EXHIBIT

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8

Direct Testimony and Schedules
Chad S. Nickell

Before the North Dakota Public Service Commission
State of North Dakota

In the Matter of the Application of Northern States Power Company
for Authority to Increase Rates for Electric Service in North Dakota

Case No. PU-24-____
Exhibit___(CSN-1)

Advanced Grid Intelligence and Security (AGIS)

December 2, 2024

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NSP Exhibit 8 - Direct Testimony of Chad S. Nickell (AGIS)

Northern States Power Company

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Schedules

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND OCCUPATION.

A. My name is Chad S. Nickell. I am employed as the Senior Director of Grid Transformation by Xcel Energy Services Inc. (XES), the service company affiliate of Northern States Power Company, a Minnesota corporation (the Company or NSPM) and an operating company of Xcel Energy Inc. (Xcel Energy).

Q. PLEASE BRIEFLY OUTLINE YOUR RESPONSIBILITIES.

A. As the Senior Director of Grid Transformation, I am responsible for managing the delivery of the Advanced Grid Intelligence and Security (AGIS) and related projects, which includes management of costs, schedule, and scope. My role also includes supporting the project governance, change management, and structure for Project Management, Resource Management, Financial Management, Change Management, and Training that are necessary for projects of this magnitude and complexity.

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I graduated from the University of Colorado, Boulder, in May 2004, where I earned a Bachelor of Science degree in electrical engineering. I joined Public Service Company of Colorado (PSCo), an operating company affiliate of Xcel Energy, in 2008. I have over 16 years of experience in the utility industry and have held a variety of positions for XES, including AGIS Delivery Lead for Distribution, Distribution System Planning Engineer, and the Manager of Distribution System Planning and Strategy—South. My Statement of Qualification is attached as Exhibit___(CSN-1), Schedule 1.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. My testimony focuses on the Company's AGIS Initiative. In broad terms, AGIS gives the Company more of a real-time ability to understand and control the functioning of the system. We previously had only limited information and control as to what happens beyond the substation level.

Q. HOW HAVE YOU ORGANIZED YOUR TESTIMONY?

A. My testimony is organized into the following sections:

- Section I – Introduction
- Section II – AGIS Initiative
  - A. AGIS Background
  - B. AGIS Status in North Dakota
- Section III – Conclusion

II. AGIS INITIATIVE

Q. BEFORE YOU DESCRIBE AGIS, PLEASE EXPLAIN THE DESIGN OF THE COMPANY'S ORIGINAL DISTRIBUTION SYSTEM.

A. Utility distribution systems were originally designed to accommodate primarily a one-way flow of electricity and information from the utility to the customer with limited monitoring points. This structure did not provide us with much visibility beyond the substation, and sometimes feeder level, of the distribution system. And because prior communications networks were not reliable, the system evolved to rely heavily on manual and local control schemes, meaning that human intervention was needed to complete operations such as opening and closing switches or disconnecting service. The Company had to send workers out into the field to gather information and make changes.

One result of this reliance on manual and local control systems is that the Company's had limited ability to "see" what was happening on the distribution system from the control room, which hampered our ability to identify outages, monitor and control voltage levels, and accommodate higher penetrations of distributed generation. When outages take longer to resolve due to the lack of information and control, that can result in greater disruptions to customers and higher costs such as additional contractor or overtime costs during storm events.

Q. PLEASE DESCRIBE THE COMPANY'S VISION FOR THE FUTURE OF THE DISTRIBUTION GRID.

A. The technical capabilities of the former grid system were limited compared to what is currently offered by more advanced grid technologies. The Company's vision for the future distribution grid is one that utilizes advances in technology to improve monitoring and operation of the grid for the benefit of our customers. AGIS seeks to take advantage of new technologies to increase grid reliability, transparency, efficiency, and access by enhancing grid visibility.

Through AGIS, the Company has more accurate, information about what is happening on all portions of the grid, from substations down to each individual customer's meter. These investments provide information, automation, and intelligence to help the company address outages and other problems more efficiently. For example, visibility into outages means we can know outages have occurred after they happen from our systems without relying on customers to notify us, which previously was the case for most outages. In some cases, we can identify symptoms that may lead to an outage, such as overloaded equipment, before an outage even occurs. We can then take action to prevent the outage and prevent this disruption for our customers. The increased number of field sensors and devices also means that we can have greater insight into energy usage and voltage levels at each location throughout the system.

A. AGIS Background

Q. WHAT DROVE THE NEED FOR THE COMPANY'S AGIS INITIATIVE?

A. First, our meters had become outdated and needed to be replaced. Our automated meter reading (AMR) technology was nearing end of life and our meter reading services vendor, Landis+Gyr (Cellnet), informed the Company that it would no longer manufacture replacement parts for this system after 2022. Further, our contract with Cellnet for meter reading services expires at the end of 2025. We have obtained good value from the AMR technology. It worked efficiently for more than 20 years, but it was time to move toward a new solution.

Second, in light of the need to transition away from our AMR meters, we surveyed the available options and determined that the state of advanced grid technology had reached a point where it was sufficiently mature to be deployed. Since the Company needed to make an investment in replacing its outdated AMR meters, it made sense to maximize this investment by modernizing other aspects of the distribution system to achieve greater benefits for our customers. Stated differently, it made sense to upgrade to one of the latest meter technologies available and implement communications and control systems that maximized the capabilities of the meters because our vendor was retiring the former technology, and the new communications and control technology had sufficiently matured to be ready for adoption.

In this way, the timing of the AGIS Initiative was driven by the need to replace our AMR meters, but the Company's decision was also consistent with our broader infrastructure needs and general industry direction. For example, the Department of Energy's 2018 Smart Grid System report had recognized the prudence of modernizing the distribution grid:

> Our [country's] electric infrastructure is aging and it is being pushed to do more than it was originally designed to do. Modernizing the grid to make it "smarter" and more resilient through the use of cutting-edge technologies, equipment, and controls that communicate and work together to deliver electricity more reliably and efficiently can greatly reduce the frequency and duration of power outages, reduce storm impacts, and restore service faster when outages occur. Consumers can better manage their own energy consumption and costs because they have easier access to their own data. Utilities also benefit from a modernized grid, including improved security, reduced peak loads, increased integration of renewables, and lower operational costs.
>
> "Smart grid" technologies are made possible by two-way communication technologies, control systems, and computer processing. These advanced technologies include advanced sensors… that allow operators to assess grid stability, advanced digital meters that give consumers better information and automatically report outages, relays that sense and recover from faults in the substation automatically, automated feeder switches that re-route power around problems, and batteries that store excess energy and make it available later to the grid to meet customer demand.[1]

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[1] https://www.energy.gov/sites/prod/files/2019/02/f59/Smart%20Grid%20System%20Report%20November%202018_1.pdf, as of October 24, 2024 (internal citations omitted) (DOE Smart Grid System Report 2018).

Q. DID CUSTOMERS' PREFERENCES PLAY A ROLE IN THE COMPANY'S DECISION TO IMPLEMENT AGIS?

A. Yes. While our customers have a varied range of engagement or interest with specific advanced grid technologies the Company adopts, they do value the benefits, such as improvements in safety and reliability including less frequent and shorter outages.

Q. PLEASE DESCRIBE THE FOUNDATIONAL COMPONENTS OF AGIS.

A. The core foundational elements of the AGIS initiative are: (1) the Advanced Distribution Management System (ADMS), which allows personnel in our control rooms to monitor and control the distribution system; (2) the Advanced Metering Infrastructure (AMI), which includes the smart meters and related software and back-end infrastructure; and (3) the Field Area Network (FAN), which provides the communications network connecting the meters and other field devices to the ADMS and other software platforms. Below, I discuss each of these core components at greater length. I also discuss Fault Location Isolation and Service Restoration (FLISR), which is an integrated technology that consists of an advanced ADMS application, automated field devices (reclosers, switches, substation relays) used to detect and isolate feeder mainline faults and restore power to unfaulted sections by closing tie switches to adjacent feeders, and leverages the FAN for two-way communications.

1. ADMS

Q. WHAT IS ADMS?

A. ADMS is a collection of hardware and software applications that monitor and control the electric distribution system safely, efficiently, and reliably. It is a centralized system that allows control room operators, field personnel, and engineers to monitor, control, and optimize the electric distribution system. ADMS does this by tracking the flow of power on the grid, thereby providing Company employees with visibility into those power flows.

Q. HOW DOES ADMS ACHIEVE THESE IMPROVEMENTS?

A. ADMS uses an enhanced distribution grid model that includes substations, feeders, taps, and service, in one user interface, to more accurately represent the entire distribution grid. This includes an updated geographic information system (GIS) model to provide a geo-spatial electrical model for ADMS. ADMS can maintain the as-operated, and continually updated, GIS electrical model in real-time. This model provides the Company with greater insight into the distribution system and information at a more granular level than previously existed.

Q. WHAT ARE THE CORE APPLICATIONS OF ADMS?

A. The core applications of ADMS are various software programs that enable Company personnel to get real-time information on the state of the grid. Examples include software programs that model the distribution network, analyze how parts of the network relate to each other, and calculate impedance. Unlike simpler grid control methods that assume a balanced load, ADMS allows for the more accurate and complex approach in which imbalances can be recognized, analyzed, and corrected. These applications provide the basis for running load flow and state estimation on the distribution system providing near real-time calculations of the state of the network including factors such as voltages, currents, real and reactive power, voltage drops, and losses.

Using these applications, the Company can provide load flow calculations on the grid, accurately adjusting the calculations with changes in grid topology and insights from sensors. This allows the Company to improve the monitoring and control of load flow from substations to the edge of the grid, which enables multiple performance objectives to be realized over the entire grid.

Q. WHAT INPUTS DOES ADMS RECEIVE AND ANALYZE?

A. ADMS operates as a centralized system, receiving inputs from devices such as substation remote terminal units, reclosers, capacitor banks, AMI meters, load tap changers (which regulate the output voltage of a substation transformer), and other distribution automation devices.

Q. WHAT DOES ADMS DO WITH THESE DATA INPUTS?

A. ADMS takes the inputs from these devices and computes the most efficient way for the system to operate and respond to changes based on both manual switching and automated switching (to the extent it is implemented).

More broadly, ADMS helps manage the interaction of outage events, feeder switching operations, and, perhaps in the future as appropriate, additional advanced applications utilizing added intelligent field devices. As a centralized system, ADMS controls the distribution devices in unison and dynamically reacts to an increasingly complex system in a safe, efficient, and reliable manner.

The various operating systems and technologies on the grid can communicate with and update each other in the ADMS platform, including the Company's GIS system. ADMS adjusts for real-time grid conditions and topology that are impacted by each application. As further technology is rolled out, ADMS will support the management and complex interaction of outage events, feeder switching operations, Distributed Energy Resources (DERs), and advanced applications utilizing intelligent field devices. It is already integrated with the previously-installed IntelliTeam smart switches.

2. *AMI*

Q. WHAT IS AMI?

A. AMI is an integrated system of advanced meters, communications networks, and software systems that together enable two-way communications between customer meters and utilities' business and operational systems.

Q. HOW IS THIS DIFFERENT FROM THE COMPANY'S FORMER METER TECHNOLOGY?

A. We had AMR technology in place before. AMR consists of meters equipped with one-way communication modules that transmit meter readings to a fixed radio frequency network. The function of AMR is the collection of meter readings for billing purposes, whereas AMI meters can enable additional functions and benefits in addition to collecting meter billing reads.

Q. PLEASE DESCRIBE ADVANCED METERS.

A. Advanced Meters, or AMI meters, are the key endpoint component of the AMI system that measures, stores, and transmits metering quantities, including energy usage information at customer locations.

Q. CAN YOU DESCRIBE THE FUNCTION OF THE AMI METERS?

A. Yes. The Company's AMI meters are able to measure and transmit voltage, current, and power quality data and can act as a sensor, providing timely monitoring at the point of service, which has a variety of uses. The consumption and demand can be recorded by the advanced meters by time intervals. The Itron Generation 5 Riva meters selected by the Company can have their software remotely updated, which will create flexibility to expand or change their capabilities in the future as appropriate. They can be used to, among other things:

- Measure and transmit voltage, current, and power quality data;
- Detect and transmit meter power outage and restoration events;
- Remotely connect or disconnect service without an in-person visit;
- Detect and report meter tampering events;
- More efficiently support distributed generation through remote reconfiguration to measure two-way power flows;
- Perform and transmit meter diagnostics pertaining to the correct functioning of the meter and communications module; and
- Perform local computing that can better monitor the condition of Company's distribution system and leverage customers' Wi-Fi to provide customers with near-real-time granular usage data.

Q. HOW WERE THE COMPANY'S FORMER AMR METERS LESS CAPABLE?

A. The previously utilized AMR meters had a number of limitations as compared to AMI-capable meters:

- AMR meters have fixed, basic metering functions and are limited to enabling transmission of meter readings for only energy delivered or net energy; another configuration is limited only to delivered energy or demand. In contrast, AMI meters are programmable to meter these energy parameters as well as flexible time of use schedules, reactive energy quantities, and various load profile interval choices;

- AMR meters generally do not have interval data (load profile) recording capability. For interval data needs, the AMR meter must be swapped with a non-AMR meter that has that functionality and it is either manually read or equipped with a modem for remote reading;
- AMR meters generally cannot measure and transmit information related to voltage, current, power quality, diagnostics, or outage events;
- AMR meters do not have an internal service switch to provide remote connection (and disconnection) of service;
- AMR meter firmware cannot be upgraded remotely; and
- AMR meter configuration cannot be remotely modified (such as from unidirectional to bidirectional, to support distributed generation).

Q. HOW DOES THE FUNCTIONALITY OF AMI ENHANCE THE DISTRIBUTION GRID?

A. As mentioned, AMI meters capture information at customer locations that provide us enhanced visibility into the distribution grid that was not possible with earlier meters. AMI meters gather voltage measurement information and transmit it through the communications system, where it is available to the Company through head-end software application. The Company can then use this information to better plan and operate the distribution system. AMI is therefore a key element of grid modernization because it provides a central source of information that interacts with each other component.

Q. ARE THERE OTHER ASPECTS OF THE AMI METERS YOU WOULD LIKE TO MENTION?

A. Yes. In discussing the AMI meters above, I referred to the fact that they can perform local computing. Along those lines, it should be noted that each of the AMI meters contains the equivalent to a small computer and has a Wi-Fi radio.

This aspect of the meters' capabilities is often referred to as distributed intelligence. One of the benefits of these capabilities is that customers can choose to access granular, near-real-time information regarding their own energy usage via the My Energy Connection application. Other benefits involve using the meters' distributed computational power to better monitor the condition of Company's distribution system.

Q. HOW WILL AMI INTERACT WITH ADMS AND THE COMPANY'S OUTAGE MANAGEMENT SYSTEM?

A. AMI provides ADMS with timely real and reactive power measurement data that can be used in system operations. Additionally, and importantly, AMI meters report a power-out or "last gasp" event to the Company's outage management system to report a power outage. Meters are then automatically pinged to confirm restoration. This information allows us to promptly detect outages without our customers calling them in and improves our outage response.

Q. HOW DOES AMI INTERACT WITH THE FAN?

A. The AMI meters have embedded communication modules that allow the devices to communicate with each other and other nodes in the FAN via a mesh network. FAN is used to communicate data between the meters and back-end systems such as ADMS and billing-related systems. In addition to allowing for communication of data, the FAN also allows for communication of commands, such as those used for remote connection and disconnection.

Q. DO AMI METERS REQUIRE THE FAN?

A. The AMI meters must be connected using some type of communication system. The Company decided upon the communications methods making up the FAN for the reasons I discuss below in the next section of my testimony.

3. FAN

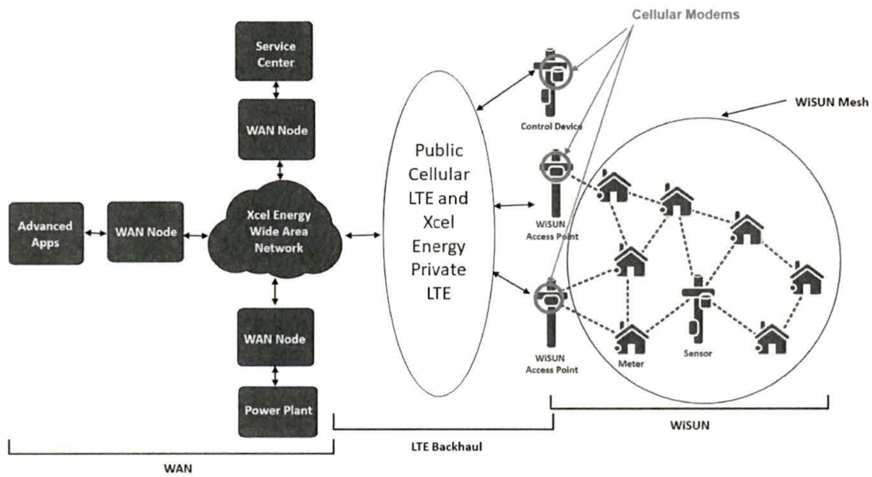
Q. WHAT IS THE FAN?

A. The FAN is a highly secure wireless communications network. The primary function of FAN is to enable secure and efficient two-way communication of data and commands between the AMI meters and other field devices to ADMS and the AMI operational and billing systems. The FAN enables back-office applications to directly communicate with AMI meters and field devices providing usage information for both our customers and the Company.

Q. WHAT ARE THE COMPONENTS OF THE FAN?

A. The FAN consists of two separate wireless technologies: (a) a lower-speed WiSUN mesh network connecting individual meters and other field devices to each other, and (b) use of a public cellular long-term evolution (LTE) solution to provide connectivity between the WiSUN mesh network and the Company's data centers and back-office applications. Figure 1 shows the field area network illustration.

Figure 1
Field Area Network Illustration



The Company is also now developing its own private LTE wireless network, as can be seen in Figure 1 above. This private LTE will complement the current public cellular FAN solution, which is provided by a third-party telecommunications company.

Q. PLEASE PROVIDE MORE INFORMATION ABOUT THE PRIVATE LTE.

A. The private LTE project will improve the resiliency of the electric distribution environment by creating an additional layer of connectivity between the WiSUN network and the Company's data centers and back-office applications, with the existing public communications network kept as a backup service. Once it is in place in an area, the Company will not pay for full-time access to third-party networks but will access them in the event of an outage. With this redundant design, communication outages will be less common and there will be fewer instances of field workers being dispatched when communications with field devices are lost. The private LTE will also enhance the security of the FAN.

Q. HOW DOES THE FAN WORK?

A. The FAN provides a single, general-purpose, communication network that is capable of simultaneously accessing diverse types of endpoints, each with their own performance requirements on the Company's electric system. The equipment consists of cellular modems, access points, and repeaters. Going forward, FAN will be able to communicate with other endpoints as new devices are installed or existing devices are upgraded with communications modules.

Q. HOW DOES THE FAN SUPPORT ADMS?

A. The FAN enables data and information from field devices to be communicated to ADMS, and commands to be transmitted to field devices from ADMS.

Q. DID THE COMPANY CONSIDER ALTERNATIVES TO ITS CORE FAN COMPONENTS?

A. As I noted above, some type of communications solution was required to communicate with the AMI meters. The FAN also provides reliable communication capabilities to all participating field devices, regardless of the device's use.

The Company considered various alternatives for the portion of FAN involving direct communication to the meters and decided upon one using the WiSUN communications. WiSUN is a widely implemented technology that has proven to be cost effective, reliable, and secure. The leading alternative the Company considered was to use public cellular. The disadvantage of that solution was that it would require the Company to deploy a cellular modem in every meter and pay monthly usage fees for every device, which would have incurred substantial monthly and annual expense.

Another significant advantage of pairing AMI meters with the FAN is security. With FAN, the Company has more control over security and resiliency than if public cellular networks were used for all portions. While not fully private, we designed the FAN to be segmented, which allows us to keep the WiSUN portion private and the data secure. Further, from a security standpoint, whether public or private, the data is encrypted as it traverses through the cellular providers' networks. The private LTE that the Company is developing will then add additional security and resiliency.

With respect to resiliency, the WiSUN network we deployed is a self-healing mesh network that will reroute traffic to different access points and cellular modems if it detects a loss of communication. This will help in reducing the potential impact if a FAN device is not functioning. We have also implemented alternate routing of cellular traffic at our data centers in the event the connection between the cellular provider and our data centers is lost.

Q. PLEASE SUMMARIZE THE BENEFITS OF AGIS.

A. AGIS has supported the installation of the latest generation of technology and in general will help us improve the efficiency, reliability, resilience, and security of the Company's distribution system.

4. FLISR

Q. WHAT IS FLISR?

A. FLISR is an integrated technology that consists of an advanced application in ADMS, two-way communication, and automated field and substation (reclosers, switches, substation relays) equipment. FLISR improves customers' reliability experience, reducing the frequency and duration of customer outages and reducing the number of customers affected. The FLISR technology can detect feeder mainline faults, isolate the fault by opening section switches, and restore power to unfaulted sections by closing tie switches to adjacent feeders as necessary.

Q. PLEASE PROVIDE ADDITIONAL DETAILS AND EXPLAIN HOW IT WILL BENEFIT CUSTOMERS.

A. The FLISR technology is a form of power distribution automation that involves the deployment of automated switching devices that work to detect feeder mainline faults, and the ability to isolate them, and restore power to un-faulted sections through reconfiguration of the system. The FLISR technology relies on three components to operate: (1) an advanced application within ADMS, for the central control and logic; (2) intelligent field devices to detect faults and operate field equipment; and (3) the FAN, for two-way wireless field communications. FLISR has the potential to reduce outage durations and the number of customers experiencing sustained interruptions and improve overall system reliability performance metrics, such as System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI). It should be noted that while outage durations will decrease, a customer may see an increase in the number of momentary (less than five minutes) outages as FLISR isolates the faulted section.

Q. ARE THERE OTHER POTENTIAL BENEFITS?

A. While the primary benefit of FLISR is improved reliability, there are other benefits. One is the reduction in field trips for our employes to conduct non-outage switching, as that switching will be enabled by the automated field devices. Another is that data gathered from the sensors on remotely operable switches will add to system visibility, which can improve our distribution planning and give more data to use in our reliability management efforts.

B. AGIS Status in North Dakota

Q. NOW THAT YOU HAVE PROVIDED US AN OVERVIEW OF WHAT AGIS IS, WHAT IS THE STATUS OF THE COMPANY'S AGIS INITIATIVE IN NORTH DAKOTA?

A. The Company has nearly completed rollout of the AGIS Initiative in North Dakota. ADMS is fully deployed and operational, all of the FAN devices are installed, the deployment of new AMI software and integrations is complete, and we will complete the AMI meter installation in North Dakota by the end of the 2025 test year. The foundational AGIS components are thus largely in place and full deployment will be completed within the test year. There are 67,200 AMI meters planned for installation in 2024 and in 2025, there are 32,800 meters planned.

Q. DOES THE COMPANY HAVE GREATER VISIBILITY OF THE DISTRIBUTION SYSTEM WITH AGIS NOW MOSTLY IMPLEMENTED?

A. Yes. We have enhanced visibility of and control over the distribution system in North Dakota. For instance, AMI meters report power outages to our outage management system and IntelliTeams are integrated with ADMS, which will provide faster outage restoration and improved reliability and will be available for all areas once the final meter installations are complete in 2025. The Company is also realizing other benefits from AGIS. For example, the Company has, with Commission approval, implemented remote connection and disconnection, which allows for a quicker and less costly process.

Q. WHAT AGIS-ASSOCIATED COSTS DOES THE COMPANY PROPOSE TO RECOVER?

A. As explained earlier in my testimony, the primary driver for the AGIS Initiative was the need to replace meters that have reached the end of their useful life and which would no longer have replacement parts or contracted meter reading services. Having now replaced most meters, and because the Company will have all foundational elements of AGIS in service by the end of the test year, the Company is seeking recovery of its deferred AGIS costs and of all other test year AGIS-related costs.

The Company previously agreed to defer all capital-related and O&M expenses for its AGIS Initiative in the Commission-approved settlement that resolved the prior electric rate case, Case No. PU-20-441. This is outside of my area of expertise as I do not have a legal background, but I am aware that the Settlement Agreement generally provided that capital expenditures and O&M expenses associated with the AGIS Initiative should be deferred until such time as all foundational elements of AGIS were in service. The agreed deferral of the AGIS Initiative costs was designed to treat the Company's capital and O&M expenses as if they were capital expenditures included in Construction Work in Process (CWIP), whereby an allowance for funds used during the deferral is provided, similar to the treatment for Allowance for Funds Used During Construction (AFUDC). Company witness Allen D. Krug mentions this issue in his testimony and Company witness Benjamin C. Halama provides the Company's proposed amortization.

I also note that the Company's private LTE and distributed intelligence projects are not included in the AGIS deferral or the AGIS case driver. Instead, those projects are included in the Company's general and intangible capital investments driver. The case drivers are discussed by Company witnesses Krug and Halama.

Q. PLEASE PROVIDE AN OVERVIEW OF THE COMPANY'S TOTAL AGIS-RELATED CAPITAL INVESTMENTS FROM 2021 TO 2025.

A. The table below reflects total capital investments in the AGIS Initiative from 2021 through the 2025 test year, broken down by category. The 2021 to 2023 figures are actuals, and the 2024 and 2025 additions are forecasted.

Table 1
AGIS Capital Additions (ND Electric)
(Dollars in Millions)

AGIS Program	2021	2022	2023	2024	2025	Total
ADMS	$3.1	$0.1	-	$0.2	-	**$3.4**
FAN	$0.5	$0.5	$1.0	$0.4	$0.1	**$2.5**
AMI		$0.1	$0.1	$13.4	$4.7	**$18.3**
FLISR	-	-	-	$0.1	$0.2	**$0.3**
Total	**$3.6**	**$0.7**	**$1.1**	**$14.1**	**$5.0**	**$24.5**

In addition, the private LTE project consists of $2.6 million in capital additions (North Dakota electric) through 2025 and there are also $1.2 million of distributed intelligence capital additions (North Dakota electric) in the same period. As noted above, these are not included in the Company's AGIS driver for this rate case; instead, they are included in the general and intangible capital investments driver.

Q. WHAT TRENDS DOES THE TABLE ILLUSTRATE?

A. The table illustrates that our deployment of foundational AGIS components largely took place prior to the 2025 test year, with the only remaining budgeted capital additions fitting in the AMI category. The table also highlights the centrality of the AMI meters to the AGIS project, with the AMI meters representing the largest component, FAN, which is used to communicate with the meters, as the next largest.

Q. PLEASE DESCRIBE THE COMPANY'S AGIS O&M EXPENSES.

A. Actual 2021 to 2023 O&M expenses were $0.4 million, and 2024 and 2025 forecasted AGIS O&M expenses are $2.1 million. These expenses are partially offset by a reduction in test-year legacy AMR meter reading expenses of $472,500.

Q. WHAT TRENDS DO THE HISTORIC AND FORECASTED O&M EXPENSES ILLUSTRATE?

A. AGIS O&M was quite limited until the meters began to be installed. Most of our AGIS O&M spending is related to the meters, including the costs to run the meters and software costs.

Q. PLEASE SUMMARIZE HOW THE AGIS INITIATIVE BENEFITS NORTH DAKOTA CUSTOMERS.

A. As an initial matter, I will note that the Company needed new meters and a means of reading meters for billing purposes. Given those needs, it was appropriate to use this opportunity to adopt more modern technologies that make it possible for the Company to better monitor and control the distribution system. AGIS allows the Company to provide customers with more reliability, responsiveness, and a better customer experience. AMI meters provide outage information and other timely and detailed information about the distribution system that allow us to better determine and respond to problems, including outages. In addition, AGIS provides insights into power flow that will help limit overloads, thus reducing the potential of outages due to overloaded equipment failures. FAN enables secure and efficient communication of information and data between the AMI meters and field devices, and operational and billing software including ADMS. ADMS is integrated with the IntelliTeam smart switches and can also support future, additional smart devices that could further improve distribution system operations. Collectively, the AGIS components enhance our operational capabilities, understanding of the system, and the overall customer experience.

Q. WHAT IS YOUR RECOMMENDATION WITH RESPECT TO AGIS?

A. I recommend that the Commission approve our request to recover the deferred costs of our capital investments related to implementation of the AGIS Initiative, along with other AGIS-related costs.

III. CONCLUSION

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. I recommend that the Commission approve the capital additions and O&M expenses related to the AGIS Initiative in this case. The timing of these investments was driven by the existing meters reaching the end of their lives and it was appropriate to upgrade to more advanced technology that had become sufficiently mature. The AGIS initiative has promoted the reliability, resiliency, and efficient operation of the distribution grid.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

Statement of Qualifications

Chad Nickell

Senior Director of Grid Transformation
Xcel Energy Services Inc.

Chad Nickell is the Company's Senior Director of Grid Transformation and has held that position since March 2022. He is responsible for managing the delivery of the Advanced Grid Intelligence and Security (AGIS) and related projects, which includes management of costs, schedule, and scope. Mr. Nickell's role also includes supporting the project governance, change management, and structure for Project Management, Resource Management, Financial Management, Change Management, and Training that are necessary for projects of this magnitude and complexity.

Mr. Nickell has more than 16 years of experience with the Company and has held a variety of positions for Xcel Energy Services Inc., including AGIS Delivery Lead for Distribution, Manager of Distribution System Planning and Strategy—South, and Distribution System Planning Engineer.

Mr. Nickell earned a Bachelor of Science Degree in electrical engineering from the University of Colorado, Boulder in 2004.

STATE OF NORTH DAKOTA
BEFORE THE
PUBLIC SERVICE COMMISSION

NORTHERN STATES POWER COMPANY 2025 ELECTRIC RATE INCREASE APPLICATION	)))	Case No. PU-24-___

AFFIDAVIT OF
Chad S. Nickell

I, the undersigned, being first duly sworn, depose and say that the foregoing is the Direct Testimony of the undersigned, and that such Direct Testimony and the exhibits or schedules sponsored by me to the best of my knowledge, information and belief, are true, correct, accurate and complete, and I hereby adopt said testimony as if given by me in formal hearing, under oath.

Chad S. Nickell

Subscribed and sworn to before me, this 22nd day of November, 2024.

MADELEINE GREINER
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20224031715
MY COMMISSION EXPIRES 08/12/2026

Madeleine Greiner
Notary Public
My Commission Expires: August 12th, 2026