January 4, 2016

Mr. Daniel P. Wolf

Executive Secretary Minnesota Public Utilities Commission

121 7th Place East, Suite 350

St. Paul, MN 55101-2147

Re: Xcel Energy's 2015 Biennial Distribution Grid Modernization Report, E002/M-15-962

Dear Mr. Wolf:

The Minnesota Energy Storage Collaborative, a project of the Energy Transition Lab, hereby submits, via electronic filing, its comments in the matter of Xcel Energy's Biennial Distribution Grid Modernization Report. Please contact me if you have any questions.

Sincerely,

Ellen Anderson

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Docket No. E002/M-15-962

Xcel Energy's 2015 Biennial Distribution Grid

Modernization Report

Comments of the Minnesota Energy Storage Collaborative—Individual Members

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The Minnesota Energy Storage Collaborative is a newly formed effort to bring together stakeholders around a common mission of accelerating energy storage in our state and region. The Energy Transition Lab (ETL) convened the first-ever Minnesota Energy Storage Summit at the University of Minnesota in July 2015; we appreciated the participation of Commissioner Tuma. During the Summit, the nearly 200 attendees from the private, public, nonprofit, and academic sectors were polled in real time, and a broad consensus was reached around the goal of accelerating energy storage. Since then, the Energy Transition Lab formed several workgroups to discuss market, policy, and regulatory challenges, barriers, and opportunities relating to energy storage and to seek funding for researching and demonstrating important energy storage applications. ETL has also formed a steering committee, consisting of representatives from industry, utilities, state government, MISO, NGOs, private consultant experts, and the University of Minnesota, to guide the work of the Collaborative. In the coming months, the Energy Storage Collaborative will reach out to a broader group of interested stakeholders to help further formalize the organization and develop future steps.

These comments represent the views of the undersigned individuals only, as members of the Energy Storage Collaborative Steering Committee. The comments should not be attributed to other members of the Steering Committee or other participants in the Energy Storage Collaborative.

We support energy storage in the context of the imperative to modernize our electricity grid and energy systems. Multiple pressures are pushing for change: our state's strong renewable energy requirements and greenhouse gas reduction goals, the Clean Power Plan, low gas prices, flattening energy demand, utility leadership, customer preferences, aging infrastructure, technology advancement, and the global Paris Agreement, to name a few. Our energy systems need to maintain affordability and enhance reliability while reducing carbon and increasing renewable energy, efficiency, resilience, flexibility, distributed participation, and smarter real-time communications and control mechanisms. We applaud the Commission for opening a Grid Modernization docket (Investigation into Grid Modernization, Docket No. E999/CI-15-556) and for leading its excellent stakeholder process with national experts sharing knowledge from other key states, and we also highlight the e21 process that is developing recommendations for a modernized electricity system that meets Minnesota's policy goals.

Energy storage is an important linchpin to a modern, efficient, and low carbon grid. We need to begin building the future grid now. Other states are already deploying various energy storage

technologies for multiple purposes, including reducing peak demand, adding value to variable renewable resources, smoothing out ramping, voltage and frequency regulation and other grid services, resiliency, and more. Energy storage applications at the utility, distribution, and behind the meter scales are expanding dramatically and range from customer-owned electric vehicles used as electricity storage to large-scale opportunities to strengthen regional grids. Just as costs of renewable energy generation from wind and solar have declined, the trajectory for advanced energy storage technologies are moving in the direction of higher economies of scale and lower costs. We recommend that the Commission support prudent and potentially high value applications of energy storage in the near term, so we are ready as the market evolves.

Energy storage has been termed the "Swiss Army knife" of the grid because of its potential multiple benefits. The best applications of storage will unlock a variety of benefits and stack multiple value streams. Correspondingly, our state and our region need to understand the value that various energy storage applications bring to a strong modern grid, and to allow market participants to monetize that value. While we can learn from other states, there is no substitute for deploying storage in strategic ways to understand its values, benefits, and costs in a Minnesota-specific context.

As Minnesota and the Midwest build out large amounts of renewable energy resources, pairing them with energy storage is a natural extension of that progress and can add value to our abundant but variable energy resources. We particularly need to understand the uses of storage combined with wind and solar energy resources, both of which are growing rapidly in Minnesota.

To meet the requirements of the 2015 statute and to approach grid modernization successfully, the Commission will have to approve projects that are 1) at scale, not just experimental or lab size; 2) have the flexibility to test and demonstrate a variety of value streams, whether behind the meter, at the utility system level, and/or in the regional market; 3) a good fit for Minnesota's energy resource mix and system needs; and 4) likely to enhance reliability, security, and energy efficiency as well as to meet other Minnesota law and policy goals. In addition, rather than looking back at what's worked previously, the Commission will have to understand that least-cost determinations need to incorporate projections of value that may not yet be able to be monetized in current markets, but are real, quantifiable benefits to a modernized grid. We can look to examples in other markets as well as to the Value of Solar process to help assess true value.[1]

[1] Note that in the MISO region, in December 2015 Duke Energy filed a Transmission, Distribution, and Storage System Improvements Petition for cost recovery along with other grid modernization improvements, with the Indiana Regulatory Commission.
https://myweb.in.gov/IURC/eds/Tab.aspx?tabid=28&dn=SEARCHDOCKETEDCASE

We support Xcel Energy's Solar + Storage proposal in this docket. Xcel's filing is triggered by Minnesota Statute Sec. 216B.2425 Subd. 2, requiring utilities to submit a transmission projects report every odd-numbered year. As part of its report, a utility operating under a multiyear rate plan (Xcel) must identify in its report:

> investments that it considers necessary to modernize the transmission and distribution system by enhancing reliability, improving security against cyber and physical threats, and by increasing energy conservation opportunities by facilitating communication between the utility and its customers through the use of two-way meters, control technologies, energy storage and microgrids, technologies to enable demand response, and other innovative technologies. (M.S. 216B.2425, Subd. 2 (e))

Xcel's report must also, *inter alia*, identify necessary distribution upgrades to support the continued development of distributed generation resources. (M.S. 216B.2425, Subd. 8)

The Commission then must decide whether to certify proposed projects and must adopt a state transmission project list by June 1, 2016. (M.S. 216B.2425, Subd. 3).

As Xcel points out, this new statutory language "reflects the growing interest in ensuring the distribution system is well-positioned to meet future system and customer needs while maintaining reliability, safety, and security." In its report Xcel proposes a variety of building blocks for grid modernization and in particular requests certification for two projects prior to requesting cost recovery (under 216B.16 7b (b)(5)).

We address our comments specifically to the solar plus battery storage project. We respectfully request the Commission to certify this important project. The Belle Plaine Battery Storage project is intended to address a distribution capacity need, where the existing substation is nearing capacity and an upgraded substation will be needed in the next five years. The installation of a 6 MWH, 2 MW battery combined with a 1 MW solar array will defer the need for a large distribution capital infrastructure upgrade.

The 2014 Minnesota Department of Commerce-commissioned White Paper analysis of several energy storage use cases by Strategen and EPRI is instructive here. http://mn.gov/commerce-stat/pdfs/utility-managed-storge-study.pdf. This analysis found that the most likely positive benefit/cost ratio would result from a utility-controlled storage system installed to defer distribution upgrades, along with regional market participation, assuming net present value of lifetime benefits and costs. A number of variables were also discussed, including the addition of solar PV with the Investment Tax Credit, system capacity value (avoiding building combustion turbine), frequency regulation, and additional ancillary services that improve operator ability to integrate variable resources, including frequency regulation and spinning reserve. Because the number of use cases modeled was small, and the number of variables and changing market conditions is large, the paper authors emphasized that the "economics of energy storage are best investigated on a case-by-case basis. Distribution level services are especially sensitive and dependent on location." (Strategen, 54) While the White Paper is extremely helpful, the next

step needed is to demonstrate and test some of the potential use cases in real-time under a variety of variable conditions.

To justify the additional cost of the battery plus solar alternative, it needs to be able to demonstrate other potential value propositions such as enhancing energy system reliability and security and increasing opportunities for energy conservation (M.S. 216B.2425, Subd 2 (e)); and meeting other statutory goals. The value of a demonstration project is that different configurations of "individual and stacked operational modes of the battery system" can be tested for their research and learning outcomes, without one rigid model of usage being required. Using different battery and system configurations, Xcel's proposed project will be useful to test: Volt/Var control, optimizing feeder voltage and reactive power flow; Loss Impact Analysis, which can measure peak demand reduction, smoothing of distributed energy resources, and more; Regulation or Ancillary Services, evaluating potential for participating in MISO's frequency regulation market; Power Quality, to protect loads of sensitive customers who need stable power; and potential specific Solar Energy system assets, like reducing voltage fluctuation, increasing feeder capacity, and reducing maintenance costs for voltage regulation equipment.

Xcel points out correctly that we need Minnesota-specific field data to test battery storage applications so that utilities will have the knowledge they need to deploy storage more widely in the future where it will benefit the grid and benefit customers. In conclusion, we believe the Belle Plaine project is a good example of the type of energy storage the Commission should approve to help meet the goal of a modernized grid that better serves customers.

Sincerely,

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