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GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENERGY, LABOR & ECONOMIC GROWTH
PUBLIC SERVICE COMMISSION

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September 1, 2009

Honorable Jennifer Granholm
Governor of Michigan

Honorable Members of the Senate

Honorable Members of the House of Representatives:

The enclosed Report on Status of Power Quality in Michigan, is submitted on behalf of the Michigan Public Service Commission (Commission) in accordance with Section 10p of 2008 PA 286, MCL 460.10p (Act 286), and represents the results of the research conducted by the Commission and its Staff. The report is available on the Commission's Web site under reports and also in Case No. U-15945. The report provides the Commission's findings regarding electric power quality, service reliability and power plant generating cost efficiency and the consequent impact on end-use customers.

The Commission reviewed existing performance measurements for evaluating the service quality, reliability and power plant generating cost efficiency of electric utilities operating in Michigan under the Commission's jurisdiction. Power quality performance measurements in ten states, half in Michigan's geographical region (Illinois, Indiana, Wisconsin, Ohio and Minnesota) and half based on perceived progressive regulation (Delaware, District of Columbia, Utah, California and Pennsylvania) were also investigated. The research indicated that the states had similar performance measurements for power reliability and customer service to those that currently are in place in Michigan, although some other states are using additional performance measurements.

The Commission solicited comments on implementation of the provisions of Act 286 in Case No. U-15895 and U-15901 for power quality disturbances and power plant generating cost efficiency. In Case No. U-15945, the Commission solicited further comments on power quality standards, rules, and distributed a customer questionnaire, which was also available on the Commission's Web site.

The Commission concludes as a result of the investigation no statutory changes are needed at this time. However, the Commission intends to adopt in subsequent orders Staff's recommendation that new additional reporting requirements be established for electric power quality, reliability and power plant generating cost efficiency.

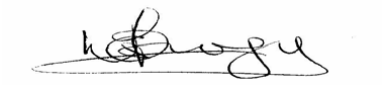
Specifically, Consumers Energy Company and The Detroit Edison Company, who serve a majority of the industrial companies in Michigan, will be required to provide new information in an

annual power quality report by April 2, 2010, and for each of the next three years. The annual report will contain data on all primary customer power quality investigations conducted in the past year for end-use customers, derived from their power quality meters, and the outcome of such investigations. At the end of the three year period, Staff will file a report to the Commission regarding new standards and recommend if they should be applied to all electric utilities. The Staff will examine the data to determine if the two companies are meeting IEEE power quality standards.

In addition, three new performance reliability measurements for service quality will be reported by Consumers Energy and The Detroit Edison Company: (1) System Average Interruption Duration Index – SAIDI, (2) System Average Interruption Frequency Index – SAIFI, and (3) Customer Average Interruption Duration Index – CAIDI. Each index will be reported with and without "major events" on a rolling five year average using the industry standard IEEE methodology of calculation. These indices have been proven to show the reliability of electricity in a utility's power system and will be useful to the Commission in identifying utility performance trends for each specific utility. The intent of the information is not to benchmark the utilities nationwide or within the state, but to review current performance levels to determine improvement.

The Commission will instruct Staff to add reporting requirements for electric utilities to be filed as part of existing filings to evaluate power plant generating cost efficiency. These requirements will allow the Commission to more closely monitor power plant generating cost efficiency. Based on these reports, the Commission will apprise the Governor and the Legislature of any future developments that may warrant action.

Very truly yours,



Orijakor N. Isiogu, Chairman

Monica Martinez, Commissioner

Steven A. Transeth, Commissioner

# REPORT ON
# STATUS OF POWER QUALITY
# IN MICHIGAN

**September 1, 2009**

**Orjiakor N. Isiogu, Chairman**
**Monica Martinez, Commissioner**
**Steven A. Transeth, Commissioner**

**MICHIGAN PUBLIC SERVICE COMMISSION**
Department of Energy, Labor & Economic Growth

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## Executive Summary

Customer power quality and reliability are two challenges that electric utilities face on a continuing basis. Stricter federal and state mandates have made providing high quality, reliable power a priority to utility companies who desire to stay competitive. In 2004, the Michigan Public Service Commission (Commission) formally adopted administrative rules on service quality and reliability, R 460.701, which require the utilities to file annual reports. The Commission's Report on the August 2003 regional blackout found that the voluntary reliability standards at the Federal level were inadequate in protecting Michigan's customers due to lack of enforcement of those standards. In 2004, action was taken by the Commission to mandate reliability standards and enforcement of those standards by sanctions. In June 2008, a series of severe storms swept across Michigan and the Commission further investigated the power quality and reliability policies used by electric utilities to determine if additional mandates were needed.

Commission Staff investigated power quality performance measurements and reliability policies in ten states, half in Michigan's geographical region (Illinois, Indiana, Wisconsin, Ohio and Minnesota) and half based on perceived progressive regulation (Delaware, District of Columbia, Utah, California and Pennsylvania). The research indicated that many states had similar performance measurements for power reliability and customer service to those that currently are in place in Michigan, although some other states are using additional performance measurements. The Commission adopts Staff's recommendation that three additional measurements be added as reporting requirements for Consumers Energy Company (Consumers Energy) and The Detroit Edison Company (Detroit Edison): (1) System Average Interruption Frequency Index (SAIFI), which represents the average annual number of interruptions per customer; (2) Customer Average Interruption Duration Index (CAIDI), which represents the average restoration time per outage; and (3) System Average Interruption Duration Index (SAIDI), which represents the average annual number of minutes of interruption per customer. The additional service quality metrics of SAIFI, SAIDI, and CAIDI will assist in monitoring customer service reliability on a system wide basis.

Consumers Energy and Detroit Edison are to provide information for these indices to the Commission beginning April 2, 2010 (with and without "major events") on a rolling five year average. These indices have been proven to show the reliability of electricity in a utility's power system and are useful to the Commission in identifying utility performance trends for each specific utility. The information will not be used to benchmark the utilities nationwide or within the state, but rather to measure performance levels for each utility to ensure that they are continuously monitored against their own historical data. The Commission Staff will review the data and meet with Consumers Energy and Detroit Edison in an attempt to ensure that the performance quality is improving. The Commission concludes that the new reporting indices will provide additional information needed to evaluate electric reliability and will augment the current performance standards of duration and repetitive outage mandates.

The reliability standards for the transmission system within Michigan are regulated by the Federal Energy Regulatory Commission (FERC), which has jurisdiction over all interstate transmission of electricity. The stated purpose of the FERC reliability standards is: "To ensure that the transmission system is operated so that instability, uncontrolled separation, or cascading outages will not occur as a result of the most severe single contingency and specified multiple contingencies." (http://www.nerc.com/files/TOP-004-2.pdf ) The North American Electric Reliability Corporation (NERC) is a self-regulatory organization subject to FERC and

governmental authorities in Canada oversight. Following the blackout of 2003, NERC, under FERC authority, initiated mandatory reliability standards that were enforced with penalties as of June 2007. Currently NERC develops and enforces transmission reliability standards for the bulk power system in North America. It assesses reliability annually via 10-year and seasonal forecasts, monitors the bulk power system, evaluates users, owners and operator preparedness, and educates, trains, and certifies industry personnel.

The Commission created a Power Quality Questionnaire (Questionnaire) in Case No. U-15945 and it was distributed directly to interested parties, as well as via press release and posting on the Commission's Web site. The intent of the Questionnaire was to identify and document the type and extent of power quality issues in Michigan. Despite the Commission's efforts to widely distribute and communicate the availability of the Questionnaire, the sole response was from the Michigan Electric and Gas Association (MEGA), on behalf of its electric utility members, Consumers Energy, Detroit Edison, and the electric distribution cooperative members of the Michigan Electric Cooperative Association (MECA). According to MEGA: (1) the electric providers in Michigan believe that the current reliability standards in place are sufficient to ensure high power quality; (2) power quality disturbances are investigated and remedied on a case-by-case basis due to the varied causes of the disruptions; (3) this method has been effective in resolving issues before they reach the attention of the Commission via formal complaint; and (4) this approach allows the utility to provide the customer with an individual, cost-effective solution that does not impose an undue financial burden on other customers, who would not directly benefit from an extensive system upgrade.

In order to continuously monitor customer power quality, the Commission will require Consumers Energy and Detroit Edison, who serve a majority of the commercial and industrial companies in Michigan, to provide an annual Power Quality Report for Staff review for a three year investigation period. The annual utility Power Quality Report will detail each of Consumers Energy's and Detroit Edison's power quality investigations conducted in the previous calendar year and the outcome, if any, of each investigation. All utility investigations into customer power quality from data derived from primary customer power quality metering monitors will be reported, as well as the outcome of each investigation. The first Power Quality Reports will be filed in a new docket by April 2, 2010, and reports will be filed each year for the next three years. Staff will meet with the utilities each year to discuss and review the data and after the third report, Staff will make its own final report to the Commission on its findings if new rules or performance standards are warranted, for all electric utility companies. The Staff will examine the data of the two companies, which are to be presented similar in detail to those presented during the compilation of data for this report including the Information Technology Industry Council Curve (ITI Curve).

Pursuant to the Commission's orders in Case Nos. U-15316 and U-15631, the electric utility companies filed 10 year generation efficiency plans. The Commission will order the electric utility companies to continue to file 10 year fossil fuel generation efficiency plans every three years in those cases to assist in monitoring power plant generating cost efficiency. The Commission will also direct Staff to include new reporting requirements in the next cycle of Power Supply Cost Recovery (PSCR) cases in 2010 for power plant generating cost efficiency for the 2011 plan year.

The Commission concludes as a result of Staff's investigation into power quality, reliability and power plant cost efficiency that no new or statutory changes are needed at this time. The electric utilities current method of addressing power quality complaints individually

provides the most efficient means to solve the problem for the customer at the distribution level. However, as discussed above the Commission intends to adopt in subsequent orders, Staff's recommendation that new additional reporting requirements be established for electric power quality, reliability and power plant generating cost efficiency for the purpose of continued monitoring of these issues. The Commission will also continue to provide opportunities for customers, particularly commercial and industrial customers, to report their concerns.

## Introduction

In response to Governor Jennifer M. Granholm signing into law 2008 PA 286 (Act 286) in October 2008, the Commission began its review process of the current Service Quality and Reliability Standards for Electric Distribution Systems. As an amendment to 1939 PA 3, Section 10p(8) of Act 286 provides that the Commission shall submit a report to the Governor and the Legislature by September 1, 2009, that shall include:

(1) An assessment of the major types of end-use customer power quality disturbances.
(2) An assessment of utility power plant generating cost efficiency.
(3) A description of current efforts to enforce standards pertaining to power quality disturbances and power plant generating cost efficiency.
(4) Recommendations for monitoring power quality disturbances and power plant generating cost efficiency.
(5) Recommendations for statutory changes, if any (http://legislature.mi.gov/doc.aspx?mcl-460-10p).

Section 10p(12) requires the Commission to "establish a method for gathering data from the industrial customer class to assist in monitoring power quality and reliability standards related to service characteristics of the industrial class." (*Id.*)

## Procedural History

The concern about electric reliability and power quality has been an ongoing concern for many years. In 1999, a Commission Staff report on Detroit Edison's distribution system reliability and storm response sparked a subsequent Commission investigation into reliability methods employed by all Michigan electric utilities. Staff consulted with electric utilities operating in Michigan, customer groups, and other relevant stakeholders about methods currently employed to improve the service reliability of electric transmission and distribution systems. Thereafter, the Commission directed the Staff to develop recommendations regarding appropriate measures of service quality, current industry standards, and changes in existing methods that would advance service reliability.

On January 3, 2000, the Commission initiated a proceeding in Case No. U-12270 to consider methods to improve the reliability of service to all of Michigan's electric utility customers. As the Staff's investigation continued, in June 2000, the Customer Choice and Electric Reliability Act of 2000 (Act 141) became effective. Section 10p of Act 141 provided in part:

> (5) The commission shall adopt generally applicable service quality and reliability standards for the transmission and distribution systems of electric utilities and other entities subject to its jurisdiction, including, but not limited to, standards for service outages, distribution facility upgrades, repairs and maintenance, telephone service, billing service, operational reliability, and public and worker safety. In setting service quality and reliability standards, the commission shall consider safety, costs, local geography and weather, applicable codes, national electric industry practices, sound engineering judgment, and experience. The commission

shall also include provisions to upgrade the service quality of distribution circuits that historically have experienced significantly below-average performance in relationship to similar distribution circuits.

(6) Annually, each jurisdictional utility or entity shall file its report with the commission detailing actions to be taken to comply with the service quality and reliability standards during the next calendar year and its performance in relation to the service quality and reliability standards during the prior calendar year. The annual reports shall contain that data as required by the commission.

(7) The commission shall analyze the data to determine whether the jurisdictional entities are properly operating and maintaining their systems, assess the impact of deregulation on reliability, and take corrective action if needed.

(8) The commission shall be authorized to levy financial incentives and penalties upon any jurisdictional entity which exceeds or fails to meet the service quality and reliability standards. (MCL 460.10p(5)-(8))

In December 2001, after Staff submitted their final report on the development of reliability measurements, the Commission issued an order in Case No. U-12270, which initiated rulemaking proceedings for service quality and reliability standards for electric distribution systems as required by Act 141. The order states in part that "the public interest and the rulemaking process will be significantly furthered by the collection and submission of data." (http://efile.mpsc.cis.state.mi.us/efile/viewcase.php?casenum=12270). Effective January 1, 2002, all electric utility companies under the Commission's authority were directed to begin collecting service quality data for submission. The electric utilities were ordered to "measure, record, and report information necessary to demonstrate their performance in relation to the proposed performance standards." (http://efile.mpsc.cis.state.mi.us/efile/docs/12270/0040.pdf) On January 29, 2004 the Commission issued its final order in Case No. U-12270 formally adopting new administrative rules on service quality (R 460.701 - 460.752). A summary of the 11 reliability standards are found in Attachment A.

The interest in electric power quality and reliability escalated substantially with the extensive blackout on August 14, 2003, that affected most of Northeastern US and Canada. The Commission issued a 107 page report in November 2003, which concluded that electric reliability had been seriously compromised by the fragmented and ineffective regulation of the electric transmission system and that the simulated (as opposed to real) enforcement of reliability standards was inadequate to protect Michigan or the nation's citizens. The Commission recommended that "the Federal Energy Regulatory Commission (FERC) be authorized to require membership in a single transmission organization for each region and have jurisdiction to mandate the development of reliability standards and enforce those standards with real rather than simulated sanctions."[1]

In line with the recommendations submitted by the Commission and by a US/Canada joint committee report on the 2003 blackout and as required by the Energy Policy Act of 2005 (EPA 2005), FERC created mandatory reliability standards and enforced penalties for electric

[1] Executive Summary of November 2003 Blackout Report (p. 2).

utilities.[2] These standards increased the amount of information that utilities are required to submit to their RTO in order to increase reliability. Subsequently, most Michigan utilities became members of the Midwest ISO and the Commission joined as a regulatory authority serving on the Advisory Committee in 2005, when the real-time and day ahead markets were initiated.

The Midwest ISO is a FERC-regulated control area operator of the transmission grid within its footprint. Its responsibilities include providing non-discriminatory access to the grid, managing congestion, maintaining the reliability and security of the grid, and providing billing and settlement services. Currently, the Midwest ISO has over 300 members stretching across 15 states and Manitoba with a footprint of almost 1,000,000 square miles. As the official balancing authority of electric utilities in this region, the Midwest ISO has the authority to order utilities who have voluntarily relinquished control of their transmission facilities, to immediately comply with any requests or mandates deemed necessary to maintain high reliability. Additionally, the Midwest ISO operates a wholesale market that operates on both a day-ahead and real time basis.

The EPA 2005 directed states to consider implementing standards dealing with net metering, fuel sources, and fossil fuel generation efficiency. In August 2008, the MPSC issued an order in Case No. U-15316 that adopted these federally recommended standards. The Commission, in Case No. U-15631, ordered the regulated electric utilities that owned generation to file 10 year fossil fuel generation efficiency plans with the Commission by December 31, 2008.

After a series of severe thunderstorms crossed the Lower Peninsula of Michigan in June 2008, the Commission opened Case No. U-15605 to investigate the effects that the storms had on the utilities' distribution reliability and whether the utilities were adequately prepared to respond to customer demands and concerns as they restored power. In March 2009, the Commission ordered Consumers Energy and Detroit Edison to make improvements to their storm response procedures to increase electric reliability and decrease the duration of outages. The Commission also ordered both companies to make outage credit information more accessible to customers.

Pursuant to Act 286, the Commission opened Case No. U-15895 to receive comments from interested parties regarding Section 10p(11), which deals with the creation of benchmarks for utilities to alleviate end-use customer power quality disturbances and promote power plant generation cost efficiency. In addition, in December 2008, the Commission opened Case No. U-15901 to begin the process of revising the Service Quality and Reliability Standards for Electric Distribution Systems, as required by Act 286. Collectively, these dockets initiated formal investigations into current policies and practices used by Michigan electric utilities. To facilitate the stated goals of Act 286, the Staff determined that a workgroup comprised of electric utilities operating in Michigan, customer groups, and other relevant stakeholders would be the best venue for gathering information.

To gain additional information about power quality and power plant generating cost efficiency, the Commission opened Case No. U-15945 in April 2009 (http://efile.mpsc.cis.state.mi.us/efile/viewcase.php?casenum=15945). In this docket, Staff created a Power Quality Questionnaire to solicit information about the current state of power quality from commercial and industrial electric customers to determine if more stringent

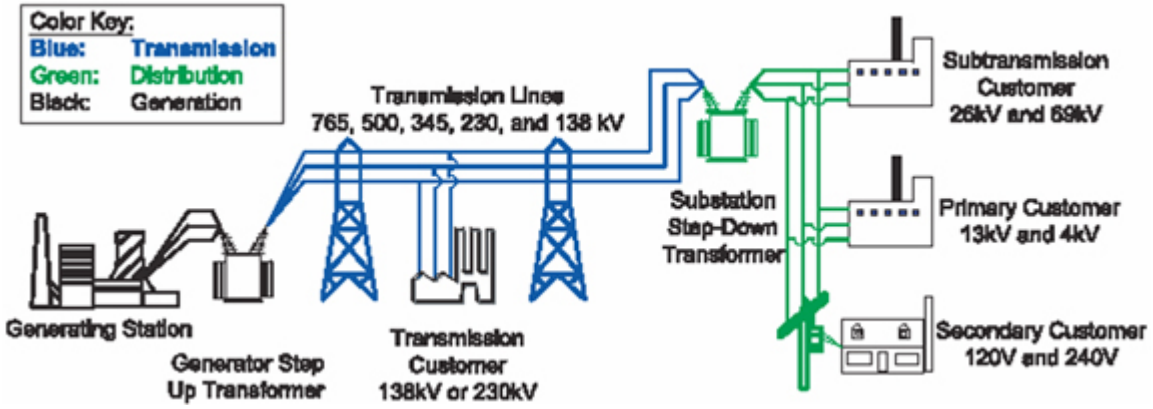
[2] NERC is also responsible for developing and enforcing reliability standards, assessing reliability annually via 10 year and seasonal forecasts, and monitoring the bulk power system.

mandates are required. This questionnaire was announced via press release, distributed to industrial and commercial class customers in Michigan, and was posted on the Commission Web site under the corresponding e-docket. In addition, a Power Quality and Generation Cost Efficiency Workgroup was formed, which conducted a series of meetings beginning on May 28, 2009.

## Part 1 – Power Quality and Electric Reliability

A typical electric system is comprised of three separate aspects: Generation, Transmission, and Distribution. The following excerpt from Commission Report on the August 14, 2003 blackout best describes their delineation, followed by the diagram from the Department of Energy:[3]

> Generation, or the act of producing electricity, is, for the most part, carried out at large power plants, which convert another energy source to electricity. Although the specific details vary, in general, fossil fuel plants burn coal, oil, or natural gas, use the resulting heat to convert water to steam, and then run the steam (or the heated air from combustion) through turbines to create electricity. Other fuels, such as landfill gas or municipal solid waste, can be substituted in essentially the same process. The generating process in nuclear plants is similar, except that the heat is derived from the fission decay of radioactive elements.
>
> The transmission function involves the large-scale movement of power from generating units to the distribution networks, which then deliver that power to the customer. Transmission is distinguished from distribution in that transmission lines are larger, operate at significantly higher voltages, and individually deliver much larger amounts of power. Transmission can be fairly described as the bulk transport of power primarily at wholesale, while distribution is the delivery to the customer of smaller amounts of power at retail.[4]




Within the electric system there are many variables that can affect power quality, thus, it is necessary to have a clear understanding of the different disturbances that can occur to investigate the status of these phenomena in Michigan. The term "power quality" is often used

[3] http://www.oe.energy.gov/information_center/electricity101.htm
[4] http://www.michigan.gov/documents/mpsc_blackout_77423_7.pdf

to refer either to the condition of electric power sent to customers, or to the reliability of the delivery of this power, or both. In this report, "power quality" will henceforth be used to refer to the overall strength and consistency of the electric power sent to the consumer and "reliability" will be used to refer to how dependable the delivery of this electric power is. Customer classes can have drastically different views of power quality/reliability issues based on how they are affected. Small variations in power quality within a residential application will rarely be noticed by the customer. Those same variations in an industrial manufacturing setting could severely impact the various technology applications used at that location which can be disruptive to business operations. Conversely, electric reliability impacts every customer class and is often noticed as long or frequent outages that the end-use customer experiences.

The IEEE has been working to standardize the terms that are used to describe electrical phenomena with its standard IEEE-1159. The chart below is a summary of those terms described in IEEE-1159:[5]

| Category | Types | Typical Duration | Common Causes |
|---|---|---|---|
| Transients | Oscillatory, Impulsive | Less than 1 cycle | Lightning, Switching Loads |
| Short Duration Variations | Sags, Swells, Interruptions | Less than 1 minute | Faults, Motor Starting, Utility Protective Equipment |
| Long Duration Variations | Undervoltages, Overvoltages, Sustained Interruptions | Over 1 minute | Poor Voltage Regulation, Incorrect Transformer Tap Setting, Overloaded Feeder, Utility Equipment |
| Voltage Imbalance | — | Steady State | Unbalanced Loads, Equipment Failure |
| Waveform Distortion | Harmonics, Notching, Noise | Steady State | Electronic Loads |
| Voltage Fluctuations | — | Steady State | Arcing Loads, Loose Connections |
| Power Frequency Variations | — | Steady State | Poor Generator Control |

WE Energies provides a more detailed definition with symptoms of those same disturbances described in IEEE-1159. It outlines how an industrial customer might experience the effects of each phenomenon in the chart below[6]:

[5] http://www.powerlogic.com/literature/199036.pdf
[6] http://we-energies.com/powerquality/pq_whosrespons.pdf

| Disturbance Type | Description | Symptoms |
|---|---|---|
| **Power Outage** | Total interruption of electrical supply<br>• Momentary (less than one minute)<br>• Long-term (one minute or more) | - System shutdown<br>- Loss of computer/controller memory<br>- Hardware/product loss or damage |
| **Transient (Surge)** | A subcycle disturbance in the AC waveform, resulting in a sharp but brief voltage increase | - Computer lock-up, processing errors, data loss<br>- Burned circuit boards, electrical insulation damage, equipment damage |
| **Sag/Swell** | Any short-term (½ cycle to 3 seconds) decrease (sag) or increase (swell) in voltage | - Memory loss and data errors<br>- Equipment shutdown; motors stopping or stalling and decreased motor life<br>- Flickering lights |
| **Noise** | An unwanted high frequency electrical signal that alters the normal voltage pattern (sine wave) | - Lock-up of sensitive equipment<br>- Data loss and processing errors<br>- Distorted audio and video reception |
| **Harmonic Distortion** | The alteration of the normal voltage pattern due to equipment generating frequencies other than the standard 60 cycles per second | - Electrical equipment/wiring overheating<br>- Decreased motor performance<br>- Improper operation of breakers, relays or fuses |
| **Under/Overvoltage** | Any long-term change (more than 1 minute) below or above normal voltage levels | - Dim or bright lights<br>- Equipment shutdown; overheating of motors or lights<br>- Reduced efficiency or life of equipment |

In most cases, a residential customer would not notice these disturbances to the extent described above. It is important to address power quality/reliability issues with the understanding that each customer class may or may not experience an impact from each type of disturbance, which will change the level of perceived service quality respectively. Further, even within a customer class, the type or vintage of a customer's equipment may make it more or less susceptible to these types of disturbances.

## 1.1 - Power Quality

Act 286 ordered the MPSC to investigate and report on the status of power quality and electric reliability in the State of Michigan. The Commission opened Case No. U-15895 to receive comments on the standard rate application filing forms and instructions and/or the power quality disturbance benchmarks provided for in Sections 6a(6) and 10p(11) of Act 286. The Commission also opened Docket number U-15901 to receive comments on power quality rules and collection of data from industrial class customers to assist in monitoring power quality standards under Act 286.

Staff initiated its investigation by meeting with Consumers Energy, Detroit Edison, and MEGA to receive input regarding Act 286. The collective decision from that meeting was to begin a workgroup on Power Quality, Reliability, and Power Plant Generation Cost Efficiency that included all stakeholders to gather information on the topic. Staff prepared a detailed public questionnaire on power quality to assess the current status of power quality that end use customers were experiencing in Michigan. The questionnaire is provided in Attachment B. The power quality questionnaire was sent to all stakeholders, including Association of Businesses Advocating Tariff Equity (ABATE), Michigan Manufactures Association, and the Michigan Chamber of Commerce, announced via a press release, and posted on the Commission's Web

site in Case No. U-15945 (http://efile.mpsc.state.mi.us/efile/docs/15945/0003.pdf). The only response received was from MEGA (http://efile.mpsc.state.mi.us/efile/docs/15945/0004.pdf). No information was received from any industrial or commercial customers or groups indicating any power quality issues.

ABATE did provide comments with regard to power quality in Cases Nos. U-15895 and U-15901. It proposed to eliminate Subrule (4) of R 460.3702 of the Commission's Technical Standards for Electric Distribution Service (http://efile.mpsc.state.mi.us/efile/docs/15901/0004.pdf). ABATE proposed a new Rule 706 that would require the utilities to measure voltage fluctuations which can affect electronic devices, such as computers, and industrial operations. Consumers Energy, Detroit Edison, MEGA, and the Michigan Electric Cooperative Association filed a joint response to the ABATE proposal. The utilities argue that ABATE has not made any showing of deteriorating or inadequate power quality experienced by its members. They also contend that power quality is not the sole responsibility of the utilities because customer equipment can cause significant power quality problems in the form of harmonics, flicker and voltage sag. In response, ABATE states the Commission is required by Act 286 to review all of its rules and propose changes, if needed. ABATE believes new performance standards for generation facilities and for distribution facilities to protect end-use customers from power quality disturbances are required. The Commission will address the need for new or amended rules in a subsequent discussion.

### 1.2 - The Workgroup

The Power Quality, Reliability, and Generation Efficiency Workgroup (Workgroup) met for the first time on May 28, 2009 at the offices of the Commission. Staff invited all stakeholders and the attendees consisted of representatives of Consumers Energy, Detroit Edison, ITC, Wolverine Power Cooperative, and MEGA. Staff presented the results of its power quality survey, the ten state regulatory review, analysis of power quality issues, and asked attendees to describe any power quality problems they were experiencing and how they process complaints. The group met again on June 11, 2009, with participants providing information on how they address power quality issues within their system. The Workgroup met for the final time on July 9, 2009. The utilities provided further data on power quality investigations and their frequency. The information extracted from those meetings is as follows:

***Consumers Energy Power Quality Program***

Consumers Energy's power quality program begins with a proactive approach. At the time of this report they have 225 Dranetz-BMI power quality meters in place at industrial and commercial locations with primary metering. The meters record any power quality information that includes voltage, current, power trends, harmonics, and voltage and current unbalance. The data is downloaded daily to a database that currently has power quality data archived dating back to January 1999. Daily reports are provided to power quality engineers with information related to sags, swells, or transients that fall outside criteria. The engineer's process evaluates the reports each day, to identify potential sources of the disturbance and any trends that might be established. Customers are then notified of corrective utility actions used to eliminate the root cause of each disturbance. In an instance where the customer's system is identified as the source of the disturbance, Consumers Energy provides assistance in seeking solutions to modify the customers system to avoid future disturbances.

This approach has been successful in identifying many utility or customer issues such as open jumpers, load-tap changer contact failures, customer faults, equipment failures, and single phase fuse openings before they are discovered by the customer themselves. Consumers Energy has 3500+ commercial and industrial customers within their system that are supported by a power quality team. Only 225 of those customers are equipped with the power quality meters at all times, however, in the event any customer is experiencing power quality disturbances there are additional monitors that are installed to gather data at that location.

Each customer is assigned to a Customer Account Manager who can be contacted directly with any power quality concerns they are experiencing. The engineer responsible for that area will generally meet with the customer to understand the issue and begin investigating the circuit. They may choose to install a more basic meter called Rustrak Data Logger to establish a voltage profile if a meter is not already in place at that location. If they cannot identify a solution with this information, the case is forwarded to the power quality team. The power quality team analyzes all the information available from either the Dranetz-BMI or Rustrak Data Logger meter to determine the source of the power quality issue and identify potential solutions. The team will contact the customer to review the findings and discuss the solutions with them as well as initiate the necessary modifications to the system if needed. Consumers Energy works closely with ITC when investigating power quality issues. They compare event data to look for a correlation between transmission disturbances that might have been experienced on the distribution circuit. Events on the transmission system can be seen as voltage sags/swells on the distribution system occasionally. ITC assists in the investigation at the request of Consumers Energy whenever needed.

Consumers Energy provided Staff with data to gain an understanding of the current power quality issues that the utility experiences within its system. Since January 2008, it has had 134 power quality inquiries. Of those, 92 were generated from the utility's power quality monitoring system (from 48 unique locations) and 42 were generated from customer initiated investigations. While reviewing the sources of those issues, Consumers Energy found that 55 were caused by the utility's system (these include faults from lightning, windstorms, ice storms, car-pole accidents, and other third-party activities on the system), but only nine of those required Consumers Energy to make changes to the system. Consumers Energy found 43 to be initiated from the customer's site and the remaining 36 did not have a root cause identified. Consumers Energy continued to support the customers in those 43 instances to help customers make changes within their facility to mitigate future disturbances.

***Detroit Edison Power Quality Program***

Detroit Edison has a similar approach to power quality using a proactive customer relations focus. The utility serves around 5,000 commercial and industrial companies within its service territory and has 160 PQ meters installed at specific locations throughout its system. The meters log data to a database for alarm event reports that are generated on a daily basis for engineers to review. They process the alarms to look for trends or possible root causes. Any proactive measures taken are communicated to the customer.

Any customer that experiences power quality issues contacts its direct account representative to handle the case. The account representative alerts the distribution design engineer to begin investigating the issue. The engineer contacts the customer to gather information on the exact power quality disturbance and what equipment that disturbance is affecting. If that location is already equipped with a power quality meter the data will be

examined, otherwise a temporary meter will be installed to begin gathering data. If correlations with Detroit Edison's system and the disturbances the customer experiences are identified, they will determine what changes are needed to remedy the issue. Any abnormal conditions are addressed by the Planning Engineer with corrective actions. If the customer's equipment is identified as the root cause, Detroit Edison will continue to work with the customer to identify changes they can make to harden their equipment to minimize the impact of future disturbances. ITC also works closely with Detroit Edison while investigating disturbances on the distribution system, and assists in investigations at the request of Detroit Edison when looking for potential root causes of voltage sags/swells.

Detroit Edison also provided data to Staff regarding power quality investigations within its system. The data consisted of the calls received from customers regarding disturbances since 2005. Since January of 2008, Detroit Edison has received 25 calls that resulted in varying levels of investigation. The previous years indicate a steady average of one to two calls per month on a consistent basis. Both Detroit Edison and Consumers Energy have a power quality process that addresses each disturbance on a case by case basis as it occurs.

The sensitivity of a commercial or industrial customer's equipment has a direct correlation to the power quality impact that will be felt at that location. There are normal disturbances on the distribution system that occur frequently as a result of system switching execution, lightning strikes, and other faults that are correctable. Consumers Energy and Detroit Edison utilize standards for RMS voltages with the goal of meeting the magnitude and duration that they provide. Consumers Energy uses the ITI Curve revised in 2000[7] as their RMS voltage criteria. This template was established by the Information Technology Institute (ITI) with the goal of industrial equipment manufacturers building highly technical equipment capable of meeting this curve. For performances meeting the goals of this curve and companies utilizing equipment manufactured to withstand this curve, normal occurrences on the distribution system should not have any noticeable effect. Detroit Edison pointed out that the Electric Power Research Institute (EPRI) publishes SEMI F47-0706,[8] a similar curve with the intent of standardizing the electric sensitivity of manufacturing equipment. This is generally only needed in the instances where an industrial or commercial customer is utilizing highly sensitive equipment. The process of equipment manufacturers and utilities migrating to a common standard is still in the future; however, it does provide an avenue for a utility and its customers to work together.

***MEGA Power Quality Program***

MEGA provided information regarding member power quality procedures to Staff in a consolidated report. According to this information, there has not been an increase in power quality concerns in the past five years with any utility. Each utility handles each issue on a case-by-case basis directly with the customer affected as well. Data recorders are not installed at permanent locations as they are with Consumers Energy and Detroit Edison, but they are installed to gather data when needed for an investigation. If the investigation concludes the issue to be on the utility's system then it is addressed (*e.g.* service line or transformer). In the instance that the root cause is with the customer's equipment, the utility will continue to work with them to eliminate the disturbance.

[7] http://www.itic.org/clientuploads/Oct2000Curve.pdf
[8] http://f47testing.epri.com/f47abstract.html

Alpena Power Company has had one power quality investigation in the past several years. The low voltage was resolved with a new transformer and a re-conductoring project. Edison Sault Electric Company estimates it investigates one power quality complaint every two to three months. Recently it had a customer experiencing a voltage drop after installing a new tank-less water heater drawing 150 amps. The issue was resolved with a customer upgrade in service level to 200 amps. Indiana Michigan Power Company has experienced six complaints from 2004 to 2008. We Energies reports investigating one power quality concern a month in Michigan. Each concern is addressed within three days by a local troubleshooter or system planning personnel and is completed to the customer's full satisfaction. Wisconsin Public Service Corporation and Upper Peninsula Power Company each estimate less than one power quality investigation per month. Northern States Power has a single customer with instances of equipment malfunction from momentary faults (lightning, switching) and the resolution involves equipment upgrades to increase the durability of the equipment to ride out normal system disturbances. None of these have resulted in a formal complaint at the Commission in the last five years.

### 1.3 - Power Quality Conclusions and Recommendations

The Commission did not receive any indication through Staff's investigation that there is currently a significant issue with power quality in Michigan. The number of informal complaints regarding power quality that Staff receives is minimal and they are dealt with on a case-by-case basis. Staff acts as a neutral party to intervene between the customer and the utility to resolve the power quality disturbances experienced. After receiving an informal complaint, Staff contacts both parties to determine the problem and analyze the rules or tariffs that pertain to the issue. In the event that an informal complaint cannot be resolved, the procedure will continue to the formal complaint process. The solution to each of these complaints is very customer specific and based on the unique circumstances that encompass the system.

Staff's investigation shows that the utilities respond to power quality issues as they arise. The circumstances of power quality disturbances lend themselves to variability. Addressing power quality on a case-by-case basis is the most effective means of problem solving for the customer at this time. The Commission finds that the electric utilities should continue to strive to improve power quality, and to monitor such improvement the Commission is requiring Consumers Energy and Detroit Edison, who serve a majority of the commercial and industrial companies in Michigan, to provide an annual power quality report. The report is to contain information similar in detail to that provided to the work group for a three year investigation period. The annual information will be filed by April 2 each year in a new docket. Staff will meet with the utility companies each year to review and discuss the data. The utility report will detail each of the power quality investigations the utility conducted that year and the outcome, if any, of that investigation. Staff notes ABATE's comments and the Staff will examine the data of the two companies, which are to be presented similar in detail to those presented during the workgroup session including the ITI Curve to determine if the IEEE power quality standards were met during the next several years.

Allowing each utility to address power quality complaints individually provides the means to specifically and most efficiently solve the problem for the customer at this time. However, if the data collected from the annual power quality reports indicates a power quality problem in the state, at the end of the three year period a workgroup would commence to explore new rules and regulations. Staff will provide a final recommendation to the Commission on status of power quality in Michigan at the conclusion of the three year period. As discussed

above, an industrial or commercial customer who experiences a power quality issue that is not resolved can contact the Staff or the Commission to assist in seeking a resolution.

### 1.4 - Electric Transmission and Distribution Reliability

The reliability standards for the transmission system within Michigan are regulated by FERC, which has jurisdiction over all interstate transmission of electricity. The stated purpose of the FERC reliability standards is: "To ensure that the transmission system is operated so that instability, uncontrolled separation, or cascading outages will not occur as a result of the most severe single Contingency and specified multiple Contingencies." (http://www.nerc.com/files/TOP-004-2.pdf )

NERC is a self-regulatory organization that FERC oversees along with authorities in Canada. The reliability standards that FERC approves are developed by NERC with authority granted to them following the 2003 blackout. In Michigan, NERC has designated two RTOs as the reliability coordinators for their footprints. These RTOs continually monitor the regional transmission systems to provide consistent reliability for the dispatching of energy throughout their territory. The secure digital systems that are in place provide real time contingency analysis, load balancing, and alarming tools to reduce the duration, size, and number of outages on the transmission grid. The RTOs must work with utilities to protect the integrity of the system by keeping generators online and synchronized, keeping transmission lines online, and maintaining acceptable voltage levels. The reliability standards NERC has in place are designed to ensure the reliability of bulk power systems throughout the United States through such efforts as load balancing, relay loadability, and contingency analysis.

The Commission Staff conducted an investigation into electric distribution reliability to assess the current regulation being used throughout the United States. Staff's work began by conducting a Ten State Regulation Review that also included reviewing detailed reports from the Pacific Economics Group as well as Berkeley National Labs that encompassed all fifty states and the District of Columbia.

### 1.5 - Staff Ten State Regulation Review

The Ten State Regulation Review on power quality and reliability was designed to fulfill the Act 286 requirement to examine what other states have mandated to ensure power quality and customer service satisfaction. Staff conducted research on regulatory policies that directly impacted power quality, reliability, and customer service satisfaction of ten states, half based on similar geographical region (Illinois, Indiana, Wisconsin, Ohio and Minnesota) and half based on perceived progressive regulation as referenced in a recent Utah Public Service Commission Staff investigation (Delaware, District of Columbia, Utah, California and Pennsylvania)[9]. A table of the results can be found in Attachment C.

Staff's review found that all ten states required reporting of SAIDI, SAIFI, and/or CAIDI. These indices are reliability indicators that quantify the frequency and length that power reliability issues are experienced on a system wide basis.

[9] Utah Public Service Commission, Division of Public Utilities. *The Investigation into the rules, standards, or procedures other states have adopted to ensure safe, reliable, and adequate utility service and facilities*. Docket No. 08-999-07. November 3, 2008.

According to the IEEE Standard 1366-2003, the definitions for these indices are as follows:

SAIDI is the average number of minutes of interruptions in a year per customer served. It is calculated by dividing the sum customer minutes interrupted by the total number of customers served.

$$\left( \frac{\text{Sum Customer Minutes Interrupted}}{\text{Total Number of Customers Served}} \right)$$

SAIFI is the average number of interruptions per customer for the year. It is determined by dividing the sum total number of customers interrupted by the total number of customers served during the year.

$$\left( \frac{\text{Sum Total Number of Customers Interrupted}}{\text{Total Number of Customers Served}} \right)$$

CAIDI is the average minutes of interruption per customer interrupted. It approximates the average length of time required to complete service restoration. It is determined by dividing the total number customer minutes interrupted by the total number of customers interrupted.

$$\left( \frac{\text{Total Number Customer Minutes Interrupted}}{\text{Total Number of Customers Interrupted}} \right)$$

SAIDI, SAIFI and CAIDI are normally reported by utilities with and without "Major Event Days" included. The definition of those events varies throughout the industry. IEEE has developed the IEEE 1366-2003 standard to define a "major event" as one that exceeds a specific threshold found by adding 2.5 standard deviations to the average of the natural logarithms of the electric utilities daily SAIDI performance during the most recent five-year period.[10] However, only five of the states (Delaware, Ohio, District of Columbia, Minnesota, and Utah) that Staff researched required SAIDI, SAIFI and CAIDI reporting with the IEEE 1366-2003 standard.

Additionally, Staff's review found that two of the ten states (California and Pennsylvania) require reporting of the Momentary Average Interruption Frequency Index (MAIFI). MAIFI is a reliability indicator that shows the average number of momentary interruptions that a customer would experience during a given period (typically a year). It is calculated by dividing the sum total number of customer momentary interruptions by the total customer number of customers served.

$$\left( \frac{\text{Sum Total Number of Customer Momentary Interruptions}}{\text{Total Number of Customers Served}} \right)$$

Electric power utilities may define momentary interruptions differently; some consider a momentary interruption to be an outage of less than 1 minute in duration, while others consider a momentary interruption to be an outage of less than 5 minutes in duration. Overall, MAIFI is useful for tracking momentary power outages, or "blinks," that are not included in SAIDI or SAIFI. The drawback to this indicator surrounds the sophisticated communication equipment and the amount that must be located in precise areas throughout the distribution system to

[10] *See*, Attachment D for details on the proper calculation of the IEEE 1366-2003 "Major Event Day" Standard.

effectively collect the required data. Pennsylvania only requires it to be reported if it is already available due to the high infrastructure cost to measure it.

In addition to requiring SAIDI, SAIFI, CAIDI and/or MAIFI reporting, some of the states researched established benchmarks or dead bands for each indicator that utilities must meet. If a utility does not meet the established benchmark or fall within the dead band parameters, the utility is either levied a fine and/or must create a report to the regulating authority, detailing the reason(s) why the utility did not meet the benchmark/dead band. The utility must also state what will be done in the future to ensure that the utility meets the benchmark/dead band.

Research conducted on customer satisfaction standards found that most states have mandates similar to the ones currently in place by the Commission in Case No. U-12270. Of the states researched, each regulating authority has rules in place to ensure that customer calls are answered in a timely fashion and customer complaints/concerns are resolved in a reasonable amount of time. To ensure this, each of these state's regulators require that the utilities compile a report to them that details plans to maintain reliability and quality of service at an acceptable level.

### 1.6 - 2008 Staff Storm Outage Report

The series of thunderstorms that crossed the Lower Peninsula of Michigan in June 2008 and turned much of Consumers Energy and Detroit Edison's service territories into a federal disaster area were an anomaly. Consumers Energy enlisted the help of Great Lakes Mutual Assistance to restore service to its service territories deemed federal disaster areas within five days. Detroit Edison experienced more challenges in its restoration efforts. The sheer volume of calls pouring into the utility's automated system, coupled with vendor telephone equipment issues caused the system to malfunction and led to the misinterpretation of the extent of outages. Once the phone system problem was identified and resolved, Detroit Edison was able to return service to the majority of its service area within the week with the help of additional crew workers from Great Lakes Mutual Assistance.

The Commission set up an investigation in Case No. U-15605 to review Consumers Energy's and Detroit Edison's response to the outages caused by the storm and to determine if changes should be implemented. Although it was noted that most of the problems experienced by both Consumers Energy and Detroit Edison were due to the severity of the storms, the Commission found that the restoration times could have been reduced with additional improvements to their severe storm response procedures. As noted above, Detroit Edison experienced trouble with its automated phone response system, resulting in customers unable to reach the utility to report outages. The Commission[11] recommended that, subsequent to repairs, Detroit Edison perform communication testing to ensure that the phone system operates at full capacity. Another issue brought to light during the investigation was the damage caused by trees falling on the power lines. Detroit Edison reported that nearly 50 percent of the trees that took

[11] Detroit Edison made three recommendations that the Staff supported: 1) perform testing of critical communication and information systems; 2) improve the restoration estimate and customer communication process; and 3) collaborate with communities to arrange for the removal of dead ash trees outside of the company's line clearance distance and easements. Additionally, the Staff recommended that Detroit Edison provide more detailed action plans and progress reports to the Staff until the recommended improvements have been completed. The Staff also recommended that, in addition to collaborating with local communities, Detroit Edison should also work with the Michigan Department of Agriculture (MDA) to develop a program for addressing the problems associated with the Emerald Ash Borer infestation. (U-15605 Final Order Issued 3/4/09)

down power lines were diseased Ash trees located outside of the tree trimming clearance zones. The Commission recommended upgrading the power lines in Detroit Edison's tree-lined area territory with alternative construction techniques that have proven to minimize the impact of trees. Also, additional communication with the community and environmental groups to remove the dead Ash trees was recommended to help eliminate the threat to power reliability.

The implementation of Advanced Metering Infrastructure (AMI) was also noted by Consumers Energy and Detroit Edison as a tool they plan to use to reduce the duration of outages. With this technology, the utility is able to pinpoint the location(s) of outages on the system without the customer needing to call the company. The utility is then able to dispatch crews and work efficiently to restore power without customer involvement to verify that power was restored.

The mandates in Case No. U-12270, with the additional requirements determined in Case No. U-15605, are sufficient to handle severe storms such as the ones that occurred in June 2008. Each utility is required to submit a report to the Commission, detailing its power quality and reliability plans for the upcoming year as well as explaining any failures in meeting the established benchmarks in the previous year. If there were any failures or any major storms that rendered the utility incapable of meeting the established standards, the utility must detail what it is doing to improve power quality and reliability.

## 1.7 - Additional Reports Reviewed

### *Pacific Economics Group (PEG) Report*

In Case No. U-14838 (March 2006) the Commission required Detroit Edison to show cause as to why its electric rates should not be lowered after questions regarding service quality became an issue. The Commission later adopted a settlement agreement that required an independent study to review Detroit Edison's service quality. The goals of the study were to review the indicators in place to measure service quality, make recommendations to expand the set of indicators used for service quality monitoring, and propose a method for benchmarking service quality.[12] The study was performed by Pacific Economics Group LLC (PEG) – a consultant with extensive experience in the regulatory industry benchmarking utility performance for service quality and reliability.

As a part of the study completed in 2007, PEG reviewed the service quality regulation in all 50 states and the District of Columbia and found that 34 of the states require common reliability indicators reported such as SAIDI, SAIFI and CAIDI; however, only 11 states require MAIFI. Michigan is one of 20 states that have some aspect of a penalty/reward regulatory system in place. Only three states, including the District of Columbia., have a service quality system in place that is target driven.[13] The remaining regulation studied was very similar to Michigan's and defined circuit indicators, restoration standards, telephone services, metering/billing, customer service satisfaction, and non-emergency services. While assessing the current standards in place for Michigan utilities PEG commented that:

[12] *In the Matter, on the Commission's own motion, ordering the Detroit Edison Company to show cause why its retail rates for the sale and distribution of electric energy should not be decreased.* MPSC Case No. U-14838, August 31, 2006.

[13] Pacific Economics Group. (2007, March). *Service Quality Regulation for Detroit Edison: A Critical Assessment*. Madison, WI: Larry Kaufmann

> The plan currently encourages DTE and other companies to prevent extremely long power outages and to reduce the number of outages to customers on certain circuits. However, service quality regulation for DTE does not explicitly target the level of power reliability currently experienced by an average customer on the system. (http://efile.mpsc.state.mi.us/efile/docs/15901/0006.pdf )

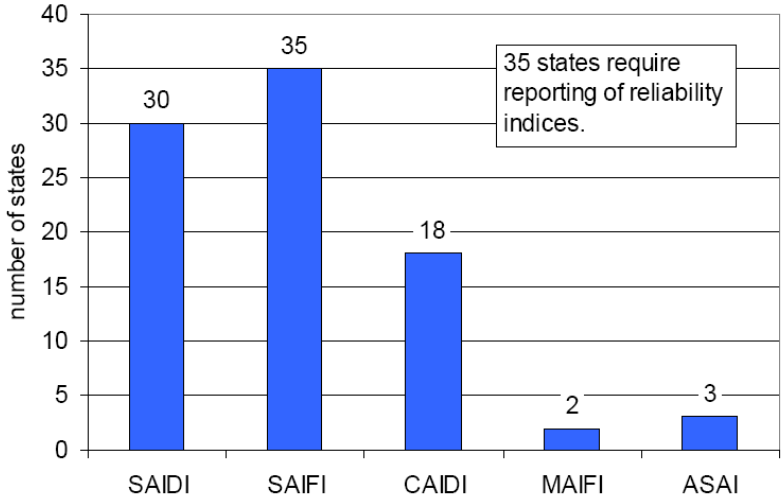
The report concluded with three recommendations for an expanded set of indicators to supplement the existing standards in Michigan. They were to include SAIDI and SAIFI as indicators as well as the percentage of customer bills that were adjusted each year. A two-year rolling average was proposed to be used for reporting SAIDI and SAIFI with a dead band in place equal to one standard deviation of that average. Lastly, the utilities would be required to operate within the dead band as part of a penalty/reward regime. The proposed annual reporting of the two-year rolling average would be with "major events" excluded.

***Berkeley National Laboratory Report***

The expansive blackout that affected the northeastern United States and Canada in August of 2003 sparked a large amount of interest in the reliability of electric service. In October of 2008 the Lawrence Berkeley National Laboratory (Berkeley Lab) completed a report entitled "Tracking the Reliability of the U.S. Electric Power System: An Assessment of Publicly Available Information Reported to State Public Utility Commissions" that was funded by the Office of Electricity Delivery and Energy Reliability of the U.S. Department of Energy (DOE). The report assessed state and utility practices for collecting and reporting electric reliability information as well as discussed the challenges that arise from assessing reliability due to differences in these practices. The authors contacted commissions in all 50 states and the District of Columbia. They also accessed publicly available reliability information reported by utilities for the year 2006. Of those contacted, 37 states and 123 utilities provided information. The data they received represents 77% of total electric sales by investor-owned utilities and 60% of total U.S. electric sales. The report focused primarily on SAIDI, SAIFI, and MAIFI stating that: "Taken together, the three metrics can be used to comprehensively assess reliability nationwide."[14] The breakdown of reporting requirements by state is shown in the figure below:[15]

[14] Ernest Orlando Lawrence Berkeley National Laboratory. (2008, October). *Tracking the Reliability of the U.S. Electric Power System: An Assessment of Publicly Available Information Reported to State Public Utility Commissions.* Berkeley, CA: Joseph H. Eto and Kristina Hamachi LaCommare

[15] http://repositories.cdlib.org/lbnl/LBNL-1092E/




It is important to point out that SAIDI, SAIFI, and CAIDI are all interrelated measures. CAIDI can be derived using SAIDI and SAIFI and similarly, SAIDI can be derived using SAIFI and CAIDI.[16] As a result, if most states report SAIDI and SAIFI, the figures related to CAIDI can be derived if desired. Thirty-five of the states in the study require reporting of SAIFI while only two require MAIFI information.

Reliability reporting was reviewed to see how the measures are defined with respect to major event days. Major event days are a key definition when reporting reliability metrics to state utility regulators and the definition varies. Only 21 of the 37 state commissions reporting had a formal definition of major event day. Of those 21 states, only four of them utilized the IEEE 1366-2003 definition for a major event day. The authors also reviewed data for each individual utility that exceeded the minimum recording/reporting requirements put in place by their regulatory authority. The summary showed that all 123 of the utilities reported SAIDI and SAIFI (or CAIDI) with MAIFI only reported by 12 of the 123 utilities. A large majority of them provided detailed reports to their state commissions for each individual major event during the year. The authors concluded that the reliability reporting should be accompanied with and without major event days included, as well as a detailed description of each event.

The Berkeley Lab report provided very basic reliability information that involved a good majority of the industry's regulatory bodies as well as the utilities they regulate. It also presents an opportunity to standardize the methods in which the indices are reported. Both the PEG and the Berkeley Lab reports discuss the importance of measuring and reporting SAIFI and SAIDI based on their respective research. Each was different in their approaches for conducting research and presenting their data, however, both had similar conclusions.

### 1.8 - Reliability Conclusions and Recommendations

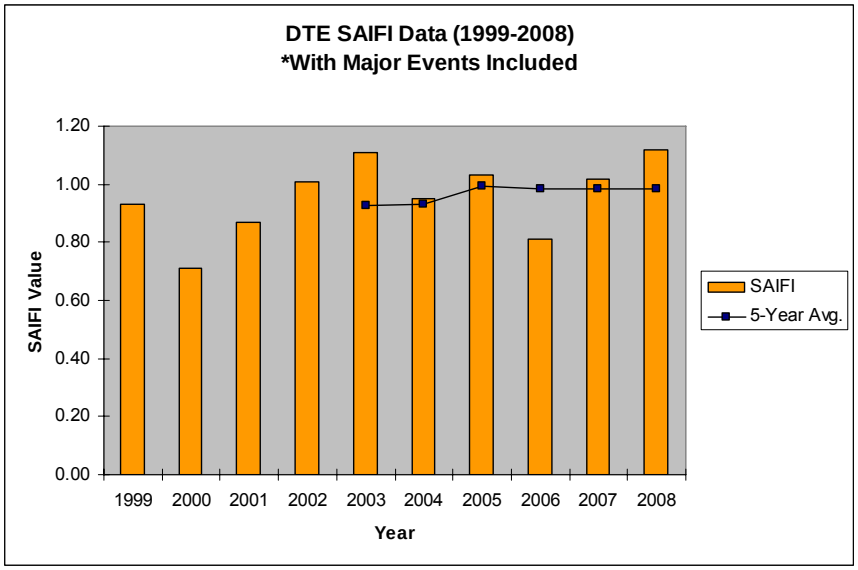
In light of the research Staff conducted, the Commission finds that Consumers Energy and Detroit Edison at this time should include SAIDI, SAIFI, and CAIDI reporting (with and without major events) on a rolling five year average in a new docket that will be opened by the Commission. These indices have been proven to show the reliability of electricity in a utility's power system and are useful to the Commission in identifying utility performance trends for each specific utility on a going forward basis. The intent of the information is not to benchmark the

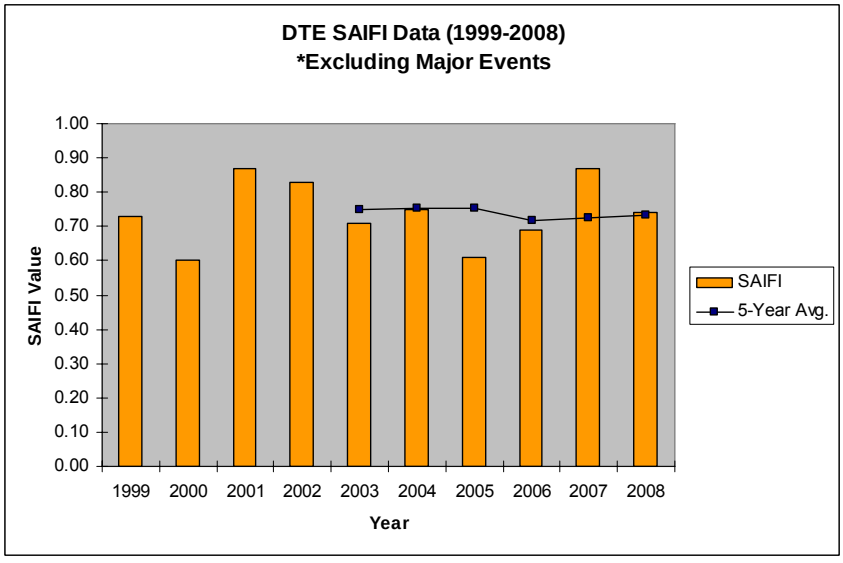
[16] The relationship is SAIDI = SAIFI * CAIDI

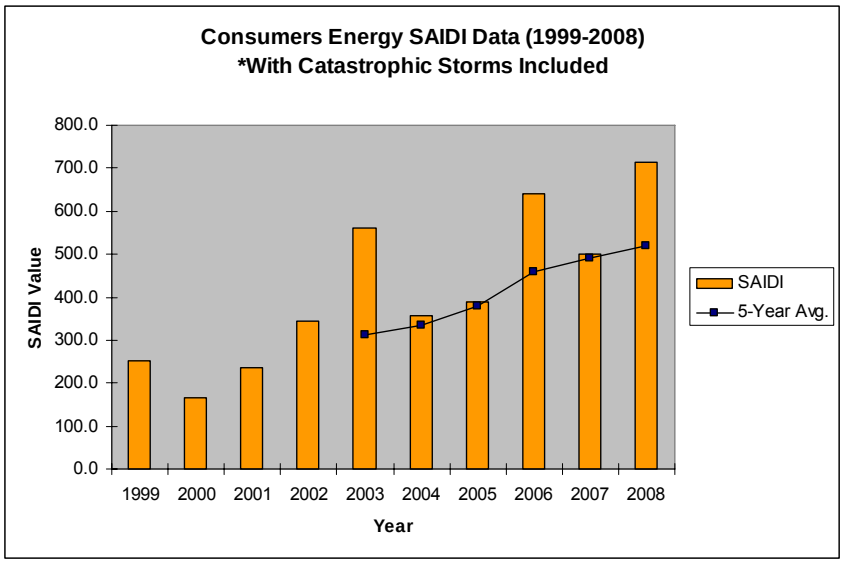
utilities nationwide or within the state, but rather to measure performance levels of each utility against its own historical data.

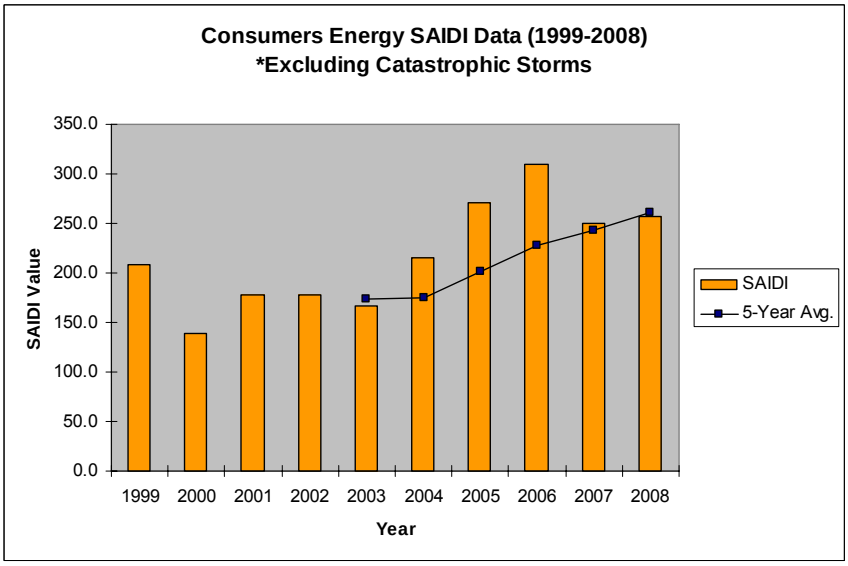
The Commission also finds that Consumers Energy and Detroit Edison should report reliability indices utilizing the major event definition provided by the IEEE 1366-2003 standard. This is sometimes referred to as the 2.5 beta method. The process of reporting the data with this definition will provide consistency for future regulation as more states adopt this standard. It provides a fair and reasonable method to remove highly atypical days from the indices and provide data that shows the utilities underlining ability to control the frequency and duration of outages on a system wide basis.

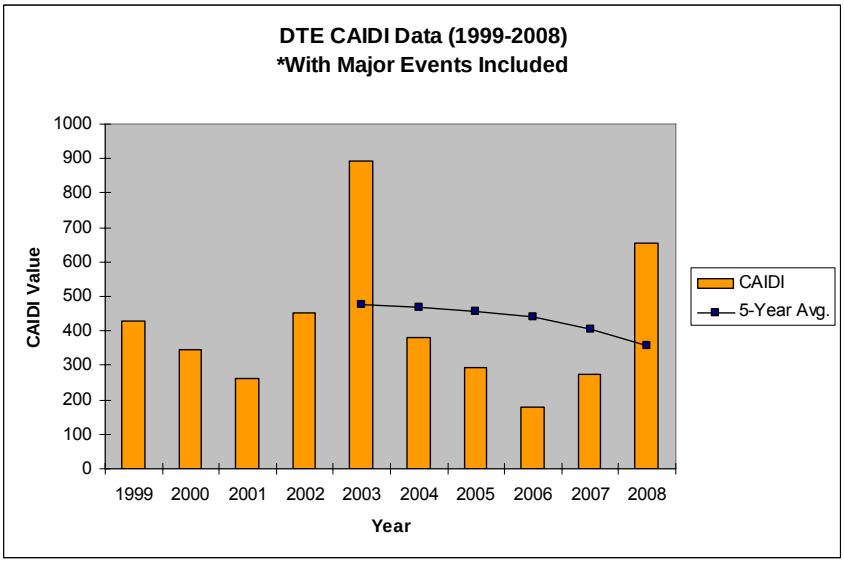
Detroit Edison and Consumers Energy have provided their data in the format that will be required from this point forward. The reporting will include the numerical values and also be graphed to look similar to the following charts for all three indices:

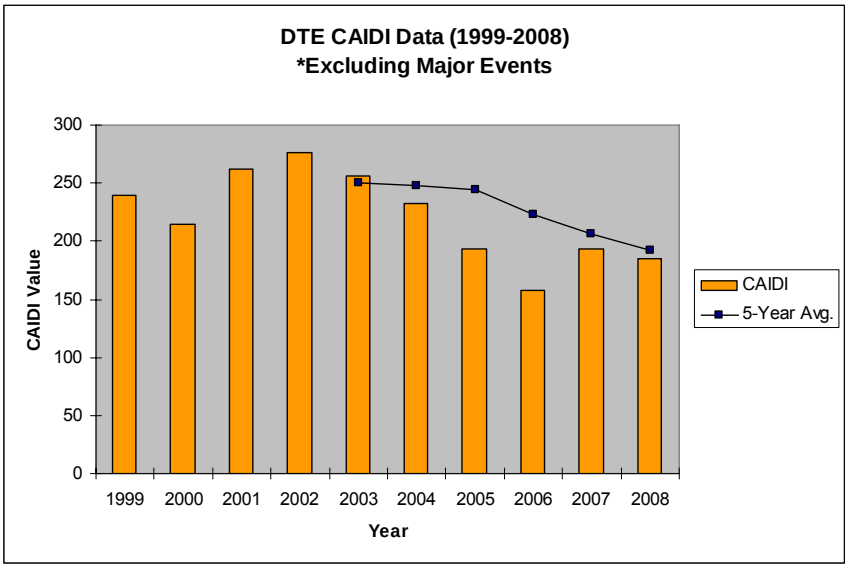



Consumers Energy SAIDI Data (1999-2008)
*With Catastrophic Storms Included
SAIDI Value
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
Year
SAIDI
5-Year Avg.


Consumers Energy SAIDI Data (1999-2008)
*Excluding Catastrophic Storms
SAIDI Value
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
Year
SAIDI
5-Year Avg.


DTE CAIDI Data (1999-2008)
*With Major Events Included
CAIDI Value
1000
900
800
700
600
500
400
300
200
100
0
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
Year
CAIDI
5-Year Avg.




*Detroit Edison Major Event Days calculation was changed in 2007 to adopt IEEE-1366.
*Consumers Energy Catastrophic Days are those that impacted 100,000 customers on its system.

# Part 2-Utility Power Plant Generating Cost Efficiency

## 2.1-Overview

The Commission initiated Case Nos. U-15895, U-15901 and U-15945 to solicit comments on power quality standards, rules, surveys, and data collection in order to implement the provisions of Act 286. MEGA, ABATE and ITC filed comments in the dockets. Independent of Act 286, the Commission, on its own motion, in Cases Nos. U-15316 and U-15631, required regulated utilities with fossil fuel generation to file 10 year fossil fuel generation efficiency plans consistent with the Energy Policy Act of 2005. The Staff in its investigation into utility power quality also conducted a 10 state review of utility power plant generation cost efficiency. A workgroup on this issue was established and met three times. As will be described or summarized in this part of the report, there are ongoing processes and cases that are conducted here at the Commission and regionally through market organizations that annually examine and enhance efficiency. These dynamic processes continue to change regarding the parties involved, changing customer needs, evolving technology, improving emissions and the ageing of power plants.

## 2.2-Comments Provided in Workgroup

***Consumers Energy and Detroit Edison***

Consumers Energy and Detroit Edison believe that Michigan law and regulation currently has several features that make additional generating plant cost efficiency standards unnecessary and redundant:

Thorough regulatory review process – both Detroit Edison and Consumers Energy are regulated by the Commission. Regulation is executed through contested rate cases for general rates and for PSCR cases.

Generating facility operation and maintenance (O&M) and capital costs are covered through general rate case proceedings, while fuel, purchase power, emissions allowances and urea costs are covered in PSCR proceedings. Anyone with standing can intervene in these proceedings if they choose. Both Consumers Energy and Detroit Edison have the capability to blend various fuels in certain units. Blending decisions are made on a daily and weekly basis to benefit the cost to the customer and the market needs in Midwest ISO. These blending decisions are sometimes not necessarily consistent with pure heat rate efficiency of a unit, but the overall benefit is to the customer. An example is the increased utilization of Western coal (low sulfur, lower cost), and dispatching units to lower loadings during periods of low electric market prices.

The provisions of Act 286 call for the utilities to submit "a schedule for planned and unplanned outages." While a schedule for unplanned outages is not possible, both Consumers Energy and Detroit Edison do explain outage plans for expected upcoming generator outages, and a projection of the "Random Outage Rate" (maintenance and unplanned outage rate) in the ordinary course of regulation.

Open competitive electric generation market – in April of 2005, the Midwest ISO instituted both a day-ahead and a real-time market for the sale of electric energy. In this market, electric generators (both utilities and independent power producers) offer the price and volume of electricity available for the next day. In addition, as of January 2009, the Midwest ISO started an ancillary services market which also serves as a competitive market. Based on the expected need, the Midwest ISO dispatches generators based on these prices. Corrections to the day-ahead market for actual load are made in the real-time market. This process, as well as the existence of an Independent Market Monitor, promotes a competitive environment that incentivizes cost efficiency.

In addition to the Midwest ISO market, electric customers have the option to choose an alternate energy supplier for their electric generation. Retail open access (ROA) has been a feature of the Michigan electric utility landscape since 2000. Under ROA, an electric customer has the ability to select to receive their electricity from alternative electric suppliers.

Economic project selection – both Consumers Energy and Detroit Edison evaluate required capital and O&M projects using a consideration of the costs and benefits to the ratepayer of those projects. The evaluation includes estimates of any improvements in generating thermal efficiency, availability, fuel savings, O&M cost savings, replacement power savings, and other benefits and compare these benefits to the cost to the customer. Projects are then ranked based on the net customer benefit, and selected from most beneficial to least based on the available funding. This process assures that the projects with the greatest benefit to the customer are chosen.

Readily Available Cost Comparisons - Both Consumers Energy and Detroit Edison submit information on the cost of generation at each of our power plants to the Commission annually. This information, combined with similar publicly available and readily obtainable information from the FERC (Form 1), provides substantial generator cost data. While one can generate simplified cost

comparisons from this data, it is important to accommodate certain unique features of the Michigan generation fleet when compared to the industry as a whole.

In Consumers Energy's case, the base-load coal fleet is believed to be the oldest coal fleet in the country. Because unit size has tended to increase over time, Consumers Energy's coal-fired units also tend to be small. When constructing appropriate industry benchmarks it is important to recognize two effects of a small, old fleet. Small units take almost as many people to operate as larger units, and older units were not built with the degree of automation that is part of current units. Although this tends to make the O&M cost per megawatt-hour of an older, smaller unit higher, if one includes the fact that the unit probably has a low book value, the all-in cost (including depreciation and financial costs) tends to be lower.

In Detroit Edison's case, the base coal fleet varies in age from the 1940's to 1980's. The same caution applies in evaluating Detroit Edison's smaller, older units. Other differences include transportation constraints, delivery, and fuel costs. Therefore, a benchmark for generation cost efficiency comparisons must be made against units that are similar in size and age with similar geographical and fuel constraints.

Environmental – both Consumers Energy and Detroit Edison recognize that the addition of environmental equipment to the units increases the production costs through additional parasitic load and environmental consumables. One criteria considered in the technology evaluation is cost to operate, including parasitic load requirements from the unit being controlled. Minimizing the power demand required to operate the emission control technology is an important criteria of the system design. For some pollutants, there are very different technologies available for consideration. These technologies have a range of power requirements. When evaluating the technology to install, the parasitic load impact on the unit is considered along with other operating costs, the capital cost to install, and the reduction of unit capability due to emission controls. All of these issues can and are reviewed in the existing regulatory process.

Conclusion – both Consumers Energy and Detroit Edison believe that additional generating power plant cost efficiency standards are not necessary due to the existence of regulatory oversight through general rate cases and the PSCR, an open and competitive electric market, readily available cost data, and in-place processes that encourage continuous improvement. Overall there exists a balance between cost, risk, and reliability that ultimately benefit the customers of Consumers Energy and Detroit Edison.

The electric providers' comments acknowledged generator cost efficiency as an ongoing issue and they referenced operational measures, technology improvements, power supply cost recovery process, and integrated resource planning as elements in improving generator cost efficiency. They do not see a need to make statutory changes at this time.

***ABATE***

ABATE did not participate in the workgroup, but did provide comments in Case Nos. U-15895 and U-15901. ABATE recommends that the Commission adopt certain reporting standards for electric utilities, both as part of their PSCR filings and as part of any general rate case filing on power plant generating cost efficiency. ABATE believes that at a minimum, the reporting requirements should cover the following for base load generation:

- Actual heat rate performance;
- On-line hours during the year;
- Planned outage rate;
- Unplanned outage rate;
- Gross megawatt hours generated;
- Net megawatt hours delivered to the grid;
- For each generating unit, a short description of the function/use of the unit, whether it is base load, has been dispatched to provide voltage support, intermediate unit, or peaking unit;
- The average annual on- and off-peak bid price into Midwest ISO for each unit.

In addition, ABATE recommends that the Commission establish performance standards for each utility's base load units equal to 75 percent of the average capacity factors of nuclear units as reported by the Nuclear Regulatory Commission (NRC) and 75 percent of the capacity factors of all coal plants as reported by NERC's Generating Availability Data System (GADS). ABATE states an overall performance factor for base load units is needed because if one or more units trip off line for even less than the 90 day threshold set forth in 1982 PA 304, the utility's response is to purchase replacement power from the Midwest ISO at a much higher cost than the cost of production from the base load plants and pass that cost on to customers through the PSCR factor. They go on to say, there should be an appropriate allocation of risk between shareholders and customers of bad plant performance. That is not fully captured in 1982 PA 304.

**2.3-Current Dockets U-15316 and U-15631**

On January 2, 2008, the Commission issued an order in Case No. U-15316 on its own motion to conduct a proceeding in accordance with Section 1251 of the Energy Policy Act of 2005 to consider implementation of standards for net metering, fuel sources, and fossil fuel generation efficiency. One section of that act required consideration of a standard requiring each electric utility to develop and implement a 10 year plan to increase the efficiency of its fossil fuel generation. On August 6, 2008, the Commission ordered regulated electric utilities with fossil fuel generation to file a 10-year fossil fuel generation efficiency plan.

The regulated electric utilities with fossil fuel generation filed generation efficiency plans in Cases Nos. U-15316 and U-15631. Utilities having smaller infrequently run fossil fueled units report plans to continue scheduled maintenance on the units for continued efficiency.

Wolverine Power Supply Cooperative is the exclusive provider for four distribution cooperatives. It indicate a plan to continue maintenance on its fossil fueled generation and to evaluate the feasibility of constructing a new generation project that includes a 600 MW base-load solid fuel plant and potential wind farm, currently being considered in Case No. U-16000.

Six of the utilities, all investor owned, have more than a small amount of fossil fuel generation. These utilities include Detroit Edison, Consumers Energy, Indiana Michigan Power Company, Wisconsin Public Service Corporation, Wisconsin Electric Power Company, and Northern States Power.

***Detroit Edison Plan***

Detroit Edison summarized its plan by stating that the ongoing review and analysis in general rate cases, summer capacity plans and power supply cost proceedings will continue to demonstrate Detroit Edison's focus on fossil fuel generation efficiency. The utility continually seeks to lower the cost of fossil fueled generation for its customers. Detroit Edison's investments in technology allow for greater real time insight into fuel quality, combustion and other fossil fueled plant performance issues that impact unit generation efficiency. Plant-specific continuous improvement initiatives will continue to leverage the information needed to adjust operational parameters in real time to improve efficiency and performance, or initiate timely corrective action if maintenance is required. The capital, operational and planning processes are designed to be continuous and are expected to continue through at least the year 2020. Other necessary and justified countervailing customer cost considerations such as utilization of low sulfur western coal, fuel blending, lowering unit minimum loads, and power consumption to support new environmental equipment can negatively impact unit efficiency as measured by heat rate. Notwithstanding, the company's continuing fossil fuel efficiency efforts have resulted in an overall Detroit Edison fossil fueled generation fleet heat rate is projected to be flat to slightly improved over the next several years. Thus, Detroit Edison claims that its fossil fuel efficiency efforts and planning are well underway and properly designed to address the circumstances it will face over the next decade.

***Consumers Energy Plan***

Consumers Energy's fossil fleet is a function of the technology available at the time the units were constructed, the maintenance of those units, the effect of additional pollution control equipment and the dispatch of the units. Consumers developed a Balanced Energy Initiative (BEI) in 2007 as a long-term comprehensive energy resource plan to meet the Company's projected electric power requirements. The BEI includes energy efficiency and demand management programs, an expanded renewables program, the utilization of existing generation resources, and the development of new in-state electric power generating plants. Consumers concludes that its analysis shows that over the next ten years, the efficiency of Consumers Energy's fossil fleet will improve substantially, despite the adverse effect on efficiency of the addition of new pollution control equipment. The inclusion of the Zeeland plant, a new clean coal plant into the Consumers Energy fossil fleet, and the substantial modification of the Ludington Pumped Storage Plant to both improve its efficiency and increase its capacity, can substantially improve the fleet's overall efficiency. At the same time, a program of routine turbine outages will maintain the efficiency of the existing fleet. More efficient plants built elsewhere in the Midwest ISO can also reduce the efficiency of Consumers Energy's units by shifting dispatch away from its units. This places added emphasis on maintaining the efficiency of units, and increasing the efficiency of the fleet.

***Indiana Michigan Power Company (I&M) Plan***

I&M has developed plans to operate its fossil units more efficiently and to increase capacity at its Cook nuclear plant. I&M has undertaken a study of its oldest fossil units Tanners

Creek Units 1-3, and has concluded that the continued operation of these units, at least through 2018, results in lower revenue requirements than retiring these units in either 2012 or 2014. I&M has plans to make prudent capital investments in its fossil units to improve or maintain unit availability or to improve environmental performance. I&M has also established a program to improve heat rate at its fossil units. In summary, I&M's 10-Year Fossil Fuel Generation Efficiency Plan consists of:

1. A comprehensive technical and economic analysis of the consequences resulting from the potential retirement of existing fossil fuel generation facilities, and plans for repair or replacement of generating units;

2. Periodic evaluation of equipment upgrades; and

3. Efficient day to day operation of I&M's generating units.

***Wisconsin Public Service Corporation Plan***

Wisconsin Public Service Corporation combined its fuel diversity plan with its fossil fuel generation efficiency plan. The combined plan consists of two pages of text and two tables. The plan indicates a system that is sensitive to outages at one of its most efficient plants. Maintenance activities are expected to keep coal plant heat rates stable. The utility identifies no other plans to specifically reduce unit heat rate. It does mention three potential measures to improve system heat rates but does not appear to show them favor. These measures include "to force" replacement of older less efficient generation, applying a dispatch adder to less efficient units and increasing percentage of renewable resources.

***Wisconsin Electric Power Company Plan***

Wisconsin Electric Power Company described a number of items in its 15-page filing. They include a fuel diversity plan, brief description of an environmental consent decree, generation efficiency plans, steam turbine generator inspection schedule, and some environmental data request responses. The efficiency part of its filing summarized retirement of a units, adding new units, investigating the feasibility of replacing a hydro plant powerhouse for greater efficiency albeit non-fossil, turbine upgrades and maintenance, fleet wide performance monitoring, condenser re-tubing, feed water heater replacement, and replacing fan motor drives. The Presque Isle Units 3&4 are at the front of the line for replacing old units. They will be replaced with a couple of expansion units at Oak Creek. This is associated with the consent decree and completion of an ATC transmission line. This part of the plan could take place at beginning of next year.

***Northern States Power Plan***

Northern States Power (Northern States) combined its fuel diversity and generator efficiency plans in its three page report. The generator efficiency discussion refers to its Resource Plan filed in the Minnesota jurisdiction. An internet link is provided in the filing. In discussing the plan, Northern States acknowledges that it is a five-year plan. It also shows concern for making improvements that would trigger substantial and expensive emission control upgrades.

Northern States efficiency plan addresses regular review of heat rate data, plans for systematic testing of plant heat rates and describes some heat rate improvement projects. While the efficiency plan covers a five-year period, it is the intent of the utility to review the efficiency plan regularly and to continue to implement efficiency improvements where economically and environmentally justified and when the improvement can be made in a safe manner. The utility's ability to make large-scale efficiency improvements on its coal-fired generating units is hampered by the potential of such improvements to trigger an Environmental Protection Agency review, which can result in the need to make substantial and expensive emissions control upgrades. The recent court decision on clean air interstate rules further clouds this issue. Nevertheless, the company expects that the fundamental tension that currently exists between state energy efficiency policy and federal emission controls rules will be resolved within the next five to 10 years. In the meantime, maximizing the value of existing fossil-and biomass fueled resources through carefully selected investments will ensure that they continue to provide low-cost, reliable and energy efficient service to customers.

**2.4-Commission Power Supply Cost Recovery (PSCR) cases**

The PSCR section of Act 304 allows utility recovery of costs incurred through reasonable and prudent policies and practices. Review of utility policies and practices encompass direct purchasing of fuels and purchased power. It also includes power plant operations as power supply costs incurred due to power plant outages can be disallowed. More broadly, the review of power plant operations includes overall plant availability GADS, especially for the lower cost base load coal plants, and the timing of plant outages. The focus of Act 304 is to minimize power supply costs. Minimizing power supply costs is achieved in part by utilizing lower cost base load coal plants as much as possible. Generally, the lower cost base load coal plants are also the more efficient (lower heat rates) coal plants. This efficiency is experienced when outages and derates are minimized, especially random outages, which necessitate additional shut downs and start ups. While PSCR review of power plant operations directly focuses on power supply costs, indirectly it also examines power plant and system generation efficiency.

In the ongoing PSCR cases that are filed annually, Staff reviews each case to determine that reasonable and prudent costs are included in these cases. Examination of a power plant's cost to operate has the indirect effect, if only by matter of definition, of analyzing cost efficiency. In practice, individual unit outages are scrutinized with consideration for a unit's over all availability as compared to replacement power costs. Reasonable and prudent generation costs are then determined.

Subsection 10(8)(b) of Act 286 references schedules for planned and unplanned outages. The schedule for planned outages, taken by individual generating unit, would impact a power plant's availability and a utility's system cost efficiency. These schedules are compared against power purchased on the market. The GADS compiled by the NERC provides a useful tool for comparison in the analysis of a unit's availability. The data provided by the utilities includes planned and unplanned actual availability or unavailability figures for similar unit fuel type and size. The ups and downs of individual unit data provide details to be analyzed that might otherwise be masked in per plant or per system data. The per unit data with its greater detail and thus greater dynamics from one year to another will be a necessary part of on going annual PSCR analysis.

The publicly available GADS data showing five years of actual data on numerous availability statistics will continue to be a useful tool in the PSCR process. Some of the statistics

include: unit age, capacity, generation, starts, service hours, forced outages, planned outages, maintenance outages, availability factor, and forced outage rate. The statistics are grouped by fuel type and also separate by fuel type and similar size. From the GADS "Generating Availability Report" Introduction:

> The "Generating Availability Report" is the means NERC uses to distribute generating unit and equipment availability information to the industry. It presents statistics for 17 categories of electric generating units and their related equipment. Data are displayed on an annual and five-year cumulative basis. The measures of generating unit performance calculated from the GADS data, and presented in this report, are based on standard definitions and statistical methods developed by the IEEE and recognized world-wide.
>
> Classification of units – for the purpose of this report, units are grouped by type, size, and fuel. Type is determined from unit design data which participants supply to GADS. Size is determined from the design data, too. For fossil, nuclear, multi-boiler/multi-turbine, combined cycle, and geothermal units, the turbine nameplate rating is used to assure consistent classification from year-to-year. The turbine nameplate is not reported for other types of units, so size is estimated by multiplying the generator megavoltamperes (MVA) by its power factor. Finally, fuel is used to classify fossil-steam units. The primary fuel (*i.e.* that which contributes the most to thermal generation) is used.

A more detailed examination of statistics is conducted in reconciliation cases after the plan year when actual figures are available. As an example, Case No. U-15675 is Consumers Energy's 2009 PSCR plan case. Exhibit A-8 of that case is a table of per unit availability, periodic factor (scheduled outages), random outage rate (unplanned outages albeit projected), and actual five-year rate of return. Exhibit A-9 is a schedule for major unit outages in 2009. The more detailed examination would take place in a reconciliation case with actual numbers as part of the ongoing processes.

As another example, Case No. U-15417 is Detroit Edison's PSCR case. In this 2008 plan year, Detroit Edison describes a Performance Excellence Process (PEP). As described in testimony, it has developed a PEP with the purpose of a multi-year effort to improve both performance and cost structure. The plan is to identify performance and cost structure over the next several years and to sustain those through Fossil Generation's ongoing continuous improvement and productivity efforts. As already mentioned, a more detailed examination is conducted in reconciliation cases. Staff examined and compared GADS data to that obtained from Detroit Edison. The 2008 reconciliation, Case No. U-15417-R, is ongoing. Testimony in Detroit Edison's 2009 plan case indicates that it does not have any scheduled outages exceeding 90 days in 2009.

**2.5-Commission Staff Investigation for Other States**

Commission Staff conducted research on other state legislation or rules regarding utility power plant generating cost efficiency. This included five states of similar geographic region (Illinois, Indiana, Wisconsin, Ohio, and Minnesota) and five states perceived to have progressive regulation (Delaware, District of Columbia, Utah, California, and Pennsylvania). Staff found that in other states that current legislation in place or proposed is environmentally based and not

focused on power plant generating efficiency. The intent was to reduce harm to the environment and increase use of "greener" energy to meet imposed standards.

### 2.6-Case No. U-15896

This case is *In the matter, on the Commission's own motion, to implement the provisions of MCL 460.6s(10) and (11)*[17] *of Act 286.* If a utility seeks a certificate of necessity under this section, it must file an application with the Commission, along with an integrated resource plan. The Commission finds this section to be relevant because "those changes associated with the proposed increases in fossil-fuel generation plant efficiencies"[18] is to be included in a utility's integrated resource plan.

### 2.7-Competitive Electric Market Generation

Competition provides another method to improve utility power plant generating cost efficiency. Midwest ISO is a non-profit, member-based organization and regional transmission organization for overseeing the wholesale power grid that touches 15 states and the Canadian providence of Manitoba. Midwest ISO now controls an open competitive wholesale electric market for generators to enter the grid. The Midwest ISO organization was formed to provide customers with a valued service, reliable, cost-effective system and operations, dependable and transparent prices, open access to markets, and planning for long-term efficiency. If Michigan's utilities do not maintain their power plant generators with the latest equipment upgrades and advanced technology, their power will not be competitively priced and will not be able to compete in the market. The Midwest ISO instituted both a day-ahead and a real-time market for the sale of electric energy. This created a market for electric generators (both utilities and independent power producers) to offer the price and volume of electricity available for the next day. In January 2009, Midwest ISO started the Ancillary Services market, which optimized this

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[17] (11) The commission shall establish standards for an integrated resource plan that shall be filed by an electric utility requesting a certificate of necessity under this section. An integrated resource plan shall include all of the following:

(a) A long-term forecast of the electric utility's load growth under various reasonable scenarios.

(b) The type of generation technology proposed for the generation facility and the proposed capacity of the generation facility, including projected fuel and regulatory costs under various reasonable scenarios.

(c) Projected energy and capacity purchased or produced by the electric utility pursuant to any renewable portfolio standard.

(d) Projected energy efficiency program savings under any energy efficiency program requirements and the projected costs for that program.

(e) Projected load management and demand response savings for the electric utility and the projected costs for those programs.

(f) An analysis of the availability and costs of other electric resources that could defer, displace, or partially displace the proposed generation facility or purchased power agreement, including additional renewable energy, energy efficiency programs, load management, and demand response, beyond those amounts contained in subdivisions (c) to (e).

(g) Electric transmission options for the electric utility.

[18] Attachment B - PA 286 – Integrated Resource Planning Filing Guidelines

Section C – Supply Resources (Existing Supply Resources) the IRP shall include the following information for utility owned generation, and energy or capacity purchased though power purchase agreements:

3) In applicable, proposed or planned changes to existing generating capacity and associated costs, including: those changes and costs associated with the installation and operation of environmental protection facilities, those changes associated with the proposed increases in fossil-fuel generation plant efficiencies, and/or any limitations on fossil-fuel generation plant capacities.

competitive market. Based on the expected need, Midwest ISO dispatches generators based on these prices. Corrections to the day-ahead market for actual load are made in the real-time market. This process, as well as the existence of an Independent Market Monitor, promotes a competitive environment that provides cost efficiency incentives. Midwest ISO projects a reserve margin of 15 to 23 percent for 2009[19] which demonstrates that the utilities will have to schedule maintenance regularly and to continue to perform efficiency improvements to ensure their plants can operate at the lowest possible cost. Midwest ISO's goal is continue to focus on identifying ways to improve reliability and increase efficiency in the delivery of electric energy in the Midwest.

## 2.8-Power Plant Generating Cost Efficiency Conclusion and Recommendation

There are multiple opportunities in current and ongoing case proceedings, and markets that directly or indirectly include power plant generation cost efficiency. A change in the specific measure of power plant cost efficiency, either by choice or as ordered, may have an affect on other specific measures of power plant efficiency. The magnitude of this effect may be significant if it triggers expensive additions. As discussed in this report, generator cost efficiency is looked at several times in the Commission's regular duties over a course of a year or two. PSCR cases are filed every year in the fall and the recently Michigan largest utilities have been filing rate cases annually. This provides the Commission the opportunity to assure that all costs necessary for generation, from capital to operating costs, are only recovered if feasible and cost efficient. The Commission will direct Staff to include new reporting requirements in the next cycle of PSCR cases in 2010 for power plant generating cost efficiency. The Commission last year required the electric utilities to file ten year fossil fuel generation efficiency plans. Electric utilities will be ordered to continue to file these plans every three years in Case Nos. U-15316 and U-15631 to monitor generator cost efficiency.

Because of the unique nature of Michigan's combined fleet, being older and smaller in size than the average utilities in the nation, meaningful benchmarks for power plant efficiency standards are extremely difficult to establish. However, the Commission adopts the requirements of ABATE's plan, to be filed in the PSCR process, to provide additional relevant information that will be helpful in monitoring power plant generating cost efficiencies. Some of the data requested by ABATE is already filed with the Commission in different cases, but the Commission finds it useful to have all the power plant generator cost efficiency data in one case. The Commission will not require each utility to report its average annual on- and off-peak bid price into the Midwest ISO for each unit as that would require confidential marketing data to be supplied. The Commission notes that the utilities report random outage rate in the PSCR cases and the Commission will accept that as a proxy for unplanned outage rate. The Staff will use the data from the new regulations coupled with FERC data to ensure that Michigan generation is efficient.

A program just underway at the Commission is for each utility to file an Integrated Resource Plan (IRP), Case No. U-15896. Included in the IRP filing are requirements for utilities to file their plans to increase fossil-fuel generator plant efficiencies (plans that could defer, or partially displace generation facilities). The electric market is fully competitive for power generation and all the competitive benefits to the utility customer may not have been fully realized. Michigan utility companies offering their generation into the Midwest ISO market have no guarantee their generators will be chosen to operate. They must submit their capacity to an

[19] Potomac Economics "2008 State of the Market Report for the Midwest ISO."

auction and only the least cost providers will be able to market their generated power. The market is continuing to change as more focus is on renewable energy and utility fossil, gas and nuclear generation will have to will have to compete with new green alternative generation. The addition of any new power plant efficiency measures must be modeled and reviewed to balance the interests of all parties.

Power plant generating cost efficiency is certainly a measure that is already being considered. The Commission concludes that power plant generating cost efficiency should continue to be included, as applicable and reasonable, in current and existing cases and proceedings.

# ATTACHMENT A

Summary of Electric Distribution
Performance Standards

**Summary of Electric Distribution Performance Standards**

| Type of Measurement | Performance Measurement | Unacceptable Level of Performance | Triggering Customer Credit | Customer Credit |
|---|---|---|---|---|
| Outage | Service Restoration (All Conditions) | Less than 90% of customers restored in 36 hours or less | | |
| Outage | Service Restoration (Catastrophic Event) | Less than 90% of customers restored in 60 hours or less | Any customer restored in over 120 hours | Residential Customers: The greater of $25 or the customer charge (or equivalent charge) where applicable<br><br>Other Distribution Customers: Minimum Bill Prorated on a daily basis, e.g., [(min. bill)/days in billing period] x number of days out of service |
| Outage | Service Restoration (Normal Conditions) | Less than 90% of customers restored in 8 hours or less | Any customer restored in over 16 hours | Residential Customers: The greater of $25 or the customer charge (or equivalent charge) where applicable<br><br>Other Distribution Customers: Minimum Bill Prorated on a daily basis, e.g., [(min. bill)/days in billing period] x number of days out of service |
| Outage | Same-Circuit Repetitive Interruption | More than 5% of a utility's circuits experiencing 5 or more interruptions in a 12-month period | Each customer on a circuit having more than 7 interruptions in a 12 month period | Residential Customers: The greater of $25 or the customer charge (or equivalent charge) where applicable<br><br>Other Distribution Customers: Minimum Bill Prorated on a daily basis, e.g., [(min. bill)/days in billing period] x number of days out of service |
| Safety | Wire-Down Relief Factor | Less than 90% within 240 minutes within Michigan Metropolitan Statistical Areas | | |
| Safety | Wire-Down Relief Factor | Less than 90% within 360 minutes within Michigan Non-Metropolitan Statistical Areas | | |
| Customer Relations | Average Customer Call Answer Time | 90 Seconds or more | | |
| Customer Relations | Call Blockage Factor | Greater than 5% | | |
| Customer Relations | Complaint Response Factor | Less than 90% within 3 business days | | |
| Customer Relations | Meter Reading Factor | Less than 85% read within approved period, including customer reads | | |
| Customer Relations | New Service Installation Factor | Less than 90% completed with 15 business days | | |

Service Quality and Reliability Standards for Electric Distribution Systems, (R 460.701 - 460.752)

# ATTACHMENT B

MPSC Power Quality Questionnaire to
Michigan Utilities
Press Release
&
Questionnaire
(Case No. Docket U-15945)

www.michigan.gov
(To Print: use your browser's print function)

Release Date: April 30, 2009
Last Update: April 30, 2009

**Contact:** Judy Palnau (517) 241-3323

## MPSC Seeks Public Comments on Power Quality Standards

**April 30, 2009**

The Michigan Public Service Commission (MPSC) today said it is seeking public comments on power quality standards, rules, surveys and statutes. Public Act 286 of 2008 requires the Commission to submit a report to the Governor and Legislature dealing with these issues by Sept. 1.

Specifically, Section 10p(8) of the Act directs the MPSC's report to include: (1) an assessment of the major types of end-use customer power quality disturbances, (2) an assessment of utility power plant generating cost efficiency, (3) a description of current efforts to enforce standards pertaining to power quality disturbances and power plant generating cost efficiency, (4) recommendations for monitoring power quality disturbances and power plant generating cost efficiency, and (5) recommendations for statutory changes.

The MPSC staff has also developed a power quality questionnaire that interested persons may fill out and submit. The questionnaire is located here: http://www.dleg.state.mi.us/mpsc/electric/workgroups/powrquality/PQSurvey1.doc.

Comments may be e-mailed to mpscedockets@michigan.gov . Written comments should be mailed to the Executive Secretary, Michigan Public Service Commission, P.O. Box 30221, Lansing, MI 48909. All comments should reference Case No. U-15945, should be consistent with provisions of the Act, and must be received by 5 p.m. on May 22. All information submitted to the Commission in this matter will become public information, available on the Commission's Web site, and subject to disclosure.

The MPSC is an agency within the Department of Energy, Labor & Economic Growth.

Case No. U-15945

## Power Quality Questionnaire

As described in order number U-15945, this is the Power Quality Questionnaire.

In preparation for a report to the governor and the legislature by September 1, 2009, per MCL 460.10p, Sec.10p.8, the staff is requesting that you respond to the following survey questions. If you would like assistance with your power problems, please include your ***company name and/or individual name and phone number*** in the description of your business.

Any person may submit written or electronic comments regarding the listed issues, and may return the Power Quality Questionnaire. The comments and/or survey responses must be filed with the Commission and must be received no later than 5:00 p.m. on May 22, 2009. Written comments and/or survey responses should be sent to: Executive Secretary, Michigan Public Service Commission, P.O. Box 30221, Lansing, MI 48909. Electronic comments and/or survey responses may be e-mailed to mpscedockets@michigan.gov. The electronic version of the survey allows for automatic submission to the docket. All comments should reference Case No. U-15945. All information submitted to the Commission in this matter will become public information available on the Commission's website and subject to disclosure.

## Power Quality Questionnaire

Power quality is very important to anyone who relies on equipment and systems that are sensitive to electrical disturbances. Michigan Public Service Commission staff is seeking feedback on power quality disturbances and a resolution to the impact they have on your activities. Please take a few moments to answer the following survey questions. Feel free to attach additional pages, if necessary.

Questions:

1. Briefly describe your type of business:

2. What types of equipment are directly affected by power quality problems at your location(s) and what is the corresponding impact (lights flickering, malfunctions, damage, production losses)?

3. What indirect effect(s) does this have on your business?

4. Which of the following best describes your type of electric service?

   a. Commercial single phase secondary voltage

   b. Commercial three phase secondary voltage

   c. Commercial primary service

   d. Industrial single phase secondary voltage

   e. Industrial three phase secondary voltage

   f. Industrial primary service

5. Have you experienced any of the following power quality problems with the electric service at your location(s) over the past year? Please mark all that apply.

   ☐ Sag voltage - reduced by at least ___% for at least ___minute(s)

   ☐ Over voltage - voltage high by at least ___% for at least ____minute(s)

   ☐ Oscillatory transient - rapid voltage change for _____cycle(s)

   ☐ Voltage swell - voltage high by at least ___% for _____second(s)

   ☐ Distortion - irregular wave form described as _____

   ☐ Power frequency variation - 60 hertz varied by _____

   ☐ Momentary interruption - voltage was reduced to zero for at least _____

   ☐ Sustained outage - all power is lost for at least _____

6. Of the disturbances you have experienced, please indicate how often they occur:

Sag- _____ times per day /_____ week / _____month / _____year

Over voltage- _____ times per day /_____ week / _____month / _____year

Transient- _____ times per day /_____ week / _____month / _____year

Swell- _____ times per day /_____ week / _____month / _____year

Distortion- _____ times per day /_____ week / _____month / _____year

Frequency- _____ times per day /_____ week / _____month / _____year

Momentary- _____ times per day /_____ week / _____month / _____year

Sustained outage- _____ times per year

Caused by Severe Storm? ____Yes____No

7. For each of the following locations, please indicate the measurement equipment used and the disturbance measured:

| Location | Disturbance | Equip. Type (Handheld/Recording) | Method (Temporary/Permanent) |
|---|---|---|---|
| Main panel | | | |
| Branch panel | | | |
| End equip. | | | |
| Multiple equip. | | | |

8. When you experience power quality problems at your location(s), how likely are each of the following to be the cause of those problems?

| | Never | Not that often | About half the time | Most of the time | Always | Don't Know |
|---|---|---|---|---|---|---|
| Severe Weather | 1 | 2 | 3 | 4 | 5 | 6 |
| Other reasons not controllable by utility | 1 | 2 | 3 | 4 | 5 | 6 |
| Equipment/electrical system owned by company | 1 | 2 | 3 | 4 | 5 | 6 |
| Utility's distribution System | 1 | 2 | 3 | 4 | 5 | 6 |

Other – Specify: 1 2 3 4 5 6

_____

9. Please briefly describe the power quality problems experienced at your location(s) and actions taken to resolve them.

| Problem | Comments |
|---|---|
| | |
| | |
| | |

10. How have you resolved the power quality problems at your location(s) in the past? (check all that apply)

- ☐ With your own employee(s)
- ☐ With contractors
- ☐ Through utility provider
- ☐ Solved temporarily
- ☐ Contacted Michigan Public Service Commission
- ☐ Not resolved
- ☐ Unable to resolve

11. Has your utility provider responded to your concerns? If yes, please describe the action(s) taken.

12. Are there particular power disturbances not already identified that the Commission should address? If yes, please list them.

13. Do you believe that there are infrastructure improvements that the utility company could make that could resolve your identified problems? If yes, please list them.

14. Would you be interested in joining a consortium to collect needed information on power quality? If yes, please leave the name and phone number of a person to contact.

15. What recommendations do you have regarding, “the most effective ways for Michigan stakeholders to participate in this process” regarding MCL 460.10 p (8) requirements?

16. Are there recommendations about implementation issues to resolve power quality problems that you believe should be contained in the report? If yes, please explain.

17. Is there anything else, not included in these survey questions, that you would like to see addressed in the staff's report? If so, please provide details and recommendations.

18. Rank the following in order of preferred service ( 1 = most preferred, 10 = least preferred )

___ A small charge to monitor and diagnose a limited list of types of disturbances

___ A higher fee for monitoring and diagnosing a broad variety of disturbances

___ Rate increase for infrastructure improvements

___ Special contractual arrangement for premium service

___ Require infrastructure improvements if general power quality standards are not met

___ Require infrastructure improvements if a broad variety of very specific power quality standards are not met

___ Receive a credit if specific disturbances are documented

___ Allow the utility to receive a reward if they meet a certain power quality response level

___ Apply a penalty for a utility's failure to resolve complaints based on specific power quality standards

___Establish criteria for determining utility control of power quality problems and requiring a specific procedure to follow in responding to a complaint

# ATTACHMENT C:

Staff Results of Ten State Review on Reliability

| **Illinois** | |
|---|---|
| | Service Quality Monitoring |
| Companies Involved | All utilities |
| How Mandated | Title 83 Public Utilities, Chapter 1: "Illinois Commerce Commission",<br>Subchapter C: "Electric Utilities", Part 411, "Electric Reliability" |
| Standard & Benchmarks | ***SAIFI & CAIDI***—Unspecified<br>***Customer Call Centers***—Answer time cannot exceed 60 seconds.<br>***Abandon Call Rate***—Shall not exceed 10%<br>***Worst Performing Circuits***—Worst numbers for SAIDI, SAIFI, & CAIDI must be identified. Targets: SAIFI—6 and CAIDI—18. Must be noted in annual report with detailed plan of action to improve performance<br>***Annual Report***: Pursuant to Section 16-125 of the Public Utilities Act and the Commission's electric reliability rules, each of the six investor-owned public utilities files an annual electric reliability report summarizing the entity's reliability performance to the Commission. Then, the Commission must complete an annual report to Governor. |
| Weather Adjustments | IEEE 1366 does not apply. Utilities report **all** outages to the Commission instead. |
| Deadbands | Not Applicable |
| Penalty | Corrective Action Plan |

| **Indiana** | |
|---|---|
| Style | Service Quality Monitoring |
| Companies Involved | All utilities in Indiana, including Duke Energy (has specific requirements) |
| How Mandated | Title 170—Indiana Utility Regulatory Commission |
| Standard & Benchmarks | ***All Utilities***: SAIDI, CAIFI, SAIFI—With and without major events—unspecified benchmarks<br>***Duke Energy***—SAIDI 175 Minutes, CAIDI 115 Minutes, SAIFI 1.65 Interruptions<br>***Adjustment of Bills***: "Adjustments Due to Meter Errors. If any service meter, after being tested, as provided for in these rules, is found to have a percentage of error greater than three percent (3%) for watt-hour meters and four percent (4%) for demand meters, the bills for service shall be adjusted…"<br>***Annual Report***: Each utility files a report with the Commission, stating the reliability indices for that year. |
| Weather Adjustments | IEEE 1366 not required for all utilities. A working group of utilities could not develop consensus on the definition of a "major event" during the development process. Thus, each utility must submit their definition of major event with its annual reliability report. |
| Deadbands | Not Applicable |
| Penalty | Corrective Action Plan |

| **Wisconsin** | |
|---|---|
| Style | Service Quality Monitoring |
| Companies Involved | All utilities |
| How Mandated | Wisconsin Administrative Code, PSC 113 |
| Standard & Benchmarks | ***SAIDI, SAIFI, CAIDI***—Unspecified<br>***Worst Performing Circuits***—Worst numbers for SAIDI, SAIFI, & CAIDI must be identified. Must be noted in annual report with detailed plan of action to improve performance.<br>***Annual Report***: Must be submitted annually, detailing measures taken to ensure reliability and aggregate SAIFI, SAIDI AND CAIDI indices by system and operating area.<br>***Customer Service Calls***: A utility or its agent shall maintain sufficient employees to<br>Achieve an average speed of live response of not more than 90 seconds. |
| Weather Adjustments | No IEEE 1366 Standards. Event definitions explained in Administrative Code:<br>Rules(10) "***Major catastrophic events***" means train wrecks, plane crashes, or explosions that are beyond the utility's control and result in widespread system damages causing customer interruptions that affect at least ten percent of the customers in the system or in an operating area and/or result in customers being without electric service for durations of at least 24 hours.<br>(11) "***Major storm***" means a period of severe adverse weather resulting in widespread system damage causing customer interruptions that affect at least ten percent of the customers on the system or in an operating area and/or result in customers being without electric service for durations of at least 24 hours. |
| Deadbands | Not Applicable |
| Penalty | Corrective Action Plan |

| **Delaware** | |
|---|---|
| Style | Penalty/Reward & Service Quality Monitoring |
| Companies Involved | Delmarva Power & Light, Delaware Electric Cooperative |
| How Mandated | Title 26 of Delaware Administrative Code, "3007 Electric Service Reliability & Quality Standards" |
| Standard & Benchmarks | ***SAIDI—1.75 standard deviation of data variability***<br>***Delaware Electric Cooperative—635 minutes per customer***<br>***Delmarva Power and Light—295 minutes per customer***<br>***Constrained Hours of Operation:*** (Based on PEPCO/Conectiv Merger Settlement) 600 hours for each Electric Distribution Company (EDC)<br>***CAIDI, SAIFI, CEMI8 and CELID8—***must be tracked and reported annually. No specific benchmarks identified.<br>***Worst Performing Circuits***: Worst 10 or 2% must be identified and a plan of future action must be submitted.<br>***Restoration of Service***: Must begin repair within 2 hours and submit an explanation to Commission.<br>***Sustained Outages***: EDC's must strive to restore service to customers as quickly and safely as permitted by major events.<br>***Reports***: Major Event Report due within 15 days after the end of a major event and must detail the dates, times, number of customers affected, total number of repairs, timeline of event in 6 hour increments as well as which contractors or crews were involved.<br>Planning and Studies Report due by March 31, that details company objectives, planned actions and projects, programs and forecast studies that serve to maintain reliability and quality of service at an acceptable reliability level.<br>Performance Report due by April 30 that assesses the achievement of the previous year's objectives, planned actions, projects and programs and assesses the relative accuracy of forecast studies and previous year's performance measures with respect to benchmarks. Three year rolling average of CAIDI, SAIFI, & SAIDI must be reported. |
| Weather Adjustments | IEEE 1366-2003 |
| Deadbands | Not Applicable |
| Penalty | 13.1 "***Private or investor owned utilities and cooperatives***, operating in Delaware under the regulation of the Commission, are subject to penalties and other remedial actions in accordance with 26 Del.C.,§205(a), §217, and §1019…Such penalty shall not exceed $5,000 for each violation,<br>with the overall penalty not to exceed an amount reasonable and appropriate for the violation (Maximum of $600,000 per year per reporting or standard violation). Each day of noncompliance shall be treated as a separate violation. In the case of an ***electric cooperative***, in violation of a reporting requirement or benchmark standard, the Commission shall not assess any monetary penalty that would adversely impact the financial stability of such an entity and any monetary penalty that is assessed against an electric cooperative shall not exceed $1,000 for each violation, which each day of noncompliance shall be treated as a separate violation (maximum of $60,000 per year per reporting or standard violation)."<br>13.2 An EDC shall be considered in violation of the SAIDI or Constrained Hours of Operation performance benchmark standard when the annual year-end cumulative measure exceeds the benchmark standard. The term of the violation shall extend for the period of time during which the performance measure exceeded the benchmark standard.<br>13.3 Upon failure of any EDC to meet performance benchmark standards, the EDC shall report monthly, or over such other period of time that the Commission shall establish by order, the latest performance indices, until such time as performance meets the acceptable reliability level.<br>13.4 Each EDC not meeting performance benchmark standards as required by Section 4, shall inform its customers, in writing, of the results and plans to improve electric service reliability and quality by July 1 of the year following any year in which its performance does not meet an acceptable reliability level.<br>13.5 Each violation of any reporting rule or performance standard of this regulation shall constitute a single, separate and distinct violation for that particular day. Each day during which a violation continues shall constitute an additional, separate and distinct violation. Provided, however, that a violation of a performance measure shall not be deemed to be a violation per customer, whether affected or otherwise, but shall constitute a single Delaware-wide violation for the day.<br>13.6 In a proceeding to determine penalties or other remedial measures for any violation, but particularly with respect to the Constrained Hours of Operation, the Commission should consider the extent to which the measure or reporting requirement did not meet the established standard and the extent to which the EDC may have implemented cost-effective efforts to comply with the requirement.<br>13.7 Penalty assessments are payable as provided by Delaware statute. |

| **Ohio** | |
|---|---|
| Style | Penalty/Reward & Service Quality Monitoring |
| Companies Involved | All utilities. Duke Energy has specific requirements |
| How Mandated | Ohio Administrative Code Chapter 4901:1-9, Chapter 4901:1-10 |
| Standard & Benchmarks | ***All Utilities: SAIFI, CAIDI, SAIDI***—Unspecified<br>***Duke Energy: SAIFI, CAIDI, SAIDI, ASAI***—2005 Performance<br>***Customer Service Calls***—"Call answer time shall not exceed ninety seconds…Callers shall not be delayed from reaching the queue by any promotional or merchandising material not selected by the customer." Not allowed to fail minimum standards for two consecutive months without notifying the service quality and enforcement department within 30 days of failure with report of why failure occurred and details of remedial steps in place.<br>***Worst performing circuits***. The following provisions apply to the reporting of each electric utility's **eight per cent worst performing circuits**: Each electric utility shall submit, no later than ninety calendar days after the end of its reporting period, a report to the director of the service monitoring and enforcement department that identifies the **worst performing eight per cent** of the electric utility's distribution circuits during the previous twelve-month reporting period.<br>***New Service Installations***: Ninety-nine per cent of new service installations requiring no construction of electric facilities shall:<br>(a) Be completed within three business days after the electric utility has been notified that the service location is ready for service and all necessary tariff and regulatory requirements have been met.<br>(b) Be completed by the requested installation date, when an applicant requests an installation date more than three business days after the customer's service location is ready for service and all necessary tariff requirements have been met.<br>***Annual Report***: By March 31 of each year, each electric utility shall submit an annual report to the director of the service monitoring and enforcement department,<br>(1) Annual performance and supporting data for each service reliability index set forth in paragraph (B) of this rule both with and without exclusions for major events and transmission outages.<br>(2) Performance on the same indices during major events and transmission outages, reported in separate categories with their respective supporting data.<br>(3) Data for die total number of sustained outages, customers interrupted, and customer minutes interrupted for each outage cause code, all of which shall be reported in the following versions:<br>(a) Data excluding major events and transmission outages.<br>(b) Data for major events only.<br>(c) Data for transmission outages only.<br>(d) Data for the total number of momentary interruptions on the electric utility's system where practicable.<br>(5) Each electric utility shall file the annual report required by paragraph (C) of this rule in an electronic form prescribed by the commission or its staff. |
| Weather Adjustments | **Adopted 11/5/2008—BUT is currently in front of Commission for rehearing…**<br>"***"Major event"*** encompasses any calendar day when an electric utility's system average interruption duration index (SAIDI) exceeds the major event day threshold using the methodology outlined in section 4.5 of standard 1366-2003 adopted by the IEEE in "IEEE Guide for Electric Power Distribution Reliability Indices." The threshold will be calculated by determining the SAIDI associated with adding 2.5 standard deviations to the average of the natural logarithms of the electric utility's daily SAIDI performance during the most recent five-year period. The computation for a major event requires the exclusion of transmission outages. For purposes of this definition, the SAIDI shall be determined in accordance with paragraph (C)(3)(e)(iii) of rule 4901:1-10-11 of the Administrative Code." |
| Deadbands | Not Applicable |
| Penalty | Corrective Action Plan. Penalties for Duke Energy not specified. |

| **Washington D.C.** | |
|---|---|
| Style | Service Quality Target |
| Companies Involved | All utilities |
| How Mandated | Title 15 of the District of Columbia Municipal Regulations: Ch. 36 Electricity Quality of Service Standards |
| Standard & Benchmarks | ***SAIFI, SAIDI, & CAIDI***—5 year rolling average + 2 standard deviations<br>***Customer Calls Received***—70% of calls must be answered in 30 seconds<br>***Abandon Call Rate***—Shall not exceed 10%<br>***Worst Performing Circuits***—Improve the worst 2% circuits with no yearly repeaters<br>***New Residential Installations***—Must be completed in 10 business days<br>***Non Major Event Day Outages***—Service must be restored in 24 hours<br>***Billing Errors***—Report any errors that effect 100 customers or more than 2%<br>***Annual Report***: Provide a summary of the required standards and a corrective action plan for those that are not in compliance |
| Weather Adjustments | IEEE 1366 Major Event Days |
| Dead bands | Not Applicable |
| Penalty | Corrective Action Plan |

| **Pennsylvania** | |
|---|---|
| Style | Service Quality Target |
| Companies Involved | All utilities |
| How Mandated | Public Utility Code Chapter 57. Electric Service, Section 57.195 |
| Standard & Benchmarks | ***SAIFI, SAIDI, CAIDI, & MAIFI (if available)***— Rolling 12-month value & rolling 3 year value<br>***Dead bands for utilities with less than 100,000 customers***— Within 10% of 3 year rolling average and 35% of 12-month rolling average<br>***Dead bands for utilities with more than 100,000 customers***— Within 10% of 3 year rolling average and 20% of 12-month rolling average<br>***Worst Performing Circuits***—Improve the worst Performing 5%<br>***Annual Report***: Each utility files a report with the Commission, stating the reliability indices for that year. |
| Weather Adjustments | Major Event defined as affecting 10% or customers for a duration of 5 min. or more |
| Dead bands | See Above |
| Penalty | Further Investigation |

| **Minnesota** | |
|---|---|
| Style | Service Quality Target and Penalty/Reward |
| Companies Involved | All utilities, Xcel Energy has special requirements |
| How Mandated | ***All utilities***: Minnesota Statutes 216B.029 Minnesota Rules 7826.0400, 7826.0500 and 7826.1300 and pursuant to Minnesota Rules 7826.0600, Subpart 1<br>***Xcel Energy***: Minnesota Northern States Power Company Electric Rate Book General Rules and Regulations 2/1/07 |
| Standard & Benchmarks | ***All Utilities:***<br>***Annual Report***: Each utility submits an annual report with the previous year's data for the standards below. In that report they must propose benchmarks for each standard for the following year based on historical data that the Commission will review for approval.<br>***SAIFI, SAIDI, & CAIDI***<br>***Average call center response time***<br>***Abandon call rate***<br>***Worst performing circuits***<br>***Meter reading frequency***<br>***Complaint response time***<br>***Service extension request response time***<br>***Number of customer complaints*** |
| Weather Adjustments | IEEE 1366 Major Event Days |
| Dead bands | Not Applicable |
| Penalty | ***Xcel Energy has a special rate book with the following benchmarks & penalties:***<br>***The penalties are disbursed with 50% going to the customers and 50% funding corrective actions in the operations and maintenance budget***<br>SAIDI \| Above 98 min but less than 108 min \| $1,000,000 |

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|---|---|---|---|---|---|
| | | | at 108 min but less than 118 min | $1,500,000 | |
| | | | 118 minutes or above | $2,000,000 | |
| | | SAIFI | Above 1.00 but less than 1.10 | $1,000,000 | |
| | | | at 1.10 but less than 1.20 | $1,500,000 | |
| | | | at 1.20 or above | $2,000,000 | |
| | | Individual customer interruptions | Customers experience at least 6 | $50 | |
| | | Length of individual customer interruptions | Per interruption lasting 24 hrs or more | $50 | |
| | | Amount of Meters Read | April through November <90% | 50% of $625,000 | |
| | | | April through November <80% | 50% of $1,250,000 | |
| | | | December through March <80% | 50% of $625,000 | |
| | | | December through March <70% | 50% of $1,250,000 | |
| | | Written complaints submitted to the Commission | More than 450 but less than 500 | $625,000 | |
| | | | 500 or more but less than 550 | $937,500 | |
| | | | 550 or more per year | $1,250,000 | |
| | | Telephone Response Time | < 80% but >76% answered within 20 sec | $625,000 | |
| | | | ≥ 72% but < 76% answered within 20 seconds | $937,500 | |
| | | | < 72% answered within 20 seconds | $1,250,000 | |

| **Utah** | |
|---|---|
| Style | Service Quality Target and Penalty/Reward |
| Companies Involved | Rocky Mountain Power (PacifiCorp) |
| How Mandated | Docket No. 98-2035-04 Order Accepting Agreement on Performance Standards (Updated on 6/2/08 in 05-035-54 effective until 12/31/2011) |
| Standard & Benchmarks | ***SAIFI***— Improve 27% from 2.2 by December 31, 2011<br>***SAIDI***—Improve 29% from 217 by December 31, 2011<br>***Customer calls received***—Answer 80% of telephone calls within 30 seconds<br>***Complaints to the Commission***—Resolve 95% of informal complaints in 30 days<br>***Worst performing circuits***—Reduce the CPI by 20% for the five worst circuits<br>***Switching power back on***— Switch on power within 24 hours<br>***Estimates for new supply***— Give an estimate to the applicant within 15 days<br>***Respond to billing inquiries***— Respond to the Customer within 10 days<br>***Resolving meter problems***— Test the meter and report within 10 days<br>***Notification of planned interruptions***— At least two days notice<br>***Non major event day outages***—Restore supply after an outage within 24 hours<br>***Supply restoration***— Restore service to 80% of customers within 3 hours<br>***Appointments***— Keep appointments within a two-hour window<br>***Annual Report***: Provide a summary of the required standards and a corrective action plan for those that are not in compliance |
| Weather Adjustments | IEEE 1366 Major Event Days est. in Docket No. 98-2035-04 |
| Dead bands | Not Applicable |
| Penalty | ***Switching power back on***— $50<br>***Estimates for new supply***— $50<br>***Respond to billing inquiries***— $50<br>***Resolving meter problems***— $50<br>***Notification of planned interruptions***— $50<br>***Non major event day outages***— $50 ($25 for each add. 12 hrs.)<br>***Appointments***— $50 |

| **California** |
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| | |
|---|---|
| Style | Service Quality Monitoring |
| Companies Involved | All utilities, SDG&E (specifics), and PG&E (specifics) |
| How Mandated | All utilities - Docket # D96-09-045. SDG&E - Rate Case # D.08-07-046.<br>PG&E - Rate Case # D.04-10-034. |
| Standard & Benchmarks | ***All Utilities:***<br>***SAIFI***— Past 10 Years of Data<br>***SAIDI***— Past 10 Years of Data<br>***MAIFI***— Past 10 Years of Data<br>***CAIDI***— 570 for events affecting 10% of customers<br>***Worst performing circuits***— Improve Circuits with greater than 12 sustained outages in a year<br>***Worst outages based on SAIDI impact***— Report top 10 outage events based on customer min.<br>***Major event restoration***— Restore service in less than 12 hours<br>***Annual Report***: Each utility files a report with the Commission, stating the reliability indices for that year<br><br>***SDG&E:***<br>***SAIDET (system average interruption duration exceeding threshold)***— Exceeding a defined annual threshold of 150 min<br>***Estimated restoration time***— Report accuracy of each outage/# of customers experiencing an outage<br><br>***PG&E:***<br>***Division Indices***— Those that vary by 10% from a 5-yr rolling average<br>***CAIDI***— Report a major event that causes it to vary by 25% |
| Weather Adjustments | Event that effects more than 15% of the systems facilities or 10% of the utilities customers |
| Dead bands | Not Applicable |
| Penalty | Detailed explanation |

# ATTACHMENT D:

Calculation of the IEEE 1366-2003
"Major Event Day" Standard

The main steps for identifying an major event day under Standard 1366 are the following:

- A major event day is a day in which daily SAIDI exceeds a threshold value $T_{MED}$.
- In calculating daily SAIDI, interruption durations that extend into subsequent days are assigned to the day on which the interruption begins. This technique ties the customer-minutes of interruption to the instigating events.
- The major event day identification threshold value $T_{MED}$ is calculated at the end of each reporting period for use during the next reporting period. For utilities that have six year of reliability data, the first five are used to determine $T_{MED}$ and that threshold is applied during the sixth year.
- The methodology for calculating $T_{MED}$ is as follows:
  - Values of daily SAIDI for a number of sequential years, ending on the last day of the last complete reporting period, are collected.
  - If any day in the data set has a value of zero for SAIDI, those SAIDI data are excluded from the analysis.
  - The natural logarithm of each daily SAIDI value in the data set is calculated.
  - The average of the logarithms, $\alpha$ , of the data set is calculated.
  - The standard deviation of the logarithms, $\beta$ , of the data set is calculated.
  - The major event day threshold, $T_{MED}$, is calculated by using the equation (this value should in theory give an average of 2.3 major event days per year)

$$T_{MED} = e^{\alpha + 2.5\beta}$$

- Any day with daily SAIDI greater than the threshold value $T_{MED}$ is designated a major event day, and data for this day is removed from SAIFI and SAIDI performance to provide a "normalized" measure of performance. [20]

[20] This explanation of IEEE Standard 1366-2003 was provided from the Pacific Economics Group March 2007 report titled "Service Quality Regulation for Detroit Edison: A Critical Assessment" by Larry Kaufmann on page 22.