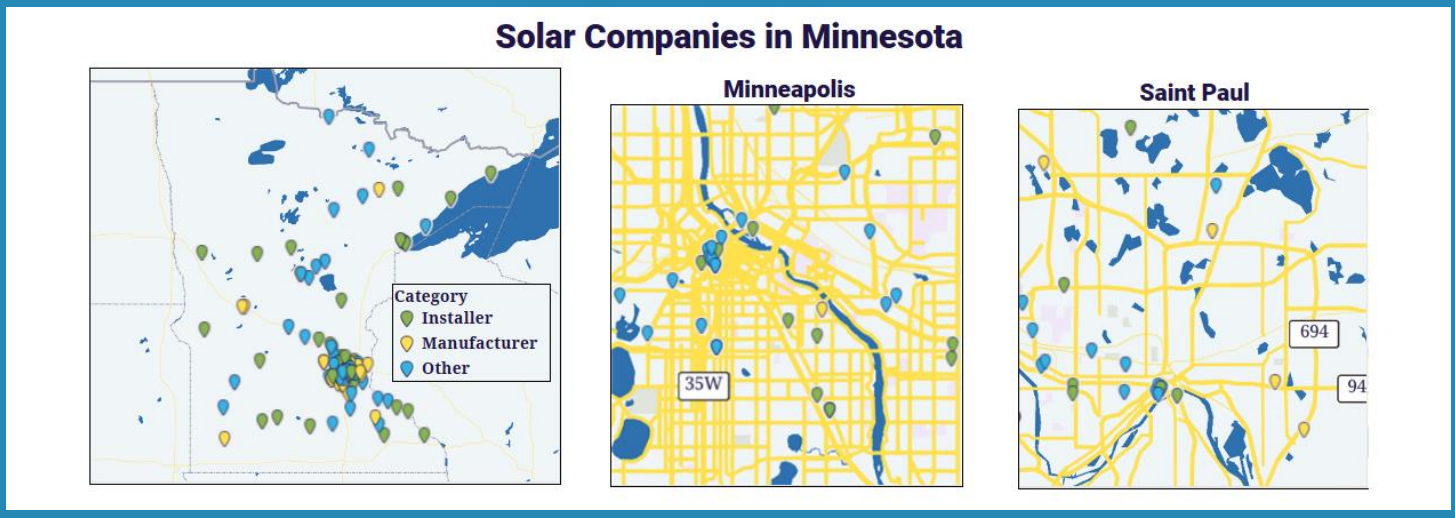
- **Solar Installed:** 1,015.4 MW (436.9 MW in 2017)[i]
- **National Ranking:** 13th (6th in 2017)
- **State Homes Powered by Solar:** 139,000
- **Percentage of State's Electricity from Solar:** 1.94%[ii]
- **Solar Jobs and Ranking:** 4,255 (16th in 2017)[iii]
- **Solar Companies in State:** 185 companies total; 32 Manufacturers, 68 Installers, 85 Others[iv]
- **Total Solar Investment in State:** $ 1,465.68 million ($607.59 in 2017)
- **Price Declines:** 43% over the last 5 years
- **Growth Projections and Ranking:** 1,045 MW over the next 5 years (ranks 16th)



Notable Projects

- Waseca Solar has the capacity to generate 10.0 MW of electricity -- enough to power over 1,373 Minnesota homes.[v]
- At 5 MW, Dodge Holdco Solar is among the largest solar installations in Minnesota. Completed in 2017, this photovoltaic project has enough electric capacity to power more than 686 homes.[vi]
- IKEA is one of the first major corporations to get involved in Minnesota with their 1 MW project in Bloomington.[vii]

Solar Spotlight – Minnesota



About SEIA

The Solar Energy Industries Association (SEIA®) is the driving force behind solar energy and is building a strong solar industry to power America through advocacy and education. As the national trade association of the U.S. solar energy industry, which now employs more than 250,000 Americans, we represent all organizations that promote, manufacture, install and support the development of solar energy. SEIA works with its 1,000 member companies to build jobs and diversity, champion the use of cost-competitive solar in America, remove market barriers and educate the public on the benefits of solar energy.

References

[i] All data from SEIA/GTM Research *U.S. Solar Market Insight* unless otherwise noted: http://www.seia.org/research-resources/us-solar-market-insight
[ii] Energy Information Administration, Electric Power Monthly: http://www.eia.gov/electricity/monthly/#generation
[iii] The Solar Foundation, State Solar Jobs Census: http://www.thesolarfoundation.org/solar-jobs-census/states/
[iv] SEIA, National Solar Database: http://www.seia.org/research-resources/national-solar-database
[v] SEIA, Major Solar Projects List: http://www.seia.org/research-resources/major-solar-projects-list
[vi] Ibid
[vii] SEIA, *Solar Means Business*: http://www.seia.org/campaign/solar-means-business-2016