PPL companies

LG&E and KU Energy LLC
State Regulation and Rates
220 West Main Street
PO Box 32010
Louisville, Kentucky 40232
www.lge-ku.com

Rick E. Lovekamp
Manager - Regulatory Affairs
T 502-627-3780
F 502-627-3213
rick.lovekamp@lge-ku.com

Mr. Jeff DeRouen
Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40601

March 20, 2013

Re: CONSIDERATION OF THE IMPLEMENTATION OF SMART GRID AND SMART METER TECHNOLOGIES
Case No. 2012-00428

Dear Mr. DeRouen:

Enclosed please find and accept for filing an orginial and fourteen copies of Louisville Gas and Electric Company and Kentucky Utilities Company Responses to the Commision Staff's First Request for Information dated February 27, 2013 in the above referenced matter.

Should you have any questions regarding the enclosed, please contact me at your convenience.

Sincerely,

Rick E. Lovekamp

Rick E. Lovekamp

c: Parties of Record

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

CONSIDERATION OF THE	)	CASE NO.
IMPLEMENTATION OF SMART GRID	)	2012-00428
AND SMART METER TECHNOLOGIES	)	

JOINT RESPONSE OF LOUISVILLE GAS AND ELECTRIC COMPANY AND KENTUCKY UTILITIES COMPANY TO THE COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION DATED FEBRUARY 27, 2013

FILED: March 20, 2013

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **David E. Huff**, being duly sworn, deposes and says that he is Director of Customer Energy Efficiency & Smart Grid Strategy for Louisville Gas and Electric Company and Kentucky Utilities Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and that the answers contained therein are true and correct to the best of his information, knowledge and belief.

David E. Huff

David E. Huff

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 18th day of March 2013.

(SEAL)

Notary Public

My Commission Expires:

7/21/2015

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Edwin R. Staton**, being duly sworn, deposes and says that he is Vice President, State Regulation and Rates, for Louisville Gas and Electric Company and Kentucky Utilities Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Edwin R. Staton

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 18th day of March 2013.

(SEAL)
Notary Public

My Commission Expires:

7/21/2015

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF JEFFERSON)

The undersigned, **Eric Slavinsky**, being duly sworn, deposes and says that he is Chief Information Officer for Louisville Gas and Electric Company and Kentucky Utilities Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

____
Eric Slavinsky

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 18th day of March 2013.

______________________ (SEAL)
Notary Public

My Commission Expires:

7/31/2015

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF JEFFERSON)

The undersigned, **Thomas A. Jessee**, being duly sworn, deposes and says that he is Vice President, Transmission for Louisville Gas and Electric Company and Kentucky Utilities Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Thomas A. Jessee

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 18th day of March 2013.

(SEAL)
Notary Public

My Commission Expires:

7/21/2015

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **David S. Sinclair**, being duly sworn, deposes and says that he is Vice President, Energy Supply and Analysis for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

David S. Sinclair

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 18th day of March 2013.

(SEAL)
Notary Public

My Commission Expires:

7/21/2015

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Paul Gregory "Greg" Thomas**, being duly sworn, deposes and says that he is Vice President, Electric Distribution for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Paul Gregory Thomas

Paul Gregory "Greg" Thomas

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 18th day of March 2013.

Susan A. Henry (SEAL)
Notary Public

My Commission Expires:

7/21/2015

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Steve E. Woodworth**, being duly sworn, deposes and says that he is Director – Revenue Collection for LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Steve E. Woodworth

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 18th day of March 2013.

(SEAL)
Notary Public

My Commission Expires:

7/21/2015

LOUISVILLE GAS AND ELECTRIC COMPANY
AND
KENTUCKY UTILITIES COMPANY

CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information Dated February 27, 2013

Question No. 77

Witness: David E. Huff

Q-77. Refer to the Initial Testimony of Lonnie E. Bellar ("Bellar Testimony"), page 4, lines 18-19. Do LG&E and KU track how often their customers access usage data online, either by the number of customers who access usage data and/or the frequency with which usage information is accessed by a customer?

A-77 Customers have access to their historic usage data 24x7 via My Account. The Companies do not track the frequency with which a customer accesses their individual account(s), and the Companies do not track a customer accessing their usage. The Companies started tracking the aggregate views of the usage history page to monitor overall utilization of the information within My Account in December 2012.

LOUISVILLE GAS AND ELECTRIC COMPANY
AND
KENTUCKY UTILITIES COMPANY

CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 78

Witness: Edwin R. Staton / David E. Huff

Q-78. Refer to the Bellar Testimony, page 5, lines 2-4, which state that customers tend not to respond to time-of-use pricing to a great extent. State whether this statement pertains to all customer classes, or only to particular customer classes.

A-78. The statement indicated in the testimony is based on the Smart Meter Pilot Program results and associated Responsive Pricing participant group which was mostly composed of customers under Rate RS (residential), as detailed in the table below.

Number of Customers on the Responsive Pricing Pilot					
Rate Class	Year				
	2008	2009	2010	2011	2012 (End)
Residential	102	94	78	76	64
Commercial	2	4	5	4	4

LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 79

Witness: David E. Huff

Q-79. Refer to the Bellar Testimony, page 11, lines 5-Q-7. State whether the "rigorous cost-benefit analysis" to be performed when considering a Smart Grid investment is envisioned to mirror the analysis performed when considering a DSM program investment. Provide any known or foreseen differences in the analysis of DSM and Smart Grid investments.

A-79. The "rigorous cost-benefit analysis" to be performed when considering Smart Grid investments would include the costs and savings achieved by deploying the Smart Grid initiative. DSM programs evaluate the cost of the deployed measure against the energy or demand savings. While the Smart Grid investment may include energy or demand savings the economic evaluation would also include operational and maintenance savings and thus go beyond traditional DSM investment analysis.

LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 80

Witness: Edwin R. Staton

Q-80. Refer to the Bellar Testimony, page 12, in which Mr. Bellar notes agreements with the Attorney General's ("AG") and CAC's recommendation regarding performance metrics. Identify the performance metric which LG&E and KU believe to be appropriate.

A-80. Because the Companies have not developed a Smart Grid initiative, they do not have specific metrics to recommend at this time.

LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 81

Witness: Eric Slavinsky

Q-81. Refer to the Bellar Testimony, page 18. Explain the potential security vulnerabilities associated with a data network architecture that is IP based.

A-81. Nearly universal application of the internet protocol ("IP") as a standard allows "standard attack" approaches that could potentially impact any component utilizing it. The Internet itself lends itself to anonymity because there is no inherent authentication mechanism built into IP, and the Internet's interconnectedness provides attack vectors from potentially across the world, depending on how the networks are connected and the security protective measures implemented.

LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 82

Witness: David E. Huff

Q-82. Refer to the Initial Testimony of David E. Huff ("Huff Testimony"), page 1. Mr. Huff states that time-of-use pricing was divided into three time periods and the rates ranged from low to medium to high. Provide details of when these periods occurred, their length, and the electric rates associated with each.

A-82. Please refer to pages 3 and 4 of the 2010 Annual Report in Case No. 2007-00117, filed on April 1, 2011. The time-of-use pricing periods changed depending on the time of year and are detailed below.

June through September		
Time	**Weekdays**	**Weekends**
Midnight to 10 a.m.	Low	Low
10 a.m. to 1 p.m.	Medium	Low
1 p.m. to 6 p.m.	High	Medium
6 p.m. to 9 p.m.	Medium	Low
9 p.m. to Midnight	Low	Low
October through May		
Time	**Weekdays**	**Weekends**
Midnight to 8 a.m.	Low	Low
8 a.m. to 6 p.m.	Medium	Low
6 p.m. to 10 p.m.	High	Medium
10 p.m. to Midnight	Low	Low

In addition, the associated electric rates are included below for comparison. The rates below are average rates for the period of January 2008 through May 2012.

Rate Class	**Average Rate ($/kWh)**				
	Low	***Medium***	***High***	***Critical***	***Standard***
Residential	0.0516	0.0643	0.1198	0.3193	0.0729
Commercial	0.0566	0.0719	0.1485	0.3198	0.0794

LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 83

Witness: David E. Huff

Q-83. Refer to the Huff Testimony, page 1, line 21 through page 2, line 4 regarding the discussion of the real-time pricing component. Provide details concerning the periods of around 80 hours per year of critical peak pricing and the five times higher rates in effect during those periods.

A-83. Line 2 on page 2 of the Huff Testimony explains that critical peak pricing was limited to no more than 80 hours per year. Also, critical peak pricing events occurred only during hours of peak energy demand. Please refer to the Responsive Pricing and Smart Metering Pilot Program Final Report filed on July 1, 2011 in Case No. 2007-00117. Page 10 of 16, Section 3.3, Critical Peak Pricing Events, summarizes critical peak pricing event details as shown in the chart below. Please refer to the answer provided to Question No. 82 for particulars regarding the critical peak pricing rates.

Summer CPP Event Log			
Year	**Date**	**Time (EST)**	**MAX Temperature (°F)**
2008	July 18	16:00 - 18:00	92
	July 21	16:00 - 18:00	89
	August 11	16:00 - 18:00	79
	August 12	16:00 - 18:00	81
	September 4	16:00 - 18:00	86
2009	June 2	15:00 - 19:00	89
	June 19	14:00 - 18:00	91
	June 24	14:00 - 18:00	91
	June 26	14:00 - 18:00	92
	July 28	14:00 - 18:00	82
	August 26	14:00 - 18:00	89
2010	June 17	15:00 - 19:00	90
	June 18	15:00 - 19:00	93
	June 22	15:00 - 19:00	93
	June 23	15:00 - 19:00	94
	June 25	15:00 - 19:00	91
	July 15	15:00 - 18:00	94
	July 23	15:00 - 18:00	95
	August 10	15:00 - 19:00	100

**LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

**Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013**

Question No. 84

Witness: David E. Huff

Q-84. Refer to the Huff Testimony, page 2, regarding the use of in-home monitors as a component of the smart meter pilot program.

a. State whether the use of such devices required a resident to be present near the monitor during rate changes. If the response is no, explain why not.

b. If not addressed above, discuss the possibility of information from the in-home monitors being displayed, or transferred, to other equipment or mobile devices (smart phones, iPads, laptops, etc.) which would allow customers' decisions or actions to be made remotely.

A-84.

a. In-home monitors used in the Smart Meter Pilot Program were table-top devices. The top of these devices had a color wheel which reflected the current pricing tier (e.g., green indicated low-priced periods while red indicated high-priced periods). Hence, the customers would have had to be in close proximity to the devices in order to take notice of changes in pricing tier.

b. The Smart Meter Pilot Program enabled customers with access to some basic information via internet. Pilot customers who requested access to the website could make basic adjustments to their thermostat settings, control the water heater (or pool pump) switch (i.e., on/off), and view the consumption reading, when logged in. The website also displayed a chart showing the pricing tier schedule and, in the event of critical peak pricing, sent e-mail notifications to those customers who provided their e-mail address.

In-home energy monitors are designed to receive and display energy usage information to customers. Smart meters are typically used to communicate energy usage data to in-home monitors locally using a home area network (HAN). More advanced in-home devices are capable of communicating the received energy usage data through the internet for customer to access through a wide range of internet enabled mobile devices. Any accompanying customer benefits are dependent upon active customer participation in monitoring, shifting and reducing their energy usage. In addition, the same benefits assume the availability of internet access in customer homes, as well as a commitment to devote time to monitoring energy data presented by the web portal. Until nationwide HAN communications standards are firmly in place, there is a risk of technology incompatibility or obsolescence.

LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information Dated February 27, 2013

Question No. 85

Witness: David E. Huff

Q-85. Refer to the Huff Testimony, page 2. Those individuals who were the control group and not direct participants in the smart meter pilot program were noted as receiving "...various levels of equipment ..." Describe the type of equipment provided to those customers and the benefits afforded the customers who received that equipment.

A-85. Please refer to Page 7 of the July 12, 2007 Order in Case No. 2007-00117. Please also refer to the Responsive Pricing and Smart Metering Pilot Program Final Report filed on July 1, 2011 in Case No. 2007-00117, Page 7 of 16, Section 2.3, Customer Groups, which states, "The Pilot included several combinations of smart devices to determine the impact of various types of tools and energy cost information on customers' energy usage. Customers residing on the selected metering routes who did not volunteer for Responsive Pricing were eligible to receive one or more smart devices. Over the course of the Pilot, approximately 95 customers chose programmable thermostats and in-home energy usage displays; approximately 20 customers chose programmable thermostats and/or load control switches; and approximately 90 customers chose in-home energy usage displays only."

LOUISVILLE GAS AND ELECTRIC COMPANY
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CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 86

Witness: David E. Huff

Q-86. Refer to the Huff Testimony, pages 2 and 3 regarding the "bounce back" effect.

a. Provide a more detailed explanation of the "bounce back" effect and its impact on the LG&E system.

b. If the participants saved energy and presumably lowered expenses by shifting their usage to lower cost periods, explain the statement on page 3, lines 7-9, that they used more energy and that it was counterproductive from an energy-efficiency standpoint.

c. State whether the participants saved money on their overall energy bills.

d. Refer to page 3, lines 21-23. Mr. Huff states that "... results indicated there were load reductions, shifts in peak usage to off-peak periods, but that customers receiving critical peak pricing signals created higher peaks and consumed more energy." Provide further information to explain these results.

A-86.

a. Please refer to page 15 of the 2010 Annual Report in Case No. 2007-00117, filed on April 1, 2011: "When a load control or CPP period ends, it is imperative not to create a new system load peak. This phenomenon can occur when HVAC systems operate to lower or raise the temperature in the premise to a predetermined thermostat setting. This phenomenon is known as a snapback or bounce-back effect." Please also refer to page 11 of the Responsive Pricing and Smart Metering Pilot Program Final Report filed on July 1, 2011 in Case No. 2007-00117: "Average load bounce-back was greater on days when the critical peak pricing period was in effect for four hours than on the days when the critical peak pricing period was in place for three hours. The maximum average load increase after CPP was released amounted to 0.8 kW."

b. Please refer to the Answer No. 1, part b, item 4, in the Response to the Commission Staff's Initial Request for Information in Case No. 2011-00440, filed on January 6, 2012: "While the intent of the program was to enable participants to maximize their savings through energy usage reduction and time-shifting, data demonstrated that participating customers decreased their energy usage slightly in high- and critical-peak priced periods but used more energy overall in lower-priced off-peak and weekend time periods. LG&E found the program to be very effective in shifting system load, but determined no benefit in energy savings when compared to the cost of the program."

c. Please refer to page 9 of the Responsive Pricing and Smart Metering Pilot Program Final Report filed on July 1, 2011 in Case No. 2007-00117. Section 3.2.1. Usage Reports states, "The customer reports established that an average Responsive Pricing customer experienced a 1.4% bill decrease for the summer billing period."

d. Please refer to the Answer No. 4 in the Response to the Commission Staff's Initial Request for Information in Case No. 2011-00440, filed on January 6, 2012: "The referenced result describes the bounce-back effect and was determined when sampling proportion of the total control group population (representing original system peak) was decreased to only customers on the Responsive Pricing program, to ensure statistical validity throughout the course of the analysis study. The increase in system peak is attributed to participants' electric household devices coming back online instantaneously after the last hour of a CPP event. Thus, the Responsive Pricing participants increased their energy use and created a peak which exceeds the peak of the corresponding control group."

LOUISVILLE GAS AND ELECTRIC COMPANY
AND
KENTUCKY UTILITIES COMPANY

CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 87

Witness: David E. Huff

Q-87. Refer to the Huff Testimony, page 3.

a. Lines 6 and 7 indicate that customers tend not to respond to time-of-use pricing changes to a great extent and their overall energy usage tends to go up. Given that in the Smart Meter Pilot customers' overall usage went up, explain whether the customers' overall bills also went up. Include in the explanation whether the decreased rate during non-peak hours gave the customers the opportunity to decrease bills, while at the same time increase usage.

b. Lines 10-13 indicate that two-way communications could not be fully tested and evaluated because fully embedded systems were not readily available or economically feasible during the pilot, and that hardware and software employed became outdated and limited. Given these limitations, describe the usefulness of the pilot. Include an explanation for why LG&E proceeded with the pilot, rather than suspend the pilot until the limitations could be addressed.

A-87.

a. The last paragraph on page 18 of the 2010 Annual Report in Case No. 2007-00117, filed on April 1, 2011 states, "The customer reports established that an average Responsive Pricing customer experienced a 1.4% bill decrease for the summer 2009 billing period. Similarly, nearly 11% of the Responsive Pricing customers demonstrated more than 6% in bill savings. On the other hand, approximately 6.5% of the Responsive Pricing customers experienced a bill increase of 10% or more for the summer 2009 billing period. In addition, the customer reports established that 17% of the Responsive Pricing customers were almost bill neutral." As described previously, analysis of the Smart Meter Pilot Program demonstrated that the reduced rate during low-priced off-peak periods enabled participants to shift no less than half of their energy usage to low-priced periods; however, as described above, not all participants experienced a decrease in their bills.

b. Overall, LG&E found the Smart Meter Pilot Program very useful. The goals of the Smart Meter Pilot Program were: 1) to determine if customers, when given pricing signals, the tools and information they need, would shift electricity use to times when overall costs are lower; and (2) to test the effectiveness of emerging smart meter technology. LG&E succeeded in meeting both of these goals. As reported previously, LG&E found that customers shifted their energy usage from higher-priced weekday hours to lower-priced off-peak and weekend time periods. Also, LG&E gained significant experience in smart meter technology and identified the requirements needed to operate such network in a fully automated two-way mode of transmission. Limitations indicated in the testimony touch on those requirements and, in part, apply to enterprise systems used for collection and management of actual meter data. As described in Answer No. 9 in the Response to the Commission Staff's Initial Request for Information in Case No. 2011-00440, filed on January 6, 2012, LG&E employed a hosted data collection and management system because it was the only available cost-effective method for a short-term pilot project at the time the pilot was being implemented.

LOUISVILLE GAS AND ELECTRIC COMPANY
AND
KENTUCKY UTILITIES COMPANY

CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 88

Witness: David E. Huff

Q-88. Refer to the Huff Testimony, page 4, regarding federal stimulus funding. State whether KU or LG&E pursued or acquired any federal stimulus funding for any Smart Grid initiatives. If the response is yes, provide the amount of funds received and the initiatives pursued. If no, explain why not.

A-88. The Companies did not pursue federal stimulus funding. Stipulations of receiving funding included contributing customer funds. After reviewing the requirements, potential benefits, and technological risk, the Companies concluded that the benefits associated with any initiative did not outweigh the costs. Consequently, the Companies did not pursue federal stimulus funding for any Smart Grid initiative.

LOUISVILLE GAS AND ELECTRIC COMPANY
AND
KENTUCKY UTILITIES COMPANY

CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information Dated February 27, 2013

Question No. 89

Witness: David E. Huff

Q-89. Refer to the Huff Testimony, page 7, regarding customer-education efforts concerning smart meters. Identify and describe the customer-education tools or methods used in the pilot and those that might be used in the future to encourage or compel participation in such a pilot.

A-89. During the Smart Meter Pilot, educational efforts were directed toward the responsive pricing customer group. The Companies used a variety of communication techniques and messaging. These efforts included direct mail campaigns, telemarketing, door-to-door participant recruitment on identified routes, personalized customer usage reports, participant web site, specialized billing information that compared how Responsive Pricing electric charges compared to the standard electric rate charges, and telephone and email support for Pilot participants.

In the future, the Companies anticipate utilizing a variety of these strategies. The strategies will further customer understanding of the technologies deployed and how the technologies can be used to provide a better understanding of energy consumption.

LOUISVILLE GAS AND ELECTRIC COMPANY
AND
KENTUCKY UTILITIES COMPANY

CASE NO. 2012-00428

Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013

Question No. 90

Witness: Thomas A. Jessee

Q-90. Refer to the Initial Testimony of Edwin R. "ED" Staton ("Staton Testimony"), page 1. Describe the KU and LG&E transmission system in a manner similar to the description of the Kentucky Power system provided on page 5 of the Munsey Testimony.

A-90. LG&E and KU are engaged in the regulated generation, transmission, distribution and sale of electricity in Kentucky and, in KU's case, Virginia and Tennessee. LG&E also engages in the distribution and sale of natural gas in Kentucky. LG&E provides electric service to approximately 393,000 customers in Louisville and adjacent areas in Kentucky, covering approximately 700 square miles in 9 counties. LG&E provides natural gas service to approximately 318,000 customers in its electric service area and 7 additional counties in Kentucky. KU provides electric service to approximately 510,000 customers in 77 counties in central, southeastern and western Kentucky; approximately 29,000 customers in 5 counties in southwestern Virginia; and fewer than 10 customers in Tennessee, covering approximately 4,800 non-contiguous square miles. KU also sells wholesale electricity to 12 municipalities in Kentucky under load following contracts. In Virginia, KU operates under the name Old Dominion Power Company. In addition, LG&E and KU provide open access transmission services to other third parties.

In addition to LG&E and KU interconnections, the companies are interconnected with American Electric Power, Big Rivers Electric Corporation, the Department of Energy at Paducah and Electric Energy Inc., Duke Energy Indiana and Ohio, East Kentucky Power Cooperative, Ohio Valley Electric Corporation, Tennessee Valley Authority (TVA), and Vectren Energy Delivery, Indiana. LG&E and KU are not members of a regional transmission organization, but have a contract with TranServ International, Inc. to provide certain functions as an independent transmission operator and a contract with TVA to provide reliability coordinator services for the transmission system.

As of December 31, 2012, LG&E and KU, in aggregate, have approximately 5,000 circuit miles of transmission lines, nearly 23,000 circuit miles of primary distribution lines, and 179 transmission and 577 distribution substations, of which 87 are shared between the transmission and distribution systems.

**LOUISVILLE GAS AND ELECTRIC COMPANY
AND
KENTUCKY UTILITIES COMPANY**

CASE NO. 2012-00428

**Joint Response to the Commission Staff's First Request for Information
Dated February 27, 2013**

Question No. 91

Witness: Thomas A. Jessee

Q-91. Refer to the Staton Testimony, page 3, lines 3 through 5, which state, "These relays also provide numerous functions within a single box, replacing up to nine discrete devices with a single relay." Provide the following:

a. Identify and describe the benefits associated with the digital relays as compared to the electromechanical relays.

b. Provide a comparison regarding the unit cost, the cost of maintenance and the cost of installation for digital relays as opposed to the traditional electromechanical relays.

c. Provide a discussion of digital relays, including details concerning their size, placement within the transmission system, and the functions they perform that allow them to replace up to nine other devices.

d. Provide the average installed costs of each of the nine "discrete devices" broken down by cost of the "discrete device," any associated overhead, any associated labor costs, any associated transportation costs, and any other costs incurred to install these "discrete devices."

e. Provide the average installed costs of the "single relay" broken down by cost of the "single relay," any associated overhead, any associated labor costs, any associated transportation costs, and any other costs incurred to install these "single relays."

f. Provide any cost savings realized by the utilities and their ratepayers associated with the installation of the "single relays" versus the installation of the nine "discrete devices."

A-91.

a. Digital or microprocessor relays provide several benefits over electromechanical relays. From a protection-system-design standpoint, microprocessor relays present a lower burden on the voltage and current sensing devices, simplify the wiring design of the protection system through reduced components, provide a continuous and wider range of settings values than electromechanical relays, enable greater sensitivity in protection settings due to their highly accurate sensing system, enable increased flexibility in the design and revision of protection systems without additional components or wiring changes, and make additional protection elements readily available. Additionally, microprocessor relays provide for event reporting which includes voltage and current oscillography, protection element status, and relay contact status information, fault locating capabilities, self-monitoring and alarming, sequence-of-events recording, metering, remote communications access for monitoring and control, and millisecond accuracy time stamped data using a GPS-synchronized time signal.

b. Routine maintenance for electromechanical relays includes testing to ensure proper calibration and operation. The average cost of maintenance for LG&E and KU transmission electromechanical relays is approximately $265 each. Microprocessor based relays have self-monitoring capability that alerts the operator of a problem affecting performance and are therefore not routinely tested or calibrated. For a comparison of unit cost including installation for electromechanical versus microprocessor based relays used in a typical line protection panel see the responses to d. and e. below.

c. Microprocessor relays for the LG&E and KU transmission system are typically rack-mounted in a steel panel located within the control house at substations. The standard design calls for these panels to be 28 inches wide with a 19 inch vertical opening. This vertical opening provides for the rack mounting of these relays and other equipment such as test switches, communications equipment and control switches. The microprocessor relays used vary significantly in size, but, they are designed to fit in this rack-mount system and typically utilize between 3 and 7 units of rack space (5.25 to 12.25 inches). A typical microprocessor relay for line protection has the ability to provide multiple functions for protection, control, and metering, including phase distance protection including communications assisted schemes, ground distance protection, out-of-step protection, overcurrent protection, over and under voltage protection, over and under frequency protection, breaker failure protection, automatic reclosing functions, and system synchronism checking. A typical electromechanical relay installation will require multiple relays to perform these same functions with additional components for control and metering. As mentioned in the Staton testimony, the nine components in the response to d. below can be replaced with a single microprocessor based relay. However, two relays are typically used as described in the response to e. below to provide a backup should one fail while in service.

d. The average estimated installed costs of the nine "discrete devices" used in a typical line protection panel are listed below.

Typical Line Protection Panel - Electromechanical Relays					
Device	Cost	Labor	Trans.	Overhead	Total
KD-10	$11,800	$4,600	$100	$6,000	$22,500
KD-10	11,800	4,600	100	6,000	22,500
KD-11	11,800	4,600	100	6,000	22,500
IRD	5,000	4,600	100	5,000	14,700
RC	2,700	4,200	100	4,200	11,200
TD-4	800	4,200	100	3,900	9,000
Meter	1,300	4,200	100	4,000	9,600
Control Switch	200	4,200	100	3,800	8,300
AUX	500	4,200	100	3,200	8,000
Total	$45,900	$39,400	$900	$42,100	$128,300

e. The average estimated installed cost of two typical "single relays" used in a line protection panel are listed below:

Line Protection Panel - Microprocessor Relays					
Device	Cost	Labor	Trans.	Overhead	Total
SEL-421	$8,800	$9,000	$100	$9,300	$27,200
SEL-311L	6,8000	9,000	100	$7,500	$23,400
Total	$15,600	$18,000	$200	$16,800	$50,600

f. The total cost savings for historically using microprocessor versus electromechanical based relays is not available. However, if LG&E and KU had chosen to install electromechanical relays instead of microprocessor based relays, the installed capital costs for system protection would have been greater. Comparing the line protection panel estimates in the response to d. and e. indicates savings on initial installed costs of nearly $80,000 per line protection panel.

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Question No. 92

Witness: Thomas A. Jessee

Q-92. Refer to the Staton Testimony, page 3, lines 6 through 8, which state, "If interconnected in the future, these networks can provide automation and efficiency gains through remote access that can allow for gathering detailed events remotely..." Provide a detailed explanation as to why local substation networks are not interconnected today.

A-92. Interconnecting the local networks outside of the control house introduces inherent security risks. Before these networks can be accessed remotely, security issues must be satisfactorily identified, resolved, tested, and documented per NERC CIP requirements. This is a significant undertaking and LG&E/KU is still in the early stages of working through these issues. NERC CIP requirements continue to be in a state of change. Therefore LG&E and KU have postponed networking these devices until the issues are understood and can be implemented to meet the NERC CIP requirements.

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Question No. 93

Witness: Thomas A. Jessee

Q-93. Refer to the Staton Testimony, page 3, lines 18 through 22, which state: "For new projects and existing control house upgrades, the Companies are implementing these new technologies through the use of drop-in control houses that are built off-site with the new technologies pre-installed and wired, which enables the Companies to install, test, and commission new equipment in a relatively short time frame, reducing system impacts." Provide a detailed explanation as to what is included in a "drop-in control house," the purpose, the size, and average installed cost of a "drop-in control house, along with any other information as it relates to "drop-in control houses" the companies feel is appropriate.

A-93. A drop-in control house is a pre-fabricated building, delivered from the vendor complete with the protection and control system components required to operate an electric substation. These components include a complete set of relay panels, assembled and wired with all required connections made to other panels within the structure and connections to termination cabinets for connections outside of the structure, a DC supply system including one or more sets of batteries and charging equipment needed to maintain the batteries, AC and DC distribution panels required to provide power to devices within the structure and operate external devices and control systems, and environmental control systems including HVAC and lighting. Depending on the size and shape of the structure as well as any delivery restrictions, the control house may be shipped in 1, 2, or 4 component pieces. The structure would be set on the LG&E-and-KU-provided foundation at the substation site by the manufacturer. Then any assembly would be performed by the manufacturer. Once the structure assembly is complete, the Companies make all external connections required for AC power, sensing devices, and control circuitry.

These drop-in control houses can be designed for a wide range of configurations, and internal components depending on the size and complexity of the substation which drives a wide range of costs. Generally, LG&E and KU will utilize structures ranging from 14'x42' to 24'x60' with costs ranging from $350,000 to over $1.2 million.

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Question No. 94

Witness: Thomas A. Jessee

Q-94. Refer to the Staton Testimony, page 3, lines 6-17. Provide a more detailed and descriptive discussion of the following terms as used in the testimony:

a. Local substation networks;

b. Gathering and distributing Synchrophasor data; and

c. Deployment of communication processors.

A-94.

a. The local substation networks installed at LG&E and KU consist of an Ethernet network providing a high speed communications path between microprocessor relays and communications processors within the substation. This network does not provide a routable communications path outside of the substation. In today's environment, LG&E and KU establish a serial communications path from the Energy Management System ("EMS") to a communications processor located in the substation control house. The communications processor is then connected to microprocessor relays through an Ethernet switch and additional serial connections. This approach provides a secure communications path for Supervisory Control and Data Acquisition from our EMS to the substation. That is, the EMS uses this communications path to acquire voltage, current, power flow, and equipment status data from the microprocessor relays. Also, the EMS uses this communications path to issue operating commands to the microprocessor relays, which in turn operate substation equipment such as breakers and switches.

b. LG&E and KU are considering the benefits of using these local networks to gather Synchrophasor data within the substation and pass it back to the Companies' operations center personnel. Synchrophasor data consists of magnitude and phase angles of voltages and current vectors that are synchronized across the transmission system with GPS clocks via time-stamping of each sample taken. Synchrophasor systems can generate significant volumes of data by sampling voltage and current values up to 120 times per second. For this reason, these systems generally consist of a data concentrator located at the substation and a high-speed data path from the substation data concentrator to the operations center. Here again, LG&E and KU intend to use the local substation network to provide a communications path from the Synchrophasor device to the data concentrator. In many cases, the Synchrophasor devices will be the existing microprocessor relays installed in the substation.

c. Communications processors, as referenced above, are data concentrators that perform the function of aggregating the data from multiple sources into one location. That data is sent to the EMS via serial communications presently. Two types of concentrators are common: phasor data concentrators and data concentrators. Each has a separate and distinguishable configuration that makes them a separate device performing separate functions. In new control houses and some Remote Terminal Unit ("RTU") replacements, the data concentrator is being installed to send relay data and alarms to the EMS and to receive supervisory commands from the EMS and direct it to the necessary relay. LG&E and KU have not deployed phasor data concentrators.

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Question No. 95

Witness: David S. Sinclair

Q-95. Refer to the Initial Testimony of David S. Sinclair ("Sinclair Testimony") in which Mr. Sinclair expresses several concerns with dynamic pricing as part of a smart meter program. Explain whether those concerns are diminished if participation in the program is solely on a voluntary basis.

A-95. No. A utility's rates should be set to appropriately recover the cost of providing service to a particular class of customers. Therefore, the design of a dynamic pricing scheme will impact both the costs recovered from customers that would voluntarily choose to be on it as well as the costs recovered from non-participating customers. Because a voluntary dynamic pricing scheme would impact both participants and non-participants, it is critical that its regulatory and customer implications are well thought through and understood.

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Question No. 98

Witness: Thomas A. Jessee / Paul Gregory Thomas /David E. Huff

Q-98. With regard to calendar years 2007 through 2012, identify and discuss what Smart Grid and/or Smart Meter initiatives the utility implemented. The discussion should include but not be limited to the reasons why each initiative qualifies as a Smart Grid and/or Smart Metering initiative; the date of installation; the total cost of installation; and any benefits resulting from the initiatives, quantifiable or otherwise, received by both the utility and the customers.

A-98. Please refer to the Responsive Pricing and Smart Metering Pilot Program Final Report filed on July 1, 2011 in Case No. 2007-00117. Page 5 of the 2011 Final Report describes that "On March 21, 2007, LG&E filed an application with the Commission that established Case No. 2007-00117 requesting Commission approval to develop a Responsive Pricing and Smart Metering pilot program ("Pilot"). LG&E planned to use time-of-use rates with a critical peak pricing component and "smart" devices with secure communications to send pricing signals to a test group of customers, allowing them to choose to save money and decrease system demand by shifting their electricity usage away from peak generation system demand periods. The smart devices would also provide information regarding real-time and historical energy usage."

As described on page 6 of the 2011 Final Report, "LG&E filed with the Commission a tariff sheet establishing Residential and General Service Responsive Pricing which incorporated a time-of-use rate with critical peak pricing ("CPP"). This Responsive Pricing tariff became effective in January 2008. Responsive Pricing was offered to customers on the six selected routes who had lived at their residences for at least twelve months. Responsive Pricing participation was voluntary and featured four pricing periods (low, medium, high, and CPP) as opposed to a standard customer's flat rate. Low and medium pricing periods had rates lower than the standard rate and made up approximately 87% of the hours in a year. CPP events could occur during hours of high generation system demand for up to eighty hours per year, implemented at LG&E's discretion." Also, "The Pilot utilized four kinds of smart devices: smart meters; programmable communicating thermostats; in-home energy usage displays; and load control switches. Customers participating in the Responsive Pricing group received all available devices listed above. The remaining Pilot customer groups received a choice of up to three in-home devices in addition to the smart meter. In-home devices received a signal from the smart meter which alerted the participants, when high and critical peak pricing periods were in effect. Similarly, the thermostat was automatically set so that less air conditioning was used during high and critical peak pricing periods, while load control switch was programmed to shut off water heater operation or a pool pump during these periods. Customers had the ability to override such settings if they so desired by accessing the devices directly or via website."

Please refer to the Answer No. 1, in the Response to the Commission Staff's Initial Request for Information in Case No. 2011-00440, filed on January 6, 2012. Part b, item 4, explains that "LG&E found the program to be very effective in shifting system load, but determined no benefit in energy savings when compared to the cost of the program. The table at the top of page 17 of the 2010 Annual Report shows program cost through year 2010 amounting to $2,033,000."

Finally, as described on page 9 of the 2011 Final Report, "LG&E performed a bill comparison analysis for each of the Responsive Pricing customers based on their individual energy usage behaviors over the summer periods. The customer reports established that an average Responsive Pricing customer experienced a 1.4% bill decrease for the summer billing period. Also, the customer reports established that 17% of the Responsive Pricing customers were almost bill neutral. Customers, who decided to no longer participate, informed LG&E that the opportunity for energy cost savings was the main reason they had signed up."

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Question No. 99

Witness: Thomas A. Jessee / Paul Gregory Thomas / David E. Huff

Q-99. With regard to calendar years 2013 through 2018, identify and discuss what additional Smart Grid and/or Smart Meter initiatives the utility has forecasted to be implemented. The discussion should include but not be limited to why each forecasted initiative qualifies as a Smart Grid and/or Smart Metering initiative; the forecasted date of installation; the forecasted total cost of installation; and any forecasted benefits to result from the initiatives, quantifiable or otherwise, received by both the utility and the customers.

A-99. The Companies could answer this question with specificity only if they had Smart Grid and/or a Smart Grid initiative planned or forecasted. Because the Companies do not have a specific initiative planned or forecasted it is not possible to provide information related to utility or customer benefits from such an initiative.

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Question No. 100

Witness: Paul Gregory Thomas / David E. Huff

Q-100. With regard to DA Smart Grid Initiatives provide the following:

a. the number of DA systems installed as of December 31, 2012, along with the associated benefits realized.

b. the number of DA systems to be installed in the next five years.

c. the total number of DA systems to be installed when the DA system is completely deployed.

A-100.

a. The Companies do not have any DA Smart Grid deployments.

b. The Companies do not presently plan to install any DA systems in the next five years; however, the Companies will continue to monitor the technology and will invest in such systems at the speed of value.

c. N/A

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Question No. 101

Witness: Paul Gregory Thomas / David E. Huff

Q-101. With regard to Volt/VAR Optimization, provide the following:

a. the number of Volt/VAR Optimization systems installed as of December 31, 2012, along with the associated benefits realized.

b. the number of Volt/VAR Optimization systems to be installed in the next five years, along with the forecasted in-service date.

c. the total number of Volt/VAR Optimization systems to be installed when the Volt/VAR Optimization system is completely deployed.

A-101.

a. The Companies do not have Volt/VAR systems deployed.

b. The Companies do not presently plan to install any Volt/VAR systems in the next five years; however, the Companies will continue to monitor the technology and will invest in such systems at the speed of value.

c. N/A

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Question No. 102

Witness: Paul Gregory Thomas / Thomas A. Jessee / David E. Huff

Q-102. With regard to Supervisory Control and Data Acquisition ("SCADA") Smart Grid Initiatives, provide the following:

a. the number of SCADA systems installed as of December 31, 2012, along with the associated benefits realized.

b. the number of SCADA systems to be installed in the next five years, along with the forecasted in service date.

c. the total number of SCADA systems to be installed when the SCADA system is completely deployed.

A-102.

a. As of December 31, 2012, the Companies have three (3) SCADA systems installed. There is one (1) system for LG&E Gas Operations, one (1) system for LG&E Electric Operations, and one (1) system for KU Electric Operations.

b. One (1) SCADA system on the LG&E Downtown Network will be installed with a projected in-service date of 2013.

c. Four (4) SCADA systems as summarized in A-102(a) and A-102(b) above will be installed when SCADA is completely deployed in the LG&E-KU service territory.

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Question No. 103

Witness: David E. Huff

Q-103. As it relates to Dynamic Pricing (where rates are established hourly throughout the day) Tariffs or TOU Tariffs, provide the following:

a. the number of customers the utility has or had on these types of tariffs, identified separately by specific tariff.

b. whether these customers shifted load from high-price times periods to lower-priced time periods.

c. whether these customers consumed more, less or the same number of kWh.

d. whether the utility reached any findings or conclusions based on its experience with customers on Dynamic Pricing and/or TOU Tariffs.

A-103.

a. The table below shows the number of meters the utility has on its specific tariffs as of March 4, 2013.

Company	Description	# of Meters
KU	Retail Transmission Service	37
KU	Time-of-Day Service - Primary	213
KU	Time-of-Day Secondary Service	278
KU	Low Emission Vehicle Service	3
LG&E	Time-of-Day Secondary	260
LG&E	Commercial Time-of-Day Primary	39
LG&E	Retail Transmission Service	23
LG&E	Industrial Time-of-Day Primary	87
LG&E	Low Emission Vehicle Service	3
Total		943

The number of customers who participated on the Responsive Pricing Pilot Program is detailed in filed annual and final evaluation reports, and is summarized below for reference. The table below reflects the number of customers at the end of the Pilot in 2012.

Company	Description	# of Customers
LG&E	Residential Responsive Pricing Service	64
LG&E	General Responsive Pricing Service Single Phase	2
LG&E	General Responsive Pricing Service Three Phase	2

b. Other than in the RPP pilot discussed previously, the Companies do not have analysis related to those customers ability to shift load to lower-priced periods.

c. Other than in the RPP pilot discussed previously, the Companies do not have analysis related to those customers' changes in consumption levels.

d. On February 1, 2008, the KPSC issued an Order in Case No. 2007-00161, approving the application of LG&E and KU to implement a large commercial and industrial real-time pricing ("RTP") pilot program. The program was designed to be bill neutral if there was no change in consumption patterns. The hourly prices for each Company were based on projections of the greatest hourly marginal generation supply cost for the next day. During duration of the pilot, the Companies received inquiries from several customers, but no participants. The reasons received for non-participation in the program included adverse impact on the customer's operations, very high load factor coupled with the customer's inability to shift load, unwillingness to adjust shifts on short notice, unsteady production cycles due to general economic conditions, plant shutdowns, flat load profile, plant closure, and no interest. Over the program period, two customers asked the Companies to gather data to determine Customer Baseline Load to ascertain whether the program would provide cost benefit options. After further analysis, both customers determined the savings did not justify program participation. The RTP tariffs were cancelled effective January 1, 2013. Likewise, the RPP pilot was discontinued due to the costs associated with continuing the program and the obsolescence of the technology being used.

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Question No. 104

Witness: Eric Slavinsky

Q-104. Describe precautions taken and/or standards developed by the utility to address concerns regarding cybersecurity and privacy issues.

A-104. Some of the precautions the Companies have taken to address concerns regarding cyber security and privacy issues are:

- Separation of business from operational systems;
- Use of encryption and key management;
- Identification and authorization of users accessing systems;
- Asset identification and management;
- Monitoring and incident detection tools and capabilities;
- Incident handling policies and procedures;
- Mission/system resiliency practices;
- Security engineering practices;
- Employee security awareness training;
- Limited physical access to critical cyber assets.

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Question No. 105

Witness: David E. Huff

Q-105. Provide a discussion and details of progress made regarding the concern raised by the utilities as it relates to the interoperability standards for Smart Grid equipment and software.

A-105. Development of industry standards for smart grid has been underway for several years; however, the development of standards is an ongoing process. In its June 22, 2012 report to the Commission,[1] LG&E-KU described participation in the Smart Grid Interoperability Panel ("SGIP"), a public-private partnership that defines requirements for essential communication protocols and other common specifications and coordinates development of these standards by collaborating organizations. In addition, LG&E-KU has an elected representative on the Smart Grid Implementation Methods Committee ("SGIMC") of SGIP, a working group whose mission is to identify, develop, and support mechanisms and tools for objective standards impact assessment, transition management, and technology transfer to assist in deployment of standards-based smart grid devices, systems, and infrastructure.

Active involvement in organizations like SGIP and the SGIMC will allow LG&E-KU to be engaged in the standards process, and will afford the opportunity to learn from best practices of other utilities. As stated by Dr. George Arnold, National Coordinator for Smart Grid Interoperability at the National Institute of Standards and Technology, "There are many standards needed for the smart grid and they are in varying stages of maturity. Some have been in existence for years and are already realized in products that are being used by industry; others are more recent and are appearing in products but not yet widely deployed; and yet others are still in draft form and will be used in future products when they are finalized."[2]

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[1] Request of Louisville Gas and Electric Company to Cancel and Withdraw the Tariffs for its Responsive Pricing and Smart Metering Pilot Program, Case No. 2011-00440, June 22, 2012, p. 4.
[2] Opening Remarks by George W. Arnold, National Coordinator for Smart Grid Interoperability National Institute of Standards and Technology, Federal Energy Regulatory Commission Technical Conference on Smart Grid Interoperability Standards, Jan . 31, 2011

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Question No. 106

Witness: David E. Huff

Q-106. Provide a discussion concerning how the costs (investment and operating and maintenance costs) associated with the installation of Smart Grid facilities should be recovered from the ratepayers.

A-106. The *Case Participants Joint Response to the Kentucky Public Service Commission Case No. 2008-00408, Section 12, page 33,* provides a lengthy discussion on cost recovery. This section concludes in part by stating that the DSM recovery mechanism is an appropriate means to recover both O&M and capital components of these utility investments.

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Question No. 107

Witness: Edwin R. Staton

Q-107. State whether the utility would favor a requirement that it report to the Commission so that the Commission is aware of the jurisdictional Smart Grid and/or Smart Meter activities within the Commonwealth. As a specific example, the requirement could order that a report be provided each September regarding the Smart Grid and/or Smart Meter activities the utility is planning to perform during the upcoming calendar year, followed by an April report of the Smart Grid and/or Smart Meter activities the utility completed the preceding calendar year.

A-107. LG&E and KU believe that existing filing requirements should be sufficient to inform the Commission concerning jurisdictional smart-technology activity. For example, smart-technology pilot programs that involve tariff changes would require Commission approval. Therefore, it is not clear that a reporting requirement would provide the Commission an appreciable amount of additional information concerning jurisdictional activity.

That notwithstanding, if such reporting would assist the Commission in its oversight of jurisdictional utilities, the Commission should carefully define the requirements to ensure consistency across utilities and to prevent under- or over-reporting. The requirements should clearly state what the Commission means by "smart grid" and "smart meters," and whether utilities should report any planned deployment of technology that has "smart" capabilities regardless of whether the deployment is part of a larger smart-grid program or roll-out.

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Question No. 108

Witness: Edwin R. Staton

Q-108. State whether the utility believes KRS 278.285 is an appropriate approach to recovering the costs (investment and operation and maintenance) associated with Smart Grid investments.

A-108. The Companies believe the DSM recovery mechanism is an appropriate means to recover both O&M and capital components of these utility investments.

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Question No. 109

Witness: Edwin R. Staton

Q-109. State whether the utility believes a tracking mechanism as described beginning on page 3 of the Wathen Testimony on behalf of Duke Kentucky is an appropriate approach to recovering the costs associated with Smart Grid investments.

A-109. The Companies do not oppose other utilities' use of non-DSM-EE recovery mechanisms for smart-technology cost recovery, but they do not support requiring using a non-DSM-EE mechanism to the exclusion of other means of recovery. Instead, the Companies support Commission approval of multiple means of cost recovery for smart-technology investments, including using DSM-EE mechanisms.

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Question No. 110

Witness: David E. Huff

Q-110. State whether the utility has commissioned a thorough DSM and Energy Efficiency ("DSM-EE") potential study for its service territory. If the response is yes, provide the results of the study. If no, explain why not.

A-110. Yes. Pursuant to the Commission order in Case No. 2011-00375, the Companies bid and contracted with a third party consultant, The Cadmus Group Inc., to develop an energy efficiency market potential study focused on the residential and commercial customer sectors within its service territory. This study commenced on August 3, 2012 and is targeted to be completed in the third quarter 2013. The results of this study will be filed with the Commission and case participants within 30 days of the date it is completed and finalized.

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Question No. 111

Witness: David E. Huff

Q-111. Refer to the Munsey Testimony on behalf of Kentucky Power, page 10, lines 11-19 regarding the Green Button initiative. Describe the extent of your utility's participation in this industry-led effort.

A-111. The Companies currently offer customers the ability to download their monthly consumption data in a comma-delimited file that can be imported into a spreadsheet for further analysis. Although the Companies have not implemented the Green Button at this time they continue to monitor the continued development of Green Button standards through SGIP and the development of applications that use Green Button data.

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Question No. 112

Witness: Edwin R. Staton

Q-112. Refer to the Roush Testimony on behalf of Kentucky Power, DMR Exhibit 1. Provide a similar exhibit containing a list of time-differentiated rates available to your customers.

A-112. The table below shows the time-differentiated standard rates, riders, and pilot programs available to the Companies' electric-service customers:

Standard Rate	**Applicable**
TODS	Time-of-Day Secondary Service: Loads of 250 kVA to 5,000 kVA
CTODP*	Commercial Time-of-Day Primary Service: Loads of 250 kVA to 50,000 kVA
ITODP*	Industrial Time-of-Day Primary Service: Loads of 250 kVA to 50,000 kVA
TODP**	Time-of-Day Primary Service: Loads of 250 kVA to 50,000 kVA
RTS	Retail Transmission Service: Time-of-Day for transmission service to loads up to 50,000 kVA
FLS	Fluctuating Load Service: Time-of-Day for primary or transmission service to fluctuating loads of 20,000 kVA to 200,000 kVA
CSR10 Rider	Curtailable Service Rider 10: Provides billing credits to customers contracting to reduce load upon a request by the Company at an optional 10-minute notice for not less than 1,000 kW individually
CSR30 Rider	Curtailable Service Rider 30: Provides billing credits to customers contracting to reduce load upon a request by the Company at an optional 30-minute notice for not less than 1,000 kW individually
SQF Rider	Small Capacity Cogeneration Qualifying Facilities: Customer-generator of 100kW or less off-setting consumption or selling generation to the Company
LQF Rider	Large Capacity Cogeneration Qualifying Facilities: Customer-generator of 100kW or more selling energy and/or selling capacity to the Company
LEV (Pilot Program)	Low Emission Vehicle Service: Residential time differentiated energy rate to residential customers with low emission vehicles

* LG&E electric only

** KU electric only

Excluded from the table above are two pilot programs that offered dynamic pricing options. First, on February 1, 2008, the Companies received Commission approval to implement a large commercial and industrial real-time pricing ("RTP") pilot program. The RTP tariffs were cancelled effective January 1, 2013. Second, from 2007-2011, LG&E offered a Smart Meter and Responsive Pricing Pilot Program utilizing time-of-use rates with critical peak pricing. On March 22, 2012, LG&E received approval to discontinue the Smart Meter and Responsive Pricing Pilot and to cancel and withdraw the associated tariffs.

Time-differentiated rates are not available to LG&E Gas customers.

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Question No. 113

Witness: Steve E. Woodworth

Q-113. Provide a description of the type of meters (mechanical, electromechanical, AMR [one-way communication], AMI [two-way communication]) currently used by the utility. Include in the description the reasons the current meters were chosen and any plans to move to a different type of metering configuration.

A-113. LG&E and KU categorize electric meters as either electromechanical or electronic. Both companies now purchase only electronic electric meters because manufacturers no longer make electromechanical electric meters. It will take many years before all electromechanical meters are phased out and replaced with electronic. The table below contains the count of the total electronic, electromechanical, and gas meters installed as of the beginning of March 2013 for LG&E and KU.

Total Installed Meters	KU	LG&E Electric	LG&E Gas	Total
Electronic	64,853	61,726	NA	126,579
Electromechanical	462,813	351,244	NA	814,057
Total	527,666	412,970	333,536	1,274,172

LG&E and KU purchase a small number of electric and gas AMR meters each year to maintain the current base of AMR meter reading routes and to replace non-AMR meters that have access or safety issues. The growth of AMR meters is expected to be modest in the next several years. The table below contains the count of installed AMR and AMI meters as of the beginning of March 2013 for LG&E and KU. This table is a subset of the total installed meters depicted in the table above.

Installed Meters	KU	LG&E Electric	LG&E Gas	Total
AMR	26,401	31,744	31,813	89,958
AMI	0	0	0	0

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**Joint Response to the Commission Staff's First Request for Information
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Question No. 114

Witness: Edwin R. Staton / Steve E. Woodworth

Q-114. If either AMR or AMI metering is in use, state whether the utility has received any customer complaints concerning those meters. If the response is yes, provide the following:

a. the number of complaints, separated by gas and electric if a combination utility, along with the total number of customers served.

b. how the complaints were addressed by the utility.

c. a detailed explanation as to whether customers should have the ability to opt out of using either AMR or AMI metering.

d. If customers were to be given the opportunity to opt out of using either AMR or AMI metering, provide:

i. an explanation as to whether the utility should establish a monthly manual metering reading tariff or charge applied to the opt-out customers to recover the costs associated with manually reading the non-AMR or -AMI accounts.
ii. an explanation as to whether these opt-out customers could still receive benefit from the utility using either AMR or AMI metering.
iii. an explanation addressing the point at which opt-out customers, either in terms of number of customers or a percent of customers, affect the benefits of the utility using either the AMR or AMI metering.

A-114.

a. The Companies have not received any complaints related to AMR installations. The Companies have not had any KPSC complaints related to AMR functionality.

b. Please see response a.

c. Customers should not have the ability to opt out of AMR or AMI metering. Currently, these meters are utilized in areas where safety or access to the meter is an issue. Thus it is critical the utility have this option to serve customers consistent with the Companies selection of other utility equipment.

d.

i. Yes, as customers cause additional costs, they should bear those costs.

ii. No; however, all customers will realize both the cost and benefits of a full deployment of AMR and AMI initiatives as they are applied to every customer across the rate class.

iii. AMR and AMI meters are more expensive than traditional meters. Consequently, they are currently justified only where the value from increased safety or hard to read meters is determined. Thus, any percentage or number of customers who opt out make it difficult to justify a full deployment.

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Question No. 115

Witness: Eric Slavinsky

Q-115. In testimony, each utility cited cybersecurity as an area of concern related to the implementation of Smart Grid technologies. Provide and describe your company's policy regarding cybersecurity or the standard your company has adopted governing cybersecurity. If your company has not adopted any policy or standard, identify and describe any industry or nationally recognized standards or guidelines that you may be aware of that the Commission should consider relating to cybersecurity issues and concerns.

A-115. The Companies do not subscribe to a single standard regarding cyber security. It monitors several recognized bodies of knowledge, including but not limited to those listed below, adopting and adapting best practices to the needs of the business.

- NIST – National Institute of Standards and Technology
    - NIST SP 800-53, NIST SP 800-82 – These are standards that deal with industrial control system security
    - NIST SP 1108R2 – This is the Smart Grid Framework and Roadmap for Interoperability, including privacy concerns
    - NISTIR 7628 – This is the Guidelines for Smart Grid Cyber Security, including privacy concerns
- ANSI/ISA-99.02.01-2009 –American National Standards Institute (deals with industrial control system security)
- NERC CIP – North American Electric Reliability Corporation Critical Infrastructure Protection (regarding reliability of the bulk power system)
- SANS – SysAdmin, Audit, Networking, and Security (develops, maintains, and makes available at no cost the largest collection of research documents about various aspects of information security
- ITIL – Information Technology Infrastructure Library (the worldwide de-facto-standard for service management - contains broad and publicly available professional documentation on how to plan, deliver, and support IT service features)
- COBIT - Control Objectives for Information and Related Technology (an IT governance framework and supporting toolset that allows managers to bridge the gap between control requirements, technical issues, and business risks)

- COSO - Committee of Sponsoring Organizations of the Treadway Commission(comprehensive frameworks and guidance on enterprise risk management, internal control and fraud deterrence designed to improve organizational performance and governance, and to reduce the extent of fraud in organizations)

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Question No. 116

Witness: Edwin R. Staton

Q-116. If not previously addressed, provide a detailed discussion of whether deployment of smart meters should allow for an opt-out provision.

A-116. The Companies do not have a Smart Meter initiative. Deciding on an opt-out provision and its potential impact to customers would need to be considered in any Smart Meter deployment plan. That notwithstanding, any opt-out provision should include an appropriate rate for opt-out customers that reflects the additional costs, if any, such customers cause.