

199—20.17(476,478) Service reliability requirements for electric utilities.

20.17(1) Applicability. This rule is applicable to investor-owned electric utilities operating within the state of Iowa subject to Iowa Code chapter 476 and to the construction, operation, and maintenance of electric transmission lines by electric utilities as defined in subrule 20.17(4) to the extent provided in Iowa Code chapter 478.

20.17(2) Purpose and scope. Reliable electric service is of high importance to the health, safety, and welfare of the citizens of Iowa. The purpose of this rule is to establish requirements for assessing the reliability of the transmission and distribution systems and facilities that are under the commission's jurisdiction. This rule establishes reporting requirements to provide consumers, the commission, and electric utilities with methodology for monitoring reliability and ensuring quality of electric service within an electric utility's operating area. This rule provides definitions and requirements for maintenance of interruption data, retention of records, and report filing.

20.17(3) General obligations.

a. Each electric utility shall make reasonable efforts to avoid and prevent interruptions of service. However, when interruptions occur, service shall be reestablished within the shortest time practicable, consistent with safety.

b. The electric utility's electrical transmission and distribution facilities shall be designed, constructed, maintained, and electrically reinforced and supplemented as required to reliably perform the power delivery burden placed upon them in the storm and traffic hazard environment in which they are located.

c. Each electric utility shall carry on an effective preventive maintenance program and be capable of emergency repair work on a scale that its storm and traffic damage record indicates as appropriate to its scope of operations and to the physical condition of its transmission and distribution facilities.

d. In appraising the reliability of the electric utility's transmission and distribution system, the commission will consider the condition of the physical property and the size, training, supervision, availability, equipment, and mobility of the maintenance forces, all as demonstrated in actual cases of storm and traffic damage to the facilities.

e. Each electric utility shall keep records of interruptions of service and make an analysis of the records for the purpose of determining steps to be taken to prevent recurrence of such interruptions.

f. Each electric utility shall make reasonable efforts to reduce the risk of future interruptions by taking into account the age, condition, design, and performance of transmission and distribution facilities and providing adequate investment in the maintenance, repair, replacement, and upgrade of facilities and equipment.

20.17(4) Definitions. Terms and formulas when used in this rule are defined as follows:

"*Customer*" means (1) any person, firm, association, or corporation, (2) any agency of the federal, state, or local government, or (3) any legal entity responsible by law for payment of the electric service from the electric utility that has a separately metered electrical service point for which a bill is provided. Each meter equals one customer. Retail customers are end-use customers who purchase and ultimately consume electricity.

"*Customer average interruption duration index*" or "*CAIDI*" means the average interruption duration for those customers who experience interruptions during the year. It is calculated by dividing the annual sum of all customer interruption durations by the total number of customer interruptions.

$$\text{CAIDI} = \frac{\text{Sum of All Customer Interruption Durations}}{\text{Total Number of Customer Interruptions}}$$

"*Distribution system*" means that part of the electric system owned or operated by an electric utility and designed to operate at a nominal voltage of 25,000 volts or less.

"*Electrical service point*" means the point of connection between the electric utility's equipment and the customer's equipment.

"*Electric utility*" means investor-owned electric utilities owning, controlling, operating, or using transmission and distribution facilities and equipment subject to the commission's jurisdiction.

“GIS” means a geospatial information system. This is an information management framework that allows the integration of various data and geospatial information.

“Interrupting device” means a device capable of being reclosed whose purpose is to interrupt faults and restore service or disconnect loads. These devices can be manual, automatic, or motor-operated. Examples may include transmission breakers, feeder breakers, line reclosers, motor-operated switches, fuses, or other devices.

“Interruption” means a loss of service to one or more customers or other facilities and is the result of one or more component outages. The types of interruption include momentary event, sustained, and scheduled. The following interruption causes shall not be included in the calculation of the reliability indices:

1. Interruptions intentionally initiated pursuant to the provisions of an interruptible service tariff or contract and affecting only those customers taking electric service under such tariff or contract;
2. Interruptions due to nonpayment of a bill;
3. Interruptions due to tampering with service equipment;
4. Interruptions due to denied access to service equipment located on the affected customer’s private property;
5. Interruptions due to hazardous conditions located on the affected customer’s private property;
6. Interruptions due to a request by the affected customer;
7. Interruptions due to a request by a law enforcement agency, fire department, other governmental agency responsible for public welfare, or any agency or authority responsible for bulk power system security; or
8. Interruptions caused by the failure of a customer’s equipment; the operation of a customer’s equipment in a manner inconsistent with law, an approved tariff, rule, regulation, or an agreement between the customer and the electric utility; or the failure of a customer to take a required action that would have avoided the interruption, such as failing to notify the company of an increase in load when required to do so by a tariff or contract.

“Interruption duration” as used herein in regard to sustained outages means a period of time measured in one-minute increments that starts when an electric utility is notified or becomes aware of an interruption and ends when an electric utility restores electric service, as long as the duration is not less than five minutes long.

“Interruption, momentary” means single operation of an interrupting device that results in a voltage of zero. For example, two breaker or recloser operations equals two momentary interruptions. A momentary interruption is one in which power is restored automatically.

“Interruption, momentary event” means an interruption of electric service to one or more customers of duration limited to the period required to restore service by an interrupting device. Note: Such switching operations must be completed in a specified time not to exceed five minutes. This definition includes all reclosing operations that occur within five minutes of the first interruption. For example, if a recloser or breaker operates two, three, or four times and then holds, the event shall be considered one momentary event interruption.

“Interruption, scheduled” means an interruption of electric power that results when a transmission or distribution component is deliberately taken out of service at a selected time, usually for the purposes of construction, preventive maintenance, or repair. If it is possible to defer the interruption, the interruption is considered a scheduled interruption.

“Interruption, sustained” means any interruption not classified as a momentary event interruption. It is an interruption of electric service that is not automatically or instantaneously restored, with duration of greater than five minutes.

“Loss of service” means the loss of electrical power, or a complete loss of voltage, to one or more customers. This does not include any of the power quality issues such as sags, swells, impulses, or harmonics. Also see definition of “interruption.”

“Major event” will be declared whenever extensive physical damage to transmission and distribution facilities has occurred within an electric utility’s operating area due to unusually severe and abnormal weather or event and:

1. Wind speed exceeds 90 mph for the affected area,
2. One-half inch of ice is present and wind speed exceeds 40 mph for the affected area,
3. Ten percent of the affected area total customer count is incurring a loss of service for a length of time to exceed five hours, or
4. 20,000 customers in a metropolitan area are incurring a loss of service for a length of time to exceed five hours.

“*Metropolitan area*” means any community, or group of contiguous communities, with a population of 20,000 individuals or more.

“*Momentary average interruption frequency index*” or “*MAIFI*” means the average number of momentary electric service interruptions for each customer during the year. It is calculated by dividing the total number of customer momentary interruptions by the total number of customers served.

$$\text{MAIFI} = \frac{\text{Total Number of Customer Momentary Interruptions}}{\text{Total Number of Customers Served}}$$

“*OMS*” is a computerized outage management system.

“*Operating area*” means a geographical area defined by the electric utility that is a distinct area for administration, operation, or data collection with respect to the facilities serving, or the service provided within, the geographical area.

“*Outage*” means the state of a component when it is not available to perform its intended function due to some event directly associated with that component. An outage may or may not cause an interruption of service to customers, depending on system configuration.

“*Power quality*” means the characteristics of electric power received by the customer, with the exception of sustained interruptions and momentary event interruptions. Characteristics of electric power that detract from its quality include waveform irregularities and voltage variations, either prolonged or transient. Power quality problems shall include but not be limited to disturbances such as high or low voltage, voltage spikes and transients, flickers and voltage sags, surges and short-time overvoltages, as well as harmonics and noise.

“*Rural circuit*” means a circuit not defined as an urban circuit.

“*System average interruption duration index*” or “*SAIDI*” means the average sustained interruption duration per customer served during the year. It is calculated by dividing the sum of the customer sustained interruption durations by the total number of customers served during the year.

$$\text{SAIDI} = \frac{\text{Sum of All Customer Sustained Interruption Durations}}{\text{Total Number of Customers Served}}$$

“*System average interruption frequency index*” or “*SAIFI*” means the average number of sustained interruptions per customer during the year. It is calculated by dividing the total annual number of customer sustained interruptions by the total number of customers served during the year.

$$\text{SAIFI} = \frac{\text{Total Number of Customer Sustained Interruptions}}{\text{Total Number of Customers Served}}$$

“*Total number of customers served*” means the total number of customers served on the last day of the reporting period.

“*Urban circuit*” means a circuit where both 75 percent or more of its customers and 75 percent or more of its primary circuit miles are located within a metropolitan area.

20.17(5) Recordkeeping requirements.

a. Each electric utility shall maintain a GIS and an OMS sufficient to determine a history of sustained electric service interruptions experienced by each customer. The OMS shall have the ability to access data for each customer in order to determine a history of electric service interruptions. Data shall be sortable by each of, and in any combination with, the following factors:

- (1) State jurisdiction;
 - (2) Operating area (if any);
 - (3) Substation;
 - (4) Circuit;
 - (5) Number of interruptions in reporting period; and
 - (6) Number of hours of interruptions in reporting period.
- b.* Records on interruptions shall be sufficient to determine the following:
- (1) Starting date and time the utility became aware of the interruption;
 - (2) Duration of the interruption;
 - (3) Date and time service was restored;
 - (4) Number of customers affected;
 - (5) Description of the cause of the interruption;
 - (6) Operating areas affected;
 - (7) Circuit number(s) of the distribution circuit(s) affected;
 - (8) Service account number or other unique identifier of each customer affected;
 - (9) Address of each affected customer location;
 - (10) Weather conditions at time of interruption;
 - (11) System component(s) involved (e.g., transmission line, substation, overhead primary main, underground primary main, transformer); and
 - (12) Whether the interruption was planned or unplanned.
- c.* Each electric utility shall maintain as much information as feasible on momentary interruptions.
- d.* Each electric utility shall keep information on cause codes, weather codes, isolating device codes, and equipment failed codes.
- (1) The minimum interruption cause code set should include: animals, lightning, major event, scheduled, trees, overload, error, supply, equipment, other, unknown, and earthquake.
 - (2) The minimum interruption weather code set should include: wind, lightning, heat, ice/snow, rain, clear day, and tornado/hurricane.
 - (3) The minimum interruption isolating device set should include: breaker, recloser, fuse, sectionalizer, switch, and elbow.
 - (4) The minimum interruption equipment failed code set should include: cable, transformer, conductor, splice, lightning arrester, switches, cross arm, pole, insulator, connector, other, and unknown.
 - (5) Utilities may augment the code sets listed above to enhance tracking.
- e.* An electric utility shall retain for seven years the records required by paragraphs 20.17(5) “a” through “d.”
- f.* Each electric utility shall record the date of installation of major facilities (poles, conductors, cable, and transformers) installed on or after April 1, 2003, and integrate that data into its GIS database.
- g.* Each electric utility shall make its records of customer interruptions available to the commission as needed.
- 20.17(6) Notification of a major event.** Notification of a major event as defined in subrule 20.17(4) shall comply with the requirements of rule 199—20.18(476,478).
- 20.17(7) Annual reliability and service quality report.** Each electric utility shall submit to the commission on or before May 1 of each year an annual reliability report for the previous calendar year for the Iowa jurisdiction. The report shall include the following information:
- a. Description of service area.* Urban and rural Iowa service territory customer count; Iowa operating area customer count, if applicable; and major communities served within each operating area.
 - b. System reliability performance.*
 - (1) An overall assessment of the reliability performance, including the urban and rural SAIFI, SAIDI, and CAIDI reliability indices for the previous calendar year for the Iowa service territory and each defined Iowa operating area, if applicable. This assessment shall include outages at the substation, transmission, and generation levels of the system that directly result in sustained interruptions to customers on the distribution system. These indices shall be calculated twice, once with the data associated with major

events and once without. This assessment should contain tabular and graphical presentations of the trend for each index as well as the trends of the major causes of interruptions.

(2) The urban and rural SAIFI, SAIDI, and CAIDI reliability average indices for the previous five calendar years for the Iowa service territory and each defined Iowa operating area, if applicable. The reliability average indices shall include outages at the substation, transmission, and generation levels of the system that directly result in sustained interruptions to customers on the distribution system. Calculation of the five-year average shall start with data from the year covered by the first Annual Reliability Report submittal so that by the fifth Annual Reliability Report submittal a complete five-year average shall be available. These indices shall be calculated twice, once with the data associated with major events and once without.

(3) The MAIFI reliability indices for the previous five calendar years for the Iowa service territory and each defined Iowa operating area for which momentary interruptions are tracked. The first annual report should specify which portions of the system are monitored for momentary interruptions, identify and describe the quality of data used, and be updated as needed in subsequent reports.

c. Reporting on customer outages.

(1) The reporting electric utility shall provide tables and graphical representations showing, in ascending order, the total number of customers that experienced set numbers of sustained interruptions during the year (i.e., the number of customers who experienced zero interruptions, the number of customers who experienced one interruption, two interruptions, three interruptions, and so on). The utility shall provide this for each of the following:

1. All Iowa customers, excluding major events.
2. All Iowa customers, including major events.

(2) The reporting electric utility shall provide tables and graphical representations showing, in ascending order, the total number of customers that experienced a set range of total annual sustained interruption duration during the year (i.e., the number of customers who experienced zero hours total duration, the number of customers who experienced greater than 0.0833 but less than 0.5 hour total duration, the number of customers who experienced greater than 0.5 but less than 1.0 hour total duration, and so on, reflecting half-hour increments of duration). The utility shall provide this for each of the following:

1. All Iowa customers, excluding major events.
2. All Iowa customers, including major events.

d. Major event summary. For each major event that occurred in the reporting period, the following information shall be provided:

- (1) A description of the area(s) impacted by each major event;
- (2) The total number of customers interrupted by each major event;
- (3) The total number of customer-minutes interrupted by each major event; and
- (4) Updated damage cost estimates to the electric utility's facilities.

e. Information on transmission and distribution facilities.

(1) Total circuit miles of electric distribution line in service at year's end, segregated by voltage level. Reasonable groupings of lines with similar voltage levels, such as but not limited to 12,000- and 13,000-volt three-phase facilities, are acceptable.

(2) Total circuit miles of electric transmission line in service at year's end, segregated by voltage level.

f. Plans and status report. A plan for service quality improvements, including costs, for the electric utility's transmission and distribution facilities that will ensure quality, safe, and reliable delivery of energy to customers.

g. Capital expenditure information. Reporting of capital expenditure information shall start with data from the year covered by the first Annual Reliability Report submittal so that by the fifth Annual Reliability Report submittal five years of data shall be available in each subsequent annual report.

(1) Each electric utility shall report on an annual basis the total of:

1. Capital investment in the electric utility's Iowa-based transmission and distribution infrastructure approved by its board of directors or other appropriate authority. If any amounts approved by the board of

directors are designated for use in a recovery from a major event, those amounts shall be identified in addition to the total.

2. Capital investment expenditures in the electric utility's Iowa-based transmission and distribution infrastructure. If any expenditures were utilized in a recovery from a major event, those amounts shall be identified in addition to the total.

(2) Each electric utility shall report the same capital expenditure data from the past five years in the same fashion as in subparagraph 20.17(7) "g"(1).

h. Maintenance. Reporting of maintenance information shall start with data from the year covered by the first Annual Reliability Report submittal, so that by the fifth Annual Reliability Report submittal, five years of data shall be available in each subsequent annual report.

(1) Total maintenance budgets and expenditures for distribution, and for transmission, for each operating area, if applicable, and for the electric utility's entire Iowa system for the past five years. If any maintenance budgets and expenditures are designated for use in a recovery from a major event, or were used in a recovery from a major event, respectively, those amounts shall be identified in addition to the totals.

(2) Tree trimming.

1. The budget and expenditures described in subparagraph 20.17(7) "h"(1) shall be stated in such a way that the total annual tree trimming budget expenditures shall be identifiable for each operating area and for the electric utility's entire Iowa system for the past five years.

2. Total annual projected and actual miles of transmission line and of distribution line for which trees were trimmed for the reporting year for each operating area and for the electric utility's entire Iowa system for the reporting year, compared to the past five years. If the utility has utilized, or would prefer to utilize, an alternative method or methods of tracking physical tree trimming progress, it may propose the use of that method or methods to the commission in a request for waiver.

3. In the event the utility's actual tree trimming performance, based on how the utility tracks its tree trimming as described in numbered paragraph 20.17(7) "h"(2) "1," lags behind its planned trimming schedule by more than six months, the utility shall be required to file for the commission's approval additional tree trimming status reports on a quarterly basis. Such reports shall describe the steps the utility will take to remediate its tree trimming performance and backlog. The additional quarterly reports shall continue until the utility's backlog has been reduced to zero.

i. The Annual Reliability Report shall include the number of poles inspected, the number rejected, and the number replaced.

20.17(8) *Inquiries about electric service reliability.* A customer may request a report from an electric utility about the service reliability of the circuit supplying the customer's own meter. Within 20 working days of receipt of the request, the electric utility shall supply the report to the customer at a reasonable cost. The report should identify which interruptions (number and durations) are due to major events.

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