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DE-OHIO EXHIBIT_____

BEFORE

THE PUBLIC UTILITIES COMMISSION OF OHIO

In The Matter of the Application of Duke Energy Ohio for Approval of an Electric Security Plan	)))	Case No. 08-920-EL-SSO
In the Matter of the Application of Duke Energy Ohio for Approval to Amend Accounting Methods	)))	Case No. 08-921-EL-AAM
In the Matter of the Application of Duke Energy Ohio for Approval of a Certificate of Public Convenience and Necessity to Establish an Unavoidable Capacity Charge	)))))	Case No. 08-922-EL-UNC
In the Matter of the Application of Duke Energy Ohio for Approval to Amend its Tariffs	)))	Case No. 08-923-EL-ATA

DIRECT TESTIMONY OF

TONY R. ADCOCK

ON BEHALF OF

DUKE ENERGY OHIO

July 31, 2008

234365

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TABLE OF CONTENTS

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Tony R. Adcock and my business address is 526 S. Church St, Charlotte, NC 28202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I work for Duke Energy Business Services, LLC., a service company affiliate of Duke Energy Ohio, Inc. (DE-Ohio) as a Power Delivery Project Manager.

Q. WHAT ARE YOUR DUTIES AND RESPONSIBILITIES AS POWER DELIVERY PROJECT MANAGER?

A. I'm responsible for overseeing special projects and initiatives within the power delivery area. For example, I recently completed a project focused on standardizing the materials used by Power Delivery throughout the Duke Energy companies. This effort took place over a period of twelve months. Project lengths have ranged from one year to two years or beyond. My duties have included project scoping, costing, solution development, process development, communications, project integration, implementation, tracking and monitoring, which often includes budget management.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I received a Bachelor of Science in Electrical Engineering from North Carolina State University in 1987. Upon graduation I accepted a job with Duke Power as an Electrical Engineer. I have held various positions of increasing responsibility in the Electrical Engineering area with Duke and was promoted

to my current position in 2004. I am a Registered Professional Engineer in the states of North Carolina and South Carolina.

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

A. The purpose of my testimony is: (1) to describe De-Ohio's electric delivery system; (2) to explain Duke Energy Ohio's overall policies relating to the design, construction, operation and maintenance of the Company's electric delivery facilities; and (3) to provide an overview of DE-Ohio's proposed distribution automation project, SmartGrid, and (4) to explain the need for the Commission's approval of Rider DR-IM, the Distribution Investment Rider.

II. DESCRIPTION OF DE-OHIO'S ELECTRIC DELIVERY SYSTEM

Q. PLEASE DESCRIBE THE DE-OHIO ELECTRIC DELIVERY SYSTEM.

A. The DE-Ohio electric delivery system is used, among other things, to provide electric service to approximately 690,000 consumers located throughout our service area in Ohio. DE-Ohio owns and operates all of its electric distribution and local transmission facilities. The bulk transmission facilities are subject to the functional control of the Midwest Independent Transmission System Operator, Inc. (Midwest ISO). DE-Ohio's electric delivery system includes approximately 228 substations, 15 transmission substations (locations with 69 kilovolt [kV] or higher operating voltages) having a combined capacity of approximately 8,776,106 kilovolt-amperes (kVA), 200 distribution substations (locations that supply one or more circuits at 35 kV or lower voltage) having a

combined capacity of approximately 5,783,899 kVA, and 15 both transmission and distribution substations (locations with 69 kV or higher operating voltages that also have 35 kV or lower voltage) having a combined capacity of approximately 5,541,733 kVA. The DE-Ohio electric delivery system includes various other equipment and facilities such as control rooms, computers, capacitors, street lights, meters and protective relays and telecommunications equipment and facilities. While the DE-Ohio electric system is not a North American Electric Reliability Corporation (NERC) Balancing Authority Area, DE-Ohio does own transmission facilities that are part of the Duke Energy Corporation Balancing Authority Area which is operated by Duke Energy Midwest Control Area Operation. DE-Ohio's facilities are directly interconnected to four other Balancing Authorities. DE-Ohio's electric delivery system provides considerable flexibility for DE-Ohio to operate in a manner that provides reliable and economic power to our consumers.

Q. PLEASE GENERALLY DESCRIBE HOW DE-OHIO'S ELECTRIC DELIVERY SYSTEM HAS GROWN BETWEEN SEPTEMBER 30, 2004, THE DATE CERTAIN OF DE-OHIO'S LAST DISTRIBUTION RATE CASE AND THE CURRENT DATE CERTAIN, MARCH 31, 2008.

A. DE-Ohio's electric distribution system has grown significantly. On September 30, 2004, DE-Ohio's original cost of electric distribution system plant in service was approximately $1.4 billion. By March 31, 2008, DE-Ohio's original cost electric delivery system plant in service had increased by 14% to approximately

$1.6 billion. As a further example, since September 30, 2004, DE-Ohio has installed over 188 circuit miles of distribution circuits, and 458,717 kVA of distribution substation transformer capacity. Investments like these have been necessary to maintain safe, reliable, efficient and economical electric delivery service for our existing consumers as well as serve approximately 31,000 new retail electric consumers added to the DE-Ohio system since September 30, 2004.

Q. IN YOUR OPINION, ARE DE-OHIO'S ELECTRIC DELIVERY SYSTEM FACILITIES USED AND USEFUL IN PROVIDING SERVICE TO DE-OHIO'S RETAIL ELECTRIC CONSUMERS?

A. Yes. DE-Ohio's electric delivery system is used daily to provide safe, reliable, efficient and economical electric delivery service to our consumers.

Q. PLEASE GENERALLY DESCRIBE HOW THE TRANSMISSION AND DISTRIBUTION SYSTEM IS DESIGNED, CONSTRUCTED AND OPERATED.

A. The electric transmission system is designed to deliver bulk electric power from local generating plants and other resources to regional substations, or to interconnect with other systems in order to enhance system reliability. DE-Ohio's transmission voltages are 69 kV, 138 kV and 345 kV. The system generally consists of steel tower or wood pole transmission lines and substations with power transformers, switches, circuit breakers and associated equipment. The system is operated in accordance with standards issued by NERC and Reliability*First* Corporation (RFC). RFC is a Regional Reliability Organization

that is the successor organization to the East Central Area Reliability Council (ECAR). The system is under the control of the Midwest ISO, a regional transmission organization approved by the Federal Energy Regulatory Commission (FERC).

The electric distribution system is designed to receive bulk power at transmission voltages, reduce the voltage to 34.5 kV, 12.5 kV, or 4 kV, and deliver power to consumers' premises. The distribution system generally consists of substation power transformers, switches, circuit breakers, wood pole lines, underground cables, distribution transformers, and associated equipment. The physical design of the distribution system is also generally governed by the National Electric Safety Code (NESC), which I understand has been adopted by the state of Ohio in Ohio Administrative Code (O.A.C.) 4901:1-10-06. The system is operated in accordance with RFC and NERC guidelines and is under the control of the Midwest ISO, a FERC approved regional transmission organization.

DE-Ohio operates the transmission and distribution facilities it owns in accordance with good utility practice. DE-Ohio continuously runs the system with a workforce that provides service 24 hours per day, seven days per week, 365 days per year, including trouble response crews. DE-Ohio monitors equipment loading in accordance with good utility practice. The Company monitors outages with various systems such as Supervisory Control and Data Acquisition (SCADA), Trouble Call Outage Management System (TCOMS), Electric Trouble data mart, and Outage Information System.

Dispatchers continuously monitor weather conditions. When lightning, wind or

ice storms hit DE-Ohio's service territory; line crews are paged, called or held over to respond. DE-Ohio will often call in several hundred employees to respond to severe storms, including Duke Energy's Franchised Electric and Gas employees stationed in Kentucky, Indiana, North Carolina and South Carolina. If necessary, DE-Ohio will contact contract employees and other utilities for additional line crews through a mutual assistance program. These rigorous operating practices have enabled DE-Ohio to provide reliable electric service to its consumers.

Q. PLEASE GENERALLY DESCRIBE HOW DE-OHIO'S DISTRIBUTION SYSTEM IS MAINTAINED.

A. DE-Ohio maintains its distribution system in accordance with good utility practice by following several inspections, monitoring, testing, and periodic maintenance programs. Examples of these programs include: substation inspection program, line inspection program, ground-line inspection and treatment program, vegetation management program, underground cable replacement program, capacitor maintenance program, infrared scanning of equipment and dissolved gas analysis. DE-Ohio uses various reliability indices to measure the effectiveness of its maintenance programs and system reliability. DE-Ohio follows the Public Utilities Commission of Ohio's (Commission) Electric Service and Safety Standards (ESSS) set forth in O.A.C. 4901:1-10. DE-Ohio uses various indices to measure the effectiveness of its maintenance programs and system reliability.

Q. HAVE THERE BEEN ANY IMPROVEMENTS TO THE WAY DE-OHIO MAINTAINS IT ELECRIC DISTRIBUTION SYSTEM SINCE THE COMPANY'S LAST ELECTRIC DISTRIBUTION RATE CASE?

A. Yes. In addition to the existing maintenance programs previously described, DE-Ohio implemented a comprehensive ground line inspection and treatment program for its entire distribution system. This program is targeted to inspecting and maintaining the wood poles that are used throughout DE-Ohio's service territory to ensure they continue to provide safe and reliable electric service. Since its implementation, approximately 54,600 wooden poles have been inspected which equals approximately $1/5^{th}$ of the entire distribution system. The purpose of the program is to not only treat existing poles so that they will last longer, thereby reducing DE-Ohio's costs for replacement of poles, but to identify potential problems, whether immediate or in the near future. If the problem is immediate in nature, such as a utility pole in need of replacement, it is promptly addressed. Additionally, DE-Ohio has implemented an inspection and maintenance program for over head distribution line reclosers.

III. MEASURING THE RELIABILITY OF DE-OHIO'S ELECTRIC DELIVERY SYSTEM

Q. YOU STATED THAT DE-OHIO USES VARIOUS INDICES TO MEASURE THE EFFECTIVENESS OF ITS MAINTENANCE PROGRAMS AND SYSTEM RELIABILITY. PLEASE EXPLAIN THESE RELIABILITY INDICES.

A. These reliability indices are generally recognized standards for measuring the number, scope and duration of outages. Ohio requires electric distribution

utilities to annually report on these reliability indices in O.A.C.4901:1-10-10 through 4901:1-10-26. These indices are defined as follows:

- Customer Average Interruption Duration Index (CAIDI) is the average interruption duration or average time to restore service per interrupted customer, and is expressed by the sum of the customer interruption durations divided by the total number of customer interruptions.
- System Average Interruption Duration Index (SAIDI) is the average time each customer is interrupted, and is expressed by the sum of customer interruption durations divided by the total number of customers served.
- System Average Interruption Frequency Index (SAIFI) is the system average frequency index and represents the average number of interruptions per customer. SAIFI is expressed by the total number of customer interruptions divided by the total number of customers served.

Q. HOW HAS DE-OHIO'S SYSTEM PERFORMED AS MEASURED BY THESE RELIABILITY INDICES?

A. DE-Ohio has performed well. Its reliability scores have always exceeded DE-Ohio's targets established in consultation with Commission Staff pursuant to O.A.C. 4901:1-10-10(B)(2). The latest reliability index scores available are for calendar year 2007, and are reported below.

Duke Energy Ohio
Rule #10
2007
Distribution System Reliability Report

CAIDI - Customer Average Interruption Duration Index
(In Minutes)

a.	b.	c.
CAIDI Performance Target	CAIDI With Storm & Transmission Exclusions	CAIDI Without Storm & Transmission Exclusions
127.80	97.07	159.53

SAIDI - System Average Interruption Duration Index
(In Minutes)

a.	b.	c.
SAIDI Performance Target	SAIDI With Storm & Transmission Exclusions	SAIDI Without Storm & Transmission Exclusions
174.00	128.66	326.71

SAIFI - System Average Interruption Frequency Index

a.	b.	c.
SAIFI Performance Target	SAIFI With Storm & Transmission Exclusions	SAIFI Without Storm & Transmission Exclusions
1.50	1.33	2.05

Q. WHAT ARE DE-OHIO'S OBJECTIVES IN DESIGNING, CONSTRUCTING, OPERATING AND MAINTAINING ITS DISTRIBUTION FACILITIES?

A. In designing, constructing, operating and maintaining its facilities, DE-Ohio strives to provide safe, cost-effective and reliable electric service.

Q. PLEASE DESCRIBE SOME OF THE FACTORS THAT THE COMPANY MUST CONSIDER IN ATTEMPTING TO ACHIEVE THESE OBJECTIVES.

A. In providing electric service to its consumers, DE-Ohio must provide safe and reliable service while at the same time prudently and responsibly managing the costs of providing such service. DE-Ohio weighs various factors in selecting the electric delivery system projects in which to invest, including DE-Ohio's planning criteria, any requirements mandated either by regulatory authorities or reliability councils, and government mandated projects, to name a few.

Q. HOW DOES DE-OHIO BALANCE ALL OF THESE FACTORS?

A. Annually, electric system studies are performed to determine where and when system modifications are needed to ensure load is adequately served. When these needs are identified, multiple solutions are developed, addressing not only the capacity need, but also providing opportunities to maintain or improve reliability and operating flexibility. Recommendations are made and discussed with the operations staff to ensure a balanced, workable plan has been developed.

In the course of maintaining and operating the electric system, equipment and

hardware is identified that requires repair or replacement. Blanket budgets have been established to cover small items, but specific projects are developed for larger expenditure items. These items are triggered as a result of operating issues, new load growth, or as a result of the various inspection, monitoring, and testing programs I described above.

IV. DE-OHIO'S INVESTMENT IN ITS TRANSMISSION AND DISTRIBUTION FACILITIES

Q. PLEASE DESCRIBE DE-OHIO'S INVESTMENT RELATING TO ITS TRANSMISSION AND DISTRIBUTION FACILITIES DURING THE PAST FIVE YEARS.

A. The table below summarizes DE-Ohio's capital expenditures for its transmission and distribution facilities for the period from 2003 through March 31, 2008.

Table 2 – Capital Expenditures 2003 – March 31, 2008

Function	2003	2004	2005	2006	2007	2008 thru Mar
Transmission	12,877,552	23,777,268	29,799,040	24,342,231	29,946,739	5,431,856
Distribution	66,032,355	64,893,559	71,797,048	82,417,539	86,201,462	22,617,178
Grand Total	78,909,907	88,670,827	101,596,088	106,759,771	116,148,201	28,049,033

V. MAJOR CHALLENGES FACING DE-OHIO'S ELECTRIC DELIVERY SYSTEM

Q. WHAT ARE THE MAJOR CHALLENGES FACING DE-OHIO'S TRANSMISSION AND DISTRIBUTION SYSTEM?

A. The aging of the transmission and distribution system is a major challenge. Much of this equipment is over 30 years old. This equipment typically will last from 30–50 years. We expect to incur substantial expenditures to replace this

equipment during the next several years. The charts below show the age distribution for DE-Ohio's poles, distribution circuit breakers, and transmission and distribution transformers.

Figure 1 – DE-Ohio's Distribution

Poles Age Distribution

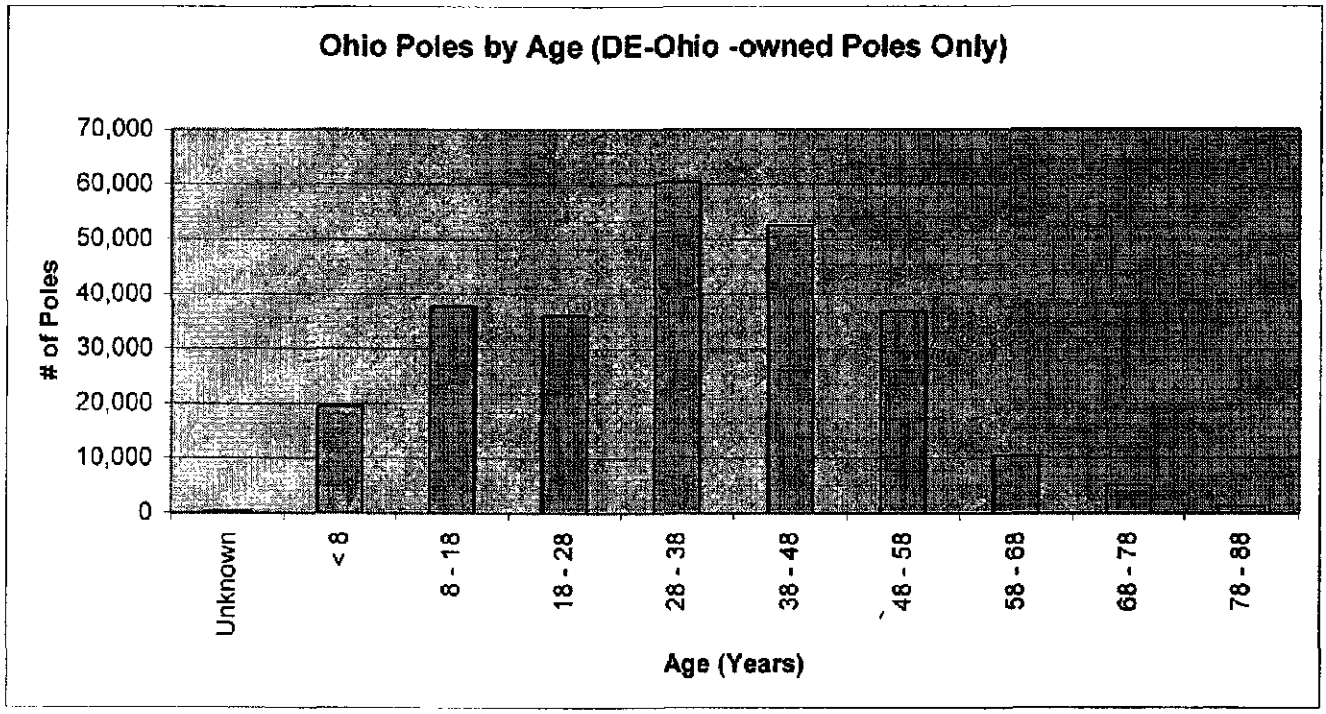
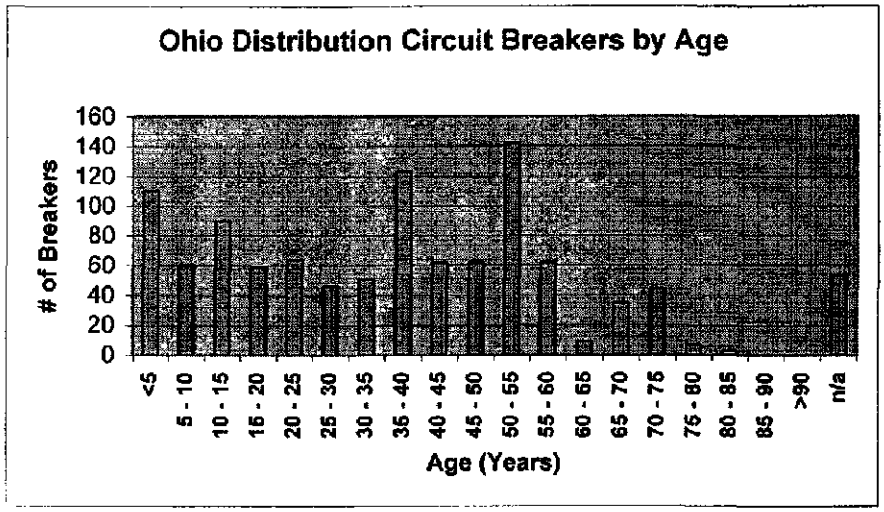


Figure 2 – DE-Ohio's

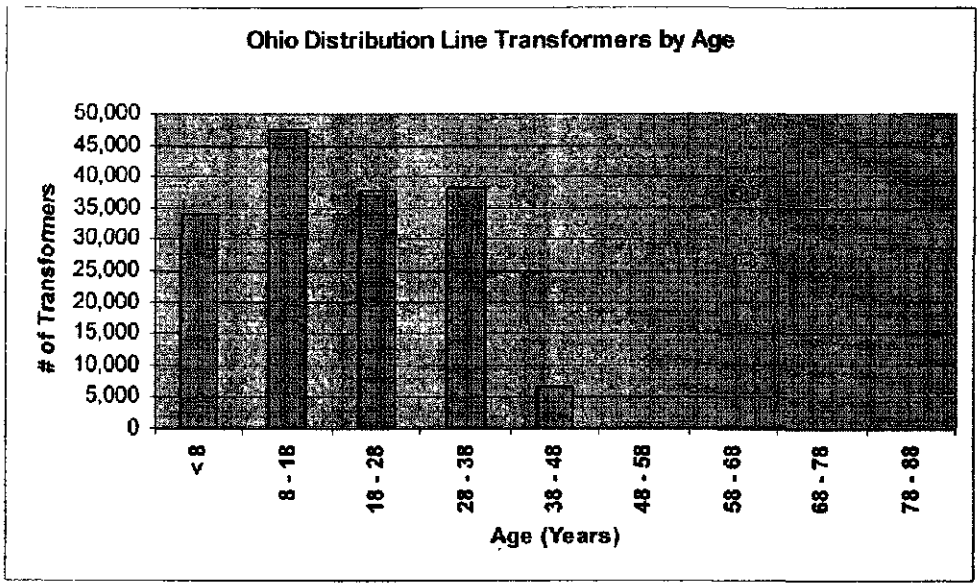
Distribution Circuit Breakers Age Distribution As of

March 31, 2008



1 **Figure 3 – DE-Ohio's Distribution Transformer Age**

Distribution as of March 31, 2008



2 **Q. DO CONSUMERS' EXPECTATIONS PRESENT A CHALLENGE?**

3

4 A. Yes. Consumers are now using equipment that is highly sensitive to voltage

fluctuations; therefore, consumers are demanding highly reliable service that minimizes the number of voltage fluctuations. This presents a challenge for DE-Ohio to strike the correct balance between reliable and economic service.

Q. DOES TIMELY COST RECOVERY OF DISTRIBUTION SYSTEM INVESTMENT PRESENT A CHALLENGE TO DELIVERING SAFE AND RELIABLE SERVICE?

A. Yes. The cost of equipment such as transformers, utility poles, wire, and other necessary components continue to rise. This inflation causes DE-Ohio's cost of providing service to continue to rise as well. Similarly, as new technologies continue to develop, existing equipment tends to become obsolete or difficult to acquire and maintain. DE-Ohio is constantly evaluating how it can better manage its costs while at the same time take advantage of the new technologies which can provide enhanced and more reliable service to its consumers. That is why DE-Ohio is proposing the implementation of its Distribution Reliability Rider (Rider DR-IM). As explained further by DE-Ohio's witnesses Paul G. Smith and Todd W. Arnold, Rider DR-IM will provide DE-Ohio with timely recovery of its costs incurred to improve and modernize its electric delivery infrastructure including the implementation of SmartGrid technologies and timely recovery of other distribution capital investments. Rider DR-IM is beneficial to consumers in that it will allow DE-Ohio to recover costs necessary to provide safe and reliable electric distribution service in a transparent manner. The Commission will review the rider, including the project costs to be included.

VI – Distribution Automation

Q. YOU STATED THAT YOU WOULD DISCUSS DISTRIBUTION AUTOMATION PROJECTS. PLEASE DESCRIBE WHAT YOU MEAN BY DISTRIBUTION AUTOMATION PROJECTS.

A. Distribution automation is a term used to describe the transformation of an existing distribution system which requires manual on site operation of power equipment to an advanced distribution system with power equipment that can be operated from a remote location such as a control center. This will be accomplished through a communication network and advanced control systems. For DE-Ohio, distribution automation will include Circuit Breakers and Electronic Reclosers, Distribution Line Switched Capacitor Banks and Voltage Regulators, enhanced Sectionalization and Self Healing Technology. We expect to gain a number of benefits from this modernization of the distribution system, including improved system reliability (fewer and shorter duration outages) , improved power quality (voltage optimization and reduction in "blinks"), improved operating efficiencies (fewer manual inspections, reduced manual equipment operation, reduced truck rolls), improved consumer satisfaction and, by controlling voltage more efficiently on DE-Ohio's distribution system, we expect to help lower power consumption.

(1) CIRCUIT BREAKERS AND RECLOSERS

Q. WHAT FUNCTION DO CIRCUIT BREAKERS AND RECLOSERS PERFORM IN THE COMPANY'S DISTRIBUTION SYSTEM?

A. Circuit breakers and reclosers are system protection equipment that perform

very similar functions. Circuit breakers are normally located inside substations while reclosers are normally installed on distribution line poles some distance from substations. Circuit breakers and reclosers address or "clear" temporary line faults such as those caused by lightning strikes, squirrels, etc. without extended interruption of service. When a temporary fault occurs, circuit breakers and reclosers briefly open thereby de-energizing the line to allow the temporary fault to extinguish. Once the temporary fault has been removed the equipment closes and service is restored. Consumers experience a momentary blink but a sustained power outage is avoided. They also isolate permanent line faults such as those caused by tree limbs hanging on lines, trees falling across lines, lightning storms, vehicle accidents, etc, until repairs are made and service is restored.

Q. WHAT TYPES OF CIRCUIT BREAKERS DOES THE COMPANY UTILIZE TODAY?

A. Today we use a mixture of oil and vacuum breakers with various control systems or "relays." Some relays are electro-mechanical and some microprocessor driven. Our current state of automation varies by circuit. Some breakers have state of the art, full automation, while some breakers have more primitive automation with only basic capability (*i.e.* open/close), some breakers have no automation or communication link at all.

Q. WHAT DOES THE COMPANY PLAN TO DO WITH CIRCUIT BREAKERS AS A PART OF THE SMARTGRID PROGRAM?

A. Our goal is to update our system and establish consistency with our circuit

breaker population using new technology equipment. Our proposed Smart Grid plan calls for: (1) replacement of old technology breakers that are difficult and expensive to automate; (2) upgrading old electro-mechanical relays to state of the art microprocessor controlled relays; (3) fully automating all circuit breakers greater than 4kv. By fully automate I mean establish a communication link to programmable two way communication controls to allow remote control capability.

Q. ARE THERE DIFFERENT TYPES OF RECLOSERS CURRENTLY IN USE ON THE COMPANY'S DISTRIBUTION SYSTEM?

A. Yes, DE-Ohio currently uses Electronic Reclosers, Hydraulic Reclosers, and Vacuum Reclosers. Electronic Reclosers are more advanced reclosers with programmable electronic controls that provide better co-ordination, faster operating time and allow for automation.

Q. HOW DOES THE COMPANY INTEND TO CHANGE ELECTRONIC RECLOSERS?

A. We plan to establish a communication link and fully automate all electronic reclosers on the DE-Ohio system. In the future we will also look for opportunities to replace old technology reclosers with electronic reclosers with communication links.

Q. WHAT WILL BE THE BENEFITS OF CIRCUIT BREAKER AND ELECTRONIC RECLOSER AUTOMATION?

A. Automating this equipment will allow the Company to conduct operations from a remote location such as a control center that would normally require an

on site visit. This will allow the obtaining of real time operating data, reduce truck rolls, improve operating efficiency, reduce O&M cost, and reduce outage duration. For example, with this new equipment we will be better able to determine actual line fault locations and dispatch crews closer to the actual location needing repair, thereby reducing restoration time. Additionally, we will be able to remotely open and close, or block, electronic reclosers, thereby reducing the number of manual on site operations. Replacement of old technology circuit breakers, relays and reclosers will also result in improved equipment performance, improved coordination, reduced outages, and reduced O&M cost for maintaining older equipment.

(2). <u>SECTIONALIZATION</u>

Q. WHAT DO YOU MEAN BY THE TERM SECTIONALIZATION?

A. Sectionalization is a term used to describe the utilization of protective devices such as electronic, hydraulic, and vacuum reclosers to reduce the number of consumers interrupted during an outage event. Reclosers are installed in strategic points where major load divisions occur.

Q. HOW DOES THE COMPANY INTEND TO CHANGE THIS AS A PART OF THE SMARTGRID PROGRAM?

A. The Company proposes to significantly increase the number of reclosers installed in the field to further sectionalize circuits and reduce the number of consumers affected when a permanent line fault occurs. Distribution circuits or lengthy line segments with high consumer densities will have additional protective equipment such as reclosers installed. This significantly reduces the

length of line segments being protected by existing equipment. By reducing the length of a line segment below a protective device we reduce the number of consumers affected when a sustained outage occurs. Many of the devices installed will be electronic reclosers with state of the art control panels for automation purposes.

Q. WHAT WILL BE THE BENEFIT OF INCREASED SECTIONALIZATION?

A. The primary benefit will be a reduction in the number of consumers affected during permanent line faults, which will be reflected in improved measurements such as SAIFI and CAIDI. Additionally, these reclosers can be integrated into self healing "teams" as discussed below.

(3). <u>SELF HEALING TECHNOLOGY</u>

Q. PLEASE DESCRIBE WHAT YOU MEAN BY THE TERM SELF HEALING TECHNOLOGY.

A. Self healing technology refers to the utilization of intelligent distribution line power devices such as switches, programmable reclosers and circuit breakers that communicate via a local area communication network to locate and isolate a fault via automated on site switching thereby reducing the number of consumers affected during an outage event.

Q. DOES THE COMPANY USE SELF HEALING TECHNOLOGY TODAY?

A. Some basic or primitive self healing technology is in limited use today primarily as a part of underground distribution systems. Today's installations

normally consist of the installation of an automatic throw over switch which has one preferred and one alternate feed.

Q. HOW DOES THE COMPANY INTEND TO CHANGE THIS AS A PART OF THE SMARTGRID PROGRAM?

A. The Company intends to increase the application of self healing technology. The proposed self healing technology will be directed toward mainly over head feeder lines and will affect many more consumers. Additionally, the proposed self healing technology is much more advanced than a standard automatic throw over switch with a preferred and alternate feed. Today's self healing technology can have multiple devices in an installation often referred to as a "team", Self healing teams normally consist of multiple "sources", and multiple feed "routes" or "paths". These devises communicate and isolate the portion of the system effected by a fault or other problem, thus minimizing the impact of such problems.

Q. WHAT WILL BE THE BENEFIT OF USING SELF HEALING TECHNOLOGY?

A. Utilization of self healing technology will facilitate automated on site trouble shooting and switching driven for local programmable artificial intelligence. This will result in reduced number of consumers effected during three phase protective device lock outs and reduced outage duration.

(4). VOLTAGE REDUCTION AND CONSERVATION

Q. WHAT DO YOU MEAN BY VOLTAGE REDUCTION AND VOLTAGE CONSERVATION?

A. Voltage reduction and voltage conservation are terms used to describe reducing system demand by lowering substation station output voltage.

Q. DOES DUKE ENERGY CURRENTLY EMPLOY A VOLTAGE CONSERVATION STRATEGY?

A. No. The infrastructure needed is not in place currently.

Q. WHAT APPROACH OR STRATEGY DOES DUKE ENERGY CURRENTLY USE IN REGULATING STATION OUTPUT VOLTAGE?

A. Due to the limited technology and capability available today, we normally set station output voltage at levels greater than 120 volts. This allows for some drop in voltage as line loses occur as we move away from the substation. Distribution line capacitors are installed along the lines to improve power factor, reduce line losses, and enhance or support line voltage outside the substation.

Q. WHAT DOES THE COMPANY PLAN TO DO DIFFERENTLY WITH VOLTAGE REGULATION IN CONJUNCTION WITH SMART GRID?

A. We will fully automate (enable two way communication, remote operation capability, and enable Volt/Var optimization) substation regulator and switched capacitor banks to optimize system performance thereby allowing substation output voltage to be lowered. By lowering the voltage on some types of loads

(primarily resistive load like lights, dryers, electric strip heat, electric stoves) we can lower power consumption and thereby reduce demand.

Q. WHAT FUNCTION DO CAPACITOR BANKS PERFORM IN THE COMPANY'S DISTRIBUTION SYSTEM?

A. Capacitor banks control power factor and system voltage.

Q. WHAT TYPES OF CAPACITOR BANKS DOES THE COMPANY UTILIZE TODAY?

A. We currently utilize switched capacitor banks with "on site" controls on distribution lines.

Q. WHAT DOES THE COMPANY PLAN TO DO WITH SWITCHED CAPACITOR BANKS AS A PART OF THE SMARTGRID PROGRAM

A. We plan to automate all switched capacitor banks. We will establish a communication link, and upgrade or retrofit old control panels to new control panels that enable automation.

Q. WHAT WILL BE THE BENEFITS OF AUTOMATING DISTRIBUTION LINE SWITCHED BANK CAPACITORS?

A. In addition to helping to enable the voltage reduction and conservation discussed above, our proposed changes will also help improve power factor, reduce line losses, allow remote control of the capacitor banks, and reduce the number of manual on site inspections.

Q. WHAT FUNCTION DO SUBSTATION VOLTAGE REGULATORS PERFORM IN THE COMPANY'S DISTRIBUTION SYSTEM?

A. Substation voltage regulators regulate output voltage from substations.

Q. WHAT TYPE OF VOLTAGE REGULATION DOES THE COMPANY UTILIZE TODAY?

A. The Company typically utilizes bus regulators to control substation output voltage. Bus regulators control the voltage on multiple circuits at once. In addition to bus regulators, some substation output voltages are control by LTC Bank Transformers. These are basically large substation bank transformers with built in voltage regulation capability. LTC stands for "Load Tap Change" which means the voltage can be raised or lowered while the transformer is under load. In some instances, individual circuit regulation may be accomplished by applying a three phase voltage regulator or a bank of three single phase regulators (one per phase) to an individual circuit. In all three scenarios, the actual

voltage control is accomplished by localized on site control panels.

Q. HOW DOES THE COMPANY INTEND TO CHANGE THIS AS A PART OF THE SMARTGRID PROGRAM?

A. We plan to replace old technology regulators and control panels with new regulators and control panels that are capable of two way communication, programmable, and allow for remote operation.

Once these pieces of equipment are retrofitted a communication link will be established to fully automate station voltage regulation.

Q. WHAT WILL BE THE BENEFIT OF THESE AUTOMATING STATION VOLTAGE REGULATION?

A. In addition to helping to enable the voltage reduction and conservation

discussed above, our proposed changes will also help improve power quality, reduce generation demand, allow remote control of the regulators, and reduce the number of manual on site inspections.

(5). <u>OUTAGE DETECTION AND RESPONSE</u>

Q. MR. MASTERS DESCRIBED THE AUTO ON SITE OUTAGE REPORTING CAPABILITY OF THE METERS IN HIS TESTIMONY. CAN YOU DESCRIBE CURRENT STATE OF OUTAGE DETECTION?

A. Yes. Currently outage detection and response is primarily driven by consumer calls. Some number of circuit breakers do have alarms or signals that are initiated if a circuit breaker opens. This is normally supplemented with consumer calls.

Q. WHAT WILL BE DIFFERENT WITH THE PROPOSED SMART GRID SYSTEM?

A. A consumer would not be required to call in to report an on site outage. Their meter would do that automatically.

Q. WHAT WOULD THE BENEFITS BE?

A. Improved accuracy in outage detection and response. Today, consumers often give us an incorrect address or phone number. As a result, a service tech would be dispatched to an incorrect location. Additionally, a Duke representative may enter or select the incorrect consumer account. This is common for consumers with multiple accounts. By allowing the meters to auto report the element of human error is greatly reduced. This enhances outage response and helps reduce outage duration. In addition to enhanced reporting

and response to individual on site outages, significant benefit will be achieved during major storm events. By having the ability to remotely detect "known" outage location for not only meters but other protective devices, Duke will be able to expedite storm assessment and can better determine the number of resources that are needed to respond to outages. We will have greater intelligence instantaneously to make quicker and more accurate response decisions. During the later stages of major storms we will be able to better assess and confirm the actual number of consumers remaining without power instantaneously and can make more accurate decisions regarding crew deployment and releasing of crew thereby better manage total storm cost.

VII. GENERAL

Q. WHAT IS THE COMPANY'S PLANNED SCHEDULE FOR IMPLEMENTING THE DISTRIBUTION AUTOMATION PROJECTS?

A. Our current schedule calls for implementing this portion of SmartGrid over a five year period, approximately 20% each year. We expect to begin in areas where distribution automation will have the most impact such as areas with higher consumer density, areas with lower reliability, or areas with critical / sensitive load.

Q. DID YOU PROVIDE DE-OHIO WITNESS CHRISTOPHER D. KIERGAN WITH ESTIMATED COSTS FOR THE AUTOMATION DISTRIBUTION PROJECTS FOR HIS USE IN THIS PROCEEDING?

A. I worked with the appropriate subject matter experts within DE-Ohio Energy Power Delivery to collect and deliver the cost projections to Mr. Kiergan.

Q. DID YOU PROVIDE MR. KIERGAN WITH ANY ESTIMATED BENEFITS ASSOCIATED WITH THE AUTOMATION DISTRIBUTION PROJECTS FOR HIS USE IN THIS PROCEEDING?

A. I worked with the appropriate subject matter experts within DE-Ohio Energy Power Delivery to collect and deliver the cost projections to Mr. Kiergan.

Q. DO YOU CONSIDER THE COST BENEFIT DATA PROVIDED TO MR. KIERGAN TO BE REASONABLE?

A. Yes.

VIII. CONCLUSION

Q. WHY SHOULD THE COMMISSION APPROVE DE-OHIOS REQUEST TO RECOVER COSTS FOR SMARTGRID DEPLOYMENT?

A. SmartGrid makes sense today as a foundation for many consumer benefits in the near term and in the future. Today, SmartGrid will enable efficiencies for DE-Ohio in terms of meter reading and distribution reliability. It will immediately provide a platform for demand reduction and greater education of the public regarding energy conservation and efficiency and it will further enable emerging technologies.

Q. DOES THIS CONCLUDE YOUR PREPARED DIRECT TESTIMONY IN THIS PROCEEDING?

A. Yes, it does.