

**A Report by the Staff of the  
Public Utilities Commission of Ohio**

Ohio Edison Company, The Cleveland Electric Illuminating Company, and  
The Toledo Edison Company

Case Numbers 09-1820-EL-ATA, 09-1821-EL-GRD,  
09-1822-EL-EEC and 09-1823-EL-AAM

February 8, 2013

This report is Staff's review of FirstEnergy's Smart Grid Modernization Initiative, also referred to as the Ohio Site Deployment. The Ohio Site Deployment was initially approved by the Commission in Case No. 09-1821-EL-GRD on June 30, 2010. The Commission approved the Company's request to implement Phase 1 of Ohio Site Deployment, which was an initial test phase of 5,000 customers in year one. After reviewing the results of Phase 1, the Commission would decide whether the Company should proceed to Phase 2. Phase 2 would expand the initial test phase to 44,000 customers. The Company has now reported on its assessment of Phase 1 of this project and the outcomes learned with the hope of deploying Phase 2. The Company worked with the Staff to develop an evaluation plan for its controlled randomized tests of consumer behavioral response to critical peak events through peak time rebate pricing, Company and customer control of programmable thermostats, and in-home displays. The Company engaged the Electric Power Research Institute (EPRI) to analyze customers' response to the various permutations of technology and pricing they could select in this initial phase. In addition, the Company retained the Shelton Group to determine the attitudes of customers regarding the initial pilot.

There are approximately 44,000 residential and commercial customers in the defined Ohio Site Deployment geographical area just east of Cleveland. In October of 2011 the Company contacted approximately 6,500 residential customers in the pilot area and achieved an initial voluntary sign-up of almost 5,000 customers for advanced meters. Of those customers who elected to take an advanced meter, the Company intended to sign up customers in the various cell permutations with at least 225 customers in each cell. The Company identified 12 different treatment cell groups to observe any differences in customer behavior based on the pricing or technology selected. In the end, only a small number of the customers who selected an advanced meter chose the peak time rebate, a programmable thermostat, or the in-home display. The Staff believes that only two of the cell treatment groups had participation significant enough to warrant valid statistical results. These two cell groups were those that selected a programmable thermostat that either the customer or the Company controlled by cycling them for either 4 or 6 hours at a time. In addition to these cell groups, a comparison control group of 500 customers was added to determine the behavioral impacts of the various cells.

EPRI conducted the following types of serial analysis to characterize the attributes of customer behavior in the initial pilot: (1) an Analysis of Variance (ANOVA), (2) a Fixed Effects Regression model and (3) a Constant Elasticity of Substitution model (CES). The Company followed the ordered sampling that was recommended by the Technical Advisory Group of USDOE.

There were several hypotheses tested:

- Who would respond more?
  - Those customers who controlled the programmable thermostat themselves
  - Those customer who had the Company control the thermostat
- Who would respond more?
  - Those who have 4 hour critical peak event lengths
  - Those who have 6 hour critical peak event lengths

- The Peak Time Collateral Behavior Effects (i.e. conservation and snap-back)
  - Does the Peak Time rebate introduce incremental conservation behavior?
  - What is the degree of snap-back consumption after an event?
- Would there be a persistent response over called consecutive days of peak time events?

In order to evaluate these hypotheses, EPRI had proposed an analysis plan. This plan involved several different steps of analysis which are provided in Exhibit A of the Company's filing on September 27, 2012.

I. What was learned from this analysis?

- A. The Company had 15 peak day events called in the summer months of June through August of 2012. The highest customer demand occurred on those days of the highest temperatures, which also provided the most demand reduction opportunity. As can be seen in the EPRI report, those days show the highest average reductions in kWh.
- B. Customers who received a programmable thermostat (PCT) and allowed the Company to control their thermostats on called peak day events showed a stronger demand reduction for electricity than those customers who reduced demand on their own initiative. Customers who only received in-home displays (IHDs) showed the lowest amount of demand reduction on event days. This is largely due to the fact that these customers did not have central air-conditioning, however, their demand reduction was still significant. The Company also tested the differences in response from those customers who were on a shorter event window of 4 hours versus those customers who had a 6-hour event window. The Company found that there was a significant difference in the demand reduction for those customers who were Company controlled versus those who controlled their own usage via the thermostat, but they were both significant reductions.
- C. The graphical results also demonstrated a strong "snap back" effect for those customers who elected either the 4 hour or 6 hour events with the programmable thermostats. By observing the data, these individual cell groups with the programmable thermostats would have had their highest peak consumption right after the event was finished. The Staff is concerned that extrapolating such results to a larger population could present a new problem of having a higher peak demand than what the control group experienced had not this program existed.
- D. The Company also retained the Shelton Group to receive feedback from customers who participated in year 1 of the program. Their conclusions of customers' feedback can found in their filing. The following are the highlights of their report.
  - a. Many of the initial pilot participants had an increased awareness of their energy usage; however the low participation levels could be increased by adding more communication touch points with potential participants in Years 2 & 3 of the pilot.

- b. Some of the customers who received the Peak Time rebate felt it was not high enough for the amount of reduced demand.
  - c. In order to increase participation in Years 2 and 3 of the pilot the Company should utilize both traditional print and other digital direct marketing.
    - i. This would involve direct mail, telephone, internet, and door hangers and geographical targeted communications.
- II. What other issues arose in the initial year of the Company's pilot?
  - A. Customers who participated in the pilot were provided with a single choice of PTR pricing, PTR pricing with a programmable thermostat controlled by either the Company or the customer, or an in-home display for those that did not have central air conditioning. If a customer did not opt for any choice in the Company's initial offering, they were placed in the overall non-participant group.
  - B. Staff is in agreement with the EPRI report that customers who opted for a programmable thermostat did demonstrate a significant amount of demand reduction on peak event days even when there were consecutive peak event days called. This shows that customers were persistent in their demand reductions on consecutive days.
- III. What is the staff recommendation for the Company to proceed with Years 2 and 3 of the Ohio Site Smartgrid Investment Project?

The staff recommends the Company proceed with the second phase of this pilot for Years 2 and 3 based primarily on the significant customer response to the peak time rebates offered in Year 1. The Staff is in agreement with the recommendations put forward by both EPRI as well as the Shelton Group to improve the pilot in years 2 and 3. The Staff also has recommendations of its own and they are listed as follows:

- A. Staff recommends that the customer snapback effect could be mitigated by either: 1) the Company scheduling the resumption of thermostats back to their normal levels gradually or 2) by offering overlapping time-based event windows. The Staff suggests that the Company move forward with the first option and if that does not work, then proceed with the second option in Year 3.
- B. The Company currently plans to offer a \$.40/kwh rebate for peak demand events called based on customer performance in the initial year. If it is necessary for the Company to offer a higher peak time rebate to achieve a significant amount of customer response, then the Company should put forward its proposal in consultation with the Staff for a different level of rebate. In the longer term, the goal should be to link peak time rebates to the value of energy (LMP's) and capacity in the ATSI energy and capacity market zone.

- C. The Company should meet 3 times a year with all interested Competitive Electric Retail Suppliers about the ability of offering time-differentiated rates to their shopping customers. This is a necessary component of smartgrids where customer choice of different generation suppliers is available in order for consumer benefits to be achieved.
- D. In order to increase overall customer participation in the technology and pricing options, the Staff recommends that customers be given a menu of second and third alternative choices in the second phase of this pilot, instead of just being put into the non-participant group after rejecting the Company's initial offer. These choices would include offering other pricing choices to its SSO customers, e.g. a simple 2-part seasonal time-of-use of on and off peak pricing and a critical peak pricing period overlaid on this seasonal time-of-use pricing structure. An effective goal for the Company would be achieve an enrollment of at least 250 residential customers on this time differentiated rate. The staff is recommending that the Company work through the rate design and tariff timing with the appropriate stakeholders.
- E. The Company shall offer the already Commission approved commercial time-of-use rate and critical peak price to those approximate 3,400 commercial customers in phase 2.
- F. In the event the Company has technologies that remain available after customers choose an option in the first instance, and some customers would like to combine some technology offerings, the staff recommends that the Company provide those technologies to those customers, e.g. those customers who have already chosen a programmable thermostat could also select an in-home display.
- G. Staff would like for the Company to offer to any customer with central air conditioning a programmable thermostat in phase 2 of this pilot to maximize peak demand reduction benefits.
- H. The Company should adopt all of the recommendations made by the Shelton Group to increase education and participation by those customers being added in the second phase of the pilot.
- I. The Company shall meet with the Staff regarding the resolution of any issues/problems that may arise with cyber security and customer privacy of consumption data in this pilot.
- J. The Company shall provide all relevant improvement in distribution reliability of CAIDI, SAIFI, and customer minutes of outage as they relate to the geographical pilot area.
- E. Since the Company has reduced the expected costs of the Ohio Project, Staff is in agreement with the Company that the estimated AMI Rider costs should be reduced by approximately \$3.35 million. An equal amount of USDOE ARRA matching funds would not need to be collected either.

In conclusion, Staff believes that the second phase of FirstEnergy's Ohio Site Smartgrid Deployment Project should be approved. Staff hopes this smartgrid pilot will help determine if this deployment will assist with electric retail customer choice and the overall reliability of the distribution system. There will be a final report regarding these issues after the pilot project is completed. This final report will help the Commission determine if smartgrid should be implemented on a larger scale for the Ohio based FirstEnergy distribution companies. The final report of this pilot project, along with appropriate metrics, shall be submitted to the Commission after it is complete.

Greg Scheck, PUCO Staff  
February 8, 2013

**This foregoing document was electronically filed with the Public Utilities**

**Commission of Ohio Docketing Information System on**

**2/8/2013 2:17:41 PM**

**in**

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Summary: Staff Report Filed electronically filed by Kimberly L Keeton on behalf of Public Utilities Commission of Ohio