MINNESOTA
PUBLIC UTILITIES COMMISSION

Staff Briefing Papers

Meeting Date	May 31, 2018		Agenda Item **5
Company	Xcel Energy		
Docket No.	**E002/M-17-775** **E002/M-17-776** **In the Matter of Xcel's Residential Time of Use Rate Design Pilot Program** **In the Matter of Xcel's 2017 Biennial Distribution Grid Modernization Report**		
Issues	Should the Commission approve Xcel's proposal for implementing a Residential Time of Use (TOU) Rate Pilot? Should the Commission certify the 2017 Biennial Report and certify the Fault Location, Isolation, and Service Restoration (FLISR) project?		
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Relevant Documents	**Date**
Docket 17-775 (Time of Use Pilot)	
Xcel Energy – Initial Filing	November 1, 2017
Center for Energy and Environment – Stakeholder Meeting Notes	February 5, 2017
Comments	
Suburban Rate Authority	February 5, 2018
Department of Commerce	February 5, 2018
Fresh Energy and the Minnesota Center for Environmental Advocacy	February 5, 2018
Office of the Attorney General (Public and Trade Secret)	February 5, 2018
Citizens Utility Board of Minnesota	February 5, 2018
Reply Comments	
Suburban Rate Authority	February 26, 2018
Xcel Energy	February 26, 2018
Office of the Attorney General	February 26, 2018
Citizens Utility Board of Minnesota	February 26, 2018
Department of Commerce	February 26, 2018

Docket 17-776 (Grid Modernization)

Xcel Energy – Initial Filing	November 1, 2017
Xcel Energy – Response to Staff IRs #2, 4-7	January 19, 2018
Xcel Energy – Supplemental Response to Staff IR #1	March 20, 2018
Comments	
Communities United for Responsible Energy (CURE)	November 30, 2017
Office of the Attorney General	February 5, 2018
Department of Commerce (Public and Trade Secret)	February 5, 2018
Citizens Utility Board of Minnesota	February 5, 2018
Reply Comments	
Xcel Energy	February 26, 2018
Office of the Attorney General	February 26, 2018
Citizens Utility Board	February 26, 2018

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Statement of the Issues

1. Should the Commission certify Xcel's proposal for implementing a Residential Time of Use (TOU) Rate Pilot? (Docket 17-775)

2. Should the Commission certify the 2017 Biennial Report and certify the Fault Location, Isolation, and Service Restoration (FLISR) project? (Docket 17-776)

Acronym Glossary

ADMS	Advanced Distribution Management System
AGIS	Advanced Grid Intelligence and Security
AMI	Advanced Metering Infrastructure
AMR	Automatic Meter Reading
CAIDI	Customer Average Interruption Duration Index
CMO	Customer Minutes Out
CRS	Customer Resource System
DA	Distribution Automation
DEMS	Dynamic Emergency Management System
DER	Distributed Energy Resources
DRWG	Distribution Reliability Working Group
DR	Demand Response
DRMS	Demand Response Management System
D-SCADA	Distribution Supervisory Control and Data Acquisition
EAMS	Enterprise Asset Management System
EMS	Emergency Management System
FAN	Field Area Network
FLISR	Fault Location, Isolation, and Service Restoration
FLP	Fault Location Prediction
GIS	Geospatial Information System
IEM	Integrated Energy Management
IEEE	Institute of Electrical and Electronic Engineers
IVVO	Integrated Volt-VAR Optimization
MRAS	Meter Reading Acquisition System
NMS	Network Management System
QoS	Quality of Service
SAIDI	System Average Interruption Duration Index
SAIFI	Systems Average Interruption Frequency Index
SAMS	Substation Asset Management System
SCADA	Supervisory Control and Data Acquisition
TCR	Transmission Cost Recovery
TOU	Time of Use
WAN	Wide Area Network
WiMAX	Worldwide Interoperability for Microwave Access
WiSUN	Wireless Smart Utility Network

Biennial Distribution System Plan/Grid Modernization Report Background

Relevant Law on the Biennial Grid Modernization Report and Certification of Projects

Minn. Stat. 216B.2425, enacted in 2001, requires all entities that own or operate transmission lines in Minnesota to submit biennial state transmission projects reports in November of each odd-numbered year. In the 2015 Legislative Session, the Legislature amended Minn. Stat. 216B.2425, Subd. 2 (e) to also require a distribution system report from utilities on a multi-year rate plan (which is currently only Xcel Energy). The Commission is required to certify, certify with modifications, or deny certification of the projects proposed as part of the report.

> Minn. Stat. 216B.2425 Subd. 2 (e): In addition to providing the information required under this subdivision, a utility … shall 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.

Minn. Stat. 216B.2425, Subd. 3 provides criteria the Commission should consider when certifying a *transmission* project[1], but it does not provide (any) criteria for a *distribution* project.

Relevant Law on Cost Recovery for Certified Projects

If the Commission certifies either a transmission or distribution project, pursuant to Minn. Stat. § 216B.2425, the utility may ask for cost recovery (net of associated Minnesota jurisdictional revenues) through the utility's Transmission Cost Adjustment rider, as outlined in Minn. Stat. 216B.16, Subd. 7b. Part (b) of Subd. 7b describes the information that should be included in the utility's tariff for its Transmission Cost Adjustment rider, i.e. the annual cost recovery mechanism. Part (c) of Subd. 7b, permits the utility to ask for annual rate adjustments to recover costs associated with these 'priority' projects (and itemizes content requirements)[2].

Part (d) of Subd. 7b indicates that cost recovery under the rider should be allowed only if the costs for the project are expected to be or have been prudently incurred and if they "achieve *transmission* system improvements at the lowest feasible and prudent cost to ratepayers." Staff notes this second part of the sentence that references the need for projects to be 'lowest cost' references only *transmission* system improvements (not distribution). However, the filing requirements under Part (c) (for all project types) require a description of efforts made to ensure the lowest cost for ratepayers (so staff believes this ultimately *is* a consideration for the Commission could consider in regard to distribution system investments).

1 Those factors include projects that are necessary for reliability, are needed (per the certificate of need statutory criteria), and in the public interest.

2 Filing requirements for the TCA rider include: description and contest of the facilities, schedule, cost, efforts to ensure the lowest cost to ratepayers, and consistency evaluation with the tariff.

Past Commission Approval Considerations for Certified Grid Modernization/Distribution System Projects

In Xcel's 2015 Biennial Grid Modernization Report Xcel requested certification of the Belle Plaine Battery Project and an Advanced Distribution Management System (ADMS). In the Commission's *Order Certifying Advanced Distribution-Management System (ADMS) Project Under Minn. Stat. 216B.2425 and Requiring Further Distribution Study* (2016 Order) the Commission denied the storage project but certified the ADMS proposal.

In that Order, and in response to parties recommending the Commission adopt certification criteria (either through order or rule), the Commission indicated it did not believe it was necessary at that time, nor should it delay certification of the ADMS project in order to do so. The Commission noted in regard to certification and cost recovery:

> Moreover, the Commission agrees with Xcel that it can interpret the statute on a case-by-case basis until such time as a comprehensive list of criteria is established. Rather than initiate rulemaking immediately, the Commission is convinced that it is more prudent to develop these criteria over time as the Commission gains experience with grid modernization. The experience gained through biennial grid-modernization reports and the grid-modernization investigation in Docket No. E-999/CI-15-556 will prove valuable should the Commission decide to initiate rulemaking on this subject.
>
> Finally, several parties expressed concern over the preliminary nature of Xcel's cost estimate. The Commission clarifies that its decision to certify the ADMS project does not imply any decision regarding recovery of the project's costs.
>
> The Commission's decision represents only a finding that the project is consistent with the requirements of section 216B.2425. Any rider recovery of costs associated with the project will be determined in response to a petition for rider recovery of those costs under Minn. Stat. § 216B.16, subd. 7b. At that time, Xcel will have the burden of establishing the prudence of the costs it requests to recover through the TCR Rider. [3],[4]

Xcel's 2017 Biennial Grid Modernization Report – Certification Requests

Xcel's Report begins with a high-level discussion of the Company's approach to grid modernization, including a discussion of its planned "foundational" technology investments, future application of these technologies, and the general benefits of these investments. In its 2017 Grid Modernization Report, which is split into two certification-requests, each with their own filing and docket number (17-775 and 17-776), Xcel requests the following of the Commission[5]:

1) Certification of its residential time-of-use (TOU) rate pilot, including approval of its:

3 Commission Order Certifying Advanced Distribution-Management System (ADMS) Project Under Minn. Stat. 216B.2425 and Requiring Further Distribution Study (2016 Order), at 9

4 On November 8, 2017, Xcel filed for recovery of the ADMS project under its Transmission Cost Recover rider (TCR Rider). That project is pending before the Commission under Docket No. E002/M-17-797

5 Both dockets also requested a Commission decision by June 1, 2018

a. Proposal for implementing a residential TOU rate pilot
b. Proposed pilot tariff
c. Requested accounting treatment

2) Certification of its Fault Location, Isolation, and Service Restoration (FLISR) reliability project[6]
3) Authorization to file a biennial grid modernization report and certification request on November 1, 2018
4) Authorization to file a biennial grid modernization report annually through at least 2022.

Notably, in the TOU Filing, Xcel explains how it views the FLISR and TOU proposals are interdependent; Xcel requires certification of the FLISR proposal to move forward with the TOU pilot. If any of the costs of either certification request are not approved by the Commission, Xcel noted it would 'stop the TOU pilot process' and wait for a rate case to bring any remaining costs forward (later in the filing it is noted that a 'partial authorization' would require recalculations of the FAN costs for the approved portion). November 1, 2017, TOU filing in 17-775 at pg. 2:

> In this Petition, the Company describes in greater detail the features of its pilot proposal, including the goals, the rate design, pilot components, and the implementation plans to bring it forward to residential customers. **We note that our intended implementation of the pilot is contingent on affirmative Commission actions in both the grid modernization filing certification request as well as this current TOU pilot petition.** If the Commission does certify the TOU pilot, we would then request cost recovery through our next Transmission Cost Recovery (TCR)/Grid Mod Rider filing. As the Commission is aware, the Company is in a multi-year rate plan and the majority of these investments are not a part of that rate plan so, **to the extent any of these costs are not approved in the TCR, the Company would stop the pilot process and wait for a future rate case to bring the pilot and any remaining costs forward.** [Emphasis by staff]

Xcel explained that each of the certification proposals (FLISR and TOU) included initial/partial costs for the underlying communications network, the Field Area Network (FAN), however, the costs associated with the full roll-out of the FAN and Advanced Metering Infrastructure (AMI) would be filed in Xcel's next biennial distribution projects report, which Xcel requests to be filed November 1, 2018 (instead of biennially, on November 1, 2019).

Staff believes there are several threshold questions relating to 'certification' that the Commission may want to use as a guidance during consideration of these dockets:

1. Whether the projects are consistent with the statute (as the term certification was used in the Commission's 2016 Order);
2. If certified, does the Commission wish to put forth any conditions, limitations, or guidance for consideration on cost recovery on either the FLISR or TOU/AMI authorizations (beyond what exists in the TCR rider statute);

6 Which Xcel notes "relies on Field Area Network (FAN) infrastructure and involves installation of intelligent field devices (see E002/17-775, November 1, TOU initial filing at pg. 2)

3. What action the Commission should take knowing Xcel intends to 'stop the [TOU] pilot' if the Commission fails to *certify* both FLISR and TOU proposals;
4. What other options are available for the Commission to proceed?
    a. Certification and/or approval of all or part of the proposals;
    b. Certification of only one of the proposals (TOU/AMI or FLISR);
    c. Approval without certification of the TOU pilot;
    d. Some other approach (delay consideration, request comprehensive (full FAN/AMI) filing in 2018 or 2019, request filing with or without Integrated Distribution Plan considerations, etc.).

The technology concepts and party positions on these issues are explained in more detail below, however, staff provides an early introduction to high level considerations first.

Staff believes it is important to note the interdependency of the filings, the TOU pilot (and supporting AMI and FAN infrastructure) with the FLISR proposal (and underlying FAN, and other supporting infrastructure). As Xcel noted, the initial costs for these proposals are interrelated and denial of one means (either withdrawal or) a recalculation of the costs of the other. Additionally, staff has concerns that approval of either of these proposals 'as being consistent with grid modernization statute' could be read as an approval of the investment as the best alternative. Staff notes that we have no comparison of cost of other grid modernization options, no comparison of alternative means of implementing a communications infrastructure (beyond what we have here – an Xcel-owned wireless network), and no clear concept of customer benefits (either current or future) of the underlying foundational elements of these proposals.

Following certification, the next step in this process (before the Commission) is approval of the specific cost of the projects under the transmission cost recovery rider. As staff noted in the relevant law section above, in the rider approval, the Commission is to consider the *prudency* of either the future or incurred investment (and questionably whether it was least cost). Staff believes that if either of the proposals are certified, it would be reasonable now for the Commission to add additional parameters to that approval process to ensure that the technologies and proposals are further vetted as reasonable, in customers best interest, are least cost (including qualitative and quantitative considerations and values and assumptions associated with each), and should include an itemization of current , planned, and potential future benefits – as most of these items are not known at present.

Another option the Commission could consider during review of this filing is whether to delay certification until a more comprehensive filing is made. Staff recently proposed Integrated Distribution Plan (IDP) requirements for Xcel in which it was proposed that Xcel file its first distribution system plan with the Commission on November 1, 2018.[7] In the draft IDP requirements, staff proposed that the IDPs require a more comprehensive evaluation of (financially) large grid modernization and distribution system plan investments among other big picture considerations (alternatives, scenario analysis, etc.).

7 See Commission Docket E002/M-18-251

Xcel has requested that it be authorized to file its next Biennial Grid Modernization Plan (required by statute) by November 1, 2018. Staff believes it would be reasonable to include the metrics outlined in the draft IDP with the statutorily-required Biennial Grid Modernization Plan as a combined filing (which would include the full AMI and FAN costs which are not yet available or proposed).[8]

Additionally, in 2016, the Commission has outlined guiding principles for grid modernization and distribution plan advancement, which staff believes consideration of, in conjunction with a request under Minn. Stat. § 216B.2425, would helpful to the Commission in the evaluation of whether to approve certification. Those 2016 guiding principles include:

- Maintain and enhance the safety, security, reliability, and resilience of the electricity grid, at fair and reasonable costs, consistent with the state's energy policies.
- Enable greater customer engagement, empowerment, and options for energy services.
- Move toward the creation of efficient, cost-effective, accessible grid platforms for new products, new services, and opportunities for adoption of new distributed technologies.
- Ensure optimized utilization of electricity grid assets and resources to minimize total system costs.

Foundational Elements of Grid Modernization

In its biannual report, Xcel summarized what it considers the fundamental components of its grid modernization plan.

Advanced Distribution Management System (ADMS)

The Commission certified ADMS in Xcel's 2015 Grid Modernization Report. ADMS is a software platform that integrates existing and new distribution grid control operations into a centralized hub. The ADMS communicates with other software and smart grid devices to allow operators better insight and control of the distribution system. Existing standalone systems, like SCADA, EMS, and OMS, can be integrated into the ADMS platform. In its report, Xcel noted "the key objectives of ADMS are to provide integrated grid preparedness, improve reliability, and to increase efficiency on the grid."[9]

One major integration into the ADMS is Xcel's existing Supervisory Control and Data Acquisition (SCADA) network. SCADA gives grid operators insight into the distribution system by collecting and storing information from grid monitoring devices. Xcel continues to roll out SCADA to all of its substations, currently around 60 percent have those capabilities.[10]

8 Staff acknowledges the IDP requirements are currently in draft form, and a comment period is anticipated in June, with a Commission decision anticipated for August. If the IDP requirements are approved in August, it is arguable whether there is sufficient time to include those metrics in a November 2018 filing, in that instance, either the Commission could determine a compromised set of metrics or delay a decision until November 2019.
9 Docket 17-776, Xcel, Initial Filing, pp. 11-12
10 *Id.*

Energy Management System (EMS)

EMS is another monitoring and management tool for the bulk electric system. Xcel's distribution EMS will primarily switch over to the ADMS platform, with the existing system running backup and serving as the transmission EMS.[11]

Field Area Network (FAN)

The Field Area Network, or FAN, is the integral communications component to Xcel's grid modernization strategy. The FAN will serve grid modernization initiatives like FLISR, ADMS, and AMI, and potentially future control of additional devices like smart inverters or streetlights.[12]

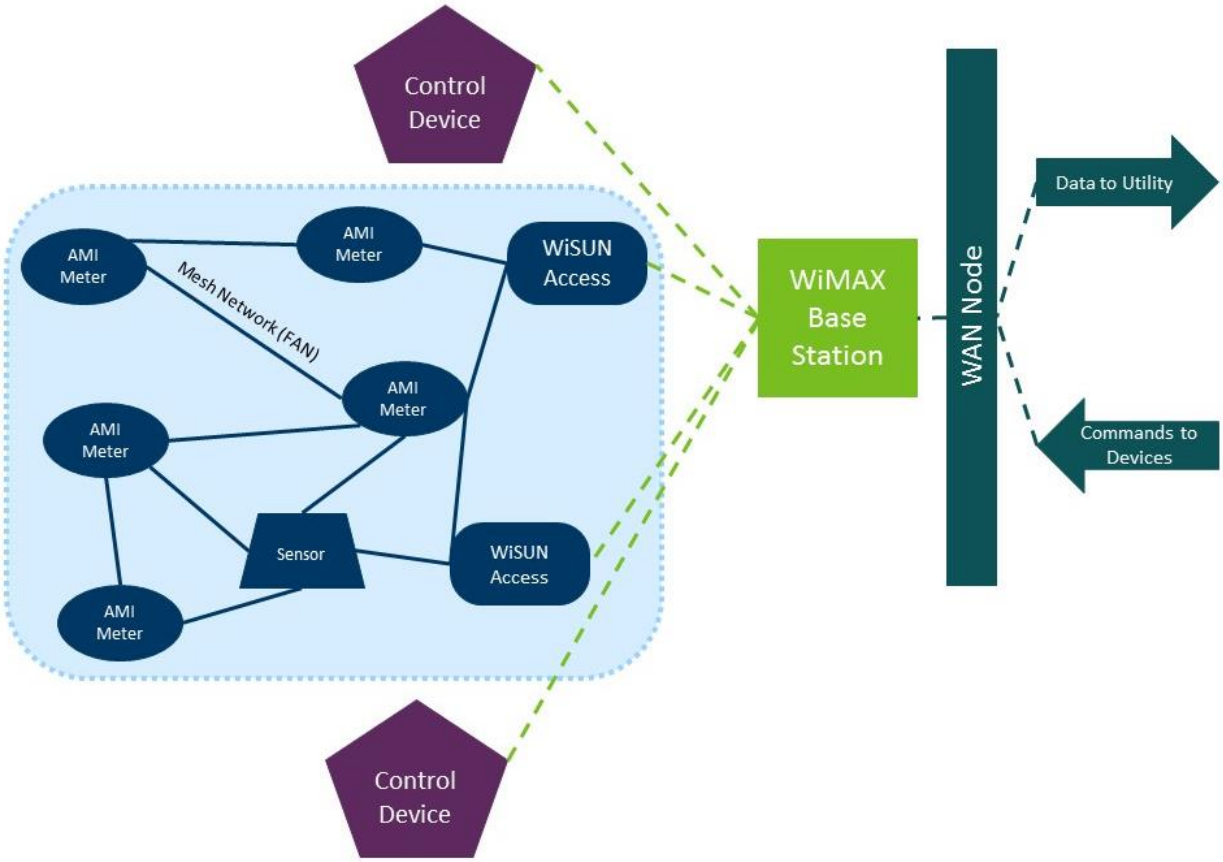
In many grid modernization investments by other utilities, the FAN or other communications infrastructure is developed as a component of an AMI deployment through a meter and communications vendor. In Xcel's case, the company will develop its own FAN in connection with its existing Wide Area Network (WAN). Xcel explained that this will increase cybersecurity by reducing third party access and the use of public networks.[13]

Xcel's FAN is comprised of two components: WiMAX and WiSUN. The WiMAX is a point-to-multipoint system that connects directly with some field devices, including control devices, and provides a connection between the WiSUN and Wide Area Network (WAN) systems.[14] The WiSUN is a mesh network that connects meters, sensors, and other smart grid hardware. In a mesh network, data from meters can take multiple paths to collection points, which are then transmitted back to a centralized data repository. Meters themselves function as communication devices in a mesh network. A mesh system provides resiliency – if one meter goes out, the data from other meters can reroute itself to reach the data collection point.

Figure 1 depicts how the portions of the communications network relate to each other.

Figure 1: FAN Structure

11 *Id.*, p. 18
12 *Id.*, p. 12
13 *Id.*, p. 12-13
14 *Id.*



Xcel's request does not specifically ask for certification of the FAN, but WiMAX and WiSUN components are necessary to implement FLISR and the TOU pilot as proposed.

Field Devices

Xcel uses a number of Field Devices that support other advanced grid investments:

- Power Line Sensor: serve as a lower cost alternative to SCADA until it can be rolled out to all distribution substations. While the give insight into the system, they do not allow the grid operator any control functions.
- Capacitor Controls: used to manage power factor and reduce system losses through Xcel's SmartVAR system.
- Automated Switch controls: component of FLISR, automatically isolate portions of the distribution system with a fault and restore power to the rest.
- Remote Fault Indicators: alerts grid operator to fault on the system.[15]

Geospatial Information System (GIS)

At its most fundamental level, GIS is an advanced mapping software. However, it goes beyond that to allow users to manipulate, analyze, manage, and present geographic data in meaningful

15 *Id.*, 18

ways. For a utility, it allows accurate depictions of the location and characteristics of infrastructure such as poles and wires in relation to each other. This spatially represented data is used in advanced software and modeling applications housed in systems like ADMS. Xcel is carrying out an extensive GIS data collection effort as a part of its ADMS implementation, detailed in the current cost recovery request for the TCR Rider (Docket 17-797).[16]

Underlying IT infrastructure

In addition to the specific software and hardware grid modernization investments, Xcel noted that it would need to continue upgrades to its corporate IT infrastructure. It outlined that these upgrades would ensure security and interoperability, and are more throughout outlined in witness testimony from its recent rate case (Docket 15-826).[17]

Impending Advanced Grid Projects and Implementation Strategy

Xcel outlined two upcoming projects: Advanced Metering Infrastructure and full FAN deployment. These advanced grid projects would continue Xcel's initiative to create a modern, interactive, self-healing distribution system.

Advanced Metering Infrastructure (AMI)

AMI encompasses both meters and a communications system that transmits data from devices throughout the distribution system. The communications network and associated devices provide a greater level of insight into a utility's system, and can allow a number of advanced applications beyond meter reading. In Xcel's report, it outlines how its AMI will use the FAN as the communications infrastructure to enable two way communication between the utility and the meter. Specifically, Xcel identified the following capabilities:

- Send price signals to customers, allowing for new rate structures that would allow customers to more proactively manage their energy usage with near real-time energy usage data,
- Monitor reliability and analyze system protection and operational attributes, leading to improved planning and design, outage response, and ultimately, the reduction or elimination of certain outages,
- Detect and verify outages without customer reporting,
- Detect and report meter tampering events,
- Identify and respond efficiently to potential metering equipment and customer usage issues,
- Allow remote service disconnects and reconnects.[18]

Furthermore, the detailed information that AMI provides at a granular level is critical for other advanced grid applications like ADMS and IVVO. The mesh repeaters (part of the

16 *Id*., pp. 18-19
17 *Id.*, p. 19
18 *Id.*, p. 39

communications infrastructure) embedded in the AMI meters also serve an important role in data transmission from other advanced grid devices.

AMI technology will replace Xcel's existing Automatic Meter Reading (AMR) technology, which is reaching the end of its license agreement. Xcel is currently in the process of laboratory and field testing AMI technology for full system integration, in addition to the proposed TOU pilot which could use AMI for participants.

Typically AMI deployment is paired with a Meter Data Management System (MDMS). Xcel did not outline whether it would implement a Meter Data Management System or other type of data management service, such as an enterprise service bus, to ensure that systems like the ADMS, GIS, and CIS could all receive the information they needed to maximize investments in grid modernization.

Full FAN Deployment

The initial FAN rollout for FLISR and TOU is concentrated in a small geographic area. In order to implement the entirety of FLISR described in the proposal, along with a system wide AMI rollout, Xcel outlined that it will need to fully deploy FAN throughout its service territory. According to Xcel, FAN installation will need to begin approximately 12 to 18 months ahead of AMI deployment.[19]

Implementation Strategy

Xcel described its overall implementation strategy as a multilayered approach, which certain investments like the FAN being necessary as a base level technology investment. If FLISR, TOU, and initial FAN are approved, Xcel would request cost recovery in late 2018. If the Commission approves additional yearly certification requests, Xcel anticipates bringing forward a proposal for AMI and a full FAN rollout in November of this year.[20]

Xcel explained that in order to implement AMI, other communications infrastructure like the FAN WiMAX base stations and head end system must first be in place. For FLISR, after the WiMAX are in service, deployment could begin. Initial FLISR deployment would precede ADMS, but after ADMS is operational and testing has been completed new FLISR feeders could be added more quickly.

Table 1 depicts Xcel's planned implementation timeline for its Advanced Grid Intelligence and Security plan.

19 *Id.*, p. 42
20 *Id.*

Table 1: Xcel AGIS Implementation Timeline [21]

Project	**Deployment Timeframe**
ADMS	*Planning*: Ongoing *Implementation*: Detailed design – Complete System implementation – In progress. Expected in-service Jan 2020.
FAN (*limited to support FLISR and TOU Pilot*)	*Planning*: Ongoing *Installation*: WiMAX and backhaul infrastructure Jan 2018 – Dec 2018 Wi-SUN (mesh network) implementation Jan – Jun 2019
FLISR	*Planning*: Ongoing *Installation* – Jan 2019 – Dec 2027
AMI (*TOU Pilot*)	*Planning:* Ongoing *Vendor Selection* – Nov 2017 *Anticipated installation of first pilot meter* – Jul 2019 *Complete TOU Pilot meter installations* – Dec 2019
Full AMI and full FAN	*Planning*: Ongoing *Installation*: 2018 to 2023

Other Grid Modernization Technologies under Evaluation

Storage Projects

Xcel outlined two storage projects in its Colorado service territory, the Pena Station/Panasonic Solar + Storage Demonstration Project and the Stapleton Battery Storage Project. Xcel has shared details of these projects with the Commission at previous planning meetings.[22]

Integrated Volt VAr Optimization (IVVO)

Xcel has a portion of IVVO in place through its SmartVAR Management pilot program. The existing IVVO includes using capacitor banks to manage the power factor across the distribution system. As Xcel implements the FAN it will switch existing cellular communications to FAN technology.[23]

Substation Automation and Upgrades

Xcel continues to automate its substations by upgrading system hardware and installing SCADA. Additionally, it continues upgrade substation communications circuits and metering technology that will allow for full three phase monitoring versus existing single phase capabilities. This increased data is important for ADMS applications and system planning.[24]

21 *Id.*, p. 43
22 *Id.*, pp. 44-46
23 *Id.*, pp. 46-47
24 *Id.*, p. 47

Demand Response Technologies

Both aging systems and a growing number of technologies have made demand response management an increasingly complicated endeavor. Xcel has started to implement a Demand Response Management System (DRMS). In Minnesota, the DRMS rollout has started with the new AC Rewards program.[25]

FLISR Certification Request

Xcel Proposal

Xcel requested certification for a reliability improvement project, Fault Location, Isolation, and Service Restoration (FLISR).

Fault Location, Isolation, and Service Restoration (FLISR)

FLISR is a form of Distribution Automation that allows service to be restored to customers more expediently after an outage occurs. The form of FLISR Xcel proposes to implement consists of three pieces:

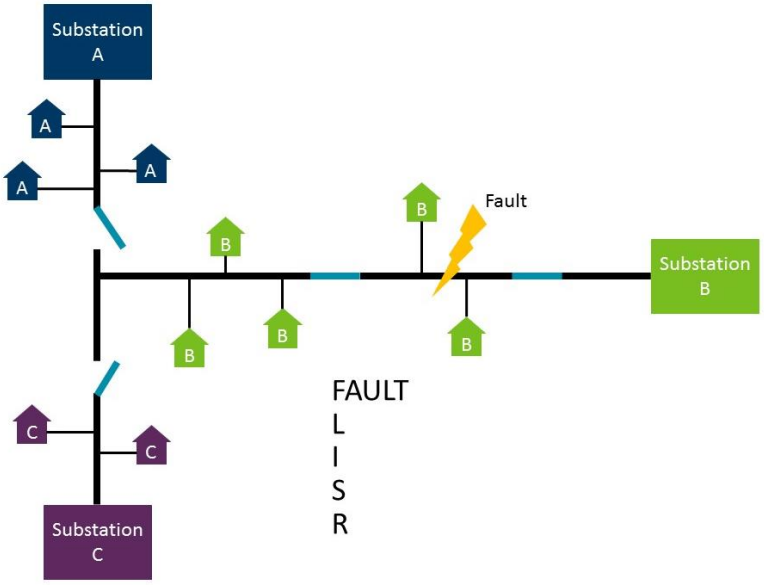
1. ADMS – centralized control software
2. FAN – communication with field devices
3. Intelligent Field Devices – detection and restoration of faults

25 *Id.*

FLISR Operations

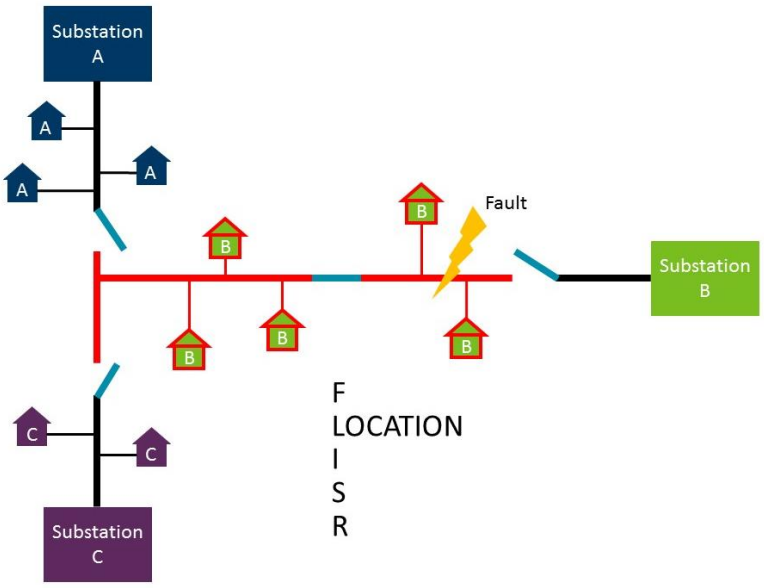
In Figure 2, a **fault** has occurred on the distribution system, symbolized by the lightning bolt. Typical faults are trees falling on a power line, animal contact, or human interference, like vehicle damage to a utility pole.

Figure 2



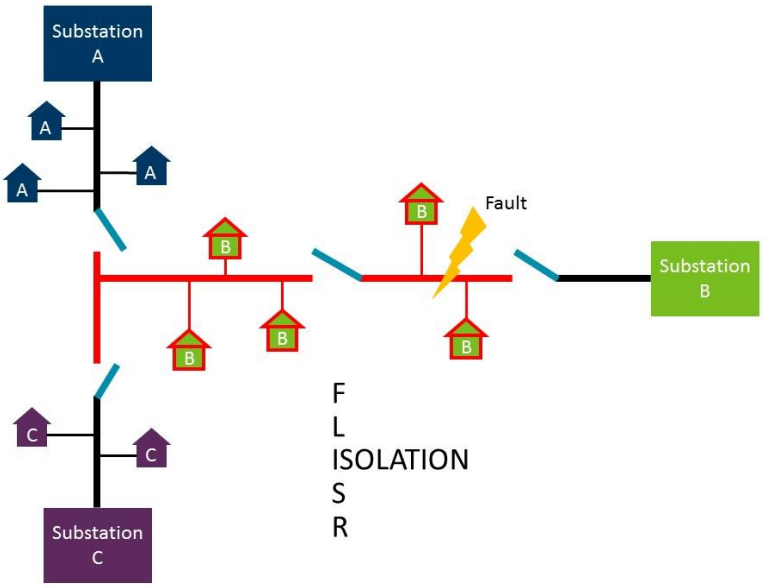
In Figure 3, FLISR has **located** the source of the fault on the distribution line and opened an automatic switching device, cutting the flow of power from Substation B to all customers located on the feeder.

Figure 3



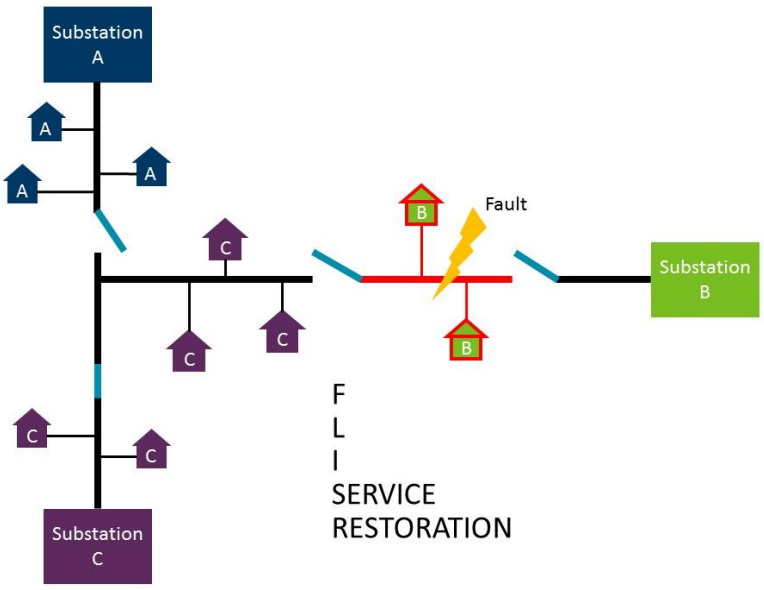
In Figure 4, the fault has be **isolated** to a specific section of the feeder through the opening of another automatic switching device.

Figure 4



Finally, in Figure 5, **service is restored** to customers previously impacted by the outage. Another automatic switching device is closed, allowing customers previously served by Substation B to instead receive power from Substation C.

Figure 5



In the end, a much smaller portion of customers are without power than before. Additionally, crews have a much narrower section of feeder to patrol to find the source of the fault, allowing them to more quickly address the cause of the outage and restore power to all customers.

Operational and Reliability Benefits

From an operational standpoint, Xcel outlined that it expects to see benefits as a result of increasing interoperability. It noted that by switching from its existing automated device vendor to Company owned technology, FLISR is a vendor-neutral non-proprietary system, allowing Xcel to go with lowest cost equipment. FLISR will also give Xcel increased visibility into the system, as well as allow the company to more efficiently dispatch crews to fix faults.[26] Xcel did not quantify any of these benefits.

On the reliability end, Xcel estimated significant increases to customer reliability. When a fault occurs on a FLISR feeder, approximately 2/3 of customers would experience service restoration within minutes, instead of the entire feeder being out until a crew could be dispatched to fix it. This would result in less Customer Minutes Out (CMO), improving Xcel's reliability metrics.[27]

Implementation Strategy

Xcel plans to target high density areas, overheard lines that have a history of higher than average outages for FLISR implementation. As FLISR is dependent on the FAN for operation, deployment needs to occur in a coordinated fashion. The initial rollout of FLISR will occur in the same geographic area as the TOU pilot, allowing Xcel to realize efficiencies by installing multiple technologies simultaneously. Beyond that, Xcel has outlined a phased deployment plan over the next ten years, although it is open to faster deployment if the Commission wishes. Overall, Xcel plans to operate FLISR on around 18% of the 1,274 feeders in its NSPM territory.[28]

Table 2 and

Table *3* below depict Xcel's estimated capital and O&M costs for FLISR and the supporting portion of the FAN network. Xcel noted that the FAN necessary to support FLISR will also support other grid modernization investments like AMI.[29]

Table 2: FLISR Costs – Capital[30]
State of Minnesota (millions)

	2018	2019	2020	2021	2022	2023-2027	Total
FLISR	$0.0	$4.5	$5.1	$6.3	$5.7	$43.7	$65.3
FAN*	$0.0	$3.8	$8.4	$8.9	$7.4	$35.6	$64.1
Total	**$0.0**	**$8.3**	**$13.5**	**$15.2**	**$13.1**	**$79.3**	**$129.4**

26 *Id.*, p. 28
27 *Id.*, p. 29
28 *Id.*, pp. 30-31
29 *Id.*, p. 34
30 *Id.*

Table 3: FLISR Costs – O & M[31]
State of Minnesota (millions)

	2018	2019	2020	2021	2022	2023-2027	Total
FLISR	$0.0	$0.4	$0.5	$0.6	$0.7	$3.2	$5.4
FAN*	$0.1	$0.2	$0.5	$0.6	$0.6	$3.2	$5.2
Total	**$0.1**	**$0.6**	**$1.0**	**$1.2**	**$1.3**	**$6.4**	**$10.6**

* Note: the underlying FAN infrastructure will also support other advanced grid technologies, including AMI.

Value Assessment

Xcel determined that the primary value benefit from FLISR is the reduction in Customer Minutes Out (CMO).[32] CMO are a primary input into the SAIDI and SAIFI metrics, which are widely used measures of customer reliability throughout the electric utility industry.

To determine the number of CMO Saved, Xcel relied on the following four assumptions:

- All but one section of the customers on the feeder will see their power restored in less than one minute, which eliminates a sustained outage for the majority of customers on the feeder,[33]
- An improvement of at least 50 percent from historical performance,
- Efficiencies associated with sharing tie switches between two automated feeders, such that each feeder acts as the back-up for the other, and
- A 25 percent reduction in the identified benefits, to represent a conservative but realistic estimate of the percentage of time that FLISR may not be available during an outage for some reason.[34]

Xcel then used the following formula to calculate the CMO savings for each individual feeder in its system:

$$CMO\ Saved = \frac{(Average\ Annual\ CMO) * (Number\ of\ Feeder\ Sections - 1)}{Number\ of\ Feeder\ Sections} * (1 - Scale\ Factor)$$

Finally, to determine the cost per CMO saved to implement FLISR on a feeder, Xcel dived the cost of automation by the expected CMO saved.

31 *Id.*
32 *Id.*, pp. 32-33
33 A sustained outage is defined as an outage lasting five minutes or more. In many cases, we expect that half or more of the restored customers will not even see a momentary outage due to our use of electronic reclosers across the feeders, which act to limit the number of customers interrupted in an outage event.
34 The system might not be available for switching for a variety of reasons including: construction, abnormal state of system, devices out of service for maintenance, system loading, communications failure and others.

$$Cost\ per\ CMO\ Saved = \frac{Cost\ to\ impliment\ FLISR\ on\ feeder}{Expected\ CMO\ savings}$$

Feeders with the lowest cost per CMO Saved would therefore be the highest value targets for FLISR implementation. For the initial years of FLISR implementation, Xcel focused efforts on feeders that have a cost per customer minute saved of less than $4.00.[35]

The Company determined that the value of a CMO for its service territory to be $0.76 based on a blended cost of commercial, industrial, and residential customer values. Xcel then established the net present value of a CMO for a 20 year period at $8.04.[36] However, in its response to Staff IR #2, it appears as though Xcel used a NPV of $8.60 in its calculations.[37]

Party Positions

Office of the Attorney General

The OAG recommended the Commission deny certification of Xcel's proposed FLISR Investment. The OAG clarified that it did not intend to "suggest that Xcel should not pursue FLISR or other reliability improvements[38]," but that the TCR rider may not be the proper path through with to secure cost recovery. Instead, the OAG suggested that Xcel could pursue FLISR through its next rate case or through a future biennial report, especially if it addressed concerns related to existing reliability targets.

Using the reasoning the Commission applied in Xcel's initial grid modernization request, the OAG outlined the following reasons for the Commission to deny certification of FLISR.

FLISR is not necessary for grid modernization

The OAG pointed out that the Certification Statue requires utilities to identify projects "necessary" for grid modernization. However, unlike the ADMS certified in the previous grid modernization proceeding, FLISR is not a foundational investment that is necessary for grid modernization efforts. The OAG noted that Xcel did not include FLISR in its "Foundational Elements of Grid Modernization" in the instant petition.[39]

Lack of clarity around cost savings

Second, the OAG emphasized the lack of analysis around cost savings resulting from improved efficiencies from FLISR operations. Like other forms of distribution automation, FLISR can allow more work to occur remotely, resulting in less staff time spent on identifying and resolving faults. The OAG highlighted research by the Department of Energy that showed that one utility's investments in distribution automation, including FLISR, resulted in $4.8 million in avoided distribution costs over three year.[40]

35 Docket 17-776, Xcel, Initial Filing, p. 33
36 *Id.*
37 Xcel Response to Staff IR 2, spreadsheet.
38 Docket 17-776, OAG, Initial Comments, p. 11
39 *Id*., p. 12
40 Id., p. 13

> The OAG noticed that Xcel had not calculated any cost savings from FLISR in its Petition … Xcel indicated that it did not have any estimates for potential cost savings. Further, although Xcel stated that it was "expecting improved crew productivity," it appears to argue that FLISR would not result in any cost savings despite the increase in productivity.[41]

The OAG expressed concern that Xcel's request contained no estimates of cost savings benefits, especially as the purpose of a certification request is to support future recovery petitions.[42]

There is not a clear need for substantial reliability investments

In its petition, Xcel states that the primary benefit from FLISR is improved reliability. However, in its comments the OAG pointed out that Xcel has far exceeded its reliability performance goals in its Quality of Service Plan (QSP).[43] Therefore, even at the status quo Xcel is accomplishing its reliability targets. The OAG advised that:

> Without some indication that customers are unsatisfied with their current level of reliability, and that they are willing to pay for increased performance, it may not be the most effective way to invest in grid modernization at this time. And, even if the Commission does decide to set new reliability targets, then there should be some analysis demonstrating that FLISR is the most cost-effective way to improve reliability before it is certified. [44]

A lack of clarity whether FLISR is an incremental cost from Xcel's rate case

Finally, the OAG cited uncertainty around whether the costs of FLISR were incremental to costs already contained for automated devices within Xcel's most recent rate case. The OAG explained that if Xcel, as stated in its petition, were to discontinue investments in automation already included in base rates and instead procure it through a rider, which could result in double recovery.[45]

<u>Department of Commerce</u>

The Department recommended that the Commission defer certification of FLISR and require Xcel to provide a cost benefit analysis of various grid modernization investments. The Department stated that it does not, "have a sufficient level of information regarding FLISR's benefits and cost compared to other similar grid modernization applications to recommend FLISR for certification at this time."[46] Instead, the Department focused its comments on an analysis of Integrated Volt VAr Optimization (IVVO), which it theorized could be a better value proposition for Minnesota ratepayers.

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41 *Id*.
42 *Id*.
43 *Id*., p. 14
44 *Id*., p. 15
45 *Id*., pp. 15-16
46 Docket 17-776, Department, Initial Comments, p. 2

FLISR Analysis

The Department questioned Xcel's calculation of $0.76 for the value of a customer minute out (CMO). It pointed out that in Xcel's SQP tariff, Xcel provides a $50 bill credit to customers experiencing an outage lasting more than 24 hours, which puts the value of a CMO at $0.035. This value is only 4.6% of Xcel's estimated CMO worth. Therefore, the Department concluded that the value proposition of FLISR relies heavily on the value of a customer minute out, and there are conflicting methods of determining that value. In the Department's estimation, while FLISR may improve reliability, it is unclear whether the capital and O&M costs of the investment would be reasonable to recover from ratepayers.[47]

IVVO

The Department referenced testimony from Xcel's Colorado implementation of Integrated Volt-VAr Optimization (IVVO). In that proceeding, the company's witness Alice Jackson said of FLISR and IVVO, both "are advanced applications and associated field devices that will support a more advanced grid."[48] Another witness, Chad Nickel, explained IVVO as a way to reduce distribution electrical losses, electrical demand, and energy consumption through maintaining proper voltage levels on the distribution system.[49] The Department asserted that in contrast to FLISR,

> IVVO could provide direct financial benefits to ratepayers, without any change in customer behavior. Further, these factors do not require imputing a value for customer outage minutes to estimate a "value-based" benefit. Instead, Xcel's costs and ratepayers' bills would be directly lower as a result of IVVO…From the Department's perspective, the idea of a 2 percent or even 1 percent decrease in energy use on the distribution system that requires no behavior change on the part of customers is appealing.[50]

The Department's comments then described Trade Secret IR responses from Xcel relating to different analysis on IVVO. In the public portion of its comments, the Department stated that it believed there were material errors with Xcel's analysis, mainly that it did not account for decoupling or the annual sales revenue adjustment approved in its multi-year rate case. In the Department's estimation, IVVO could provide more direct benefits to customers then FLISR despite the initiative addressing different end goals (conservation versus reliability). Based on its analysis, the Department recommended that the Commission defer its decision to certify FLISR until Xcel develops a through CBA that compares the costs and benefits of FLISR and IVVO for Minnesota.[51]

47 *Id.*, p. 4
48 *Id.*
49 *Id.*
50 *Id.*, pp. 5-6
51 *Id.*, p. 7

Citizens Utility Board (CUB)

CUB's comments focused on overall factors the Commission should consider as it evaluates grid modernization proposals like FLISR, with a recommendation that the Commission decline to certify FLISR until Xcel performs a cost benefit analysis.[52]

CUB recommended that the Commission should direct its attention to specific technologies, but instead focus on, "the overall objectives of grid modernization to make sure that Xcel remains on a path that will deliver more efficient and reliable service, enable options for customers interested in distributed energy resources ("DER") and provide new pricing programs for customers to manage their energy usage."[53] Instead of individual certification requests for specific projects, CUB asserted that after the Commission has determined goals for grid modernization in Docket 15-556, Xcel should file a single comprehensive plan with both specific technology investments and a cost benefit analysis for the overall plan.[54]

Cost Recovery

CUB stressed that while it is supportive of an incremental approach to grid modernization, the Commission should also consider the additive properties of recovering multiple projects through riders instead of the traditional rate case. Instead, CUB advocated for large system investments in grid modernization to go through a traditional rate case proceeding, so the Commission would have the opportunity to look at how such expenditures impact other utility practices. Furthermore, it noted that using the TCR rider proportions costs evenly across customers, while not all customers may enjoy the same benefits.

Costs and Benefits Analysis

While CUB did not object to the technologies that Xcel outlined in its report, it had concerns that there was no detail provided on the costs and benefits of each option. As CUB noted in its comments about FLISR:

> For example, while Xcel does provide a general cost summary and restoration value for its proposed fault location isolation and service restoration ("FLISR") project, there is no description of the useful life of the technology, potential cost of early retirement of other assets, or quantification of the total resource cost of each feeder upgraded.[55]

Therefore, CUB recommended that the Commission require Xcel to perform a cost-benefit analysis for any grid modernization project prior to a certification request. If a project is then certified, CUB advised requiring Xcel to report on the outcomes in specific performance metrics.[56]

52 Docket 17-776, CUB, Initial Comments, p. 6
53 *Id*., p. 1
54 *Id.*, p. 2
55 *Id.*, p. 4
56 *Id.*, p. 5

Data Access and Security

Finally, CUB discussed access to the increased data generated by grid modernization devices. CUB emphasized that data should be available to stakeholders so they can evaluate further opportunities for cost savings and efficiencies. Additionally, third parties may be able to provide services at lower cost than a utility, and should have access to the data so they can bring proposals forward.[57]

Reply Comments

In reply comments, CUB concurred with the Department's recommendation to require positive cost benefit analysis results as a criteria for any certification of full project rollouts. However, CUB acknowledged that some pilots that do not meet that criteria should be allowed, as long as positive ratepayer benefits are expected for full scale rollouts. CUB recommended the Commission do the following:

1. Limit the use of rider for grid modernization projects
2. Establish criteria for use in certifying grid modernization investments
3. Direct Xcel to compare FLISR with other advanced grid applications such as voltage optimization technologies
4. Ensure the objectives of utilities' grid modernization investments are clear and the outcomes are clearly reported[58]

Xcel Reply

In reply comments, Xcel acknowledged parties concerns with its FLISR proposal, but thought that much of the uncertainty was due to a certification process that has not reached maturity.[59]

Statutory Criteria

Xcel outlined its interpretation of the statutory criteria for certification of a grid modernization investment. In the grid modernization statute, 216B.2425, Xcel noted that there are a broad range of investments that meet the certification definition, so long as the project is needed to "modernize the distribution system."[60] Xcel rejected the OAG's approach toward defining specific criteria, noting that such criteria is "not specifically outline by the statute."[61] Instead, Xcel recommended that the Commission consider "the legislative intent of the statute and the grid modernization goals it outlines."[62]

Using this framework, Xcel asserted that FLISR fits within the statutory framework, as it would provide insight into the distribution system through deployment of intelligent devices along with providing reliability for customers. [63]

57 *Id.*
58 Docket 17-776, CUB, Reply Comments
59 Docket 17-776, Xcel, Reply Comments, p. 2
60 *Id.*, pp. 3-4.
61 *Id.*, p. 4
62 *Id.*
63 *Id.,* p. 5

Customer Value

In response to the OAG's questioning whether FLISR was necessary, Xcel replied that while it has met the reliability metrics in its QSP tariff, there are still customers that receive outage credits under its provisions. Furthermore, Xcel noted that it has not consistently met its reliability goals as established in Minn. Rules. Xcel went on to describe how reliability is frequently viewed as one of the most important qualities to its customers, and how in order to keep pace with other comparable utilities in terms of its reliability numbers, it needed to implement systems like FLISR.[64]

Cost Benefit Analysis

Xcel pushed back against multiple party suggestions that the Commission use a cost benefit analysis (CBA) to determine whether or not grid modernization investments are reasonable. In its reply, Xcel explained that it does not view a CBA as the proper way to capture all benefits to customers. In Xcel's estimation, a CBA would not show a reduction in customer costs because it would be unable to quantify the certain important customer benefits, such as:

1. Customer satisfaction
2. Customer convenience/inconvenience
3. Employee or customer personal safety
4. Power quality
5. Customer services risks associated with aging systems
6. Strategic advancement of the distribution system to accommodate other customer interests, such as DER
7. Maintaining favorable utility market position with respect to service to customers
8. Overall impressions of utility service and the regulatory environment in Minnesota[65]

Furthermore, Xcel noted that there are multiple ways to conduct a CBA which are often subjective. Xcel gave an example from the present docket:

> While our estimates of the likely reductions to outage length that FLISR offers are not contested in the Parties' comments, the Department correctly notes that our analysis of FLISR value vs. costs depends largely on the assumptions one makes regarding the value of a CMO. This is true of multiple variables within any CBA. Likewise, the value of a CMO could change based on the information available at the time regarding both projects that are not yet implemented and future conditions that have not yet occurred. While we believe our assumptions are reasonable and that CBAs may present one business case for any particular project or proposal, the Department's very analysis of CMO values demonstrates that CBAs are not a wholly objective evaluation of relevant costs and benefits.[66]

64 *Id.*, pp. 5-7
65 *Id.*, p. 8
66 *Id.*, p. 9

Comparison to IVVO

Xcel disagreed with Department's suggestion that the Company should compare Integrated Volt VAr Optimization (IVVO) with FLISR through a cost benefit analysis. Xcel made four main points:

1. FLISR and IVVO serve two different customer needs
2. In Colorado, IVVO did not present a positive NPV
3. Value propositions for IVVO are different in Minnesota than in Colorado
4. An updated Minnesota IVVO analysis would not add value at this time.[67]

At a high level, Xcel argued that IVVO and FLISR serve two different needs: IVVO is an energy conservation measure, while FLISR improves reliability. Therefore, they serve two very different purposes and should not be an apple to apples comparison. Furthermore, due to system differences, implementation of IVVO does not make sense in Minnesota at this time, and especially not until AMI is installed, as AMI devices can play an important role in monitoring feeder voltage.[68]

Rider Recovery

Xcel maintained its position that post-certification recovery of grid modernization projects is consistent with statute. It noted that the legislature expressly permitted these costs in a rider, and therefore there is not a need to wait until a rate case for recovery of costs. Additionally, in response to several parties' concerns that its proposal did not contain enough information about incremental costs, Xcel indicated that such levels of detail were more appropriate for its cost recovery filing.[69]

Staff Analysis

Staff echoes the comments of the OAG and CUB: that the Commission should consider what outcomes it wants grid modernization to achieve, and whether or not a proposal addresses those goals in a way that is cost effective to ratepayers. Staff likewise thinks that additional record development on FLISR before certification would provide the Commission with a solid foundation upon which to make its decision, so it can be assured that the investment will result in real tangible benefits customer benefits. Specifically, staff would like to see more record development around the following areas pertaining to a FLISR rollout:

1. Methodology and calculations for the Valuation of a Customer Minute Out, including differences from the LBNL ICE Calculator.
2. Quantify the decreased operating costs through increased efficiency.
3. An alternatives analysis of other methods to improve reliability, including the cost of the status quo or "no improvement" option.
4. An analysis of the FLISR/distribution automation system already operating on the Company's 34.5 kV distribution system, including the observed reliability improvements

67 *Id.*, p. 11-16
68 *Id.*, p. 11
69 *Id.*, pp. 17-18

and how those outcomes could contribute to a cost benefit analysis for system wide FLISR

5. How FLISR will interact with the FAN, including the following points:
    a. Whether FLISR devices will operate on the WiMAX or WiSUN portion of the FAN
    b. If devices are through the WiSUN mesh network, how Xcel will counter the latency of communications through a mesh network that decrease the efficiency of FLISR
    c. How the FAN will continue to function in times of high stress grid events normal power distribution is impacted (for example, a severe ice or wind storm event).
6. Where and when should reporting metrics be determined?

While FLISR could be a valuable method of reducing outages, the unanswered questions around distribution of customer benefits and the widespread rollout need to be answered. One option for the Commission would be to delay certification of FLISR until Xcel comes forward with a comprehensive FAN/AMI rollout plan, perhaps in November of 2018. This would allow the Commission and stakeholders the opportunity to assess FLISR as part of a distribution system *plan* instead of as a standalone investment.

Should the Commission decide to certify FLISR, staff recommends that the Commission make it explicit that the FAN is not certified at this time. In this report, Xcel has only asked for certification of FLISR, and while FLISR is dependent on the FAN, there is not enough information in the record to determine whether certification of the FAN is warranted at this time.

Reliability Metrics

Several different reliability metrics and reports were mentioned, and Staff provides the following clarifications. Xcel is subject to two annual reliability standards: its Quality of Service Plan (QSP) tariff and its annual report on reliability and service quality (required for all investor owned utilities by Minn. Rules). Xcel's QSP tariff is a set metric which Xcel must meet on a statewide level. The QSP tariff compensates customers who experience prolonged and/or multiple outages. The QSP standard is a fixed standard that does not vary from year to year. In contrast, the reliability standards required by Minn. Rules are based on a five year rolling average, and are calculated by work center. There seems to be some confusion among parties and Xcel about which standards should be used to evaluate the FLISR proposal. If the Commission decides to certify FLISR, staff recommends that, for clarity, Xcel submit a compliance filing using the Minn. Rules version of calculating reliability standards for all applicable reliability metrics discussed in its petition and various IRs. Staff would also support adding any reporting requirements on FLISR to Xcel's annual service quality report.

Docket 17-775: Residential Time of Use Rate Design Pilot Program

Background

On November 11, 2017, Xcel submitted its Petition for approval of a Residential Time of Use (TOU) Rate Design Pilot Program. In its Petition, Xcel described the features of its pilot proposal, including the rate design, pilot components, and the implementation plans to bring it forward to residential customers.

Xcel noted in its Petition that its implementation of the pilot is contingent on affirmative Commission actions in both the grid modernization filing certification request, as well as this current TOU pilot Petition. Xcel stated that if the Commission certifies the TOU pilot, it would then request cost recovery through the next Transmission Cost Recovery (TCR)/Grid Mod Rider filing. Xcel specified that the majority of the investments for the TOU pilot program were not a part of the Company's recently approved multi-year rate plan. Therefore, Xcel explained that to the extent any of these costs are not approved in the TCR, Xcel would stop the pilot process and wait for a future rate case to bring the pilot and any remaining costs forward.[70]

In its Petition, Xcel requested the Commission:[71]

- Approve its proposal for implementing a Residential TOU Rate Pilot;
- Approve its proposed pilot Tariff;
- Approve its request for certification of the Residential TOU Rate Pilot; and
- Approve its requested accounting treatment.

In developing its proposal, Xcel stated it began with a review of the enabling statute, reviewed the development of prior regulatory proceedings, retained an external subject matter expert, engaged stakeholders, performed market research, and surveyed other programs for best practices to inform the pilot's design. [72]

Xcel noted that its residential TOU pilot emerged from the Alternative Rate Design (ARD) Docket, No. E002/M-15-662, which arose out of a settlement between parties during the Company's electric rate case filed in 2013. Xcel explained that parties and stakeholders in the ARD contributed to the public record in this proceeding through written comments, and also participated in workshops exploring the potential, both positive and negative, of various alternative rate designs.[73]

To advance this initiative, Xcel sought external subject matter expertise and retained Lon Huber, a senior director at Strategen Consulting, to facilitate. In addition, Xcel collaborated with Great Plains Institute (GPI) and Center for Energy and the Environment (CEE) to convene stakeholders meetings over a five-month period.[74]

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70 Docket 17-775, Xcel, Initial Filing, pp. 1-2
71 *Id*., p. 2
72 *Id*., p. 7
73 *Id*., p. 8
74 *Id*.

According to Xcel, the goals of the stakeholder process were to provide advisory input during the development of the Company's pilot, and to identify and prioritize objectives for the pilot's design. Xcel stated it met with stakeholders on eight occasions, including two large group forums and six working group sessions.[75]

Xcel used market research to increase its understanding of customer interests, knowledge level, and preferences with respect to potential TOU pilot program features. In addition, Xcel stated it deployed an online customer survey to a random sample of residents in the Hiawatha West, the Midtown area of Minneapolis, and the Eden Prairie area.[76]

Existing TOU Rates

Xcel offered an optional residential TOU rate for over 35 years that has low participation. This existing TOU tariff is a two-part TOU rate with a twelve-hour on-peak period of 9:00 am to 9:00 pm weekdays except designated holidays. According to Xcel, the long on-peak period significantly limits the price response potential by residential customers and long off-peak period impedes a focus on the lowest cost hours. In addition, the existing TOU rate includes an additional two dollar per month customer charge to recover higher TOU metering costs. Finally, Xcel noted that on-peak to off-peak ratio of the current TOU tariff is 3:1, in comparison to the proposed three-part TOU pilot tariff that provides a stronger on-peak to off-peak ratio of over 4:1 described below.[77]

Xcel's TOU Rate Design Pilot Program Description

Xcel's TOU Pilot program would implement new residential TOU rates in two communities of the Twin Cities metropolitan area, and enable customer participation through the deployment of new meters and information services.[78] According to Xcel, the TOU pilot program provides select customers with pricing specific to the time of day energy is consumed, in addition to providing participants with increased energy usage information, education, and support to encourage shifting energy usage to daily periods where the system is experiencing low load conditions. Xcel explained that the TOU pilot uses price incentives to shift load away from peak to reduce or avoid the need for system investments in fossil fuel plants that serve peak electric load.[79]

Goals and Objectives

Xcel outlined that the TOU Pilot program aims to explore the ability to reduce peak demand by providing customers with price signals, and enable customers to shift to off-peak energy use through awareness building, education, and data access.[80]

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75 *Id*., pp. 9-10. In addition to CEE, GPI, and the Company, the working group was comprised of representatives from the Department of Commerce, the Minnesota Office of Attorney General, the Citizens' Utility Board, Fresh Energy, the law firm of Stoel Rives, the Suburban Rate Authority, and Energy CENTS Coalition.
76 *Id*., p. 10
77 *Id*., pp. 25-26
78 *Id*., p. 2
79 *Id*., p. 6
80 *Id*., p. 3

Through the pilot, Xcel plant to study the impact of designed price signals with technology-enabled data on customer usage patterns for a subset of customers, and will share learnings about the effectiveness of these techniques to inform future consideration of a broader TOU rate deployment in Minnesota.[81]

More specifically, Xcel's goals and objectives for the TOU Pilot would include the following learnings on which to inform consideration of a broader TOU deployment:[82]

- Adequate Price Signaling to Reduce Peak Demand;
- Effective Customer Engagement Strategies;
- Customer Impacts by Segment;
- Attainment of Demand Response Goals; and
- Integration of Pilot Elements in Xcel's Service Territory

Pilot Size and Duration

Xcel proposed that the TOU pilot would be operated for two years, likely beginning in Q1 2020, and the TOU pilot rate implementation would begin for all treatment group participants simultaneously, enabling a common twenty-four month period of study for the pilot.[83]

Xcel proposed TOU Pilot program deployment to approximately 10,000 customers in two geographic areas: customers served out of the Hiawatha West/Midtown substation in Minneapolis, and the Westgate substation in Eden Prairie and surrounding communities. According to Xcel, participation in the TOU Pilot would be split with roughly equal numbers, approximately 5,000 from Hiawatha West/Midtown and 5,000 from Westgate. Additionally, Xcel stated the Pilot would include approximately 7,500 customers in the control group, divided between the two areas.[84]

Xcel explained that the Hiawatha West/Midtown, and Westgate Substations were selected because they allowed the Company to capture results from a diverse customer population – including a diversity of single family and multifamily homes, home sizes, both high and low energy users, and a range of household incomes. Xcel specified that the selected substations also would possess the enabling technology allowing the most efficient use of Advanced Metering Infrastructure (AMI).[85]

Customer Eligibility

Xcel's pilot design excluded certain customers in the targeted pilot areas, due to the additional complexity of serving them. Xcel explained that the additional complexity is based on limitations of its current billing system capabilities as well as the incompatibility of existing rate

81 *Id*.
82 *Id*., pp. 13-15
83 *Id*., p. 19
84 *Id*., p. 16
85 *Id*.

designs with the TOU pilot structure. Xcel estimated that the impact of these combined exclusions would cause between 1 and 2 percent of the potential populations to be ineligible.[86]

The excluded customers include those on:

1. Net metering service,
2. Residential Electric Vehicle (EV) Service,
3. Limited Off-Peak Service,
4. Energy Controlled Service
5. Medical equipment dependent customers.

Xcel proposed the exclusion of medical equipment dependent customers as a precaution to recognize that energy requirements for medical equipment may be fixed and represent a substantial portion of total household energy usage.[87]

Xcel stated that excluding these customers is reasonable for three primary reasons:[88]

- The exclusions will results in a minor impact on the Pilot;
- Combining TOU rates with these services is not reasonably practical; and
- Customers in the excluded categories have other opportunities.

Xcel would select the households for participation in the pilot, nearer to the time the pilot is implemented, based in part by the following deployment planning factors:[89]

- Strength of communications to the existing meter prior to replacement to ensure minimal disruption;
- Efficiency of meter deployment crews in dense geographic areas (i.e. maximizing efficiency by installing all meters in a community at the same time);
- Proximity to the substation as there are implications for communications, reliability, and cost;
- Availability of fully tested technical architecture for data collection, processing, integration, and storage prior to deployment;
- Management of pre-deployment customer communications to ensure awareness and increase engagement; and
- Completion of location-specific technical training for employees/contractors engaged in the deployment.

Terms of Participation

Customers in the target areas would participate in the two-year pilot through auto-enrollment with the opportunity to opt-out, and will have an opportunity for a partial bill true-up to flat rates during the pilot.[90] Xcel explained that the opt-out opportunity means participants in the

86 *Id*., pp. 18-19
87 Docket 17-775, Xcel, Reply Comments, p. 4
88 *Id*., pp. 3-4
89 Docket 17-775, Xcel, Initial Filing, p. 18
90 *Id*., p. 3

targeted pilot areas would receive a new electric meter and be auto-enrolled in TOU rates. However, Xcel explained further that Customers retain the ability to opt-out of the pilot and return to flat rates at any time.

The opt-out design was informed by Xcel's experiences in Colorado with its Opt-in TOU rate design program. Xcel noted it is devoting substantial resources to attract volunteers to participate in its TOU pilot in Colorado and it hopes it can devote more resources to facilitating customer education and satisfaction with engaging tools and targeted messages in Minnesota due to the Opt-out design.[91]

Implementation and Administration

Xcel expected to complete contract negotiations with an AMI vendor by the end of 2017 to enable the designing, building, and testing of the IT system to begin in early 2018, with customer engagement to follow in 2019. Xcel anticipated that by Q1 of 2019, the head-end system would be complete, allowing the installation of FAN communications in Q2 of 2019. In addition, Xcel projected that the installation of AMI for pilot participants would begin in Q3 of 2019. Finally, Xcel stated it estimated that the pilot would launch for all participants once baseline data is collected, likely in Q1 of 2020.[92]

Xcel predicted that it would need one dedicated program manager plus a part-time marketing assistant or intern to provide ongoing program administration support, ongoing measurement and verification of pilot results, along with continued customer support, reporting, analytics, education efforts, communications, billing, and the exploration and management of any additional customer insights tools during the life of the Pilot.[93]

Measurement and Verification

Xcel specified that quantitatively measuring the extent of customer demand reduction, as well as related changes in energy use for the pilot population as a whole and segments within the overall population, would require a measurement baseline for comparison. For this reason, Xcel proposed to split pilot participants into "treatment" and "control" populations, with both populations receiving an interval AMI meter. According to Xcel, the "treatment" population would be placed on the new time of use rates, while the "control" population would remain on the current flat rate. Xcel stated that part of the process of identifying treatment and control populations would involve verifying eligibility requirements and identifying if any other customer program participation would conflict with the objectives of the rate pilot.[94]

Xcel explained that building and implementing an M&V plan is a complex task that will benefit from external expertise and resources that can leverage similar work from across the country.

91 *Id*. p. 19
92 *Id*., p. 35.
93 *Id*., p. 36.
94 *Id*., p. 28

Therefore, Xcel detailed that it planned to issue a Request for Proposals (RFP) to hire an expert to develop the detailed M&V plan and implement that plan through the life of the pilot.[95]

Rate Design and Methodology

In its Petition, Xcel provided a description of its rate design and the methodology that supports it, including an overview of the pricing for the pilot, the method for selecting the time periods associated with the pricing, and the seasonal differentials included in the design.[96]

According to Xcel, the proposed TOU rate design would not change the monthly customer charge for pilot participants and the energy charges are designed to recover the same revenue as present energy charges for the residential class average customer. Xcel explained that, to the extent that pilot participants represent the residential class and do not change their energy usage patterns, no material change in revenue is anticipated, and to the extent pilot participants reduce their usage, the reduced sales and revenues would be captured in the Revenue Decoupling Rider calculations. However, Xcel asserted that a revenue requirement impact is expected from the necessary costs, including AMI, required to conduct the pilot study and these costs would be addressed in a forthcoming request for recovery of eligible costs through the TCR Rider.[97]

Selecting TOU Rate Periods

Xcel proposed three TOU rate periods be established: (1) an on-peak period from 3:00 pm to 8:00 pm on non-holiday weekdays; (2) an off-peak period from 12:00 am to 6:00 am on all days; and (3) a middle period for all other hours. Xcel stated that the intention of the on-peak period would be to reduce peak demand by encouraging customers to reduce consumption during peak load hours and the five hour on-peak window was selected to make the design manageable for customers. Furthermore, Xcel asserted that the off-peak period in intended to encourage customers to shift consumption to the lowest system loads when low-cost wind energy is likely to be on the margin. Xcel noted that as more wind is added to the system, the Company anticipates that instances of wind energy on the margin and negative pricing will increase in frequency, especially during the off-peak period. Finally, Xcel clarified that the mid-period, which represents the majority of hours, results in a rate that is similar to today's existing volumetric flat rates.[98]

Pricing Overview

Table *4* below shows rates developed for Xcel's TOU Pilot, as well as the three-tier TOU periods, with a comparison to current flat rates (the pricing inclusive of fuel costs).[99]

Table 4: TOU Pilot Rate Design and Standard Rate Comparison

95 *Id*.
96 *Id*., p. 20
97 *Id*., p. 6
98 *Id*., pp. 21-23
99 *Id.*, Table 5, p. 20

		TOU Ratio	Rates - Cents per kWh		
			Average Monthly	June-September	October-May
TOU Pilot Rate					
On-Peak	3pm-8 pm Weekdays	4.2	23.821	25.949	22.385
Mid-Peak	Other Hours	1.95	11.07	12.125	10.43
Off-Peak	12am-6am All days	1	5.676	5.676	5.676
Standard Flat Rate			12.386	13.437	11.742
TOU Percent Change from Standard Rate					
On-Peak	3pm -8pm Weekdays		92%	93%	91%
Mid-Peak	Other Hours		-11%	-10%	-11%
Off-Peak	12am-6am All days		-54%	-58%	-52%

Notes: 1) Rates include fuel cost, 2) On-Peak excludes designated holidays

Xcel explained that the on-peak price level compared to the off-peak price level provides a 4:1 on-peak to off-peak ratio. According to Xcel, the summer on-peak rate reaches 25.949 cents per kWh, which provides a strong price signal for demand reduction. Xcel described that the TOU rates produce symmetry in pricing with each period effectively doubling to get to the peak rate, and the price for most hours is 10 percent less than the current flat rate, which provides mid-peak savings to participants.[100]

Xcel derived the energy rate design from what it referred to as "the Cost Duration Method." According to Xcel, the Cost Duration Method aims to link the recovery of system costs to the time periods during which system assets are being utilized.[101] The resulting rates are intended to meet two objectives: 1) send a time-differentiated price signal and 2) reflect the costs of the underlying assets used to meet demand at those times (i.e. cost causation).[102] Notably, Xcel selected a time period for the on-peak window that correlates to the Company's forecasted "net peak load hours in year 2024.

Xcel provided a detailed discussion of its Cost Duration Method as well as the underlying load forecast data in Attachment E of Xcel's Petition. Specifically, Xcel included a step-by-step explanation of how it assigned costs to specific hours.[103] Staff notes that Xcel used its 2017 Cost of Service Study (MN CCOSS 2017) for the revenue requirements to be allocated to each TOU period. Thus, the resulting rates are derived from Xcel's system load duration curve and system costs at each hour, and the costs that are assigned are based on the total Residential Production and Transmission costs during the peak period.

Seasonal Differentials

100 *Id*., pp. 20-21
101 *Id*., p. 20
102 *Id*., Attachment E, Page 1 of 8
103 *Id*.

Xcel detailed that developing the appropriate seasonal price differentials for each of the three proposed TOU rate periods, which are consistent and compatible with the seasonal rate differentials in established rates, was another important objective of the TOU rate design. Xcel posited that no seasonal differential was recommended for the off-peak rate to recognize the minimal cost and load differences throughout the year for the proposed 12 to 6 am off-peak rate period. In addition, Xcel identified that the same seasonal rate differential as for existing flat rates was used for the mid-peak rate period to recognize the rate level similarity with proposed mid-peak rates. Finally, Xcel stated that the on-peak seasonal differential was calculated such that the residential TOU load weighted average seasonal rate differential for proposed TOU rates matched the existing flat rate differential.[104]

Savers' Switch Discount

Xcel's Saver's Switch program provides a discount to Residential Service customers with central air conditioning in exchange for Xcel's control of their air conditioner. An additional discount is also available if these customers have an electric water heater that is controlled. According to Xcel, the Saver's Switch program is not available to customers receiving service through the existing Residential Time of Day Service tariff.[105]

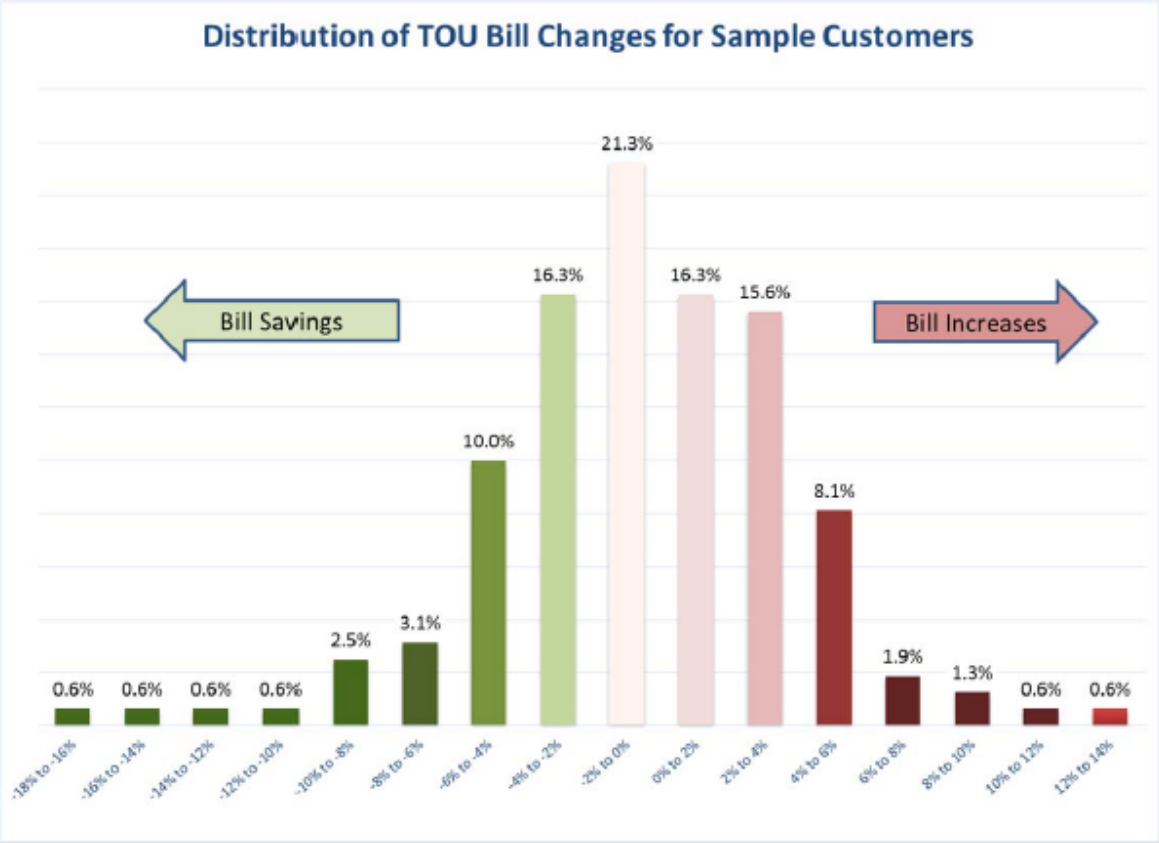
Xcel's proposed TOU Pilot program includes a revised rate design for a Saver's Switch discount. Xcel described the revised Saver's Switch discount for TOU participants as a monthly $10 bill credit applied during the billing months of June through September and an additional indirect discount through reduced on-peak usage that avoids pricing at the TOU pilot on-peak energy rate. According to Xcel, the revised Saver's Switch discount for TOU pilot participants also includes a discount for customers that have controlled electric water heating in the form of a monthly credit applied each billing month.[106]

Distribution of Customer TOU Bill Impacts

The proposed TOU rates were designed to produce the same energy revenue as the flat rate. Xcel examined the bill impact of the TOU rates for sample customers by comparing standard flat rate bills and proposed TOU rate bills using the sample customers' individual hourly loads for the year 2016. Xcel assumed customers made no changes in usage patterns. The results of this analysis is Attachment G of Xcel's Petition, and included a graphical distribution of TOU bill changes for sample customers, shown below:

104 *Id*., pp. 24-25
105 *Id*., p. 25. See also Attachment F
106 *Id*.

Figure 6



As shown by Figure 6 above, some customers are expected to incur bill increase – again, assuming no changes in energy use – while others are expected to enjoy bill savings. Overall, as Table 5 below (also from Attachment G) illustrates, the weighted rate impact for all sample customers was a 0.5 percent rate decrease. According to Xcel, the proposed TOU rates provide a reasonable range of bill impacts.[107]

Table 5

Annual KWH Range	Population Weighting	Average TOU Bill Change
0 - 2,999	22.687%	-2.5%
3,000 - 6,999	38.149%	-0.2%
7,000 - 10,999	21.485%	0.6%
11,000 - 16,999	12.587%	1.0%
17,000 - 199,999	5.091%	-1.5%
200,000 +	0.001%	-3.3%
Population Weighted	100.0%	-0.5%

107 *Id.*, pp. 25-26. See also Attachment G

Customer Engagement

Xcel would prepare pilot area participants with communications prior to the pilot launch, support time-shifting energy use behaviors with education and support throughout the pilot, and enable meaningful evaluation through customer surveying before, during, and after the pilot.[108]

Furthermore, Xcel identified four main outreach categories:

1. Audience, ensuring that communications are targeted and designed in a way that reaches the relevant customer segments;
2. Channels, using prime channels to reach the targeted audience;
3. Timing, addressing the frequency, duration and sequencing of messaging in preferred channels to reach the target audience; and
4. Packaged content, the actual messaging content that is delivered to customers at each stage of the engagement.[109]

Xcel proposed to group customer information and engagement efforts into two phases designed to create a positive customer experience and help the Company better understand customers' interests, concerns and response to new meters and TOU rates. In Xcel's proposal, phase one would focus on the meter installation, including effective change management and phase two would focus on the new rates, raising awareness and sharing tools and education materials to facilitate increased customer knowledge and positive participation.[110]

Bill Protection

While significant adverse bill impacts were not anticipated in the TOU pilot's design, Xcel warned they may be possible. In order to maintain customer satisfaction and avoid major or unanticipated billing impacts for customers, Xcel reasoned some billing protections were important to the success of the pilot.[111]

Xcel stated it would mitigate adverse bill impacts from all pilot participants in Year 1 of the two-year pilot. If, after the first year of pilot participation, the difference between a customer's standard flat rate and the new TOU pilot rate exceeds a 10 percent increase, Xcel stated it would provide an on-bill credit for the amount of difference greater than 10 percent. If a customer opts-out or moves out of the pilot area during the first year, Xcel stated the customer foregoes this protection. However, this bill protection would terminate after the first year.[112]

In addition, for customers that are LIHEAP recipients, Xcel would provide a full "true-up" to flat rates on a monthly basis for the first year and for the second year, LIHEAP recipients enrolled in the pilot will receive annual bill protection for the amount of difference from flat rates greater

108 *Id*., p. 3
109 Docket 17-775, Xcel, Reply Comments, p. 7
110 Docket 17-775, Xcel, Initial Filing, p. 32
111 *Id*., p. 27
112 *Id*.

than 10 percent. In addition, customers who opt-out or leave the pilot area would forego this Year 2 annual protection.[113]

Advanced Meters

As noted above, participants in the TOU rate pilot would have AMI meters installed at their homes. According to Xcel, the new meters would enable the essential two-way communication and interval data capabilities required for TOU participation and would provide significant benefits to participants, as well as provide a critical learning opportunity for the Company about deployment of a new technology.[114]

Xcel's current residential metering technology provides for communication from metering end points to data aggregating devices upstream. According to Xcel, the initial aggregators gather data from meters within a certain radius and the aggregators then send data to another aggregator, called a Cell-Master, which Finally sends data to a third-party owned database from Landis+Gyr. This data is then provided to Xcel Energy for customer billing, and the communication path primarily occurs in one direction from the meters to the final destination. Xcel explained that the currently installed meters do not have any register level interval data or multiple "bin" time of use functionality and would need to be exchanged for meters that can provide this functionality in order for a residential TOU pilot to be implemented.[115]

As described by Xcel, AMI devices allow for residential meters that have the interval data capabilities needed for a TOU pilot to proceed. According to Xcel, AMI meters would enable the recording of customer energy usage in 5 or 15 minutes increments throughout the day and this data would be aggregated and polled every four hours by the metering head-end system. Xcel stated that this allows for a much more granular view of the customer load and how the residential TOU rates would impact pilot customers, enabling greater energy efficiency and time-shifting usage patterns. In addition, customers would be provided their energy usage data the next day.[116]

Additional operational and reliability functions of AMI include:

1. Voltage input, providing data to the Company's Advanced Distribution Management System (ADMS) to improve the operation of the electric grid;

113 *Id*.
114 *Id*., pp. 29-30
115 *Id*., Xcel stated its existing vendor has some capabilities to extend their network with new meters and communications assets that could enable some TOU in specific areas. Xcel stated it was evaluating options as the current vendor's meter network contract approaches its end. See Attachment H for a cost comparison estimate of a Pilot using AMI versus the alternative approach of upgrading current technology to be able to offer TOU rates (but without the additional benefits provided by the AMI). Xcel summarized that the costs of either approach are similar, with the AMI approach estimated at approximately $11 M and the alternate approach at $9.8 M. the Company proposes to deploy AMI technology for the Pilot, due to the significant benefits contemplated through the Company's AGIS strategy, as described in the Grid Modernization Report.
116 *Id*., p. 30

2. Last-gasp functionality which provides data on an outage when it happens leading to a faster response time during outages and improving reliability and customer satisfaction; and
3. Providing feedback when power is restored to ensure there are no 'nested' areas that might still be out of power during restoration efforts, which increases crew efficiency and improved customer experience.[117]

Pilot Reporting

Xcel stated proposed filing a mid-point report approximately 15 months from the launch of the TOU pilot rates, and a final report approximately 27 months from the launch of the pilot rates. It stated its reports would note progress from key indicators, including participation metrics, peak demand savings achieved, customer bill impacts, and customer satisfaction learnings.[118]

Additionally, Xcel stated its reports would provide an evaluation of the pilot toward achieving its key objectives as known at that time, including an analysis of the price signal effectiveness, the outreach and engagement strategy effectiveness, and learnings about impacts by customer segment.[119]

Party Positions

The Suburban Rate Authority, Citizens Utility Board, Fresh Energy and Minnesota Center for Environmental Advocacy (FE/MCEA), Office of Attorney General and the Department of Commerce filed Comments in response to Xcel's Petition.

Suburban Rate Authority

The Suburban Rate Authority (SRA) supported implementation of Xcel's residential TOU pilot rate design, after appropriate plan development and necessary clarifications were made. The SRA believes that the TOU pilot would yield valuable customer information to Xcel and the Commission and would create opportunities that new technology can afford all residential electric customers. In addition, the SRA stated that incenting residential customers to use electricity at times when generation is cheaper would educate customers and test their willingness to adjust usage habits appropriate to cost.[120] However, the SRA had concerns on the pilot size, customer engagement strategy, bill metrics, and planning for a TOU rate design after the pilot is completed.

The SRA agreed with the Departments and OAG's objection to Xcel's statement that, if its requested TOU pilot costs are not approved in the TCR Rider, the Company "would stop the pilot process and wait for a future rate case to bring the pilot and any remaining costs forward." According to the SRA, Xcel's position holds the residential TOU pilot hostage to a blanket

117 *Id*., p. 30-31
118 *Id*., p. 28
119 *Id*., p. 28
120 Docket 17-775, SRA, Initial Comments, p. 1

request for Rider cost recovery. The SRA warned that such an approach would allow Xcel undue leverage to hold up worthy programs and improvements aimed to benefit Xcel's customers.[121]

Pilot Size

The SRA supported the diversity of customer found in the two test areas, but it requested the Commission consider whether additional areas can be included in the Pilot. While the two service areas may comprise a reasonable cross-section of socio-economic conditions affecting the customer use, the SRA cautioned that Xcel did not explain how it would ensure that the approximately 10,000 pilot participants would reflect the economic and family diversity that is found in these two service areas, particularly with an opt-out pilot plan.[122]

The SRA stated that it was pleased that one of the test areas is within the jurisdiction of an SRA member, Eden Prairie and that the Westgate substation test area also serves customers in parts of Chanhassen and Minnetonka, which are also SRA members. According to the SRA, Xcel notified the three cities of their jurisdiction over potential TOU pilot participants. However, the SRA noted neither Chanhassen nor Minnetonka has any residential customers within the pilot test area.[123]

The SRA raised the issue, on behalf of Chanhassen and Minnetonka, of whether the TOU pilot can expand in area. In addition, the SRA explained that Xcel's opt-out method itself raises the question of whether it will actually deny customers the opportunity to participate if few opt-out in the test areas, or will it expand the pilot group? Conversely, SRA warned that if many more customers opt-out than predicted and the test group falls below 10,000, Xcel may regret not having a third test area or expanded pilot area in Chanhassen and Minnetonka.[124]

Customer Engagement

The SRA noted that, in Xcel's Petition, all of the specific messaging content and methods appear to be under construction. While the SRA explained that this is not necessarily a criticism of Xcel's progress to date, it wished to highlight the fact that the Commission and interested parties should review the strategy and content of customer engagement prior to implementation.

The SRA emphasized that the engagement, acceptance and participation of all residential customers are important to this pilot and to electricity conservation efforts and agreed with the OAG that effective customer communication and education lies at the heart of the success or failure of the TOU pilot. According to the SRA, Xcel's promise to engage in rigorous communication with pilot participants and potential participants does not, standing alone, warrant approval of its customer engagement strategy.[125]

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121 Docket 17-775, SRA, Reply Comments, p. 1
122 Docket 17-775, SRA, Initial Comments, p. 3
123 *Id*., p. 4
124 *Id*.
125 Docket 17-775, SRA, Reply Comments, p. 2

The SRA recommended that, prior to pilot implementation, Xcel should be required to share with the interested parties its specific plan and drafts of what, to whom, when and how it plans to communicate with and educate the diverse base of residential customers who should be allowed to benefit from TOU pilot.[126]

Bill Metrics

The SRA advised Xcel adopt user-friendly charts to educate and incent participants to improve the efficiency of their energy use should be included on their monthly bills. The SRA suggested that Xcel's Sample Bill with a table showing Total Energy, On Peak Energy, Mid Peak Energy, and Off Peak Energy for the billed month could be improved with same information depicted with bar graphs. In addition, the SRA suggested that during second year of the pilot a month to month comparison with the previous year may help the customer gauge improvement or not.

Although the SRA did not know if any of these suggestions would be possible or cost effective, it suggested that additional metrics included on the bill could promote greater customer investment in the pilot.[127]

Post Pilot and Planning

The SRA noted that Xcel did not include in its proposal a plan for those customers that have participated in the TOU pilot, once the Pilot has concluded. The SRA was concerned that Xcel had not provided a transition plan for customers at the end of the pilot in its Petition.[128]

Citizens Utility Board

The Citizens Utility Board of Minnesota (CUB) supported Xcel's proposed pilot and tariff, and recommended the Commission define clear objectives and reporting requirements for the pilot. In addition, CUB recommended that privacy-protected data collected through the pilot process should be made available so that parties such as CUB may better evaluate the pilot as well as consider alternative rate designs and other options.[129]

Customer Engagement

CUB stated that retaining participants in the TOU Pilot program is very important to the success of the pilot. According to CUB, Xcel's Petition had few details about the customer engagement strategies it will employ. CUB claimed it would be unnecessary and probably counter-productive for the Commission to specify engagement strategies that Xcel may pursue. Therefore CUB suggested that, because a TOU rate that reduces peak demand works against the utility's business interest in capital investment, the Commission may wish to consider setting targets around the retention of customers on the TOU rate.[130]

126 *Id*., p. 3
127 Docket 17-775, SRA, Initial Comments, pp. 8-9
128 *Id*., p. 7
129 Docket 17-775, CUB, Initial Comments, p. 1
130 *Id*., p. 3

Pilot Reporting

CUB believed it will be important to understand the effects of the TOU rate on different types of residential customers, to quantify the costs and benefits of the TOU rate, and to measure the impact of specific interventions in helping customers shift their load and reduce their bills.[131]

CUB noted it was not clear from the Xcel's Petition that the time of use rate itself would meet its objective to enable demand response activities. CUB recommended that the Commission direct Xcel to report on the following indicators in mid-point and final reports:[132]

- Participation metrics, including the number of customers who have opted out of the TOU rate.
- Customer bill impacts.
- Customer satisfaction indicators.
- Total peak demand savings achieved by participating customers, and incremental load curve data at an hourly or sub-hourly level.
- Greenhouse gas emission intensity of the energy supplying power to TOU customers versus customers in the control group.
- Measurements of the effectiveness of the customer engagement strategies that Xcel has employed.
- Indicators of the impact of specific interventions in helping customers shift their load and reduce their bills.
- The above indicators should be reported in correlation with customers' ZIP+4 and the household characteristics identified through participant surveys, including income level and household size.

Customer Data Privacy

According to CUB, a large amount of data would be generated through the TOU pilot that would be valuable to Xcel, the individual customers seeking to control their own bills and to parties like CUB seeking to identify the best rates, programs, and policies to serve the public interest. Therefore, CUB proposed that anonymized, individual customer usage data from pilot participants be made available in increments of one hour or smaller and associated with each customer's ZIP+4 as well as income, household size, and any additional characteristics that would be learned through pilot surveys.[133]

Post Pilot and Planning

CUB agreed that this pilot should be undertaken with the assumption that, if it is successful, a TOU rate would be rolled out to all residential customers. Therefore, CUB suggested that Xcel should plan to transition the TOU pilot to a full implantation of a TOU rate for all Residential customers.[134]

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131 *Id*.
132 *Id*. pp. 3-4
133 *Id*., p. 4
134 *Id*.

Fresh Energy and Minnesota Center for Environmental Advocacy

Fresh Energy and Minnesota Center for Environmental Advocacy (FE/MCEA) recommended that the Commission approve the TOU pilot with modifications for the treatment of net metered customers and to the peak period duration proposed by Xcel. According to FE/MCEA, TOU rates would likely reduce Xcel's peak demand, result in overall energy savings as demonstrated in other pilots across the country, drive growth of cost-effective wind generation, and give customers stronger price signals and opportunities to save money and energy.

Treatment of net-metered customers

FE/MCEA recommended that net-metered customers be included as eligible customers in the TOU pilot.[135] FE/MCEA noted that Xcel's Petition proposed to exclude net-metered customers, due to the additional complexity for including them (based on limitations to [Xcel's] current system capabilities) as well as the incompatibility of existing rate designs with the TOU pilot structure. FFE/MCEA submitted that Xcel has not sufficiently explained why including net-metered customers in the pilot would create any "additional complexity" that Xcel cannot resolve.[136]

According to FE/MECA, Xcel includes net-metered customers in the TOU pilot currently operating in Colorado. Thus, FE/MCEA argued that Xcel does has experience regarding how to include net-metered customers in the pilot and has failed to provide any specific differences in Minnesota that would make the inclusion of net-metered customers impracticable.[137]

In addition, FE/MCEA stated that Xcel would miss valuable learning opportunities if it excluded net-metered customers from the pilot, because from a resource perspective, net-metered customers often provide energy to the grid during on-peak or mid-peak periods.[138]

Peak period duration

According to FE/MCEA, Xcel's determination for the duration and timing of its on-peak period using its forecast for the average weekday load in July 2024 is inappropriate for at least four reasons:

- First, the periods should be set according to peak days and hours, rather than average days;
- Second, historical and near-term forecast years should be given more weight than forecasts for years beyond the pilot period;
- Third, if average weekday consumption is considered, it should include both July and August; and
- Fourth, Xcel's proposed peak could inadvertently increase its Midcontinent Independent System Operator (MISO) resource adequacy requirements.

135 *Id*., p. 9
136 *Id*., p. 8
137 *Id*.
138 *Id*.

FE/MCEA asserted that Xcel's proposed peak period of 3-8 pm is both too long and falls too late in the day. Instead, FE/MCEA recommended a peak period of 2-6 pm., because it more accurately reflects Xcel's actual system peak and will make it easier for customers to respond to the rate design, which will both enhance customer satisfaction and increase the reduction in peak demand.[139]

FE/MCEA asserted that Xcel's proposed peak period swaps out a higher-usage hour (2-3pm) for two lower-usage hours (6-8pm) and that FE/MCEA's recommended peak period matches Xcel's actual peak hours more closely than Xcel's recommendation.[140]

FE/MCEA maintained that, whether considering peak days, peak hours, or average summer days, and whether using forecasts or historical data, the four highest-usage hours on Xcel's system are 2-6 pm. Therefore, they asserted that Xcel's proposed peak period is later in the day and longer than justified by the data. They stated further that the historical peak data strongly suggest that Xcel's proposed peak period of 3-8 pm is both too late and too long.[141]

FE/MCEA also disagreed with Xcel's forecast for the year 2024. While FE/MCEA stated they agreed with Xcel that it is appropriate to set TOU periods with any eye towards renewable generation in the future, they argued that there is simply too much uncertainty to rely as heavily on a 2024 net forecast as Xcel did. Given this uncertainty, FE/MCEA stated that the design of peak periods for the pilot should give more weight to historical data and near-term forecasts.[142]

In addition, Fresh Energy argued that, if average weekdays are used, it is more reasonable to include both July and August in the averages, since July and August have been Xcel's two highest-sales months of the year.[143]

Finally, FE/MCEA noted that, in three of the last five years, MISO's system peak has occurred between 3-4pm, which falls within both of recommended peak periods. However, FE/MCEA pointed out Xcel's peak period incentivizes customers to shift load into the 2-3pm hour and MISO's second highest usage hour occurred from 2-3pm. FE/- MCEA warned that if Xcel's TOU program results in increased load from 2-3pm and MISO's system peaks during that period, Xcel's TOU pilot could paradoxically *increase* Xcel's resource adequacy requirements.[144]

Office of the Attorney General

The Office of the Attorney General – Residential Utilities and Antitrust Division (OAG) recommended that Xcel's TOU Pilot Program should be approved, because it is a reasonable step toward reducing system peak demand. Specifically, the OAG recommended that the

139 *Id*.
140 *Id*., p. 2-4
141 *Id*.
142 *Id*., p. 4
143 *Id*., p. 5
144 *Id*., p. 6

Commission should find that the primary objective of a TOU rate is to reduce system peak demand, and that the goals of the TOU pilot are the following:[145]

- determine the prices that will most effectively reduce peak demand;
- identify the outreach and education strategies that are the most effective; and
- understand the potential impact on vulnerable customer segments like low-income customers;

Because Xcel's proposed TOU pilot is designed to be more effective at reducing system peak demand than the existing Time of Day rate, and it is important to explore that benefit for customer, the OAG recommended that the Commission should approve the Pilot with the following modifications to the Pilot program:[146]

- The Commission should require Xcel to provide improved bill protection for customers who self-identify as LIHEAP eligible in the TOU pilot pre-survey, rather than limiting the program to LIHEAP recipients;
- The Commission should require Xcel to track customers who self-identify as LIHEAP eligible separately from customers who are LIHEAP recipients in order to preserve data for analysis;
- The Commission should require Xcel to file a mid-pilot report including information and analysis about the performance of the pilot, the accuracy of the forecasts used to develop the pricing, and the effectiveness of any marketing strategies; and,
- The Commission should consider establishing an enrollment target to reinforce the importance of the customer education program, and further consider establishing a limiting financial incentive for the enrollment target;
- The Commission should set an on-peak period of 2 to 6 pm on weekdays, with the prices set using Xcel's cost duration methodology (the OAG stated it would also support Xcel's proposed on-peak period for 3 to 8 PM);[147]
- The Commission should direct that the TOU pilot be operated with the goal of moving towards rolling out TOU rates to Xcel's entire residential customer base;
- The Commission should require Xcel to explore methods for including net metering and other customers in future TOU rollouts; and
- In the future, significant changes such as new rate designs or new regulatory structures should be developed or reviewed by independent experts. If they are developed by Xcel or experts reporting to Xcel, the Commission should require Xcel to use a transparent method that is fully explained, and convene a stakeholder process to allow input on what the goals and outcomes should be.

The OAG stated it made its recommendation because Xcel's proposed TOU pilot will benefit ratepayers. The OAG explained the TOU pilot is designed to meet the primary goal of TOU

145 Docket 17-775, OAG, Initial Comments, p. 32
146 *Id*.
147 Docket 17-775, OAG, Reply Comments, p. 8

rates—to reduce system peak demand, which should reduce the investments required to meet demand in the future.[148]

Goals and Objectives

According to the OAG, the primary objective of a TOU rate should be to reduce system peak demand, in order to reduce system costs and use the system that exists more efficiently. The OAG also maintained that it is equally as important that a TOU rate accomplish these objectives in a way that maintains or improves customer satisfaction so that customers want to participate in the new rate. The OAG stated that Xcel's TOU pilot should be evaluated based on whether it is designed to achieve this goal.[149]

Accordingly, the OAG recommended that the Commission should find that the primary objective of a TOU rate is to reduce system peak demand, and that the goals of the TOU pilot should be to:

1. Determine the prices and on-peak periods that will most effectively reduce peak demand;
2. Identify the outreach and education strategies that are the most effective; and
3. Understand the potential impact on vulnerable customer segments like low-income customers.

The OAG stated that the primary reason that the Commission should approve Xcel's TOU pilot proposal is that it is designed to meet these goals.[150]

Bill Protection

The OAG stated that Xcel's bill protection proposal is an important part of the pilot that will protect low-income customers from undue harm, except for one significant limitation: Xcel's low-income bill protection program would only give extra protection to customers who receive funding from the Low Income Energy Discount Rider—LIHEAP customers.[151]

The OAG argued that there are many customers who are be eligible for LIHEAP funding, but do not receive it for one reason or another. Therefore, the OAG recommended that the Commission should modify the bill protection program so that all customers who self-identify that they are eligible for LIHEAP funding receive the improved bill protection offered to low-income customers. In addition, given that the Xcel's TOU rate design is a pilot program, the OAG recommended that the Commission should require Xcel to track self-identified low-income customers separately from LIHEAP recipients, and analyze any differences between the two groups to determine whether self-identification is a reasonable way to identify customers for low-income services.[152]

148 Docket 17-775, OAG, Comments, p. 5
149 *Id*., pp. 5-6
150 *Id*., p. 6
151 *Id*., p. 17
152 *Id*., pp. 17-19

Customer Outreach

The OAG advised that customers would only change their consumption patterns in response to new price signals if they are aware of the new rates, and they understand how to interact with them effectively. Therefore, the OAG stated that educating customers about their rates and how to save money by changing their behavior is an essential part of any rate design pilot.[153]

According to the OAG, the effectiveness of the marketing program used to contact customers and educate them about their rates will likely be the single most important factor in determining customer response to the rate. For that reason, the OAG suggested that the Commission might wish to consider establishing a performance target for the education and outreach component.[154]

The OAG stated that the effectiveness of Xcel's education and outreach will directly impact the enrollment rate for the program. For that reason, the OAG suggested that a metric for the enrollment rate may be an effective way to encourage a strong education and outreach program. If the Commission agrees that high enrollment is a desired regulatory outcome, the OAG recommended that Commission consider a metric for the enrollment rate by which to measure the success of the pilot. [155]

Net Metered Customers

The OAG was skeptical of Xcel explanation for excluding net metering customers from the TOU pilot program due to the limitations of Xcel's current billing system capabilities, as well as the incompatibility of existing rate designs with the TOU pilot structure. The OAG stated that such skepticism was warranted, because Xcel has found a way to include net metering customers in its TOU pilot in Colorado without apparent trouble.[156]

Despite this skepticism, the OAG stated it may be reasonable to exclude net metering customers from this limited duration pilot because net metering customers have invested in solar PV with certain assumptions about their rates and changing the underlying rates could have unexpected impacts on the payoff periods they expected when investments were made. In light of this concern, and the limited number of net metering customers in Xcel's service territory, the OAG concluded that Xcel's decision to exclude net metering customers appears reasonable at this time.[157]

However, the OAG stated that any future broad rollout of TOU rates should include the largest possible customer group. Toward that end, the OAG recommended that the Commission should direct Xcel to investigate what steps would be necessary to include net metering and other customers in the future.[158]

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153 *Id*., p. 20
154 *Id*., pp. 20-21
155 *Id*., pp. 21-22
156 *Id*., p. 23
157 *Id*., pp. 23-24
158 *Id*., p. 24.

Peak Period Duration

The OAG noted that FE/MCEA proposed an alternative on-peak period from 2 to 6 pm, rather than Xcel's proposed period of 3 pm to 8 pm The OAG advised that FE/MCEA alternative on-peak period from 2 to 6 pm is worth considering. The OAG stated it supports Fresh's proposal because it seems reasonable to rely more heavily on the near-term years of the forecast, and specifically on the forecast years in which the pilot will actually be operating. In addition, the OAG stated that it is likely that a 2 to 6 pm on-peak period will be easier for customers to respond to than a longer, later period as Xcel proposed. The OAG explained that a peak period that is shorter in duration and which ends earlier in the day is better—as long as it still aligns with the system peak—because it provides customers with more options for delaying their consumption to the mid-peak period.[159]

The OAG stated that deciding between the two proposals comes down to determining how to weigh historical data, near-term forecast data, and long-term forecast data. The OAG concluded that Xcel's proposal would be superior when applied to 2024 and further out in the forecast, and in the alternative, FE/MCEA's proposal would be superior when applied to the historical data, and is somewhat better than Xcel's proposal when applied to the near-term forecast years.[160]

The OAG concluded that both Xcel's proposal and the alternative proposal from FE/MCEA would lead to a beneficial TOU pilot and stated it would support either proposal, because either proposal would result in a TOU pilot that would lead to valuable information and be beneficial for customers.[161]

Pilot Reporting

To ensure that information is gathered and shared, the OAG recommended the Commission should establish a robust reporting schedule for the TOU pilot. At a minimum, the OAG recommended that the Commission should require Xcel to file a mid-pilot report after the first year to provide information and analysis about the performance of the pilot. Given the length of the pilot, the OAG stated that it would be helpful to begin analysis of the price signals and marketing tools sometime earlier than the two-year mark, and a mid-pilot report would allow that. The OAG stated that a mid-pilot report should include information about customer consumption patterns, bill impacts, the accuracy of the forecasts used to develop the pricing, and the effectiveness of different customer education strategies that have been employed. The OAG also suggested that Commission might wish to consider monthly reporting for a limited number of statistics, such as enrollment percentage and customer bill impacts.[162]

159 Docket 17-775, OAG, Reply Comments, pp. 2-6
160 *Id*.
161 *Id*.
162 Docket 17-775, OAG, Initial Comments, p. 19

Post Pilot Planning

The OAG advised that the pilot would be a trial run to identify any problems and correct them, so that the TOU rate could be extended to all of Xcel's customers in the future. In order to achieve the reductions in system cost that a TOU rate can provide, the OAG stated that the TOU pilot should be specifically designed to move towards that goal, rather than as a discrete experiment that will end after two years.[163]

The OAG recommended that Commission include language in its order directing Xcel to gather data and conduct analysis on how to roll out a TOU rate more broadly, after the pilot is complete.

Other options for TOU rate design that the OAG mentioned which the Commission may wish to consider in the future are a lower customer charge, peak time rebate program (PTR) and critical peak pricing (CPP). The OAG advised that reducing the customer charge in a TOU rate allows sharper peak to off-peak ratios, which can send a stronger price signal and may result in greater reductions to peak demand. If the TOU pilot does not perform as expected, the OAG recommended that Commission should consider a reduction in the customer charge as one tool that could be used to increase its performance in the future.[164]

As described by the OAG, a PTR program allows customers to receive small rebates for reducing their consumption during specific, very limited windows during high peaks. It is worth discussing additional components such as PTR for future TOU roll out, because there is some evidence that they can increase the effectiveness of a TOU rate, although they could also increase the complexity of the rate design for customers.[165]

Similarly, the OAG stated that a CPP dramatically increases prices during a similarly short window, and with similar notice standards as the PTR. According to the OAG, there is some evidence that a CPP rate can increase the effectiveness of a TOU rate and, in comparison to PTR, a CPP rate is somewhat easier to explain to customers. If the Commission considers a CPP at any point, the OAG recommended that consideration should be limited to an opt-in program only, because it can cause a significant hardship for customers who do not understand the rate, or who cannot respond to it.[166]

Department of Commerce

The Department recommended that the Commission approve Xcel's proposed TOU Pilot.[167] In its initial comments, the Department requested the following additional information from Xcel in its Reply Comments:[168]

163 *Id*., p. 22
164 *Id*., pp. 24-25
165 *Id*., p. 25
166 *Id*., p. 26
167 Docket 17-775, the Department of Commerce Reply Comments, p. 3
168 Docket 17-775, the Department of Commerce Comments, pp. 17-18

- Clarify, for each class of customer that Xcel proposes to exclude, the precise reasons Xcel proposes to exclude them from participation and more specifics on why inclusion would create the "additional complexity" cited in Xcel's petition;
- Provide more information on how the Company intends to collect sufficient baseline data given the short anticipated timeframe between when meters would be installed and TOU rates would go into effect;
- Address the Company's proposed treatment and handling of Pilot participants who become past due customers during the Pilot;
- Clarify how customer arrears repayment programs and low-income discounts will be applied to eligible TOU participation;
- Clarify whether it would need a dedicated staff member, whether this proposal would use existing staff or require hiring new staff, and why Xcel would need to recover additional internal labor costs beyond what is recovered in base rates;
- Provide a more concrete post-pilot plan for treating customers;
- Provide more information on what the Company proposes regarding the potential overlay of other alternative rate-design options—when the Company would issue the RFI/RFP, what the RFI/RFP would request, when Xcel would come forward with additional rate design offerings to compliment TOU rates, and how Xcel contemplates complimentary offerings interacting with TOU rates); and
- Provide a tentative list of the exact metrics the Company proposes to report in its two TOU reports (to be filed 15-months and 27-months after the TOU pilot begin) and more information on how Xcel expects the metrics to inform future decisions.

The Department stated it would provide complete recommendations and may offer additional recommendations upon review of Xcel's reply comments. The Department chose not to file supplemental Comments after Xcel's Reply Comments. Therefore, Staff assumes the Department had no additional concerns in regard to Xcel's TOU Pilot program.[169]

In its Reply Comments the Department stated it is indifferent to whether the Commission sets the on-peak period according to Xcel's proposed period from 3 to 8 pm or Fresh Energy and MCEA alternative period from 2 to 6 pm.[170]

Additionally, The Department stated it did not support inclusion of net metered DG customers in the Pilot because the number of such customers may be small enough that meaningful information will not be available, and most importantly because of potential rate impacts. However, the Department supported the OAG's recommendation that future inclusion of net metered customers be more fully explored.[171]

Finally, the Department stated that it could see some benefit in evaluating self-identified low-income customers and additional income protection for these customers may result in continued participation from customers who would otherwise opt out of the Pilot. The

169 *Id*.
170 Docket 17-775, Department, Reply Comments, p. 2
171 *Id*., p. 25

Department did not object to the OAG's proposal and agreed that self-identified low-income customers should be tracked and studied separately from LIHEAP participants.[172]

Xcel Reply Comments

In Reply Comments, Xcel responded to the other parties Comments and addressed recommendations for modifications to its TOU Pilot program.

Project Size

In response to the SRA's concern that the Westgate substation boundaries encompasses portions of Chanhassen and Minnetonka, but neither city has any residential customers within the pilot test area, Xcel stated that, according to its records, there are more than 2,500 residential customers in Minnetonka and 2,300 residential customers in Chanhassen. In addition, Xcel did not know how many customers from these communities will be selected for participation in the Pilot, because the Pilot is still pending regulatory review, and there has been no direct communications to customers.[173]

Customer Eligibility

Xcel stated that excluding customers on net metering service, Residential EV Service, Limited Off-Peak Service, and Energy Controlled Service from participation in the Pilot to avoid the complex process of combining these rate types with the proposed TOU Rate service is reasonable for three primary reasons.[174]

- The exclusion would result in a minor impact on the Pilot because of the relatively few customers receiving these services;
- Combining TOU rates with these services is not reasonably practical, given the complexity of administration and system investments needed to serve a very small number of unique customers; and
- Customers in the excluded categories have other opportunities. For example, Xcel stated that customers already have the option to take service under its existing time-of-day tariff and EV customers already have an option to isolate their EV to receive favorable rates for off-peak EV charging under the Residential EV Service tariff. In addition, Customers with EVs who are not taking service under an EV-specific tariff are free to participate in the Pilot.

Net Metered Customers

According to Xcel, the billing of net metering customers on the currently existing TOD rate requires 11 separate meter readings and any new meter readings would necessitate new system algorithms to be determined and applied through every calculation. Xcel explained further that net metering customers represent a very small subset of total customer and their inclusion would result in a large amount of complexity for a small amount of additional

172 *Id*., p. 3
173 Docket 17-775, Xcel, Reply Comments, p. 6
174 *Id*., pp. 3-4

learnings, due to the small population. In addition, Xcel asserted that the customer sample size for net metering customers would limit any firm conclusions from the Pilot for net metering customers.[175]

Finally, Xcel stated that while the TOU Rate Pilot currently operating in Colorado does not exclude net metering customers, that Pilot is unique in that it arose through a settlement, is structured as a voluntary opt-in framework, and serves a population with a higher penetration of photovoltaic (PV) systems than in Minnesota.[176]

Customer Engagement

Xcel provided additional context surrounding our customer engagement in Attachment A to its Reply Comments. Xcel reiterated that the its plan is a preliminary, working plan, which is subject to change based on additional research, testing, new tools, new customer insight platforms and plan refinement as it gets closer to launching the Pilot.[177]

In response to suggestions from CUB and the OAG, Xcel argued that enrollment targets are unnecessary to incentivize the Company to commit to customer outreach and engagement. Xcel was confident that it will have strong participation in the Pilot and that opt-out proposals are known to be an efficient means of acquiring and retaining a statistically significant sample for evaluation purposes. Xcel cautioned that focusing on a specific participation target may take focus away from learning how the TOU rate structure impacts peak demand, testing approaches to engage with customers, and other issues of Pilot operation. Xcel stated that this knowledge will be more useful for a potential wider rollout of TOU rates than ensuring a certain participation level in this limited Pilot.[178]

Bill Protection

Xcel agreed with the Department's proposed modifications to the Company's tariff to ensure it was in clear alignment with the Pilot proposal with respect to treatment of LIHEAP recipients. Xcel included an updated version of the modified language as Attachment B to its Reply Comments, incorporating the Department's recommendation and providing additional tariff language to address what happens if the customer starts to receive energy assistance after the pilot has begun.[179]

In response to the Department request for clarification about how customers who fall behind on their bills will be treated when it comes to bill protections, Xcel stated that the Pilot will have no effect on customer options or Company response to non-payment. According to Xcel, the bill protection mechanism will true-up the customer to flat rates (if flat rates would have been favorable) according to the terms described in the proposed tariff, but the true-up will not provide any bill forgiveness. If a customer falls behind on bills and is LIHEAP-enrolled, Xcel stated they can also apply for Power ON benefits, which provide bill repayment assistance. Xcel

175 *Id*., pp. 4-5
176 *Id*., p. 1
177 *Id*., pp. 6-7. See also Attachment A to Xcel's Reply Comments.
178 *Id*., p. 14
179 *Id*., p. 9. See also Attachment B to Xcel's Reply Comments

explained that customer participation in the pilot will have no impact on this option and noted that customers retain the option to opt out of the pilot at any time.[180]

Finally, Xcel did not support the OAG proposed modification that would extend the enhanced level of bill protections to all customers who identify as LIHEAP eligible during the surveying process for five primary reasons:[181]

- LIHEAP provides a low-cost, independent verification process to ensure that those that need electric assistance receive it;
- All customers in the Pilot will receive bill protection, not just LIHEAP recipients. While LIHEAP customers will receive the highest amount of protection, non-LIHEAP customers will also receive the true-up for bill impacts that exceed a 10 percent variance from flat rates at the end of year one;
- The expected overall impacts of the Pilot will be low, as the rates are designed to be revenue neutral, with savings opportunities during off peak offsetting higher priced peak periods;
- The Company is taking the extraordinary step in this instance of assessing potential eligibility for LIHEAP in the pre-Pilot phase and directing those identified to LIHEAP application materials;
- All participants retain the ability to opt out at any time.

Peak Period Duration

Xcel maintained that the proposed 3 to 8 PM on-peak period considered and balanced several factors to determine what would be the most appropriate and cost-effective design for the eventual application to all or most residential customers. Xcel argued that selecting an on-peak period using system peak loads from several years prior (e.g. 2012 -2016 peak day figures) to the possible wide-spread application of the residential TOU tariff is not reasonable. Furthermore, Xcel claimed that using peak periods from prior years limits actionable findings from the pilot, particularly since it provides relatively no recognition of the influence of renewable energy resources. According to Xcel, this approach would miss an opportunity to achieve price signals that more effectively discourage the use of non-renewable resources.[182]

Xcel explained that the basis for using a 2024 net peak forecast was to focus on price signals and customer incentives to minimize reliance on non-renewable generation resources for the supply of system peak loads, which was also a primary stakeholder objective. Xcel contested that FE/MCEA recommendation for an on-peak period from 2 to 6 pm would defeat one of the main purposes of the Pilot as defined by stakeholders, is counter to FE/MCEA's stated goals, and prevents learnings from the pilot to be translatable for post-pilot TOU rate offerings.[183]

In addition, Xcel noted that using a four-hour on-peak period in place of the proposed five-hour on-peak period does not adequately recognize variations in the net peak hours throughout the

180 *Id*., pp. 9-10
181 *Id*., pp. 10-11
182 *Id*., pp. 11-13
183 *Id*.

year, and more importantly, peak loads do not rise and fall that quickly or consistently. Furthermore, Xcel specified that the price and timing of the peak period serve as a customer incentive to shift load out of the peak period to reduce system peak loads and reduce power supply costs. Xcel asserted that a critical concern with selecting a peak period is an excessive amount of load shifting immediately before and after the defined time period, to the point of driving a new peak time outside of an established peak period and a four-hour peak period increases this concern.[184]

Xcel stated that the proposed 3 to 8 pm on-peak period provides a focused and well-supported price signal in balance with providing customers a reasonable opportunity for price response and increasing the cost shift to meet a narrow goal that did not come up in the various stakeholder meetings is not appropriate for this pilot.[185]

Customer Data Privacy

Xcel stated that Customer data would be a critical component in the success of this Pilot, both for the Company and customers. Xcel explained the customer data will inform its analysis of the success at reducing peak demands and would allow it to analyze how different customer segments react to the price signals built into the TOU rate structure. In addition, Xcel posited that customers would be better equipped to respond to the price signals and gain the full benefits they can from the Pilot with access to their usage data.[186]

Xcel did not support CUB's recommendation that individual customer data usage should be made available to third parties. Xcel emphasized its privacy policy has provided its customers with the expectation that their data will be kept private and it does not believe the TOU Pilot necessitates changing that expectation.[187]

Xcel argued that CUB's recommendation that individual customer data be anonymized would not be protective enough to alleviate the concerns inherent in the release of this data to third parties. Xcel had concerns that anonymity of individual customer usage data, combined with each customer's ZIP+4, income, household size, and additional characteristic could be easily compromised by simply cross-referencing the customer characteristics requested by CUB with readily available demographic research tools.[188]

Pilot Reporting

Xcel reiterated its commitment to file a mid-period report following year one of the pilot. Xcel repeated its intention to submit two reports, one 15 months after the Pilot starts and another at the conclusion of the Pilot. According to Xcel, these reports will include key learnings and analysis, and will convey the metrics of the Pilot. The compliance reports would contain the

184 *Id*.
185 *Id*.
186 *Id*., pp. 14-15
187 *Id*., pp. 15-17
188 *Id*.

metrics on customer satisfaction and engagement, demand savings, customer bill impacts, energy usage changes and post pilot takeaways.[189]

Xcel was not opposed to providing revenue collection data in its reports as recommended by the Department and it is also not opposed to the OAG's request for information about customer consumption patterns, bill impacts, the accuracy of the forecast used to develop the pricing, and the effectiveness of different customer education strategies that have been employed.[190]

Xcel intends to hire a Measurement and Verification (M&V) consultant to provide guidance in building out a plan to analyze and study the results from the Pilot. According to Xcel, the consultant will be a part of the development of highly detailed metrics for the M&V study.[191]

Furthermore, in response to the OAG requests that the Company track the data for self-identified LIHEAP eligible customers separate from those customers who are LIHEAP recipients, Xcel clarified that it would work with its M&V consultant to develop this metric, if the Commission finds this to be a useful area of study.[192]

In response to the OAG's suggestion for a monthly report providing limited Pilot statistics, Xcel thought monthly reporting of statistics such as enrollment percentages and customer bill impacts would be of limited value. However, if the Commission views more frequent data as important, Xcel stated it would be willing to consider developing a one-page "dashboard" view that could provide a limited number of enrollment statistics and other easily provided data sets[193]

Post Pilot Reporting

Xcel did not present a proposal for rate succession or a transition to a broader rollout at the conclusion of the Pilot, but stated it is open to further evaluation of the possibilities during the Pilot's duration. Xcel agreed that both of the Department's options for either temporarily extending the pilot until new rates go into effect or returning customers to their previous rate plan would be acceptable alternatives as temporary succession plans after the Pilot ends.[194]

In regard to future plans for exploring technologies and rate design proposals that could complement TOU rates, Xcel noted it had begun the process of engaging a robust stakeholder process to discuss and develop new ideas and proposals related to demand response. Xcel claimed that the demand response stakeholder process would be important in the development of proposals that could complement its TOU Rate, and accordingly, it is committed to leveraging the benefits of input gained in that process before charting the course

189 *Id*., pp. 17-18
190 *Id*., p. 19
191 *Id*., p. 18
192 *Id*., p. 19
193 *Id*.
194 *Id*., pp. 19-20

for other tools. Finally, Xcel held that its Customer Engagement plan also describes its openness to additional tools to enhance customer data views during the TOU pilot.[195]

Staff Analysis

Pilot Size

Xcel proposed that its TOU Pilot program would be deployed to approximately 10,000 customers served out of the Hiawatha West/Midtown substation in Minneapolis, and the Westgate substation in Eden Prairie and surrounding communities. In addition to Eden Prairie, the Westgate substation also serves customers in Chanhassen and Minnetonka. According to the SRA, it believed that neither Chanhassen nor Minnetonka has any residential customers that are served out of the Westgate substation and this fact raises the issue of whether the TOU pilot should be expanded to include residential customers in Chanhassen and Minnetonka that are served out of another substation. In Reply Comments, Xcel corrected the SRA and stated that, according to its records, there are more than 2,500 residential customers in Minnetonka and 2,300 residential customers in Chanhassen in the Pilot test area. Staff does not believe that evidence supports expanding the pilot program at this time, but the Commission should monitor both the number and diversity of participants in the Pilot over the duration of the Pilot.

Customer eligibility

Xcel provided a lengthy explanation defending its decision to exclude certain customers from the pilot in its reply comments, so staff will not repeat those arguments here. However, staff will add that it supports Xcel's exclusion of certain customers, in part because this is a pilot, and placing some constraints on the level of diversity in service profiles of the sample population could be beneficial to the evaluation. Xcel might be able to learn more by isolating the price responsive behavior among a more limited and defined set of customers rather than intertwining Xcel's planned sample population with complex service profiles.

The greater number of service profiles that are allowed into the sample population introduces more variability in the results. Xcel has already set up the parameters to compare behavior in the following ways:

- Size of sample: 10,000 customers with 7,500 customers in the control group;
- Income and geography: Two geographic areas, Hiawatha West/Midtown and Eden Prairie/Chanhassen/Minnetonka;
- Duration: Pilot operation of two years; and
- Rate design features: Three-tier rate, opt-out, and 4:1 on-peak to off-peak price ratio.

Some parties urge the Commission to allow more types of customers into the pilot, and those are fair, reasonable claims. It is also possible that Xcel's concerns over billing system complexities are overstated; however, it is not as though Xcel's concern about billing system

195 *Id*.

complexities is an unreasonable one. Clearly Xcel knows the most about the capabilities and limitations of the rules and algorithms within the billing system.

Net Metering Customers

Even though staff agrees with Xcel's choice to exclude net metering customers, staff believes this topic should continue as the design of a broader roll-out materializes. Parties who argue that net-metered customers should be included raise good points, and staff's support for Xcel's choice to exclude them is largely due to the fact that Xcel is in the pilot stage.

One argument Xcel put forth for excluding net metering customers is that they represent a small subset of total customers:

> Net metering customers already represent a very small subset of total customers. Their inclusion would result in a large amount of complexity for a small amount of additional learnings, due to the small population.[196]

Xcel's statement reflects the present landscape, but Xcel also explained that its rate was designed with substantially more renewable energy in mind:

> The 2030 forecast indicates a continuing trend of net system peak loads moving to later in the day, as 2030 forecast solar capacity is approximately double the 1041 MW peak solar capacity for the 2024 forecast. Although capacity from customer distributed generation is not netted from gross system load forecasts, it can indirectly influence the definition of peak hours through its effect on load forecasts.[197]

If the pilot design has a system-wide TOU rate offering in mind, Xcel will likely need to address how to accommodate net metering customers would wish to be on a TOU rate. A common theme throughout Xcel's filings is that billing systems are a barrier to participation. At this time, perhaps the number of net metering customers is too low to add value to meet the pilot's objectives; however, this may not be the case moving forward. Thus, the net metering issue, as well as the capabilities of billing systems generally, could be further explored in the compliance reports Xcel has committed to file.

Customer Engagement

The SRA recommended that, prior to implementation, the Commission should require Xcel to share with interested parties it specific plan and drafts of what, to whom, when and how it plans to communicate with and educate the Participants in Xcel's TOU Pilot Project. The OAG stated that the Commission would benefit from a review of Xcel's detailed education and outreach plan prior to implementing the Pilot. Xcel presented a more detailed communication plan attached to its Reply Comments, which it stated would be subject to change based on additional research, testing, new tools, new customer insight platforms and plan refinements as it gets closer to launching the pilot. Staff agrees that marketing, education and communication

196 Docket 17-775, Xcel, Reply Comments, p. 5
197 Docket 17-775, Xcel, Initial Filing, Attachment E – p. 7 of 8

with participants during the duration of the program will be important to the success of the TOU Pilot. Staff notes that Xcel plans to develop metrics on Customer satisfaction and engagement to include in its mid and final report on the Pilot. Staff believes such metrics will be valuable for judging the success of the Pilot and for the potential planning for a broader rollout of the TOU rate design.

While the Commission may wish to request from parties suggestions for improvements to Xcel's customer outreach plan attached to its Reply Comments, Staff is otherwise unsure that additional review of the materials from other parties is necessary prior to the implementation of the project, given Xcel will include a report on customer engagement both during and after the Pilot. The Commission may wish to consider requiring Xcel to include as attachments to its reports all marketing and educational communications it provided to Participants before and during the Pilot.

CUB recommended that the Commission should consider setting target for the number of Participants in the TOU rate. Xcel disagreed that enrollment targets were necessary to incentivize the Company to commit to customer outreach and engagement. Staff agrees with the Company and again notes that a report on customer numbers during and at the conclusion of the Pilot will help inform planning for a potential future rollout of a broader TOU rate design available to all Xcel customers.

Bill Protections

Xcel agreed to the Department's proposed modifications to the Company's tariff to ensure it was in clear alignment with the Pilot proposal with respect to treatment of LIHEAP recipients and included an updated version of the modified tariff language as Attachment B to its Reply Comments.

Xcel did not support the OAG proposed modification that would extend the enhanced level of bill protections to all customers who identify as LIHEAP eligible during the surveying process for five primary reasons, but stated that it could develop a metric to track the data for self-identified LIHEAP eligible customers separate from those customers who are LIHEAP recipients, Xcel stated that it would work with its M&V consultant to develop this metric. Staff believes that such a metric would be useful for planning of a potential future rollout of a broader TOU rate design available to all Xcel customers.

On-Peak Period

NSPM System Demand and MISO Peak Others

FE/MCEA believe a 2 pm – 6 pm on-peak period is more reasonable because "Xcel's MISO resource adequacy requirements are set according to Xcel's load at the time of MISO's system peak, not Xcel's peak."[198] While true to a degree, Xcel's long-term peak demand forecast in resource planning is still based on the NSP System, and it includes adjustments for future DSM, distributed solar, load management programs, and other variables unrelated to MISO. Once a forecast is developed for the NSP System, Xcel then develops a demand forecast coincident

198 Docker 17-775, FE/MCEA, Initial Comments, p. 7

with the MISO system peak demand, which is done using a regression model that determines the relationship between the *NSP System demand* coincident with the MISO peak demand and the *NSP System peak demand*. So to be clear, Xcel's resource plan is based on its own system, but it accounts for the diversity with MISO's peak and incorporates MISO's next year planning reserve margin, kept fixed for the entire IRP timeframe.

Furthermore, resource planning identifies the size, type, and timing of generating resources well in advance of capacity deficits. MISO resource adequacy requirements only apply to the next MISO planning year; MISO does not set long-term planning reserve margins or coincidence factors.

FE/MCEA further argues that "Xcel's TOU pilot could paradoxically *increase* Xcel's resource adequacy requirements."[199] First, it is unknown whether load shifting that may occur from the 3 PM – 4 pm hour to the 2 pm – 3 pm could have any impact on the MISO planning reserve margin, given the relative size of the hypothetical shifted load in that hour to the overall MISO footprint (which is approximately 135 gigawatts). Theoretically it could possibly have some effect, but in staff's view, there are far too many if's to say conclusively whether or to what extent resource adequacy requirements will be affected.

Second, as the Commission well knows, Xcel has a substantial capacity surplus in the near-term. Xcel, the Commission, and stakeholders will have plenty of time to review the load shifting behavior without worry over insufficient capacity needs. In other words, even accepting FE/MCEA's argument as a reality, it would not require Xcel to add resources anytime soon.

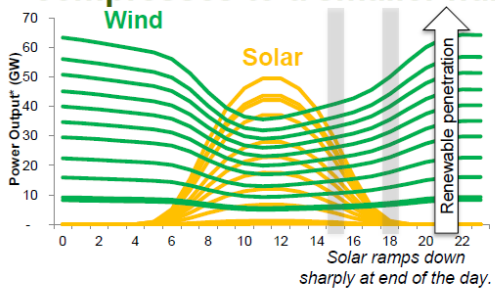
Third, one of the primary elements of Xcel's rate design is to avoid "driving a new peak time outside of an established peak period."[200] Xcel firmly believes that its selected on-peak period is actually a better way to address FE/MCEA's concern.

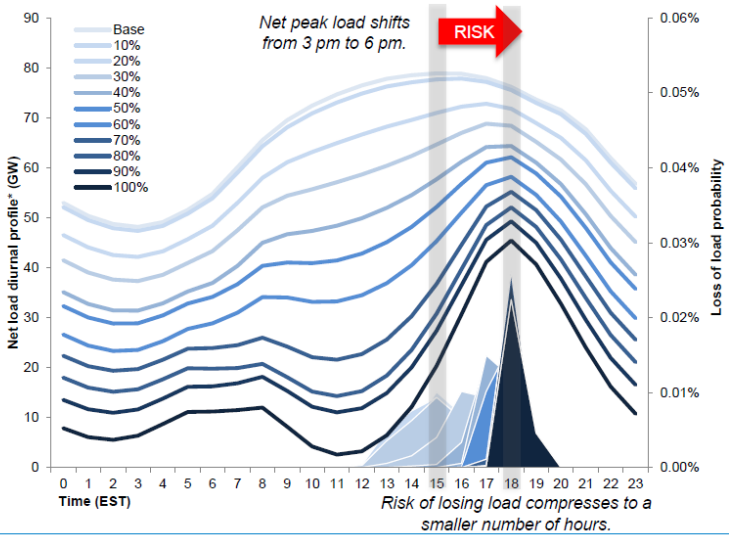
Fourth, FE/MCEA's focus on MISO's top 100 hours deviates from the Cost Duration Method Xcel used to develop the rates. As discussed previously, the Cost Duration Method links costs *on the NSP system* to the time periods during which system assets are being utilized. The distribution of MISO's top 100 hours in 2014-2017, as shown in Figure 4 of FE/MCEA's comments, is not directly comparable to Xcel's system and is therefore inconsistent with Xcel's resource planning methodology, which uses forward-looking forecasts and the NSP load profile.

To the extent the Commission is interested in MISO's peak, staff notes that MISO is currently studying the effect of increased renewable integration, especially solar generation, on MISO's net peak. One recent MISO study found that MISO's net peak could actually shift to the evening, due to risk of loss of load during the "sun-down" hours of the day.[201] As shown by the slides below, at high levels of solar penetration in particular, net peak load could shift from 3pm to 6pm:

199 *Id*.
200 Docket 17-775, Xcel, Reply comments, p. 12
201 https://cdn.misoenergy.org/20180418%20PAC%20Item%2003d%20RIIA174068.pdf

As renewable penetration increases, the risk of losing load shifts and compresses to a smaller number of hours





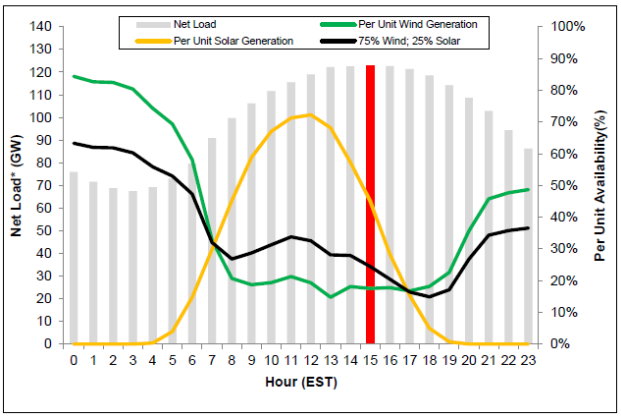
- Probability of losing load is targeted at one day in ten years over all penetration levels.
- While aggregate risk remains constant, the risk in particular hours increases.

*Profile shapes represent hourly averages across all days of the 6 study years.

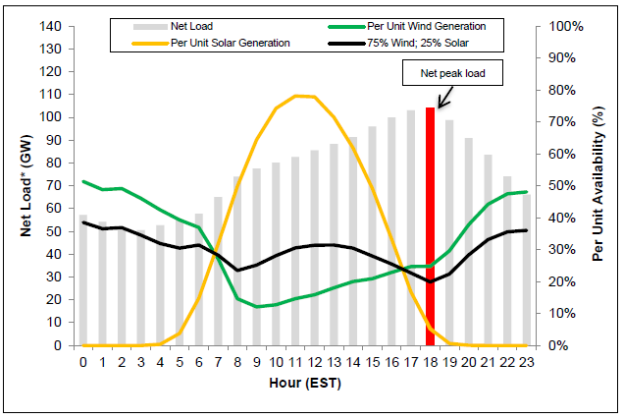
5 RIIA – PAC – 4/18/18 MISO

Technologies and behavior that change load shape could relocate at-risk hours

10% Renewable Penetration



50% Renewable Penetration



*Profile shapes represent the net peak load day averaged across all 6 study years.

10 RIIA – PAC – 4/18/18 MISO

In several instances Xcel refers to the fact that the three-tier rates were designed to account for higher penetration of renewable energy. For example, Xcel explained that its focus on year 2024 forecast data "was a primary focus for the proposed rate design, and is conservative as the year 2030 forecast includes considerably more renewable energy resources and even later peak hours."[202] Another objective of the design was "to encourage customers to shift

202 Docket 17-775, Xcel, Reply Comments, p. 12

consumption to a focused off-peak period of lowest system loads when low cost wind energy is also likely to be on the margin."[203] FE/MCEA may understandably have different opinions about the ideal TOU rate it would prefer, but its own preferences does not necessarily mean Xcel is designing its rates unreasonably; Xcel is merely designing it a slightly different way, which by the way took into account input from a stakeholder group.

Price Signals and Peak Demand Reduction

One of Xcel's stated objectives was to design a TOU rate with an approximately 4:1 on-peak to off-peak price ratio. According to Xcel, this is in line with several recent TOU pilot programs that have established a body of evidence and best practices for successfully designing TOU rates to achieve peak demand reduction.[204] Staff believes Xcel has taken a very reasonable approach in this regard, particularly because it was a "key stakeholder goal."[205] According to Xcel's reply comments, some of FE/MCEA's recommendations would adjust the rates and, in turn, deviate from Xcel's intended 4:1 ratio.

In Xcel's Cost Duration Method analysis, some measures, such as using the month of August or marginal energy costs rather than net system loads, indicated an on-peak period of 2 pm – 7 pm instead of 3 pm – 8 pm. This means there is some variability to the term "on-peak." In staff's view, while some may disagree about what the "right" on-peak period for the NSP system is, Xcel has clearly demonstrated a reasonable approach using empirically sound methods, and Xcel acknowledges that a specific time of day will not be permanent over time. But this is why Xcel is concerned about a limiting the on-peak period to only four hours, which, staff believes, is a legitimate concern.

Compliance Pilot Reports

Many parties had comments and provided recommendations on compliance reports. Xcel committed to file two compliance reports, one 15 months after the pilot starts and another at the conclusion of the pilot.

Also, Xcel frequently refers to measuring customer satisfaction and a customer survey to "gather qualitative customer feedback to understand which engagement strategies have been most effective."[206] Probably because this statement is somewhat vague, the Department requested Xcel "provide a list of the exact metrics the Company proposes to report and more information on how Xcel expects the metrics to inform future decisions."[207] Xcel's list of metrics is provided on page 18 of its reply comments and shown below:

- Customer satisfaction and engagement
    - Measure and track customer satisfaction, preferences, attitudes, acceptance, and comprehension.
    - Better understand drivers for active customer participation.

203 Docket 17-775, Xcel, Initial Filing, p. 23
204 *Id.*, p 21.
205 Docket 17-775, Xcel, Reply Comments, p. 11
206 Docket 17-775, Xcel, Initial Filing, p. 28
207 Docket 17-775, Department, Initial Comments, p. 8

- Demand savings
    - Assess how various customers groups within the Residential class change their consumption behavior during peak times in response to the propose rate structure.
    - Analyze how certain household characteristics impact responsiveness to peak price signals.
- Customer bill impacts
    - Quantify the relative impacts of the TOU rate on customers' bills as compared to the current residential rate.
    - Identify customer groups that are disproportionately impacted either positively or negatively.
- Energy usage changes
    - Measure how various customer groups within the Residential class change their overall consumption patterns in response to the propose rate structure.
    - Determine how consumption changes during off-peak (high renewable hours).
- Post Pilot takeaways
    - Evaluate the new capabilities of advanced meter infrastructure (AMI) meters
    - Assess impact of the TOU rate on the Company's revenue recovery

Customer satisfaction is crucial in this case in large part because, as the Department noted, "any customer who doesn't benefit from TOU rates can simply leave the program."[208] The OAG suggested the Commission consider monthly reporting for a limited number of statistics, such as enrollment percentage and customer bill impacts.[209] Xcel agreed it could provide "a one-page 'dashboard' view that could provide a limited number of enrollment statistics and other easily provided data sets."[210]

While staff might suggest changing the term "dashboard," as provided by Xcel and listed in the decision options, and perhaps not making it a requirement that it be limited to one page, a brief summary report of customer enrollment and other relevant statistics could be good information to have. It could allow the Commission, Commission staff, and parties and stakeholders to monitor the pilot at a high level.

In Minnesota Power's (MP) critical peak pricing pilot, for example, the Commission required MP to file 6- and 12-month compliance reports to report trends in participation rates and, in the 12-month report only, include a customer feedback survey.[211]

In Xcel's case, while monthly reporting might be too frequent, a 6-month report on certain trends, like opt-out rates and, if available, customer satisfaction, would be information that at least would like to know. The types and number of statistics that could also be included is up to

208 *Id*., p. 10
209 Docket 17-775, OAG, Initial Comments, p. 19
210 Docket 17-775, Xcel, Reply Comments, p. 1
211 *In the Matter of Minnesota Power's Temporary Rider for Residential Time-of-Day Rate for Participants in the Smart Grid Advanced Metering Infrastructure Pilot Project*, Docket No. 12-233, Commission Order (February 15, 2017), ordering paragraph 3.

the Commission, but the point would be to check-in earlier than in 15 months. A 15-month report is reasonable timeframe because, like in MP's case, it could incorporate a full year of data, plus allow time for report preparation.

Customer Data Privacy

Staff supports Xcel's commitment to secure and protect its customers' data (or CEUD). Xcel's response to CUB emphasizes the Company's own privacy policy, but staff also notes that the Commission's January 19, 2017 Order in its privacy docket prohibited companies from releasing Personal Identifiable Information. Specifically, the Order required that utilities "shall not disclose CEUD without the customer's consent unless the utility has adequately protected the anonymity of the CEUD."[212] One could argue (and Xcel takes this position) that merely anonymizing the data Xcel collects in this pilot is not nearly sufficient to qualify as unidentifiable. In any case, staff does not believe this TOU pilot is the appropriate forum or docket for debating what is or is not satisfactorily anonymized or for requiring such granular detail to be disclosed.

Post Pilot Planning

Xcel stated it is open to further evaluation of the possibilities for post pilot planning during the Pilot's duration and stated that it had begun the process of engaging a robust stakeholder process for exploring technologies and rate design proposals that could complement TOU rates. Staff suggests that the Commission encourage Xcel to engage stakeholders during the Pilot on its evaluation and learnings from the Pilot and how these learnings may inform plans for a potential future rollout of a broader TOU rate design available to all Xcel customers.

212 E,G-999/CI-12-1344, Commission Order (January 19, 2017), ordering paragraph 2.

TOU Certification Request

Xcel Proposal

Xcel submitted its Petition in conjunction with the Company's Grid Modernization Report in Docket No. E002/M-17-776, which complies with Minn. Stat. § 216B.2425, subd. 2(e) and 8 (the Grid Modernization statute).

In its Petition, Xcel noted it intended implementation of the pilot is contingent on affirmative Commission actions in both the grid modernization filing certification request as well as this current TOU pilot petition. If the Commission does certify the TOU pilot, Xcel stated it would request cost recovery in the Company's next Transmission Cost Recovery (TCR)/Grid Mod Rider filing. Xcel stated further that, to the extent any of these costs are not approved in the TCR, the Company would stop the pilot process and wait for a future rate case to bring the pilot and any remaining costs forward.[213]

Following certification by the Commission, Xcel would seek rider recovery in a forthcoming docket for Pilot costs associated with investments in distribution facilities such as AMI, software and implementation costs, customer engagement costs, and measurement and verification costs.[214]

Xcel asserted that the TOU pilot project falls squarely within the objectives of the Grid Modernization statute as it represents an investment directly linked to the benefits contemplated under the statute. The pilot will increase conservation opportunities for customers, as participants receive advanced metering capabilities which facilitate communication between the utility and customer. This will also service driving on-peak energy efficiency and load-shifting behaviors. Xcel claimed that the TOU Pilot would also enables demand response activities through increased communication capabilities, customer information and education, and targeted price signals.[215]

In addition, Xcel claimed the features of the pilot modernize the grid by enhancing reliability. Xcel explained that the technology selected for this pilot, Advanced Metering Infrastructure (AMI), provides data to the ADMS to improve grid operations and also includes outage reporting functionality that enhances outage response capability and improves reliability. For these reasons, Xcel reasoned the pilot is eligible for certification under the statute.[216]

Technology Procurement

Xcel noted that participants in the TOU rate pilot would have AMI meters installed at their homes. According to Xcel, the new meters would enable the essential two-way communication and interval data capabilities required for TOU participation and would provide significant benefits to participants, as well as provide a critical learning opportunity for the Company about deployment of a new technology. While the scope of AMI capabilities and operational

213Docket 17-775, Xcel, Initial Filing, pp. 1-2
214 *Id*., p. 5
215 *Id*., p. 7-8
216 *Id*., p. 8

and customer benefits are detailed in the Company's Grid Modernization Report, Xcel highlighted key aspects of the Company's technology selection in its Petition, including a discussion of the capabilities of its current residential metering technology (automatic meter reading or AMR) and the key benefits of the new technology.

Costs in Docket 17-776 (Annual Grid Modernization Report and Certification)

Xcel summarized the estimated total TOU Pilot costs in the below tables, which comprehensively represent expected costs for equipment, implementation, and integration. For example, Xcel claimed that the TOU Pilot amounts include costs for items such as the AMI meters, software licenses and support, consulting for program development and measurement and verification, marketing communications, and various integration and customer presentment costs. Xcel noted also that the FAN line item includes both necessary WiMAX and Wi-SUN infrastructure that will also support FLISR, and ultimately all advanced grid technologies, including full AMI. Xcel stated that these costs are based on the implementation timeline that we have outlined, and are subject to change if the timeline or other aspects of our proposed implementation change.[217]

Xcel assigned a portion of supporting FAN costs to the TOU Pilot, because it requires earlier deployment of FAN infrastructure than FLISR. If the Commission does not certify both the TOU Pilot and FLISR projects we propose, Xcel stated it would need to provide updated cost projections for the certified project that properly reflect supporting FAN capital and O&M.[218]

Table 6: Total Estimated TOU Pilot Capital Costs – Capital
State of Minnesota (millions)

	2018	2019	2020	2021	2022	2023-2027	Total
TOU Pilot	$0.5	$6.2	$0.6	$0.3	$0.0	$0.0	$7.6
FAN*	$2.5	$0.5	$0.0	$0.0	$0.0	$0.0	$3.0
Total	**$3.0**	**$6.7**	**$0.6**	**$0.3**	**$0.0**	**$0.0**	**$10.6**

Table 7: Total Estimated TOU Pilot Costs – O & M
State of Minnesota (millions)

	2018	2019	2020	2021	2022	2023-2027	Total
TOU Pilot	$0.4	$1.1	$0.5	$0.5	$0.4	$0.3	$3.2
FAN	$0.1	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1
Total	**$0.5**	**$1.1**	**$0.5**	**$0.5**	**$0.4**	**$0.3**	**$3.3**

** Note: the underlying FAN infrastructure will also support other advanced grid technologies, including AMI.*

217 Docket 17-776, Xcel, Initial Filing, p. 22-23
218 *Id*.

Xcel included limited costs for advanced grid projects in the Company's multiyear rate case, which will serve to offset the total TOU Pilot and FLISR project costs. For example, Xcel quantified that the capital it included for the FAN is nearly sufficient to cover the WiMAX component of the infrastructure needed for FLISR and the TOU Pilot through 2019. For purposes of certification however, Xcel specified it is most important to present an estimate of the full cost of the projects. Xcel stated it would detail the multiyear rate case impacts to the total project costs in its cost recovery request that will follow Commission certification of the proposed projects.[219]

Estimated Costs and Accounting Treatment

Cost Recovery proposal

Xcel estimated total TOU pilot costs of approximately $8 M in capital and $2.9 M in O&M. Upon project certification and pilot approval, Xcel stated it would seek recovery of the majority of pilot costs through the annual Transmission Cost Recovery (TCR) Rider under Minn. Stat. § 216B.16, subd. 7b.

Xcel projected the total costs for the Residential TOU Pilot Program to be approximately $11 million and these estimated costs are detailed at Table 8 below, and represent total program costs.[220]

Table 8: Estimated TOU Pilot Costs

Cost Item	Total	Capital	O&M
FAN - Mesh*	$533,197	$503,177	$30,020
Metering	$4,111,852	$3,858,191	$253,661
AMI Software Licenses	$252,000	$252,000	$0
AMI Software Maintenance and Support**	$120,000	$0	$120,000
Head End	$2,449,409	$2,382,693	$66,716
CRS	$946,400	$922,740	$23,660
Strategen Consultant	$100,000	$0	$100,000
Program Management Labor	$675,000	$0	$675,000
Marketing Communications	$420,000	$0	$420,000
M&V Consultant	$1,200,000	$0	$1,200,000
Customer Data Presentment	$145,000	$141,375	$3,625
TOTAL:	**$10,952,858**	**$8,060,176**	**$2,892,682**

Cost Treatments

As shown in the Table above, Xcel expected to incur costs related to FAN Mesh technology, meters, meter software licenses and support/maintenance agreements, Head End system development, updates to the billing system, and marketing.[221]

219 Docket 17-775, Xcel, Initial Filing, p. 3
220 *Id*., pp. 33-34
221 *Id*.

Allocation of Head End Software Costs

Xcel explained that the AMI Head End software and related integrations are an enterprise-wide software system that is being developed for use by any Xcel Energy operating company that deploys AMI technology. Xcel explained further that for the AMI Head End system, the software assets will be owned by Public Service Company of Colorado (PSCo), an Xcel Energy operating company, since PSCo has a full AMI meter deployment already underway. Xcel stated that the asset carrying cost would be calculated annually, including both the annual depreciation expense as well as a rate of return on the investment and a portion of the asset carrying cost will then be allocated to NSP-MN based on the relative number of AMI devices deployed in each operating company. Xcel stated further that a new cost allocation methodology to support this shared asset cost will be requested in the next annual update of Service Company Allocations.[222]

Other Costs

Xcel included certain installation and integration costs in its estimates in order to represent total costs of the project. Xcel stated further that as the program advances, it will evaluate internal resource availability in order to complete the work and will treat any internal labor expenses consistent with the Commission's Order in Docket No. E002/M-12-50. Xcel stated it would exclude internal labor costs from the Company's request for recovery of the project costs through the Grid Modernization Rider.[223]

Xcel also stated that it had retained an external consultant for help with development of the TOU pilot and plans to amortize these expenses over the length of the pilot.[224]

Recovery Mechanism

Following certification of the TOU Pilot, Xcel stated it would file a request for recovery of certain costs through the mechanism identified in statute: the TCR (Grid Mod) Rider.[225]

Other Parties Comments on Certification and Cost Recovery

Office of the Attorney General

Certification

The OAG recommended that the Commission certify the TOU pilot, because it is a necessary component of moving forward with grid modernization, clearly fits within the grid modernization objectives of the Certification Statute, and is a reasonable expense for rider recovery.

Specifically, the OAG referred to the certification of AMI technology for the pilot as an important component of Xcel's grid modernization initiatives. The OAG argued that in order to realize the full benefits from AMI, advanced rate structures like TOU must be used. Therefore,

222 *Id*., pp. 34-35
223 *Id*., p. 35
224 *Id*.
225 *Id*.

the OAG concluded that in order for the Commission to have a baseline for a cost benefit analysis for a full AMI rollout, it should certify the TOU pilot. Stated another way, one of the primary reasons the OAG recommended certification of the TOU pilot is so it can also serve as a pilot for Xcel's AMI rollout.

Furthermore, the OAG reasoned that the costs of the TOU pilot are likely to be fully incremental to costs included in Xcel's most recent rate case.

Rider Recovery

In its Comments in Docket 17-776, filed at the same time as these Comments, the OAG recommended that the Commission certify the TOU pilot through the biennial grid modernization process outlined in Minnesota Statutes section 216B.2425. If the Commission certifies the TOU pilot, Xcel will be authorized to seek rider recovery of the TOU pilot costs through the Transmission Cost Recovery ("TCR") rider in the future. While rider recovery is not guaranteed, certification is the first step.

The OAG stated that Xcel's position that it would not move forward with the TOU pilot unless it is permitted to recover the costs through a rider (and, presumably, that without rider recovery it will not pursue the TOU pilot - or other programs that are beneficial for ratepayers) is not consistent with the system that Minnesota uses to regulate utilities. The OAG stated that the fact that Xcel is operating under a MYRP does not mean that all of the potential costs not included in the test years should be recovered through a rider. The OAG noted that Xcel recently explained in a different docket that the purpose of the MYRP is "encourage cost containment during the course of the plan." The OAG stated that it is difficult to see how the MYRP could encourage cost containment if Xcel is anticipating that it will be allowed to recover anything outside of the MYRP through one of the twenty or more riders it operates, which now cover, among other items, costs related to fuel, transmission, grid modernization, and renewable energy generation. For that matter, the OAG stated that if Xcel is aware of investments or opportunities that would be beneficial to ratepayers, but chooses not to pursue them because they are outside of a test year, then Xcel is acting imprudently.[226]

In addition to cost containment, the OAG noted that another purpose of the MYRP is to reduce regulatory burden so that Xcel can direct more of its resources to creative concepts like the TOU pilot. The OAG argued that there will be little benefit to reducing regulatory burden from rate cases if Xcel simply chooses not to move forward with new endeavors unless it is guaranteed rider recovery for any costs it incurs outside of a test year.

The OAG warned that Xcel's statements about the TOU pilot and rider cost recovery raise concerns both for this pilot proposal and for the MYRP Xcel is operating under. The OAG recommended that the Commission require Xcel to explain its position in light of the statements included in its Petition, and, if necessary, evaluate its policy on the use of riders and the MYRP.

226 Docket 17-775, OAG, Initial Comments

Advanced Metering Infrastructure

The OAG noted that Commission approval of Xcel's Petition is also approving the first deployment of AMI meters for Xcel's residential customers of any measurable scale. While the Commission will have the opportunity to consider AMI in the future, the OAG stated it is important to recognize that the first steps towards AMI, which will be taken in this pilot, will have an impact on future decision-making as well.

The OAG stated that Xcel's plan for AMI raises several concerns. The OAG stated it is important to recognize and understand how this relatively limited TOU pilot could impact future decisions about installing AMI meters. According to the OAG, this proceeding is not directly about Xcel's future plans for AMI, but decisions about the TOU rate may be the first steps along the path toward making a significant investment in new meters. While it would not be reasonable to delay the TOU pilot until a final decision can be made about the future for AMI, the OAG cautioned that it is important to ensure that decisions about the TOU pilot do not lock in decisions about AMI before the Commission can conduct a full review of Xcel's plans.

Second, because Xcel has clarified that it intends to negotiate and execute agreements for AMI, and then bring them to the Commission for approval, this would not allow the Commission to provide guidance on what functionalities AMI should include. The OAG suggested it may be more efficient for the Commission to provide some guidance on the front end of the process, rather than after Xcel has made all of the decisions.

The OAG advised that moving to AMI is a significant investment for Xcel's customers, and it is important that decisions about how to make that investment are made with care. The OAG suggested that it may be useful for the Commission to consider establishing a process to allow parties and the Commission to have input on the future of AMI before Xcel finalizes all of its agreements. Although the OAG did not present specific recommendations at this time, it stated that it was raising the issue to ensure that the Commission has the opportunity to consider it.

The OAG also stated that it agreed with the Department that because the purpose of certification is to permit a filing for rider recovery, the Commission should limit its certification of the TOU pilot to those costs that are related to actual equipment or facilities, as suggested by the Department.

<u>The Department</u>

The Department stated it did not support Xcel's proposal to recover ongoing program operating and maintenance costs (labor costs) for Stratagen Consulting, Program Management Labor, Marketing Communications, M&V Consultant, and Customer Data Presentment. However, the Department stated that if the Commission approves recovery of the ongoing program operation and maintenance costs despite the Department's concerns, the Department supported recovering these costs over an appropriate amortization period.

Additionally, the Department noted that final decisions regarding rate recovery should be addressed in Xcel's rate recovery petition.

Certification

The Department agreed that, to the extent installation of AMI meters for the purposes of the Pilot enhances the Company's ability to respond to outages, the TOU Pilot complies with the requirement that the investment enhances reliability. The Department also concluded that it is reasonable to permit recovery of the capital investment necessary to carry out the Pilot (the AMI meters), since the TOU Pilot is intended to promote load-shifting from on-peak to off-peak periods and the pilot would help establish whether or not TOU rates are likely to reduce overall energy consumption.

Cost recovery

The Department recommended that, if the Commission approves Xcel's petition, including the certification request, the Commission should note that it is only certifying costs associated with actual equipment (capital investment), and not the more general costs associated with offering the TOU Pilot to customers. Furthermore, the Department recommended that the Commission limit recovery of TOU Pilot costs to the reasonable costs identified by Xcel in this proposal unless or until the Company provides the Commission with additional cost justification.

The Department noted that Xcel is currently under a multi-year rate plan that permits rate increases over several years, and as such should be expected to manage its costs and expenses in such a way as to permit the Company to provide new rate offerings without recovery of every cost component through a Rider. Moreover, the Department stated that Xcel's multiyear rate case extends through 2019, by which time Xcel expects to have installed all AMI meters and before Xcel expect to begin implantation of the TOU Pilot; as a result, recovery of costs of AMI meters through the TCR rider should coincide with the expected implementation of the TOU Pilot.

Thus, the Department agreed that with certification, the Company is free to request TCR Rider recovery of its proposed investments in grid modernization equipment and facilities necessary to offer the TOU Pilot. However, The Department maintained that the ongoing operating and maintenance costs of the TOU Pilot should be within the scope of costs the Company should be able to manage in the course of general business operations and its multi-year rate plan.

Xcel stated that while it appreciated the interest of the DOC and OAG in working through cost recovery questions at this stage, it believed it is premature prior to certification and in the absence of a recovery proposal. That said, Xcel stated that these are new and legitimate costs and the Commission will continue to develop its guidance on certification. Additionally, Xcel stated that rider mechanisms are important tools that allow for efficient recovery of costs to encourage the development of projects that deliver important economic, environmental, and societal goals.

Xcel Request for Additional Certification Filings

Party Comments

Office of the Attorney General

The OAG opposed Xcel's request to file annual certification requests through 2022 as it is not consistent with statutory intent and presents policy concerns.

Statutory Framework

The OAG explained that the Certification Statute, 216B.16, subd. 7b, limits cost recovery through the TCR rider to distribution projects that have been certified under 216B.2425, subd. 2(a), (e). The OAG reasoned that if the legislature had intended for utilities to file certification requests each year, it would have expressively done so, as is the case in other riders.[227] Finally, the OAG stated that it is only the legislature that has the power to create or modify riders:

> The fact that the Legislature has found it necessary to create a variety of riders through statute, in combination with the limits on rate changes found in Minnesota Statutes section 216B.16, suggests that the authority to create and modify riders (and eligibility for rider recovery) resides with the Legislature.[228]

Policy Concerns

Aside from the statutory considerations, the OAG indicated that that the Commission should deny annual certification filings because of two broader policy concerns:

1. Overuse of riders during a multiyear rate case
2. A lack of performance metrics for grid modernization

The OAG noted that Xcel has at least 26 riders for costs ranging from fuel to renewable energy development. However, while riders allow a utility to reduce regulatory lag and recover costs at a lower risk, the OAG pointed out that this is not always good for the ratepayer, as regulatory lag incentivizes cost control.[229] Furthermore, approving projects through riders does not allow regulators to get an adequate picture of the entire utility business, making it more difficult to ensure just and reasonable rates. Finally, the OAG had specific concerns about the expansion of the TCR rider while Xcel is operating under a Multi-Year Rate plan. It pointed out that in the settlement agreement reached in Docket 15-826, Xcel and some parties agreed not to seek out new riders during the MYRP, and the proposed acceleration of the TCR filings is not consistent with this understanding.[230]

The OAG also objected to the lack of performance metrics for grid modernization, specifically a lack of tools that can measure the impact grid modernization improvements are having on

227 The OAG referenced riders under 216B.1635 and .1636, which provide for utilities to recover infrastructure costs.
228 Docket 17-776, OAG, Initial Comments, p. 18
229 *Id*., p. 19
230 *Id*., p. 20

utility performance.[231] Until those metrics are developed, it may be difficult to compare the costs and benefits of different grid modernization efforts, and assess whether they are delivering their advertised outcomes. The OAG used the example of FLISR, which it commented, "may be able to improve the utility's reliability, but it will only do so if the system is operated efficiently, and if the utility modified its operations to take advantage of the new information it obtains."[232] Finally, the OAG pointed to its initial comments recommending a framework for performance metrics for Xcel in Docket 17-401.

The OAG recommended that the Commission not accelerate certification filings, and even consider denying certification requests until the current MRYP concludes and until performance metrics for grid modernization are established.

Department of Commerce

The Department recommended that Xcel be allowed to file a November 1, 2018 certification request only for projects that demonstrates a greater than one benefit/cost ratio for ratepayers. This would ensure that more frequent requests for rate increases through the TCR rider can only be certified if they result in net savings for ratepayers.[233]

Xcel Reply

In reply comments, Xcel reemphasized its position that annual grid modernization reports and certification requests are within the authority of the Commission to permit. While the OAG provided that the statute does not expressively *permit* annual filings, Xcel held that the statute does not expressively *prohibit* the Commission's ability to do so. Xcel pointed to the Commission's prior decision allowing the Company to submit a proposal for the Belle Plaine project before its next report. An annual cycle would allow Xcel to bring forward projects as they are ready to implement, delaying regulatory lag. Xcel did not agree with the OAG's position that annual certification requests would improperly expand the use of riders. Instead, Xcel argued that annual filings will not require a new rider nor would it increase the number of projects that it would bring forward.

Xcel also pushed back against the OAG's determination that the Commission should wait until performance metrics are established, saying that such metrics are used for measuring *post* certification performance, and not for evaluating a proposal. Furthermore, the Company argued that for reliability it is unclear if new metrics are needed beyond the traditional reliability measures such as SAIDI and SAIFI.

231 *Id*.
232 *Id*., pp. 20-21
233 Docket 17-776, Department, Initial Comments, pp. 7-8

Decision Options

TOU Pilot (17-775)

TOU Certification

1. Approve Xcel's request for certification of the Residential TOU Rate Pilot.
    a. Only certify costs associated with actual equipment (capital investment), and not the more general costs associated with offering the TOU Pilot to customers. (*DOC*)
    b. Limit the recovery of TOU Pilot costs to the reasonable costs identified by Xcel in this proposal unless or until the Company provides the Commission with additional cost justification. (*DOC)*
2. Approve Xcel's requested accounting treatment.
3. Deny Xcel's request for certification of the Residential TOU Rate Pilot.
4. Deny Xcel's requested accounting treatment.

TOU Pilot (17-775)

Overall Objectives and Goals

5. Find that the primary objective of a TOU rate is to reduce system peak demand, and that the goals of the TOU pilot are the following:
    a. Determine the prices that will most effectively reduce peak demand;
    b. Identify the outreach and education strategies that are the most effective; and
    c. Understand the potential impact on vulnerable customer segments like low-income customers. *(OAG)*
6. Direct Xcel to operate the TOU pilot with the goal of moving towards rolling out TOU rates to Xcel's entire residential customer base. *(OAG)*

Pilot Approval

7. Deny Xcel's proposal for implementing a Residential TOU Rate Pilot and its proposed pilot Tariff.
8. Approve Xcel's proposal for implementing a Residential TOU Rate Pilot and its proposed pilot Tariff.
9. Approve Xcel's proposal for implementing a Residential TOU Rate Pilot and its proposed pilot Tariff with some or all of the following modifications:
    a. Require Xcel to expand the TOU Pilot test area to include a third test area. *(SRA)*
    b. Require that Xcel should, prior to pilot implementation, be required to share with the interested parties its specific plan and drafts of what, to whom, when and how it plans to communicate with and educate the diverse base of residential customers who should be allowed to benefit from TOU pilot. *(SRA)*

c. Set an enrollment target to reinforce the importance of the customer education program, and further consider establishing a limiting financial incentive for the enrollment target. *(CUB and OAG)*
d. Require Xcel to include net-metered customers as eligible participants in the TOU pilot. *(FE/MCEA)*
e. Require Xcel to explore methods for including net metering and other customers in future TOU rollouts. *(OAG)*
f. Require Xcel to change the On-Peak period for it Residential TOU Rate Pilot to 2:00 pm to 6:00 pm. *(FE/MCEA)*
g. Require Xcel to provide improved bill protection for customers who self-identify as LIHEAP eligible in the TOU pilot pre-survey. *(OAG)*
h. Require Xcel to report anonymized, individual customer usage data from pilot participants be made available in increments of one hour or smaller and associated with each customer's ZIP+4 as well as income, household size, and any additional characteristics that would be learned through pilot surveys. *(CUB)*

10. Direct Xcel to implement the Commission approved Residential TOU Rate Pilot.

Data and Reporting

11. Require Xcel to develop a one-page "dashboard" monthly report of statistics such as enrollment percentages and customer bill impacts, energy usage and other data sets.
12. Require Xcel to include as an attachment to its reports all marketing and educational communications that it provided to Participants before and during the pilot program. *(Staff)*
13. Direct Xcel to report on the following metrics in mid-point and final reports:
    a. Participation metrics, including the number of customers who have opted out of the TOU rate. *(CUB)*
    b. Customer bill impacts. *(CUB)*
    c. Customer satisfaction indicators. *(CUB and Xcel)*
        i. Quantify the relative impacts of the TOU rate on customers' bills as compared to the current residential rate. *(Xcel)*
        ii. Identify customer groups that are disproportionately impacted either positively or negatively. *(Xcel)*
    d. Total peak demand savings achieved by participating customers, and incremental load curve data at an hourly or sub-hourly level. *(CUB)*
        i. Assess how various customers groups within the Residential class change their consumption behavior during peak times in response to the propose rate structure. *(Xcel)*
        ii. Analyze how certain household characteristics impact responsiveness to peak price signals. *(Xcel)*

e. Greenhouse gas emission intensity of the energy supplying power to TOU customers versus customers in the control group. *(CUB)*
f. Measurements of the effectiveness of the customer engagement strategies that Xcel has employed. *(CUB)*
g. Indicators of the impact of specific interventions in helping customers shift their load and reduce their bills. *(CUB)*
h. Track customers who self-identify as LIHEAP eligible separately from customers who are LIHEAP recipients preserve data for analysis. *(OAG)*
i. Customer satisfaction and engagement *(Xcel)*
    i. Measure and track customer satisfaction, preferences, attitudes, acceptance, and comprehension.
    ii. Better understand drivers for active customer participation.
j. Energy usage changes *(Xcel)*
    i. Measure how various customer groups within the Residential class change their overall consumption patterns in response to the propose rate structure.
    ii. Determine how consumption changes during off-peak (high renewable hours).
k. Post Pilot takeaways *(Xcel)*
    i. Evaluate the new capabilities of advanced meter infrastructure (AMI) meters.
    ii. Assess impact of the TOU rate on the Company's revenue recovery.

Transition to full TOU rate

14. Require Xcel to work with interested parties at developing a post-pilot transition plan for TOU Pilot participants. *(SRA and DOC)*
15. Require Xcel to work with interested parties develop a plan to transition the TOU pilot to a full implementation of a TOU rate for all Xcel Residential customers after the completion of the Pilot. *(OAG)*

Miscellaneous

16. Direct Xcel Energy to modify the Availability provision in its Residential Time of Use Pilot Program Service tariff to reflect the exclusion of medical equipment dependent customers from the pilot. (*Xcel*)
17. Require that any significant proposed changes, such as new rate designs or new regulatory structures, should be developed or reviewed by independent experts. If changes are developed by Xcel or experts reporting to Xcel, require Xcel to use a transparent method that is fully explained, and to convene a stakeholder process to allow input on what the goals and outcomes should be. (*OAG*)

18. Where not otherwise specified, require Xcel, within 30 days of the Order in this matter, to submit compliance filings in the current docket and updated tariff sheets to reflect the Commission's decisions.

FLISR Certification (17-776)

19. Certify FLISR under Minn. Stat. 216B.2425 *(Xcel)*

AND

20. Clarify that FAN is not certified at this time *(Staff, if FLISR is certified)*

AND

21. Require the following conditions for cost recovery authorization *(Staff, if FLISR is certified)*
    a. Xcel shall make a showing that the investments in FLISR (and any underlying technology certified) in the cost recovery petition that the project and investments are:
        i. Prudently incurred
        ii. In the public interest
        iii. The most reasonable grid modernization investment compared to other available alternatives
        iv. The least cost method of achieving the intended outcome of a more reliable system
        v. A net positive customer benefit proven through a calculated cost benefit ratio (including both qualitative and quantitative factors)
    b. Xcel shall itemize all current, planned and potential customer and system uses for FLISR and FAN and whether or not those potentials will planned to be utilized.

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22. Deny certification of FLISR *(OAG, CUB)*

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23. Defer the decision to certify FLISR *(Department)*

Request for Additional Certification Filings

24. Allow Xcel to submit annual Grid Modernization and certification request reports annually through at least 2022 *(Xcel)*

OR

25. Deny Xcel's request to allow annual certification filings through 2022 *(OAG)*

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26. Allow Xcel to file a Grid Modernization Report and certification request on November 1, 2018. *(Xcel)*

OR

27. Allow Xcel to file a Grid Modernization Report and certification request on November 1, 2018 if it meets the following conditions:
    a. Any projects proposed for certification must show a positive cost benefits analysis *(Department, CUB)*
    b. Require Xcel to provide a benefit cost analysis that compares FLISR and Integrated Volt VAr Optimization applications. *(Department, CUB)*

OR

28. Deny Xcel's request to allow an additional certification filing in 2018 *(OAG)*

OR

29. Allow Xcel to file a Grid Modernization Report and certification request on November 1, 2018, in combination with an Integrated Distribution Plan (Docket 18-251). *(Staff)*