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October 4, 2021

--Via Electronic Filing and UPS--

Steven M. Kahl, Executive Secretary
North Dakota Public Service Commission
State Capitol Building, Dept. 408
600 East Boulevard
Bismarck, ND 58505-0480

RE: ELECTRIC STANDARDS OF SERVICE RULEMAKING (RELIABILITY)
CASE NO. PU-21-360

Dear Mr. Kahl:

Northern States Power Company, doing business as Xcel Energy, submits the enclosed original and three copies of the Company's comments regarding the Commission's rulemaking relative to *Section 69-09-02-06 Continuity of Service* of the Commission's administrative rules.

An electronic copy of this filing is also being sent to you for your convenience.

The Company appreciates the opportunity to provide input into this process. Please contact me if you have any questions about the enclosed information.

Sincerely,

DAVID H. SEDERQUIST
SR. CONSULTANT, REGULATION/FINANCE

c: Victor Schock

Enclosures

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF NORTH DAKOTA

Julie Fedorchak	Chair
Randy Christmann	Commissioner
Brian Kroshus	Commissioner

COMMENTS OF NORTHERN STATES POWER COMPANY IN THE MATTER OF THE COMMISSION'S ELECTRIC STANDARDS OF SERVICE RULEMAKING

CASE NO. PU-21-360

INTRODUCTION

Northern States Power Company, doing business as Xcel Energy, submits to the North Dakota Public Service Commission these Comments in Case No. PU-21-360 regarding the Commission's Electric Standards of Service Rulemaking.

Xcel Energy is committed to providing safe and reliable service to our customers in North Dakota. Historically, the Company has had a strong track record of providing a high level of reliable service. In addition, as part of two separate reliability performance programs since 2001, the Company has provided the Commission with annual reliability reporting. This experience gives the Company a unique perspective on the proposed rulemaking which we hope will be useful in providing information and recommendations to the Commission.

These Comments address the proposed amendment to Article 69-09-02 of the North Dakota Administrative Code concerning electric continuity of service and also address various issues discussed at the September 22, 2001 Commission hearing on this matter. The Comments are organized as follows:

- *Section A – Reliability Performance and Historical Reporting* provides Xcel Energy's reliability performance over the past five years in North Dakota, the Company's historical reliability reporting in North Dakota, and Xcel Energy's reporting in its other jurisdictions.

- *Section B – Reporting Considerations and Company Recommendations* addresses the proposed reporting in the rule amendments, factors to consider regarding the

reporting requirements, industry benchmarking, and Xcel Energy's specific reporting recommendations.

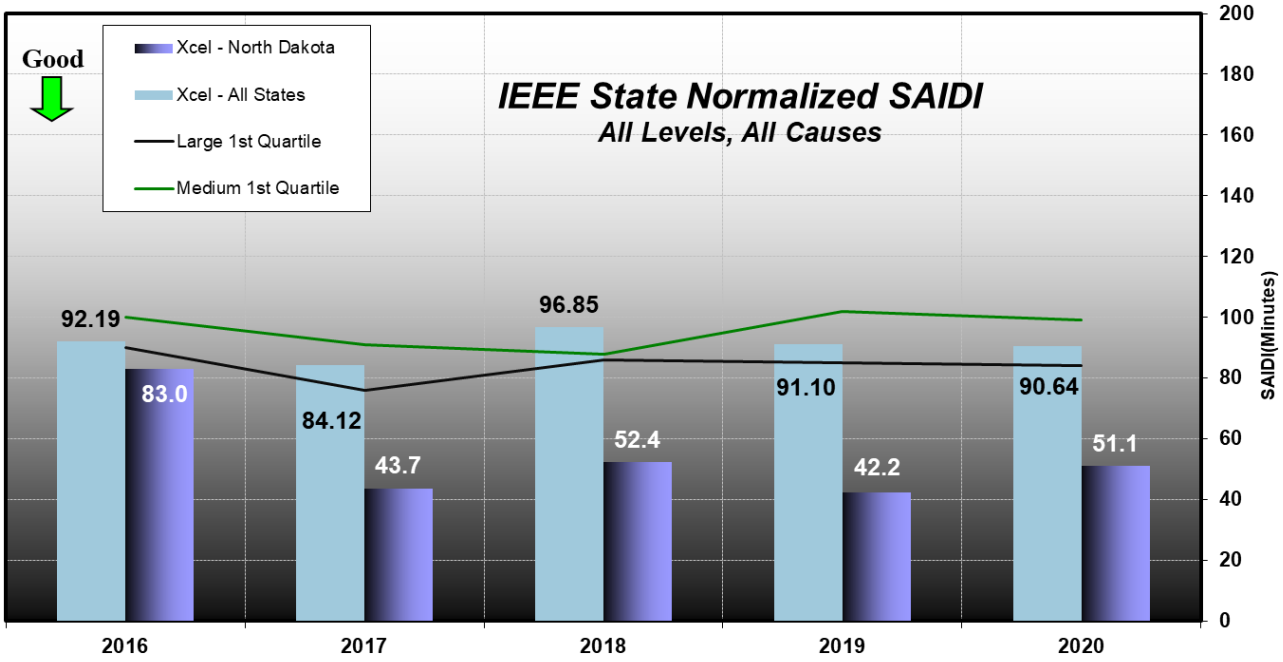
A. Reliability Performance and Historical Reporting

The Company has previously provided reporting on reliability metrics in North Dakota and complies with the current rules regarding outage records. The Company maintains a record of all interruptions to service including the date and time of interruption, the date and time service was restored, and, if known, the cause of each interruption. Below we provide the Company's North Dakota reliability performance over the past five years. We then discuss the Company's past reliability reporting in North Dakota and provide information on what Xcel Energy reports in its other jurisdictions. Throughout these Comments there is reference to various IEEE indices. For reference, Attachment A includes descriptions of these indices and formulas for calculation.

1. Xcel Energy's Historical Reliability Performance – North Dakota

Xcel Energy has provided best-in-Company reliability to our customers in North Dakota for several years. As Figure 1 and Attachment B, slide 2 shows, the Company's SAIDI results in North Dakota over the past five years is performing in the first quartile, or top 25 percent in the industry, in both the medium and large utility categories within the IEEE Distribution Reliability Working Group (DRWG). For reference, the medium category consists of utilities with greater than 100,000 customers, but less than 1,000,000 customers. The large category consists of utilities with 1,000,000 customers or more. We discuss IEEE benchmarking further in Section B. As shown in the bar chart below, reliability performance in North Dakota is also consistently better than Xcel Energy's reliability performance in the other states we serve.

Figure 1
Benchmarking Xcel Energy SAIDI in ND



The SAIDI shown above is calculated according to the IEEE standards for reliability indices found in IEEE standard 1366-2012.

2. Xcel Energy's Historical Reporting – North Dakota

Xcel Energy has reported reliability performance results in our annual North Dakota Electric Jurisdictional Reports during its *Performance Linking Utility Stakeholders* (PLUS) performance-based regulation plan from 2001 through 2005.[1] In addition, as part of our Reliability Performance Plan (RPP)[2], and shown in Attachment C, we provided comprehensive reliability metrics and information from 2013 through 2017 on the following:

- State-wide (normalized) key metrics
  - System Average Interruption Duration Index (SAIDI)
  - System Average Interruption Frequency Index (SAIFI)
  - Customer Average Interruption Duration Index (CAIDI)
- SAIFI, CAIDI for the Company's five largest substations (normalized)
- Top ten causes of actual and normalized outages

[1] Case No. PU-400-00-195
[2] The Reliability Performance Plan was established by the Settlement in Case No. PU-10-657.

- Top ten outage causes of most impactful outages (ranked by Customer-Minutes Out, or CMO)
- Customers Experiencing Multiple Interruptions (CEMI), categorized by 4, 5, and 6 or more outages during the year
- Number and total dollar amount of $50 CEMI customer credits issued
- Number of feeder-level outages and underground cable failures

The term *normalized* is used within the reliability metrics to indicate reliability results when the outages occurring on Major Event Days (MED) are excluded. A MED day is defined as any day when the daily SAIDI value is above the statistically defined IEEE threshold for the area. A MED represents a day when the "energy delivery system experienced stresses beyond that normally expected (such as during severe weather)."[3] The purpose of normalizing reliability results is to assess major events separately from daily operations and, ultimately, to reveal reliability trends in normal daily operations that can be hidden by the statistical effect of unusual and significant interruptions.

As indicated by the breadth of information included in our previous reliability reporting, industry standard indices do not provide the only way to monitor or gauge a utility's reliability performance. Other information may be equally meaningful and informative. For example, in addition to standard reliability metrics like SAIDI, SAIFI, and CAIDI, the Company's prior RPP reporting included the top ten causes of outages and the number of underground cable failures. This information provided another level of insight that may be indicative of how the Company addresses system operations and maintenance. In developing a robust reporting structure, it is important to consider the purpose of the reporting and what kinds of information is of specific interest to the Commission.

3. Xcel Energy's Reliability Reporting in Other States

To provide additional context on IEEE 1366-2012 reporting in other states, Figure 2 below shows the reliability metrics the Company reports on in the other states we serve. Table 2 indicates whether reliability statistics are provided at the state, work center/region, and feeder level. A work center or region is an area or division within a state. Each state has its own definition of these areas with populations ranging from approximately 20,000 to over 1,000,000. The Company currently does not report on

[3] IEEE Guide for Electric Power Distribution Reliability Indices (Standard 1366-2012). According to this standard, the daily SAIDI value is assumed to follow a log-normal distribution. After taking the natural logarithm transformation of the daily SAIDI values, the days falling beyond 2.5 standard deviations to the right of the mean are classified as MEDs. This method is also known as the Beta method or IEEE 2.5 Beta.

any areas smaller than these defined work centers/regions. Further, we note that we report very limited IEEE reliability metrics at the federal level. On an annual basis, we report to the Energy Information Administration (EIA) only SAIFI and SAIDI along with the customer count for each state in our entire service territory

Figure 2
IEEE 1366-2012 Xcel Energy Reporting in Other States

Xcel Energy IEEE 1366 Reporting Indices by State

State	Reporting Level	SAIDI	SAIFI	CAIDI	CEMI	ASAI	CELI	MAIFIe$_2$
Colorado	State				X$_1$		X	
	Work Center/Region	X	X	X	X		X	
	Feeder	X	X	X				
Michigan	State				X$_1$			
	Work Center/Region							
	Feeder				X$_1$			
Minnesota	State	X	X	X	X	X	X	X
	Work Center/Region	X	X	X		X		
	Feeder	X	X	X				
New Mexico	State	X	X	X		X		
	Work Center/Region							
	Feeder							
North Dakota $_3$	State	X	X	X	X			
	Work Center/Region							
	Feeder							
South Dakota	State	X	X	X				
	Work Center/Region							
	Feeder							
Texas	State	X	X					
	Work Center/Region							
	Feeder	X	X					
Wisconsin	State	X	X	X				
	Work Center/Region	X	X	X				
	Feeder	X	X	X				
Energy Information Administration (EIA)	State	X	X					
	Work Center/Region							
	Feeder							
Note 1: Modified CEMI								
Note 2: Partial reporting with incomplete data								
Note 3: Reliability Performance Plan 2015-2017								

Customer outage data on our system is maintained and reported by distribution device, meaning at the feeder level, and each feeder is in one of our three operating divisions in North Dakota: Fargo, Grand Forks, and Minot. As a result, we are readily able to report reliability metrics for our North Dakota service territory at the state,

divisional, and feeder level. Feeder level metrics would provide reliability data for the subset of customers served by a single feeder. However, feeders are not assigned in our system to a particular community or neighborhood area; a single feeder may serve customers in adjacent communities (depending on the definition of "community"). Community is not a defined term relative to reliability reporting within IEEE or across our system and could mean any subdivision at a smaller level than the division. We discuss our system reliability data and reporting capabilities further in Section B.

As the table illustrates, limited IEEE metrics are reported across the states we serve, and we do not periodically report reliability statistics or metrics at a "community" level in any of our states. While we do maintain the required outage data on our system and could manually compile or extract specific information on an outage within a specific community upon Commission request, we are not readily able to calculate and report all IEEE reliability metric results in an automated or systematic fashion by community or other subdivision across the entire service territory. For these reasons, if adopted, the proposed rule amendments would be a significant departure from current reliability tracking and reporting requirements.

B. Reporting Considerations and Company Recommendations

In this section, we address the proposed reporting in the rule amendments, discussing reporting requirement considerations, industry benchmarking, and Xcel Energy's specific reporting recommendations.

The proposed additions to section 69-09-02-06 of the rules specify certain reliability indices required to be calculated and reported, and they specify a level of granularity for that reporting. The IEEE standard 1366-2012 was referenced for all the proposed reporting indices. As discussed above, the 1366-2012 standard provides a wide range of definitions and indices, but not all are applicable or meant to be used and reported on for all systems. Additionally, the value of a particular metric should be explored to ensure it will provide meaningful information. We believe the metrics chosen, IEEE or otherwise, should be tailored to meet the objectives of the Commission. The Company will present reliability performance reporting recommendations for the Commission's consideration based on what aspects of reliability the Commission wishes to focus on, what information can most effectively address those objectives, and what information can be provided without significantly increased complexity or cost. To that end, the Company respectfully suggests that the Commission adopt rules that provide the flexibility needed to accommodate not only the reliability practices of the different utilities in North Dakota, but also evolving or changing objectives over time. We welcome additional conversations with the Commission and

Staff to better understand the Commission's objectives and which metrics can be leveraged to achieve them.

1. Reporting Requirement Considerations

For IEEE metrics that include normalized results, we recommend reporting performance results at the divisional level (Fargo, Grand Fork, Minot) and/or feeder level. This level of detail can be accommodated with the current reliability tracking systems at Xcel Energy. The Company does keep a record of all interruptions to service affecting the entire distribution system of any single community or an important division of a community and is therefore in compliance with the current rules. However, record keeping on the community level is different than systematic reporting on multiple reliability metrics at that level. The Company would be able to provide outage-specific reporting at the community level on an event-by-event basis if requested but calculating and systematically reporting on multiple IEEE metrics across various communities or important divisions of communities is not within our current system capabilities. The cost and effort required to obtain that capability would depend on the metric reporting requirements required by the Commission, but the Company does not believe it is necessary to expend additional resources to provide the Commission with meaningful reliability information from which to provide effective oversight.

Beyond cost, reporting at the divisional or feeder level will still provide improved granularity. It would also be consistent with the higher end of the granularity provided in other states the Company serves. Feeder customer counts in North Dakota range from 1 customer to approximately 4,800. Therefore, the Commission would be able to monitor reliability performance on a smaller scale. Further discussion may be warranted to determine if state, divisional, or feeder level reporting is best for a certain metric. The goal is to provide useful data to the Commission while avoiding having to manually process large amounts of data.

2. Industry Benchmarking

The proposed rules require reporting of 11 metrics defined by the *IEEE Guide for Electric Power Distribution Reliability Indices, IEEE Std 1366-2012*. However, of those, only SAIDI, CAIDI, and SAIFI are broadly utilized in industry reporting and benchmarking. Xcel Energy participates in the IEEE Distribution Reliability Working Group which performs an annual benchmarking study. That study collects the three-key metrics of SAIDI, SAIFI, and CAIDI from the participating utilities. These are generally viewed throughout the industry as the most useful in assessing, trending, and comparing electric service reliability.

The other metrics defined in IEEE Std 1366-2012 are largely intended to reveal details that may be obscured in the larger system averages such as customers experiencing substantially more interruptions than average. However, many of the metrics are not commonly used due to their limited value and the difficulty in collecting the required data. In particular, the metrics based on load or including momentary interruptions are only available with any meaningful accuracy through advanced technology investments such as Advanced Metering Infrastructure (AMI) systems, and remote communication enabled distribution equipment.

Based on IEEE benchmarking and reporting across all our jurisdictions, the list of metrics proposed for inclusion in the rule goes beyond typical or standard reliability reporting.

3. The Company's Reporting Recommendations

Based on the Company's previous reporting in North Dakota, we recommend continuing to utilize previously reported metrics based on IEEE 1366-2012, and we recommend inclusion of some additional information. These metrics are all within the Company's current reporting systems and the proposed additions to the historical reporting can be accomplished with little additional effort. The metrics within the proposed rules that are not included in the recommendation are also briefly discussed below, providing the reasons the Company does not believe they should be included in the required reporting. We also note that not all utilities are similarly situated. As such, we believe it may be appropriate for the Commission to consider requirements separately for each utility based on current reporting capabilities and plans.

Recommended Reliability Metrics and Statistics to Report

- System Average Interruption Duration Index (SAIDI)
- System Average Interruption Frequency Index (SAIFI)
- Customer Average Interruption Duration Index (CAIDI)
- Average Service Availability Index (ASAI)
- Top Ten Outage Causes
- Customers Experiencing Multiple Interruptions (CEMI) at 4, 5, and 6+ outage thresholds
- Underground Cable Failures
- Top 10 Worst Performing Feeder List (69 feeders total in North Dakota)
- Major Event Days (MEDs) and Details

To accommodate these recommended metrics, and to provide the Commission flexibility in determining the appropriate metrics over time and for each utility in general, the Company proposes the following language for Parts 5 and 6. of 69-09-02-06:

5. *By May 1 of each year, each electric public utility shall file with the Commission the records required by this section. The commission may at any time, upon notice to the electric public utility, require a filing of the records required by this section for a specified time period or specific interruption.*

6. *Each electric public utility shall include in its annual May 1 filing selected reliability indices and statistics for the previous calendar year. The indices will include the System Average Interruption Duration Index (SAIDI), the System Average Interruption Frequency Index (SAIFI), the Customer Average Interruption Duration Index (CAIDI), and other Institute of Electrical and Electronics Engineers Standard 1366 metrics or supplementary data as requested by the Commission that is reasonably within the capability of each public utility. Each utility shall include with its May 1 filing 1) all supporting data used to calculate each of the reported indices, 2) a detailed breakdown of each major event day (MED) and 3) the results of each index reported with and without all MEDs. These statistics will be compiled by each electric public utility for its North Dakota state-wide electric distribution system, each operating division within the state, and/or each feeder, as determined by the Commission.*

4. Reliability Metrics the Company Does Not Recommend

Below, we discuss reliability metrics that are included in the proposed rule amendments that the Company does not recommend for inclusion in reporting requirements and the reasons for the Company's recommendations.

- Customer Total Average Interruption Duration Index (CTAIDI) and Customer average interruption frequency index (CAIFI)

  CTAIDI and CAIFI are not currently utilized in any of the Company's other states and there are currently no information systems developed for automated reporting of this metric. These metrics are somewhat redundant with CAIDI and CEMI and therefore have limited incremental value. Development of reporting will require a full-time employee working at least four weeks each year.

- Average system interruption frequency index (ASIFI) and Average system interruption duration index (ASIDI)

  These metrics are not currently within Company's reporting capability and have not been investigated for use in the past. The equipment and technology required to derive these load-based indices would include, at a minimum, wide-spread remote equipment communication, AMI, and additional advanced data-analytic tools and software that are not yet utilized by the Company. Therefore, it is difficult at this time to determine the total cost and timeframe it would require to be able to accurately report on these metrics.

- Momentary average interruption frequency index (MAIFI), and customers experiencing multiple sustained interruption and momentary interruption events (CEMSMI)

  The Company currently is very limited in its ability to track and report on momentary interruptions. This limitation is due in part to the lack of equipment such as customer meters with AMI, substation metering, and distribution reclosers that have remote communication abilities. Reporting at this time would therefore be incomplete and would provide only partial data. Without the addition of AMI technology, remote communication upgrades, and other advanced data analytics tools, it is premature to adequately implement this type of reporting.

CONCLUSION

The Company appreciates the opportunity to provide comments and recommendations on the proposed rule amendments. The goal of our recommendation is to provide adequate reporting to meet the Commission's oversight objectives without providing an overwhelming number of statistics that may not be completely valuable or meaningful. We remain committed to providing reliable service to our customers in the state of North Dakota and we will continue to update the Commission as we deploy AMI and/or develop additional reliability tracking and reporting capabilities. We look forward to working with the Commission Staff to determine the most efficient and meaningful ways to report on the Company's reliability performance.

Summary of IEEE 1366™ Reliability Indices

Below is a summary of the IEEE 1366-2012 indices included in the proposed rule. For each, we provide a brief description and the formula used for the calculations. Following that, we provide the definitions used for the calculations. All indices are calculated over a specified period, typically a month or year.

IEEE 1366 Indices and Definitions

SAIDI - System Average Interruption Duration Index

Indicates the average total duration (in minutes) of interruption a customer experiences.

- Formula: $\frac{\text{Customer Minutes of Interruption}}{\text{Total Number of Customers Served}}$

SAIFI - System Average Interruption Frequency Index

Indicates the average number of sustained interruptions a customer experiences.

- Formula: $\frac{\text{Total Number of Customer Interruptions}}{\text{Total Number of Customers Served}}$

CAIDI - Customer Average Interruption Duration Index

Indicates the average time (in minutes) to restore service during a sustained outage.

- Formula: $\frac{\text{Customer Minutes of Interruption}}{\text{Total Number of Customer Interruptions}}$

CTAIDI - Customer Total Average Interruption Duration Index

Indicates the average total duration (in minutes) of interruption to customers who experienced a sustained interruption.

  - Hybrid of CAIDI: Similarly calculated except that customers with multiple interruptions are only counted once in the Customers Interrupted count
  - Effectively a SAIDI value that excludes any customers that did not experience sustained interruptions

- Formula: $\frac{\text{Customer Minutes of Interruption}}{\text{Total Number of Distinct Customers Interrupted}}$

CAIFI - Customer Average Interruption Frequency Index
Indicates the average number of sustained interruptions to customers who experienced a sustained interruption.

- Hybrid of SAIFI: Similarly calculated except that customers with multiple interruptions are only counted once in the Customers Interrupted count
- Effectively a SAIFI value that excludes any customers that did not experience sustained interruptions

- Formula: $\frac{\text{Total Number of Customer Interruptions}}{\text{Total Number of Distinct Customers Interrupted}}$

ASAI - Average Service Availability Index
Indicates the ratio of time customers were receiving power.

- Formula: $\frac{\text{Customer Hours Possible} - \text{Customer Hours Outage}}{\text{Customer Hours Possible}}$

$CEMI_n$ – Customers Experiencing Multiple Interruptions
Indicates the ratio of individual customers experiencing *n* or more sustained interruptions to the total number of customers served.

- Formula: $\frac{\text{Number of Customers that experienced } n \text{ or more sustained interruptions}}{\text{Total number of Customers Served}}$

ASIFI – Average System Interruption Frequency Index
Similar to SAIFI but based on load rather than customers affected.

- Effectively a SAIFI value weighted relative to customer load size.

- Formula: $\frac{\text{Total Connected kVA of Load Interrupted}}{\text{Total Connected kVA Served}}$

ASIDI – Average System Interruption Duration Index
Similar to SAIDI but based on load rather than customers affected.

- Effectively a SAIDI value weighted relative to customer load size.

- Formula: $\frac{\text{Connected kVA Duration of Load Interrupted}}{\text{Total Connected kVA Served}}$

MAIFI – Momentary Average Interruption Frequency Index
Indicates the average number of momentary interruptions a customer experiences.

- Formula: $\frac{\text{Total Number of Customer Momentary Interruptions}}{\text{Total Number of Customers Served}}$

$MAIFI_e$ – Momentary Average Interruption Event Frequency
Indicates the average number of momentary interruption events a customer experiences. Events immediately preceding a sustained interruption are excluded.

- Formula: $\frac{\text{Total Number of Customer Momentary Interruption Events}}{\text{Total Number of Customers Served}}$

$CEMSMI_n$ – Customers Experiencing Multiple Sustained and Momentary Interruption Events
Indicates the ratio of individual customers experiencing *n* or more of both sustained interruptions and momentary interruption events to the total customers served.

- Formula: $\frac{\text{Number of Customers that experienced } n \text{ or more interruptions}}{\text{Total number of Customers Served}}$

IEEE Calculation Definitions

Customer Minutes of Interruption: A Summation of [Number of Customers Affected by each outage x Length (in Minutes) of each outage]

Customer Interruptions: A Summation of [Number of Customers Affected by each outage]

Customers Served: Total number of customers served for the area

Distinct Customer Interruptions: A Summation of [Number of Distinct Customers Affected by a Sustained Outage

Customer Hours Possible: Total Number of Customers Served x Period Hours

Customer Hours Outage: A Summation of [Number of Customers Affected by each outage x Length (in Hours) of each outage]

Period Hours: Number of Hours per Specified Unit of Time (Example: 8,760 hours per 365-day year)

Connected kVA Load Interrupted: A Summation of [kVA load interrupted for each event]

Connected kVA Served: Total connected load served for the area

Connected kVA Duration of Load Interrupted: A Summation of [kVA load affected by each outage x Length (in Minutes) of each outage]

Connected kVA Served: Total connected load served for the area

Customer Momentary Interruptions: A Summation of [Number of Customers Affected by each Momentary interruption]

Customer Momentary Interruption Events: A Summation of [Number of Customers Affected by each Momentary Event]

Momentary Event: One or more Momentary Interruptions within a 5-minute period

Momentary Interruption: Brief loss of power 5 minutes or less in length impacting 1 or more customers

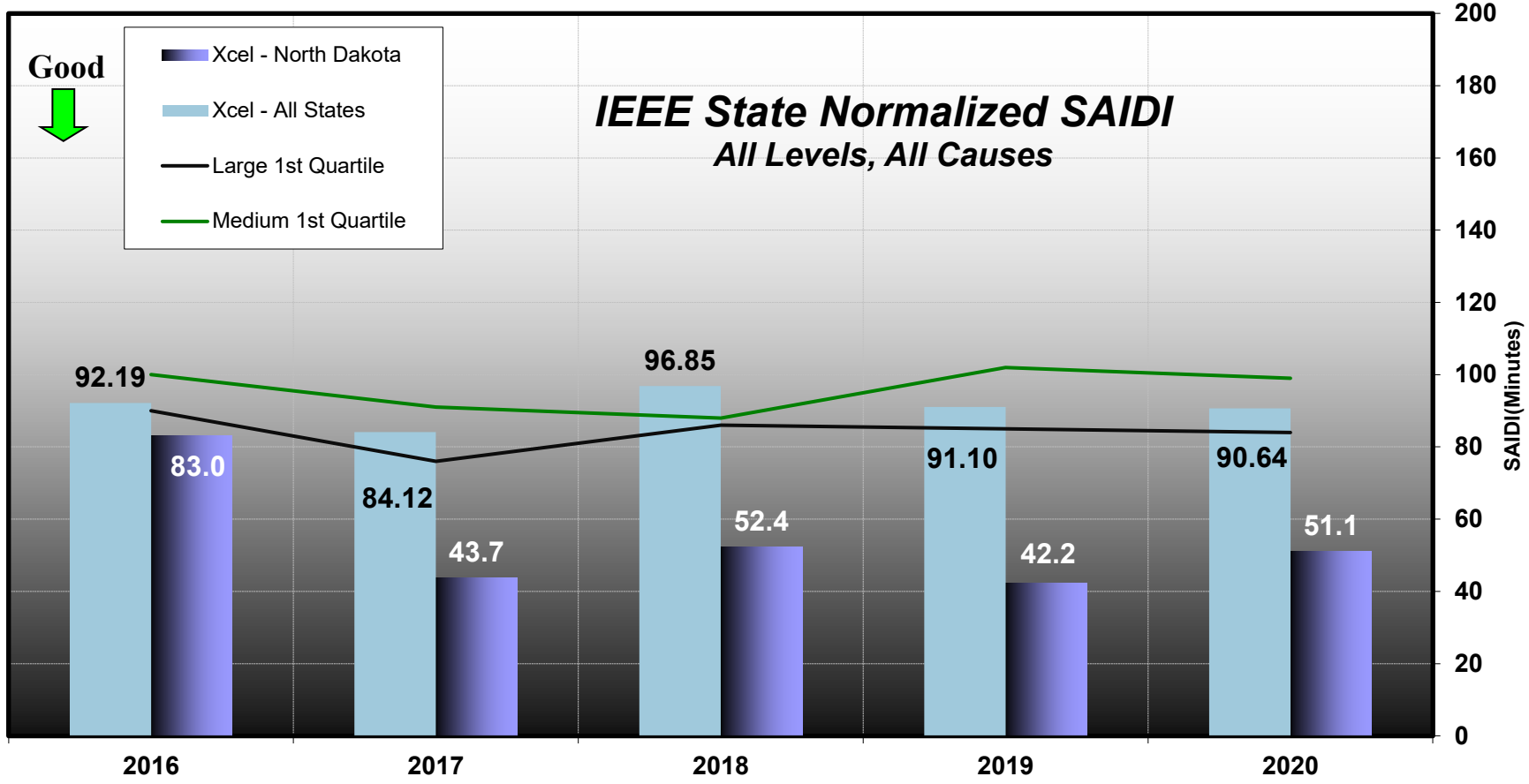
Sustained Interruption: Interruption duration of more than 5 minutes impacting 1 or more customers

Xcel Energy®

PROPOSED ELECTRIC CONTINUITY OF SERVICE RULES 69-09-02-06

Xcel Energy SAIDI – Five Year History

System Average Interruption Duration Index (SAIDI):
The Amount of Minutes a Typical Customer is Without Power During the Year



Based on sustained outages only (> 5 minutes), Meter-Based customer counts, All Levels and All Causes, IEEE State Normalized
All results based on State Only

Reliability Performance Plan (2015 – 2017)

- SAIFI, CAIDI (state-wide, normalized)
- SAIFI, CAIDI for the Company's 5 largest substations (normalized)
- Top 10 causes of outages (actual and normalized)
- Top 10 outage causes by customer-minutes out
- Customers Experiencing Multiple Interruptions (CEMI), totals by 4, 5, and 6 or more
- CEMI customer credits issued
- Number of feeder-level outages and underground cable failures
- RPP financial award calculation

Reliability Metric Recommendations

- SAIDI, SAIFI, CAIDI
- ASAI (Average Service Availability Index)
- CEMI (Customer Experiencing Multiple Interruptions) with defined threshold(s)
- Detailed breakdown of each MED (Major Event Day) used for normalization

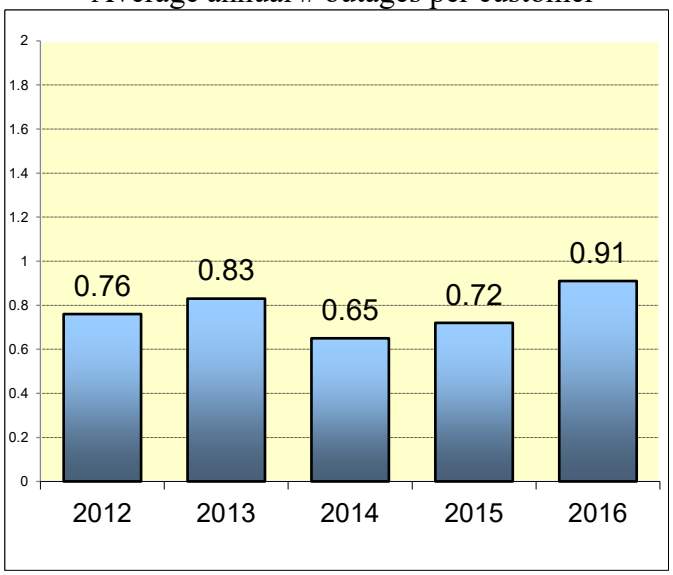
Difficulties of Certain Reliability Metrics

Other Considerations

Northern States Power Company
Electric Utility - North Dakota
Outage Frequency and Duration Indices - 2016

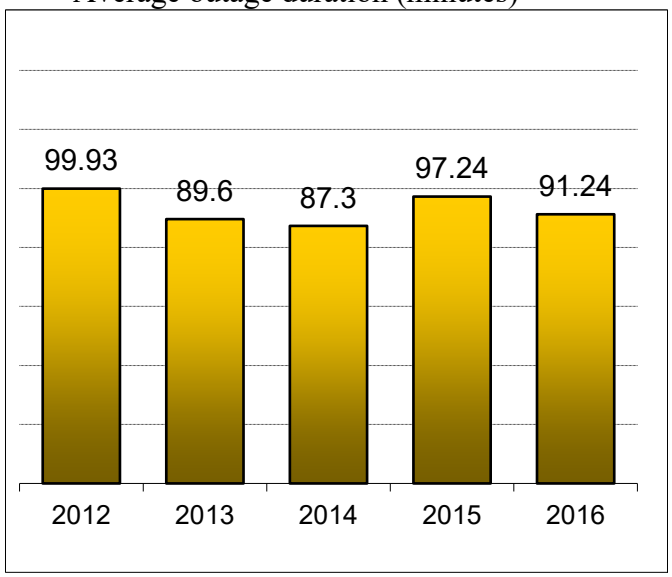
System Avg Interruption Frequency Index
(SAIFI)

Average annual # outages per customer



Customer Avg Interruption Duration Index
(CAIDI)

Average outage duration (minutes)



SAIFI (Interruption Frequency) - Largest Five Substations

	2012	2013	2014	2015	2016	5 Yr. Avg
Cass County (Fgo)	0.71	0.90	0.36	0.42	0.56	0.59
Souris (Mnt)	0.36	1.08	0.40	0.44	0.75	0.61
Nordic (GF)	1.01	0.58	0.41	0.88	0.51	0.68
Red River (Fgo)	0.70	0.86	0.78	0.93	1.29	0.91
Gateway (GF)	0.59	0.54	1.74	0.62	1.60	1.02

CAIDI (Interruption Duration) - Largest Five Substations

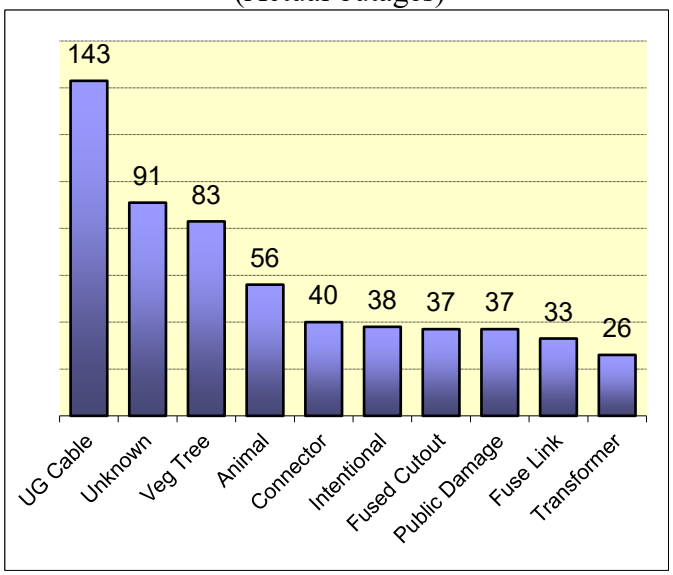
	2012	2013	2014	2015	2016	5 Yr. Avg
Gateway (GF)	89.1	100.3	54.9	75.1	71.5	78.2
Red River (Fgo)	110.1	88.7	88.7	75.8	98.2	92.3
Nordic (GF)	74.1	104.7	97.6	98.8	115.0	98.0
Souris (Mnt)	105.8	72.4	80.5	166.3	67.1	98.4
Cass County (Fgo)	78.6	109.3	158.7	104.7	120.9	114.4

Data reflects normalized outages lasting 5 minutes or longer. In 2016 one Major Event Day (May 22) was excluded.

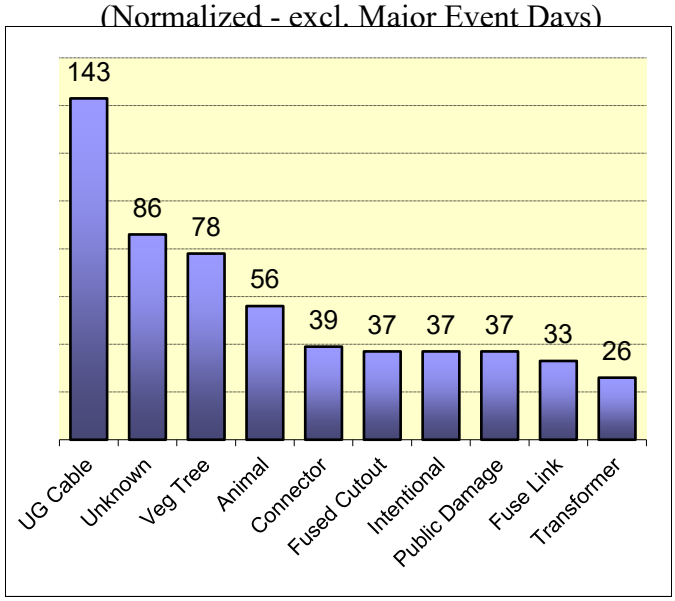
Northern States Power Company
Electric Utility - North Dakota
Most Common Outage Causes - 2016

Top 10 Outage Causes

(Actual outages)



(Normalized - excl. Major Event Days)

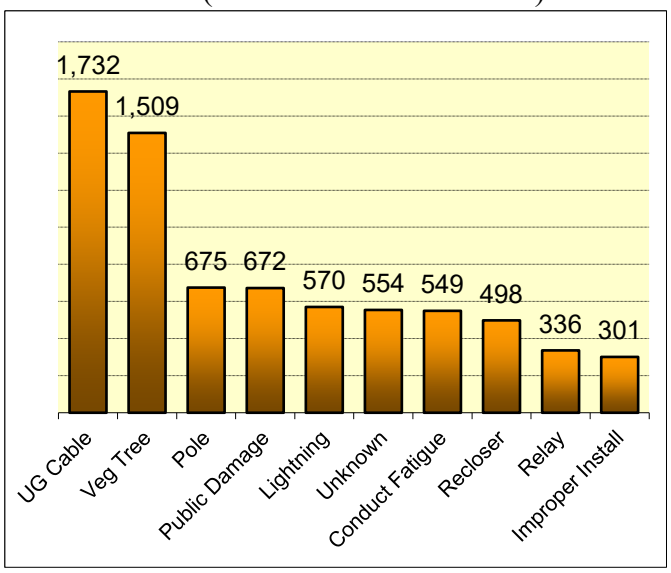


Total outage events: 665

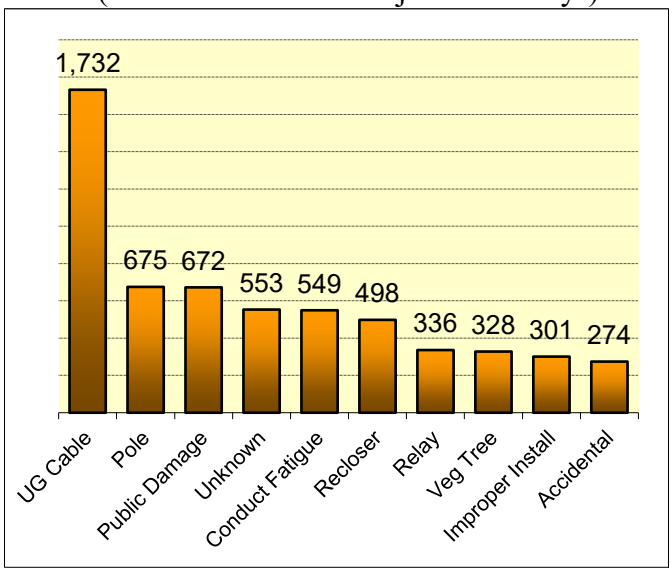
Top 10 Causes of Lengthy or Wide-spread Interruptions

(measured in customer-minutes without power - 000's)

(Actual customer-minutes)



(Normalized - excl. Major Event Days)

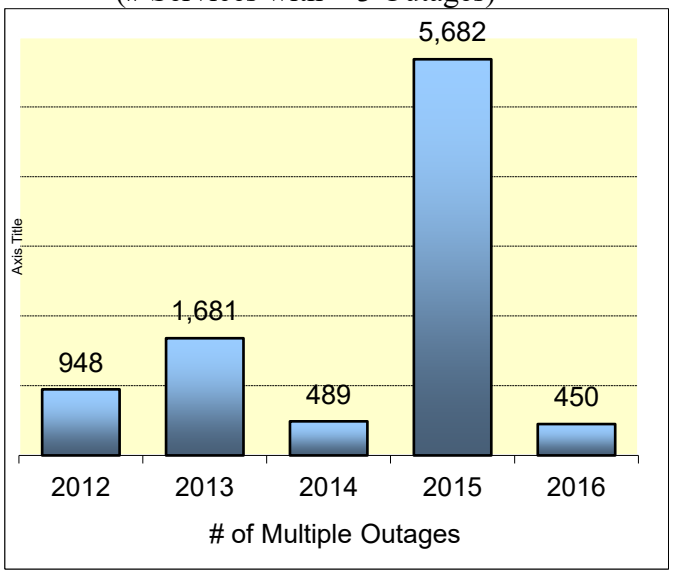


Note: Date reflects outages lasting 5 minutes or longer.

Northern States Power Company
Electric Utility - North Dakota
CEMI, Feeder Outages, and Underground Cable Failures - 2016

Customers Experiencing Multiple Interruptions
(CEMI)

(# Services with > 3 Outages)



Note: The 2012 CEMI count is an approximation.

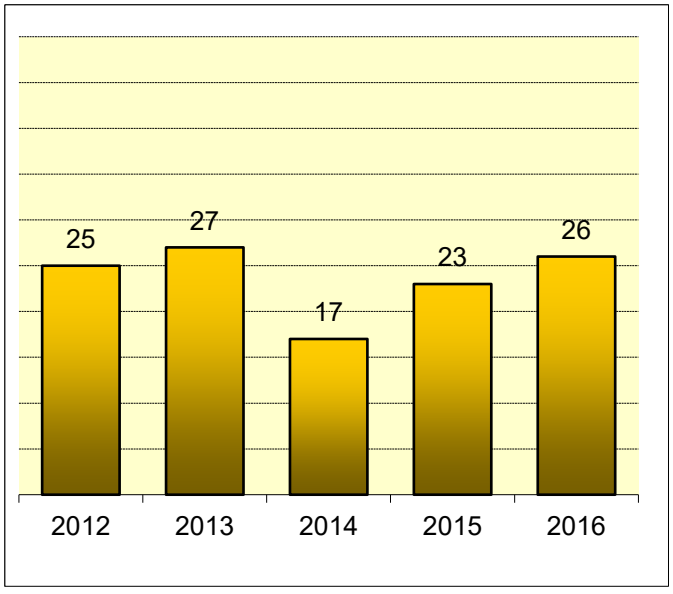
Breakdown of 2016 CEMI Levels

# Outages	Customers
4	382
5	32
6+	36
	450

CEMI Credits Issued

2013	$84,050
2014	$24,650
2015	$284,100
2016	$22,350

Feeder-Level Outages



Underground Cable Failures

Year	UG Cable Failures
2012	139
2013	159
2014	155
2015	147
2016	143

(reflects primary, secondary cable failures)

Data reflects outages lasting 5 minutes or longer; Major Event Day (May 22) & public damage events excluded.