414 Nicollet Mall
Minneapolis, MN 55401

January 24, 2020

—Via Electronic Filing—

Ryan Barlow
Acting Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101

RE: COMPLIANCE FILING
TRANSMISSION COST RECOVERY RIDER
DOCKET NO. E002/M-17-797

INTEGRATED DISTRIBUTION PLAN AND ADVANCED GRID INTELLIGENCE AND SECURITY CERTIFICATION REQUEST
DOCKET NO. E002/M-19-666

Dear Mr. Barlow:

Northern States Power Company, doing business as Xcel Energy, submits this filing in the above-referenced dockets in compliance with Order Point 5 of the Commission's September 27, 2019 ORDER AUTHORIZING RIDER RECOVERY, SETTING RETURN ON EQUITY, AND SETTING FILING REQUIREMENTS in Docket No. E002/M-17-797. Order Point 5 requires the Company to submit a compliance filing within 120 days of the Order issuance to provide detailed information about our Advanced Distribution Management System (ADMS).

We have electronically filed this document with the Minnesota Public Utilities Commission and copies have been served on the parties on the attached service list. Please contact me at holly.r.hinman@xcelenergy.com or (612) 330-5941 or martha.e.hoschmiller@xcelenergy.com or (612) 330-5973 if you have any questions regarding this filing.

SINCERELY,

/s/

HOLLY HINMAN
REGULATORY MANAGER

c: Enclosure
Service List

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Valerie Means	Commissioner
Matthew Schuerger	Commissioner
John A. Tuma	Commissioner

IN THE MATTER OF THE PETITION OF NORTHERN STATES POWER COMPANY FOR APPROVAL OF THE TRANSMISSION COST RECOVERY RIDER REVENUE REQUIREMENTS FOR 2017 AND 2018, AND REVISED ADJUSTMENT FACTORS	DOCKET NO. E002/M-17-797
IN THE MATTER OF XCEL ENERGY'S INTEGRATED DISTRIBUTION PLAN AND ADVANCED GRID INTELLIGENCE AND SECURITY CERTIFICATION REQUEST	DOCKET NO. E002/M-19-666

COMPLIANCE FILING

OVERVIEW

Northern States Power Company, doing business as Xcel Energy, submits this filing in the above-referenced dockets in compliance with Order Point 5 of the Commission's September 27, 2019 ORDER AUTHORIZING RIDER RECOVERY, SETTING RETURN ON EQUITY, AND SETTING FILING REQUIREMENTS issued in Docket No. E002/M-17-797. Order Point 5 requires the Company to submit a compliance filing within 120 days of the Order that includes:

a. *The actual expenditures on the ADMS implementation to date, in base rates and incrementally above base rates, broken down in the categories of: design (including software configuration and software interfaces), hardware, software, testing and implementation – broken down by internal and external labor.*
b. *An estimate of the total quantity of work completed on the ADMS Project identified by the major categories (listed above). In the event work cannot be quantified in a category, major tasks completed shall be provided.*
c. *Detailed information on the GIS data collection effort and what interrelated benefits (with other future benefits) or direct benefits are expected from the GIS data collection.*

The Commission's September 27 Order also contemplated an annual ADMS report, commencing sometime after the 120-day report. While this annual report is not yet due to the Commission, in an effort to provide the Commission full information on the Advanced Distribution Management System (ADMS) project and its progress at this time, we have additionally provided most of the data cited in Order Point 7 that sets the reporting requirements for future annual ADMS reporting.[1] Order Point 7 requires the Company to make an annual ADMS filing that includes:

a. *The actual costs spent on the ADMS implementation for the reporting period, and for the work to date, broken down in the categories of: design (including software configuration and software interfaces), hardware, software, testing and implementation – broken down by internal and external labor.*
b. *An estimate of the total quantity of work completed on the ADMS Project identified by major category. In the event work cannot be quantified, major tasks completed shall be provided.*
c. *The additional functional requirements installed to achieve ADMS usage functions (including AMI, FAN, FLISR or IVVO modules), their percent of system implementation or integration, and cost incurred to date.*
d. *The estimated anticipated expenses in coming reporting periods, both capital and O&M.*

In addition, Order Point 8 delegates authority to the Executive Secretary to set the annual ADMS report timing and docket. In our November 1, 2019 Integrated Distribution Plan (IDP) filing,[2] we made the following proposal regarding the timing of the annual ADMS report:

> *We propose to submit a single ADMS report by January 25, 2020 in the TCR docket and this IDP docket that contains all of the required information. We also respectfully request that the Executive Secretary establish the same January 25th due date for the ongoing annual ADMS reports beginning January 25, 2021 – and that these annual ADMS reports be filed in the most recent docket of future IDPs.*

The following ADMS compliance report provides the information required by Order Point 5, and additional information contemplated by Order Point 7 of the Commission's September 27, 2019 Order.

[1] We note that we will provide the complete information required by Order Point 7c in the first annual report.
[2] Docket No. E002/M-19-666

COMPLIANCE REPORT

A. Actual ADMS Expenditures

In compliance with Ordering Paragraphs 5a and 7a, Tables 1 and 2 below summarize actual ADMS internal labor, external labor and non-labor expenditures through 2019 for the categories of Software, Design, Testing, Implementation, Hardware, and GIS. Although we have included a category for Accumulated Funds Used During Construction (AFUDC) in Table 1, we note that AFUDC is not a capital expenditure, strictly speaking. However, we believe these costs are important costs to include when presenting all project expenditures.[3]

Table 1: Total ADMS Capital Expenditures Through 2019 – State of Minnesota

	Internal Labor Costs*	External Labor Costs*	Non-Labor Costs	TOTAL
Software	$ -	$ -	$ 2,286,720	$ 2,286,720
Design	$ 1,067,227	$ 6,613,363	$ 112,929	$ 7,793,519
Testing	$ 1,423,921	$ 5,179,690	$ -	$ 6,603,611
Implementation	$ 1,668,495	$ 6,346,388	$ 355,475	$ 8,370,358
Hardware	$ 464,579	$ 1,835,399	$ 6,799,943	$ 9,099,921
AFUDC	$ -	$ -	$ 3,384,891	$ 3,384,891
GIS	$ 35,594	$ 1,273,640	$ 93,561	$ 1,402,795
Total:	**$ 4,659,816**	**$ 21,248,480**	**$ 13,033,520**	**$ 38,941,816**

**Definitions of Internal and External Labor are consistent with treatment in all riders*

Table 2: Total ADMS O&M[4] Expenditures Through 2019 – State of Minnesota

	Internal Labor Costs*	External Labor Costs*	Non-Labor Costs	TOTAL
Software	$ -	$ -	$ 209,278	$ 209,278
Design	$ -	$ 84,049	$ 1,955	$ 86,004
Testing	$ 12,893	$ 23,202	$ 6,344	$ 42,440
Implementation	$ 12,893	$ 23,202	$ 42,070	$ 78,165
Hardware	$ -	$ -	$ 786,039	$ 786,039
GIS	$ -	$ -	$ -	$ -
Total:	**$ 25,786**	**$ 130,453**	**$ 1,045,687**	**$ 1,201,926**

**Definitions of Internal and External Labor are consistent with treatment in all riders*

[3] We note that actual project costs presented in Table 1 of Attachment 1A of our November 15, 2019 TCR Rider filing in Docket No. E002/M-19-721 are capital expenditures and as such, exclude AFUDC.
[4] Operations and Maintenance

Attachment A to this compliance filing presents detailed costs in these categories by year.

B. Quantity of Work Completed

In compliance with ordering paragraphs 5b and 7b, this section discusses ADMS implementation major tasks completed to-date and expected to be completed in 2020.

1. ADMS Major Tasks Completed

The Company began detailed design for implementation of ADMS in 2016. We first examined our service territories across all the Xcel Energy jurisdictions to assess how to best roll out ADMS. We determined that the Public Service Company of Colorado (PSCo) would be ideal for the initial ADMS roll-out, owing to its varied nature, increasing penetration of distributed energy resources (DER), and Commission implementation requirements, with the NSP Companies[5] following thereafter.

Once the server and storage hardware were purchased, implementation of the ADMS platform began with detailed design and the installation of hardware and software in the data centers. The ADMS software was also purchased and installed, and initial configurations were completed. Comprehensive testing and verification of the network impedance model and of the functionality of the core applications of ADMS followed – and continues. As part of this process we also verify connectivity to the SCADA field devices, which must interact with ADMS. Most development work to link (integrate) ADMS to various other systems was completed or well underway.

The ADMS software development, configuration and integration process began in 2017 across all Xcel Energy operating companies. Testing and deployment of the ADMS software began in 2018. The software was placed into service in the PSCo jurisdiction in April 2019. Implementation and software in-servicing in the NSP Companies is currently planned for third quarter of 2020.

The Company made significant progress on ADMS implementation in 2019. Preparations for control center enablement, such as process documentation and training, continued. The operator training environment was established, and training began. Integrations of ADMS with other systems, described below, were completed. We began a comprehensive Site Acceptance Test–the execution of structured, detailed test cases–to ensure all ADMS functionality works properly as defined in our ADMS

[5] The NSP Companies include Northern States Power Company Minnesota (NSPM) and Northern States Power Company Wisconsin (NSPW).

project requirements and detailed design. This testing effort is approximately 95 percent complete as of mid-January 2020.

The following tasks relating to ADMS implementation were completed by December 31, 2019, unless otherwise noted:

a. Design – Overall Completion 100%

The Design category of the ADMS implementation project includes planning and project initiation activities, as well as design efforts necessary to establish scope, cost estimates, project schedule, and alignment with interrelated programs such as Advanced Metering Infrastructure (AMI). This effort began in 2013. It also includes all detailed design work, the majority of which was completed prior to 2019. Most recently, during 2019, we completed the configuration of interfaces, including the interfaces to the outage management system, security monitoring, an external weather forecast service, GE Dynamic Energy Management System (DEMS), GE SmallWorld Geospatial Information System (GIS), Customer Resource System/Master Data Management, SailPoint (Identity and Access), and SAP Work Asset Management system. Only some incremental system updates are anticipated in the Design category during 2020.

- *Requirements Definition* – We detailed the business requirements and functionality the ADMS software must be capable of performing.
- *Design* – We developed high-level architecture diagrams and detailed program designs necessary to build and configure the ADMS software.
- *Project Schedule Development* – We developed comprehensive end-to-end project lifecycle documentation containing work tasks to be performed, effort, dependencies and resources approved by program leadership.
- *Cost Estimate Refinement* – We developed cost estimates and cost assignments within the Company's accounting structure.
- *Security Design* – We undertook planning and design work to ensure the ADMS system – including integrated IT and OT[6] – align with applicable security requirements.

[6] Information Technology (IT) refers to the computer systems, software, and networks for the processing and distribution of data. Operational Technology (OT) refers to the hardware and software that detects or causes a change through the direct monitoring and/or control of physical devices, processes and events.

b. Software - Overall Completion 95%

The Software category of the ADMS project includes the purchase, installation and configuration of software. The ADMS software to be utilized by the NSP Companies was loaded on the servers during 2019 and has been updated with all known updates to prepare for testing. Security software was installed and configured.

- *Application software and database installation and configuration (95% Complete)* – We have completed all primary installation and configuration of the ADMS software and network database model. We anticipate incremental updates to the software and database configuration in 2020.
- *Interface development (100% Complete)* – We have completed integrations with other software—noted under the Design category above—SCADA and business databases.
- *ADMS substation and distribution displays necessary for implementation in 2020 (20% Complete)* – These are the graphical and tabular displays of the electrical system which form the primary operator (user) interface.
- *Remote Terminal Unit (RTU) templates were created for the necessary field controls (100% Complete)* – To interface with field devices, ADMS requires their control settings to be incorporated within ADMS, accomplished through "RTU Templates."

c. Hardware - Overall Completion 90%

We have completed all hardware installations in data centers. During 2019, we began the installation of networking equipment and operator workstations in the control centers in Minneapolis and St. Paul. We finalized the installation of equipment in our training center in Minneapolis. Remaining control center equipment is expected to be installed in 2020.

- *Control center network and workstation hardware purchase and installation (50% Complete*) – We are in the process of the purchase, installation and testing of control center network and workstation hardware for the control centers.
- *Workstation consoles (75% Complete)* – We are in the process of setting up the operator workstations – both the computers and modifications to accommodate the computer equipment.
- *Substation Equipment (90% Complete)* – Existing substation equipment will be used for this phase of the ADMS deployment. Some reprogramming of that equipment is required to interface with the ADMS. The engineering and testing of those new settings is in progress.

- *Feeder equipment necessary for ADMS Go-Live (100% Complete)* – We have installed all 84 sensors and 57 device controllers.

d. Software Testing – Overall Completion 75%

Factory Acceptance Testing (FAT) concluded in 2019. FAT is comprehensive testing performed by the ADMS software vendor to ensure the software performs according to the requirements and design. Following FAT, we conducted comprehensive Site Acceptance Testing (SAT) which is on-going.

- *Site Acceptance Testing (SAT) (75% Complete)* – Xcel Energy is in the process of running test cycles to ensure all ADMS functionality works properly as defined in the ADMS business requirements and design.

e. Implementation – Overall Completion 75%

In preparation for ADMS go-live, we completed the data improvement work (discussed below in Section C. GIS), and the creation of dynamic substation displays and feeders necessary for the go-live. Additional implementation tasks will be completed during 2020.

- *Training plan and development (100% Complete)* – We have fully developed the content of end user training materials, schedule, and facilities requirements.
- *Training Room setup and initial user training (100% Complete)* – We have configured training facility and initial training classes for control center staff that will be trained on ADMS applications, and we have revised business processes that include the use of ADMS.
- *ADMS GIS Data Collection (100% Complete)* – Field verification of identified electric distribution asset data in the corporate GIS has been completed to support the ADMS Network Model build for go-live scope.
- *ADMS Network Model build for Go-Live scope (59 subs & 146 feeders) (50% Complete)* – We have completed importing GIS data into ADMS to create a digital representation of the electrical distribution grid. Detailed system characteristics and device data are being compiled and loaded in preparation for model tuning efforts to take place.

2. ADMS Major Tasks Remaining

We are currently focused on the Minnesota "go-live" portion of the ADMS initiative, which is slated for the third quarter of 2020. Going-live is the culmination of all our

efforts to implement an operational system and occurs when the software begins serving its intended function. Specifically, this is when our control center operators will begin using the ADMS system as designed. The ADMS design in Minnesota is focused on a limited subset of substations and feeders. The software in-service requires the network impedance model (the verified, accurate electrical model) for a subset of the NSPM system. Currently, Xcel Energy maintains approximately 240 substations and 1000 feeders in the state of Minnesota. The go-live stage for ADMS in Minnesota includes 59 substations and 146 feeders and is the go-live for our Minneapolis control center. This network model was chosen to include a representative sample of substations and feeders that enable us to test the software and its capabilities against an appropriate set of feeders providing a diverse set of operating and grid conditions. Hence, the GIS field asset validation addresses approximately 15 percent of feeders and 25 percent of substations. This section outlines the major tasks and their implementation readiness percentage for the go-live phase.

When the Company has determined that ADMS is properly functioning on these substations and feeders, the software will be placed in-service. We will then be positioned to deploy core functionality to additional substations and feeders which will continue to take place over the course of several years. At the end of the ADMS project, all Minnesota substations will be operated out of ADMS and the entire system will be represented in ADMS. ADMS functionality for the remaining feeders, comparable to that of the go-live feeders, will occur over time. In doing so, we will take into consideration higher priority areas such as those which serve a high penetration of community solar gardens and where we may deploy additional monitoring and control devices. Further, expansion of the advanced applications beyond the substations and feeders that will be used validate the advanced functionality of ADMS is dependent on the determination and timing for the Fault Location, Isolation, and Service Restoration (FLISR) and Integrated Volt Var Optimization (IVVO) deployments in Minnesota, which we proposed for certification as part of our advanced grid and information security (AGIS) plan in the Integrated Distribution Plan (IDP) docket.[7] In addition to the full network impedance model, intelligent devices must be installed and operational to maximize the benefits of ADMS advanced applications.

We plan to complete training, complete installation of equipment at our Minneapolis control center, and go-live by the third quarter of 2020. To reach that goal we will first complete final test phases of software and advanced applications. Our Grid

[7] Docket No. E002/M-19-666

Management group will validate that ADMS calculations are accurate for the initial set of feeders in preparation for testing the IVVO and FLISR applications.

As noted above, we will expand ADMS to remaining parts of our system, which includes two additional NSPM control centers in a timeframe following the go-live of the Minneapolis control center. As those control centers come online, additional areas around Minnesota will have the capability to support FLISR and IVVO applications, which is dependent on the determination of the FLISR and IVVO certifications that we requested in the IDP. Since the ADMS core software and servers are already built to accommodate future NSPM requirements, work to enable additional control centers, for example, will consist of deployment of workstations, building relevant substation and feeder models for each given area, and testing and validation before the respective areas will be operational in ADMS.

The following tasks relating to ADMS implementation are expected to be completed in 2020.

a. Software

We anticipate only incremental updates to the software and database configuration in 2020.

b. Hardware

We expect to install remaining control center equipment in 2020.

- *Final setup of control center network equipment and workstation consoles* – We will make final purchases and complete installation and configuration of workstation consoles and monitors in the NSP Companies' distribution control centers.
- *Field Device Installation and Provisioning* – Field Devices have been successfully installed. Efforts are underway to enable those devices with updated settings, create communications pathways to the ADMS OT network environment, and test and commission those devices from ADMS.

c. Testing

Testing is in its final stages. Final stage testing excludes FAT, SAT, and previously executed tasks which are listed in Section B.1 above.

- *SAT Test Resolution and Retesting* – We will receive and retest software improvements to resolve issues identified during SAT testing.

- *Institute Security Controls* – We will perform final scans and implement final security controls for access and identity management, logging, vulnerability scanning, and monitoring.
- *System Performance Testing* – We will test the system under various scenarios (e.g., Storm, Normal, and Emergency) to validate operational readiness within defined parameters.
- *User Acceptance Testing (UAT)* – We will conduct UAT to assure the system is functioning per expectations of end users and is ready for go-live.
- *Field Device Verification Testing (Point-to-Point Testing)* – We will test field device communication with ADMS prior to promotion to production environment.
- *Substation Point-to-Point Testing* – We will test substation communication with ADMS prior to promotion to production environment.
- *Disaster Recovery Testing* – We will conduct recovery testing at the Inter-data center (backup site) of failover capabilities in the event of a catastrophic failure in a primary data center.

d. Implementation

Remaining work required for control center go-live.

- *IVVO model "tuning" for limited set of feeders* – Tuning is an iterative process to ensure the software model accurately calculates the feeder load flows.
- *Operator and Non-operator Training* – Complete ADMS training, in a simulator-based environment, for day to day operations. Trainees include management, technicians, and control center personnel.
- *Go-Live* – Commence using the system and complete with operators shifting from legacy applications to ADMS.

C. GIS Data Collection Effort

In compliance with Ordering Paragraph 5c, this section provides detailed information about the GIS data collection effort and what direct and interrelated benefits are expected from that investment.

The GIS is a critical system that will be integrated with ADMS. Accordingly, concurrent to the roll-out of the hardware and software components of the ADMS system, a field verification of electric distribution assets is underway. As previously

discussed in this docket,[8] GIS data is critical to ADMS to provide location and specification information for the physical primary voltage system assets from the substation down to, and including, the distribution service transformers. ADMS will use that information to maintain the electric distribution model in near-real-time, leveraging the advanced applications targeted at improving system operation and customer service response activities. While the Company maintains records of all its assets, ADMS will require granular asset information in order to operate effectively. Therefore, the Company has initiated an effort to review its electric distribution physical asset records (feeder and equipment attributes, etc.), to ensure that the information available complies with the necessary level of detail needed for ADMS.

The GIS data collection effort is comprised of three components. The first is collecting data that will validate the physical characteristics of the current system. Since ADMS is dependent on a robust dataset, we will leverage system and data knowledge and confirm the accuracy and completeness of the electric distribution grid model. This is accomplished by verifying the information contained in the corporate GIS via the performance of a physical data verification and capture effort with the goal of meeting the data needs required to support the ADMS application.

The second is collecting the additional data attributes that define the electrical characteristics necessary to enable the ADMS model. We will collect data such as the size of primary wire; the size and location of equipment such as transformers, switches, poles; phasing and connectivity; and device control settings. This process validates the various data attributes contained in the corporate GIS system.

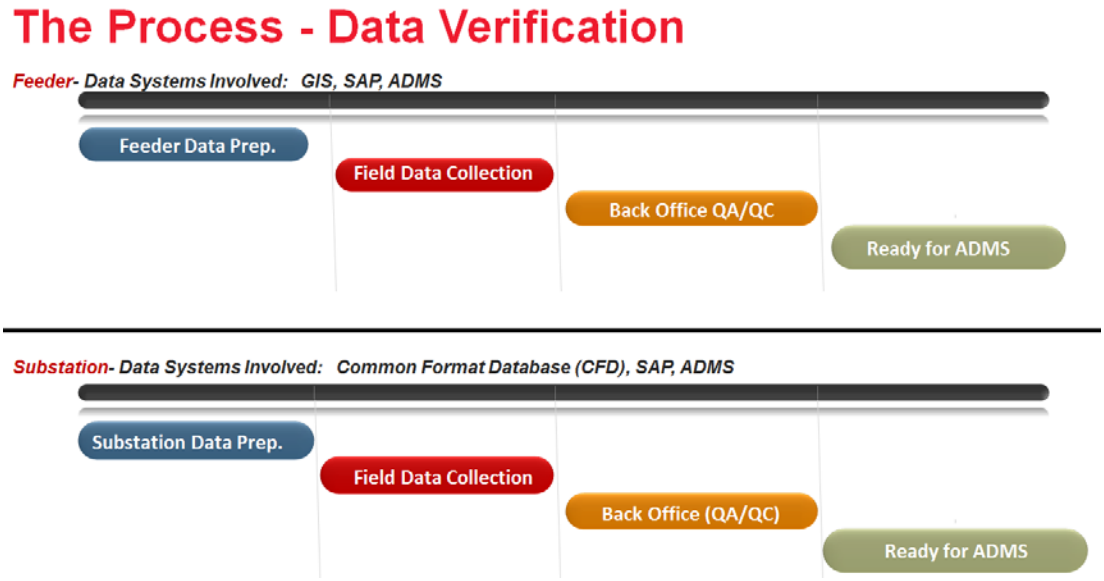
The third is the validation of equipment settings (e.g. substation control devices), that are critical to ADMS to ensure it has the necessary operating information to support grid optimization algorithms.

In order to ensure that ADMS is operating efficiently and effectively, the Company must complete end-to-end testing of the system and that cannot be done without field devices to gather the information that is needed for ADMS to operate and demonstrate it functions appropriately. As a result, 84 sensors and 57 intelligent field control devices necessary for IVVO and FLISR have been implemented early for purposes of this testing. These devices will ultimately be part of the overall intelligent field device deployment that is part of our pending AGIS certification proposal in the IDP docket.[9] ADMS processes the information provided by these devices in near-real-time and then uses the information in its application algorithms. ADMS then

[8] See Attachment 1A of the November 8, 2017 initial Petition in Docket No. E002/M-17-797.
[9] Docket No. E002/M-19-666

sends control commands from the advanced applications to the intelligent field devices to effect the necessary change in power flow on the grid. Figure 1 below illustrates the data verification process.

Figure 1



1. GIS Data Collection Status

As noted above, we are currently in the go-live phase of ADMS implementation in Minnesota. As it relates to GIS data collection, this means that we are collecting and validating data for a subset of our Minnesota distribution system needed to ensure proper system function—approximately 15 percent of feeders and 25 percent of substations. The balance of system data collection and validation will occur in future phases, after ADMS is live, as part of either the implementation of additional advanced applications (such as IVVO and FLISR) or through business-as-usual activities. No further data collection and validation is contemplated as part of the ADMS project.

2. GIS Benefits

As with any software implementation, accurate data is a key requirement. Hence, as part of the GIS Data Verification Process, ADMS will be positioned to operate using consistent asset data reflecting what is installed in the field. Via the storage of this information in the corporate GIS, we expect other systems that rely on geospatial data may also benefit as a result of having current asset information available. We discuss additional interrelated and future benefits for this data improvement below.

Additional detail can be found in Attachment M2 of the Company's November 1, 2019 IDP.[10]

- *Design* – The data collection and improvements will reduce the amount of time that planning engineers spend preparing each model for analysis. We expect a reduction in the need to perform multiple site visits affecting approximately 1,000 GIS design and planning resources (both employee and contractors) Xcel Energy-wide.
- *Distributed Energy Resources (DER)* – The GIS data improvement needed to enable ADMS also furthers grid modernization efforts related to DER. Specifically, this effort will help DER adoption by improving the GIS model which is used for system planning and for hosting capacity analysis.
- *Electric Vehicles (EVs)* – The verification and population of additional data attributes will help our designers validate capacity necessary for EVs, as well as the planning and design of EV charging stations.
- *Customer Connectivity* – The validation of data supports outage management processes and probable device outage analysis as part of service restoration activities targeted to minimize outage times and impact to customers.

D. Additional Functional Requirements Installed

In compliance with Ordering Paragraph 7c, below we discuss the additional functional requirements installed to achieve ADMS usage functions (including Advanced Metering Infrastructure (AMI), Field Area Network (FAN), FLISR, and IVVO modules) and their percent of system implementation or integration. Overall, we note that when we go live with ADMS, it will be fully functional for the feeders and substations that are part of the go-live portion of the ADMS initiative. Our first annual compliance filing, which we have proposed to be due January 25, 2021, will include the costs incurred as required by the September 27 Order.

1. AMI

From a grid perspective, the meter data provided by AMI can be used to maintain greater awareness of customer outages and aid in more expedient restoration. Advanced meters report power-out or "last gasp" events to the AMI head-end application and report a power-on event when power is restored. "Last gasp" is the final message transmitted by the meter upon detection of an outage. This information will flow from the head-end application into ADMS, improving the calculations for the fault location and restoration applications. These power-on and power-off

[10] Docket No. E002/M-19-666

notifications will provide us with a more timely and accurate scope of the outage without relying on customers to report an outage. The restoration confirmation also enables us to focus and optimize our restoration efforts on active outages, minimizing field trips where outages do not exist, also known as "Okay on Arrival" calls. Requirements and design for this work is expected to begin in 2021, concurrent with our proposed AMI implementation, and has not been started.

As proposed in our IDP filing, the Company intends to use a portion of AMI meters as "bellwether" sensing devices to provide near-real-time voltage sensing. These bellwether meters will be able to pass near-real-time power information to ADMS. This effort also has not yet been started. Finally, AMI data will be used to create improved load profiles. These requirements have not yet been completed and this effort has not yet begun. Twelve months of AMI data is necessary to create the improved load profiles, which affords time to complete this work after AMI is implemented.

2. FAN

The FAN will be a principal communication channel for ADMS. Prior to the deployment of AMI, the Company will utilize cellular communications to achieve ADMS functional requirements. At this time, the ADMS functional requirements that support FAN communication are complete, and we plan and are prepared to switch to the FAN when available. At that time, only configuration changes will be necessary within ADMS. Thus, we estimate that the ADMS functional requirements to support communicating with the FAN to be 95 percent complete.

3. FLISR and IVVO

The ADMS software functional requirements to enable FLISR and IVVO are complete. The installation and testing of hardware in the field to interface with ADMS to prove the functionality is approximately 80 percent complete. While 100 percent of the hardware is installed for the eight validation feeders (two FLISR and seven IVVO, with one overlapping both applications), confirming communications and performing final tests is approximately 20 percent complete. Overall, this work for the validation feeders is 80 percent complete.

We clarify that this level of readiness is by design, in that our ADMS implementation contemplated validating ADMS and its advanced applications through the implementation on these feeders. The validation feeders have roughly 35 existing switched primary voltage capacitor banks, two load tap changer controls, and 14 advanced substation relays that will be integrated with ADMS in 2020. In addition, to

provide the telemetry necessary to run model-based IVVO, 84 single phase line sensors have been deployed in that area. Finally, six recloser units have also been deployed in that area to support FLISR.

E. Estimated Future Costs

Order Point 7c requires that we provide estimated anticipated expenses in coming reporting periods, both capital and O&M. We provided an estimate of anticipated expenses for 2020 and beyond in Attachment 1A of our November 15, 2019 TCR Petition in Docket No. E002/M-19-721. We also provide this information in this section of the compliance filing.

1. Capital Costs

Table 3 below presents the capital costs budgeted for the remaining years of the project, 2020 through 2025, in the same categories specified in the September 27 Order for the reporting of actual costs shown in Section A above. Attachment A to this compliance filing presents detailed costs in these categories by year. We note that we budget at a project level, so all budgeted costs are categorized as external labor costs in Table 3. When actual costs are reported for these years, they will be appropriately broken out into internal labor, external labor, and non-labor categories.

The ADMS project budget as presented in our initial cost recovery request[11] was $69.1 million for the state of Minnesota.[12] As shown in Attachment A, our current budgeted capital expenditures for the ADMS project are $61.6 million for the state of Minnesota. Since the budget was prepared in July 2019, some expected 2019 costs have shifted into 2020 and are not reflected in the $61.6 million budget. We anticipate the total project capital expenditures to be approximately $69.1 million as originally presented.

[11] *In the Matter of Northern States Power Company for Approval of the Transmission Cost Recovery Rider Revenue Requirements for 2017 and 2019, and Revised Adjustment Factors*, PETITION AND COMPLIANCE FILING, Docket No. E002/M-17-797 (November 8, 2017).

[12] The total ADMS budget for the Xcel Energy enterprise is $208.9 million.

Table 3: Total ADMS Capital Budget for 2020-2025 – State of Minnesota

	Internal Labor Costs	External Labor Costs	Non-Labor Costs	TOTAL
Software	$ -	$ -	$ -	$ -
Design	$ -	$ -	$ -	$ -
Testing	$ -	$ -	$ -	$ -
Implementation	$ -	$ 3,883,462	$ -	$ 3,883,462
Hardware	$ -	$ -	$ -	$ -
GIS	$ -	$ 18,787,379	$ -	$ 18,787,379
Total:	**$ -**	**$ 22,670,842**	**$ -**	**$ 22,670,842**

As we have discussed above, the work that has been occurring to-date has focused on go-live, which is expected to occur in the third quarter of 2020. Once go-live has been achieved, our focus will turn to expanding the ADMS footprint—in other words, expanding the number of feeders enabled. We expect the post go-live future costs to largely focus on data collection, model promotion, and grid management activities.

Because ADMS is being developed as one software system across the Xcel Energy enterprise system and will be implemented in each specific operating company on a different timeline, the ADMS costs will be allocated to specific utilities and jurisdictions. Table 3 shows the state of Minnesota allocated share of budgeted costs.

2. O&M Costs

We do not budget separately for internal and external labor, so all O&M labor costs are included in the external labor category in Table 4 below. We have included in the non-labor costs category costs for hardware and software on-going maintenance once ADMS is in its operational stage. When actual costs are reported for these years, they will be appropriately broken out into internal labor, external labor, and non-labor categories.

Table 4: Total ADMS O&M Budget for 2020-2025 – State of Minnesota

	Internal Labor Costs	External Labor Costs	Non-Labor Costs	TOTAL
Software	$ -	$ 7,870,296	$ 3,182,352	$ 11,052,648
Design	$ -	$ -	$ -	$ -
Testing	$ -	$ -	$ -	$ -
Implementation	$ -	$ -	$ -	$ -
Hardware	$ -	$ -	$ 1,596,785	$ 1,596,785
GIS	$ -	$ 3,945,458	$ -	$ 3,945,458
Total:	**$ -**	**$ 11,815,754**	**$ 4,779,137**	**$ 16,594,891**

At this time, we estimate that once fully placed in-service, the state of Minnesota portion of the ADMS system should incur approximately $2.4 million per year in O&M costs to pay for external software support and maintenance, hardware support, wide-area network costs, and internal labor supporting the application and technical infrastructure. We note that we have further refined the cost estimate needed to support the ADMS system, and this current estimate is an increase over our previous estimate of $1.9 million, originally discussed in Docket No. E002/M-17-797.

F. Future Compliance

As discussed above, we propose that the Executive Secretary establish January 25 as the due date for the ongoing annual ADMS reports beginning January 25, 2021 – and that these annual ADMS reports be filed in the most recent docket of future IDPs. We have filed this report in the currently pending IDP docket for completeness of the record.

CONCLUSION

We respectfully request that the Commission accept this report in compliance with the September 27, 2019 ORDER AUTHORIZING RIDER RECOVERY, SETTING RETURN ON EQUITY, AND SETTING FILING REQUIREMENTS in Docket No. E002/M-17-797.

Dated: January 24, 2020

Northern States Power Company

Capital

Internal Labor ADMS Capital Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
Internal	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Forecast Total**	
Software	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
Design	-	1,441	87,488	359,540	618,759	-	-	**1,067,227**	-	-	-	-	-	-	**$ -**	**1,067,227**
Testing	-	-	-	-	-	582,558	841,363	**1,423,921**	-	-	-	-	-	-	**$ -**	**1,423,921**
Implementation	-	-	-	89,885	154,690	582,558	841,363	**1,668,495**	-	-	-	-	-	-	**$ -**	**1,668,495**
Hardware	-	-	-	-	8,929	156,149	299,500	**464,579**	-	-	-	-	-	-	**$ -**	**464,579**
GIS	-	-	-	-	-	12,638	22,956	**35,594**	-	-	-	-	-	-	**$ -**	**35,594**
Internal Total:	**-**	**1,441**	**87,488**	**449,425**	**782,377**	**1,333,903**	**2,005,181**	**4,659,816**	-	-	-	-	-	-	**$ -**	**4,659,816**

External Labor ADMS Capital Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
External	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Forecast Total**	
Software	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
Design	65,799	640,364	1,240,409	1,755,216	2,911,576	-	-	**6,613,363**	-	-	-	-	-	-	**$ -**	**6,613,363**
Testing	-	-	-	-	-	2,714,745	2,464,945	**5,179,690**	-	-	-	-	-	-	**$ -**	**5,179,690**
Implementation	-	-	-	438,804	727,894	2,714,745	2,464,945	**6,346,388**	3,883,462	-	-	-	-	-	**$ 3,883,462**	**10,229,850**
Hardware	-	-	-	-	31,869	234,996	1,568,534	**1,835,399**	-	-	-	-	-	-	**$ -**	**1,835,399**
GIS	-	-	-	-	-	356,748	916,892	**1,273,640**	1,741,382	870,691	2,612,073	3,898,563	2,612,073	7,052,597	**$ 18,787,379**	**20,061,019**
External Total:	**65,799**	**640,364**	**1,240,409**	**2,194,020**	**3,671,339**	**6,021,235**	**7,415,315**	**21,248,480**	**5,624,844**	**870,691**	**2,612,073**	**3,898,563**	**2,612,073**	**7,052,597**	**$ 22,670,842**	**43,919,321**

Non-Labor ADMS Capital Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
Non-Labor	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Forecast Total**	
Software	-	-	-	10	2,015,999	149,953	120,758	**2,286,720**	**-**	**-**	**-**	**-**	**-**	**-**	**$ -**	**2,286,720**
Design	616	22,680	89,634	-	-	-	-	**112,929**	**-**	**-**	**-**	**-**	**-**	**-**	**$ -**	**112,929**
Testing	-	-	-	-	-	-	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**$ -**	**-**
Implementation	-	-	-	38,708	36,811	137,639	142,317	**355,475**	**-**	**-**	**-**	**-**	**-**	**-**	**$ -**	**355,475**
Hardware	-	-	-	-	5,383,297	525,246	891,400	**6,799,943**	**-**	**-**	**-**	**-**	**-**	**-**	**$ -**	**6,799,943**
AFUDC	291	26,401	94,874	203,278	503,663	1,002,319	1,554,064	**3,384,891**	**-**	**-**	**-**	**-**	**-**	**-**	**$ -**	**3,384,891**
GIS	-	-	-	-	-	8,350	85,211	**93,561**	**-**	**-**	**-**	**-**	**-**	**-**	**$ -**	**93,561**
Non-Labor Total:	**907**	**49,082**	**184,508**	**241,996**	**7,939,771**	**1,823,507**	**2,793,751**	**13,033,520**	-	-	-	-	-	-	**$ -**	**13,033,520**

Total ADMS Capital Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
Capital Total	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Forecast Total**	**Project Total**
Software	-	-	-	10	2,015,999	149,953	120,758	**2,286,720**	-	-	-	-	-	-	**-**	**2,286,720**
Design	66,414	664,485	1,417,530	2,114,756	3,530,334	-	-	**7,793,519**	-	-	-	-	-	-	**-**	**7,793,519**
Testing	-	-	-	-	-	3,297,303	3,306,308	**6,603,611**	-	-	-	-	-	-	**-**	**6,603,611**
Implementation	-	-	-	567,397	919,395	3,434,942	3,448,624	**8,370,358**	3,883,462	-	-	-	-	-	**3,883,462**	**12,253,820**
Hardware	-	-	-	-	5,424,096	916,391	2,759,434	**9,099,921**	-	-	-	-	-	-	**-**	**9,099,921**
AFUDC	291	26,401	94,874	203,278	503,663	1,002,319	1,554,064	**3,384,891**							**-**	**3,384,891**
GIS	-	-	-	-	-	377,737	1,025,058	**1,402,795**	1,741,382	870,691	2,612,073	3,898,563	2,612,073	7,052,597	**18,787,379**	**20,190,174**
Capital Total	**66,705**	**690,887**	**1,512,404**	**2,885,441**	**12,393,487**	**9,178,644**	**12,214,247**	**38,941,816**	**5,624,844**	**870,691**	**2,612,073**	**3,898,563**	**2,612,073**	**7,052,597**	**22,670,842**	**61,612,657**

O&M

Internal Labor ADMS O&M Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
Internal	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Forecast Total**	
Software	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
Design	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
Testing	-	-	-	-	-	2,028	10,866	**12,893**	-	-	-	-	-	-	**$ -**	**12,893**
Implementation	-	-	-	-	-	2,028	10,866	**12,893**	-	-	-	-	-	-	**$ -**	**12,893**
Hardware	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
GIS	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
Internal Total:	**-**	**-**	**-**	**-**	**-**	**4,055**	**21,731**	**25,786**	-	-	-	-	-	-	**$ -**	**25,786**

External Labor ADMS O&M Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
External	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Forecast Total**	
Software	-	-	-	-	-	-	-	**-**	1,030,733	1,214,864	1,221,567	1,467,711	1,467,711	1,467,711	**$ 7,870,296**	**7,870,296**
Design	25,288	50,027	8,734	-	-	-	-	**84,049**	-	-	-	-	-	-	**$ -**	**84,049**
Testing	-	-	-	-	-	5,386	17,816	**23,202**	-	-	-	-	-	-	**$ -**	**23,202**
Implementation	-	-	-	-	-	5,386	17,816	**23,202**	-	-	-	-	-	-	**$ -**	**23,202**
Hardware	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
GIS	-	-	-	-	-	-	-	**-**	113,983	226,380	226,380	565,949	679,139	2,133,628	**$ 3,945,458**	**3,945,458**
External Total:	**25,288**	**50,027**	**8,734**	**-**	**-**	**10,772**	**35,632**	**130,453**	**1,144,716**	**1,441,243**	**1,447,947**	**2,033,660**	**2,146,850**	**3,601,339**	**$ 11,815,754**	**11,946,207**

Non-Labor ADMS O&M Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
Non-Labor	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Non-Labor Total**	
Software	-	-	-	-	-	-	209,278	**209,278**	298,553	511,956	513,066	619,592	619,592	619,592	**$ 3,182,352**	**3,391,630**
Design	-	-	1,955	-	-	-	-	**1,955**	-	-	-	-	-	-	**$ -**	**1,955**
Testing	-	-	-	-	-	1,342	5,003	**6,344**	-	-	-	-	-	-	**$ -**	**6,344**
Implementation	-	-	-	-	-	1,342	40,728	**42,070**	-	-	-	-	-	-	**$ -**	**42,070**
Hardware	-	-	-	-	-	28,730	757,309	**786,039**	236,572	238,836	241,145	293,411	293,411	293,411	**$ 1,596,785**	**2,382,823**
GIS	-	-	-	-	-	-	-	**-**	-	-	-	-	-	-	**$ -**	**-**
Non-Labor Total:	**-**	**-**	**1,955**	**-**	**-**	**31,413**	**1,012,318**	**1,045,687**	535,125	750,792	754,211	913,003	913,003	913,003	**$ 4,779,137**	**5,824,823**

Total ADMS O&M Expenditures – State of Minnesota

	Actuals								Forecast							TOTAL
O&M Total	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Actuals to Date**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Forecast Total**	
Software	-	-	-	-	-	-	209,278	**209,278**	1,329,286	1,726,820	1,734,633	2,087,303	2,087,303	2,087,303	**$ 11,052,648**	**11,261,926**
Design	25,288	50,027	10,690	-	-	-	-	**86,004**	-	-	-	-	-	-	**$ -**	**86,004**
Testing	-	-	-	-	-	8,755	33,684	**42,440**	-	-	-	-	-	-	**$ -**	**42,440**
Implementation	-	-	-	-	-	8,755	69,410	**78,165**	-	-	-	-	-	-	**$ -**	**78,165**
Hardware	-	-	-	-	-	28,730	757,309	**786,039**	236,572	238,836	241,145	293,411	293,411	293,411	**$ 1,596,785**	**2,382,823**
GIS	-	-	-	-	-	-	-	**-**	113,983	226,380	226,380	565,949	679,139	2,133,628	**$ 3,945,458**	**3,945,458**
O&M Total	**25,288**	**50,027**	**10,690**	**-**	**-**	**46,241**	**1,069,681**	**1,201,926**	**1,679,840**	**2,192,035**	**2,202,158**	**2,946,663**	**3,059,853**	**4,514,342**	**$ 16,594,891**	**17,796,817**

CERTIFICATE OF SERVICE

I, Lynnette Sweet, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States mail at Minneapolis, Minnesota

xx electronic filing

DOCKET NO. E002/M-17-797 AND E002/M-19-666

Dated this 24th day of January 2020

/s/

_____

Lynnette Sweet

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Generic Notice	Residential Utilities Division	residential.utilities@ag.state.mn.us	Office of the Attorney General-RUD	1400 BRM Tower 445 Minnesota St St. Paul, MN 551012131	Electronic Service	Yes	OFF_SL_17-797_M-17-797
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First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Generic Notice	Residential Utilities Division	residential.utilities@ag.state.mn.us	Office of the Attorney General-RUD	1400 BRM Tower 445 Minnesota St St. Paul, MN 551012131	Electronic Service	Yes	OFF_SL_19-666_M-19-666
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Thomas	Scharff	thomas.scharff@versoco.com	Verso Corp	600 High Street Wisconsin Rapids, WI 54495	Electronic Service	No	OFF_SL_19-666_M-19-666

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William	Seuffert	Will.Seuffert@state.mn.us		75 Rev Martin Luther King Jr Blvd 130 State Capitol St. Paul, MN 55155	Electronic Service	No	OFF_SL_19-666_M-19-666
Janet	Shaddix Elling	jshaddix@janetshaddix.com	Shaddix And Associates	7400 Lyndale Ave S Ste 190 Richfield, MN 55423	Electronic Service	Yes	OFF_SL_19-666_M-19-666
David	Shaffer	shaff081@gmail.com	Minnesota Solar Energy Industries Project	1005 Fairmount Ave Saint Paul, MN 55105	Electronic Service	No	OFF_SL_19-666_M-19-666
Patricia	Sharkey	psharkey@environmentallawcounsel.com	Midwest Cogeneration Association.	180 N. LaSalle Street Suite 3700 Chicago, Illinois 60601	Electronic Service	No	OFF_SL_19-666_M-19-666

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