a PPL company

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Mr. Jeff DeRouen
Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602-0615

December 21, 2012

RE: ***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

Dear Mr. DeRouen:

Pursuant to the Commission's Order of March 22, 2012, in the above-referenced proceeding, Ordering Paragraph No. 2, Louisville Gas and Electric Company ("LG&E") hereby files an update describing its efforts to develop a new dynamic pricing or smart meter program.

LG&E will engage a third-party to conduct a comprehensive assessment to refine their smart grid strategy prior to significant deployments and request an extension on the next update. LG&E request approval to submit the next update on June 28, 2013 and not submit a report on March 22, 2013.

Please place the file stamp of your Office on the enclosed additional copy and return it in the envelope provided.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

Rick E. Lovekamp

Rick E. Lovekamp

Enclosure

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

REQUEST OF LOUISVILLE GAS AND ELECTRIC	)	
COMPANY TO CANCEL AND WITHDRAW THE	)	CASE NO.
TARIFFS FOR ITS RESPONSIVE PRICING AND	)	2011-00440
SMART METERING PILOT PROGRAM	)	

Smart Meter Update Report – December 21, 2012

On July 12, 2007, the Commission issued an Order in Case No. 2007-00117[1] approving a three-year Responsive Pricing and Smart Meter Pilot Program ("Smart Meter Pilot") for Louisville Gas and Electric Company ("LG&E"). Two tariffs were approved for use under the Smart Meter Pilot: 1) the Residential Responsive Pricing Service tariff ("Rate RRP") and 2) the General Responsive Pricing Service tariff ("Rate GRP"). The Commission's Order was amended on October 7, 2008 to allow employees of the General Electric Company to participate in the Smart Meter Pilot. On July 1, 2011, LG&E submitted its final evaluation report to the Commission regarding the Smart Meter Pilot.

On March 22, 2012, the Commission issued an Order in Case No. 2011-00440[2] approving discontinuance of LG&E's Smart Meter Pilot, and the cancelation and withdrawal of Rate RRP and Rate GRP tariffs. Additionally, the Commission ordered, "LG&E shall submit a report describing its efforts to develop a new program every three months until it has submitted a dynamic pricing or smart meter application for the Commission's consideration, with its first report to be filed three months from the date of this order."

LG&E and Kentucky Utilities Company ("KU") (collectively "the Companies") are low-cost providers of electric and gas service with strong customer service. When contemplating offering dynamic pricing for customers in a changing environment it becomes a complex undertaking requiring a deliberate and methodical approach to deal with the customer acceptance, customer education, financial, technology, and regulatory utility business model, rate structure, and cost recovery to assure any deployment achieves desired results. Customers are one of the central focal points of Smart Meter or dynamic pricing investments. As the market matures, technology converges on a set of standards, production increases to meet demand, and competition amongst

[1] Case No. 2007-00117, Application of Louisville Gas and Electric Company for an Order Approving a Responsive Pricing and Smart Metering Pilot Program (Ky. PSC, Jul. 12, 2007).

[2] Case No. 2011-00440, Request of Louisville Gas and Electric Company to Cancel and Withdraw the Tariffs for its Responsive Pricing and Smart Metering Pilot Program, (Ky. PSC, Mar. 22, 2012)

suppliers are likely to drive down costs. The result can be that customer and utility benefits justify the investment. However, the identification of market maturity, economic evaluation, and customer acceptance can be a difficult task. The reports filed on June 22, 2012 and September 21, 2012, discussed some of the difficulties experienced by other utilities in addressing dynamic pricing and/or Smart Meter deployments to demonstrate the complexity of this decision making process.

Federal stimulus funding created a number of projects, which is creating the maturation of Smart Grid and Smart Meter technology, increased production of Smart Meters and Smart Grid Components to meet the needs of utility projects, and is driving the potential for the marginal costs of these technologies to decline rapidly as illustrated in the figure below from EPRI. [3]

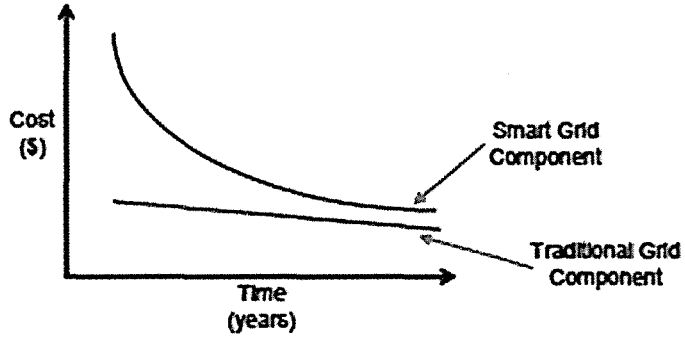

Figure 3-1
Grid Component Costs (Illustrative)

Given the general trend of declining Smart Grid Component costs, as the market matures, it is important to periodically perform a comprehensive review of Smart Metering and dynamic pricing project economics to evaluate changes, the relation of costs to benefits, and guide utility decisions.

The Companies believe that continuing research and refining of smart grid strategy is needed prior to significant deployments. To assist the Companies with additional information, they plan to engage a third party to assess the maturity and value of the technology specifically for the Companies customers. Specifically the study would seek to:

1) Determine customer value and overall impact on energy efficiency through understanding customer perspectives and acceptance of advanced meter technology and dynamic pricing offers.

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[3] Electric Power Research Institute Report, "Estimating the Costs and Benefits of the Smart Grid", March 29, 2011, http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001022519 page 3-5.

2) Develop an assessment of cost and capabilities associated with investing in new technologies on a full-scale, through pilot or targeted deployments, or other strategic direction.
3) Cost and benefits of integrating new technology with existing systems and the Companies' current IT infrastructure; and,
4) Quantify the risk associated with investing while technology continues to emerge in metering, communications, distribution system, and data management systems;

It is anticipated that this assessment may not be completed and available until the fourth quarter of 2013, taking nine months to complete. However, the comprehensive assessment can provide both the Companies and the Commission additional insight into the value of full-scale deployment, smaller scale pilots, targeted deployments, or other strategic direction.

While awaiting this direction, the Companies will continue to invest in grid modernization technologies. For example, investments in SCADA, intelligent electronic devices ("IEDs"), and other communication-enabled technologies on the distribution and transmission system totaled nearly $18 million for the period 2009 to 2012. A major area for grid modernization projects is focused on substations at both the distribution and transmission levels. The Companies continue to analyze, justify and budget grid modernization projects and project future investments of more than $25 million in distribution and transmission for the period 2013 to 2017.

The remainder of this report takes a deeper look at the Companies actions and industry experience to illustrate how emerging technologies, state policies, and development of standards remain some of the key areas the Companies continue to research to guide smart grid strategy and decisions on significant deployment and investments.

1. Emerging technologies continue to evolve

The Companies met with a number of smart grid industry vendors and consultants to gather information and insight into the smart grid marketplace. In February 2012, the Companies issued a Request for Information ("RFI") to a number of system integrators in the smart grid industry for the purpose of further assessing the marketplace in meter data management systems ("MDMS") and advanced metering infrastructure ("AMI"). The RFI process was not intended to identify specific vendors, rather it was to familiarize the Companies with the capabilities and limitations of key technologies. Specifically, information was requested on certain key tasks the Companies view as necessary in building a business case for, and the eventual implementation of, AMI and MDMS solutions. The system integrators were asked to provide information and comments on how selected MDMS will integrate with current IT infrastructure; techniques for deploying AMI technologies, intelligent distribution network equipment and communications

systems; and customer perspectives (value and perception) of smart meters and customer-focused technologies. While the Companies received a significant amount of information and insight, the responses and opinions were widely varied in terms of technology emergence and integration strategies. The consensus among smart grid integrators is that there is no "best practice" or "one-size-fits-all" implementation strategy, and further, smart grid deployments are as varied as the utilities that implement them. Many different business drivers affect a given utility's strategy, including regulatory mandates and legislation, energy efficiency standards, renewable portfolio standards, and reliability standards. The lack of convergence of industry standards and industry-standard technologies guides the Companies' to maintain a careful analytical approach to smart grid investment decisions.[4]

Over the last several years, the pace of implementation of AMI and smart grid systems has been increasing at utilities across the country. Much of this activity was spurred by federal stimulus funding, and the primary focus has been on the deployment and commissioning of systems, not necessarily the day-to-day operations of them. As deployments are completed and utilities have begun operating their systems, they are discovering a unique set of issues that require new systems, structures, and resources that are required to manage smart grid deployments. Several of these companies have set up Smart Grid System Operating Centers and are investigating systems to help them manage and monitor their smart grid infrastructure.[5] A challenge utilities face is the lack of institutional knowledge and expertise with communications network management systems. This is problematic because the eventual value of AMI and smart grid systems requires a significant increase in the monitoring, extraction, and analysis of new sources of data from the AMI and smart grid networks.

Considering that millions of new devices will be installed as part of AMI and smart grid deployments, every device will be communications-enabled and will need the ability to be remotely managed. Multiple sources of data will require integration with new systems and legacy systems, and the frequency of monitoring and analysis will vary by application. Additionally, new analytics will need to be developed to extract value from the AMI and smart grid systems. As a result, because integration and interoperability are such key issues, utilities are faced with difficult integration strategies, and the cost and ownership of AMI and smart grid systems remain high while it remains unclear when or if the benefits will exceed these costs.

The complexities of integration are compounded by the fact that technology platforms continue to evolve and converge. A smart grid network will access data from a variety of inputs and

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[4] For example, the emergence of public communications networks and cellular are challenging the conventional mesh and power line carrier network technologies found in many early AMI deployments. Additionally, Home Energy Management Systems ("HEMS") and Home Area Networks ("HAN") is still a very nascent technology and requires more research and testing before deploying in customer residences.

[5] One such company is Pacific Gas & Electric. *See* "Operations Center Puts the 'Smart' in Smart Grid," http://www.pgecurrents.com/2011/09/19/operations-center-puts-the-smart-in-smart-grid/, Sep. 19, 2011.

systems, including AMI head ends, cell relays, geographical information systems ("GIS"), and MDMS. Integrating these new data and operational and predictive analytics with a utility's legacy processes and systems requires additional analytics and planning to assure operational continuity to define and then serve customer needs. Communications systems minimally require reliable connectivity to AMI relays and sufficient bandwidth, robust security and resilience, scalability as devices are added to the network, low latency for critical data applications (for example Distribution Management Systems), and adaptability to enable future services. A single backhaul technology that is a cost-effective fit for all situations is unlikely given utilities' varying densities of meters, cell relays, distances to communication system points of presence, land coverage, and terrain.

Another key consideration in the deployment of AMI and smart grid systems is customer education. In December 2011, the Companies conducted an Internet survey to understand how much LG&E and KU residential customers were aware of smart meters and the smart grid. Key conclusions of the survey indicated that awareness of smart meters among LG&E and KU customers is low, with only one in four having heard of the technology. Among those residential customers who claimed awareness of smart meters, a majority could not articulate the benefits or disadvantages of smart meters, indicating only a slight acquaintance with the concept of smart meters or the smart grid. The survey's findings are consistent with an October 2012 survey by the Smart Grid Consumer Collaborative, which recently polled electricity customers nationwide.[6] That survey found that 54% of respondents had never heard of the terms "smart meter" or "smart grid," and another 20% to 23% had heard of the terms but did not know what they meant, indicating that over 70% of consumers are unaware of smart meters and the smart grid.[7]

The Companies' analysis of the smart meter marketplace indicates a slowdown in activity in North America for the next several years. According to a survey conducted by Chartwell, "[A]fter an upsurge in AMI installations brought about in large part by government stimulus funds in 2009, smart meter deployments have reached an estimated 1 in 3 households in the United States, according to Chartwell's 2012 survey of AMI deployments."[8] Chartwell noted in its report that the deployment of smart meters has been slowing for the last three years, and that 2012 has been a "notable year for 'winding down' utility deployments of smart meters and AMI."[9]

Chartwell further "reviewed several decisions by state PUCs and PSCs that chose not to move forward with AMI installation plans. In every case, the stated reason for electing not to deploy the technology was that the commission remained unconvinced that, under present

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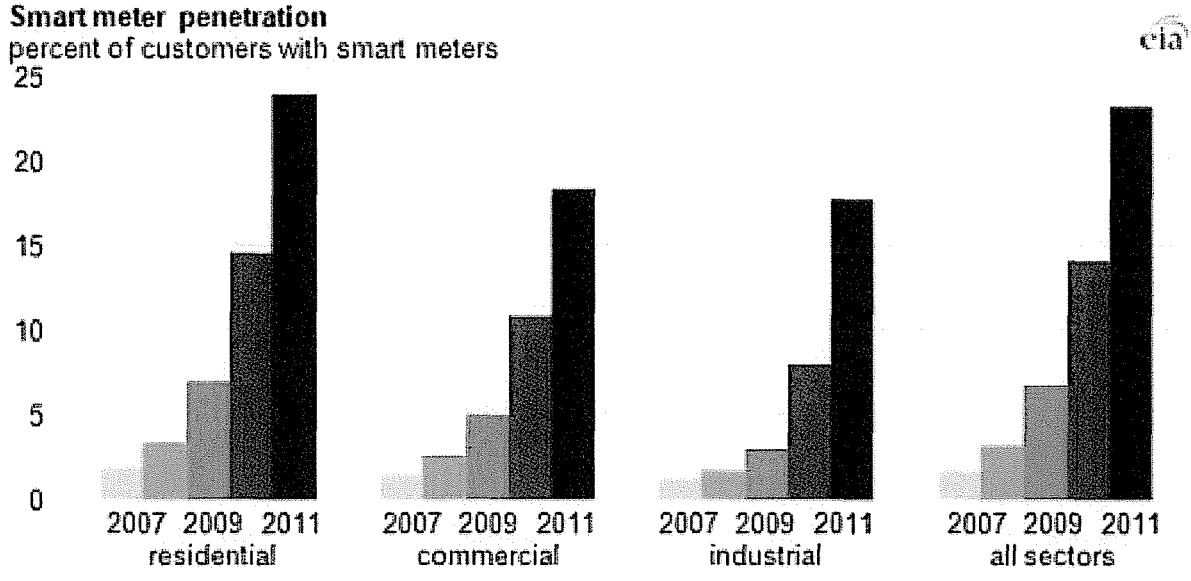
[6] "Majority of Americans Still Don't Know What the Smart Grid Is", http://www.renew-grid.com/e107_plugins/content/content.php?content.9109, October 24, 2012.
[7] *Ibid.*
[8] "Smart Meters 2012," Chartwell, Inc., August 2012, 7
[9] *Ibid.*, 10

circumstances, the projected benefits of grid modernization outweighed the considerable expense."[10]

A November 2012 report on smart meter penetration by the U.S. Energy Information Administration supports the findings of the Chartwell survey mentioned above.[11] As shown in Figure 1 below, less than 25% of all U.S. electrical customers had smart meters in 2011.[12]



Sources: U.S. Energy Information Administration, Annual Electric Power Industry Report (Form EIA-861)

Figure 1 – Smart Meter Penetration

The authors of the report state, "[W]hile advanced meters have some immediate benefits to the utility, much of the potential for consumers requires additional components or options." The report further states, "Despite these benefits, there are concerns about smart meters, including unresolved data privacy and data security issues. In addition, the net benefits of this technology to consumers remain unproven. Such concerns have resulted in moratoria or other delays on smart meter rollouts, as well as opt-out programs that allow customers to be excluded from a smart meter rollout, typically for a fee."[13] Additionally, consumer interest groups are organizing and filing complaints with both the utility and state commissions.[14]

Another example of emerging technologies is in the area of customer behavior. For many years, utilities across the country have offered financial incentives to customers to encourage them to

[10] *Ibid.*, 7-8.
[11] http://www.eia.gov/todayinenergy/detail.cfm?id=8590, Nov. 1, 2012
[12] *Ibid.*
[13] See *2. Policies are changing due to customer action* below.
[14] Smart Grid: Ten Trends to Watch in 2012 and Beyond, Pike Research, 1Q 2012, p. 4.

reduce or defer energy usage during peak hours. One example in time-of-use pricing; however, taking advantage of these pricing incentives requires awareness and planning on the part of consumers and many utilities are finding that it is not happening. As a recent article in *IEEE Spectrum* magazine stated, "[C]onvenience always trumps conservation."[15]

According to the U.S. Department of Energy, "[T]wo-thirds of residential electricity use in the United States comes from air conditioners, refrigerators, washers, dryers and other electric appliances. HVAC systems alone make up 30% of a typical home's energy use, and televisions account for more than 10% of residential energy demand."[16] When the Ontario Energy Board implemented time-of-use pricing with a two-to-one difference between peak and off-peak rates, they found the savings for consumers were too modest. They speculate that "peak electricity would have to cost 10 times as much as off-peak energy before utilities would move even 5% of their customers" to conserve electricity.[17] Attempting levels of peak to off-peak ratios such as these may result in very low customer acceptance for such rates.

In a 2008 study by Xerox's Palo Alto Research Center, researchers reviewed customers' bills, added meters to customers' appliances, and logged customers' daily energy usage to find out how "people would tolerate the inconvenience of avoiding, delaying, or reducing power consumption of various home appliances in response to higher electricity prices during certain times of day."[18] They found that consumers showed "no inclination to save money by modifying their choices of when to use energy."[19] The research indicated that, "[W]hile people were clearly willing to cut back on power usage to avoid minor discomfort, they were not inclined to do so for the purpose of saving money or conserving energy," and that "the inconvenience or discomfort of coming home to a cold house, for example, or waiting for a computer to boot up typically outweighed any desire for cost savings."[20]

Clearly, the challenges with data collection, visualization, and utilization by utilities and end users creates a number of customer-specific issues, and the cultural change in grid modernization projects can be more daunting than the technology itself.

2. Policies and Legislation continue to change

Several states have meter opt-out plans and legislation to address growing customer concern about widespread deployment of smart meters. Customer concerns regarding the safety and

[15] "Smart Conservation for the Lazy Consumer", 26-30, *IEEE Spectrum*, July 2012
[16] *Ibid.*, 27
[17] *Ibid.*, 27
[18] *Ibid.*, 27
[19] *Ibid.*, 27
[20] *Ibid.*, 28

security of RF-transmitting meters, health effects, and privacy have been voiced by consumer groups in states such as California, Vermont, Arizona, Texas, Florida, Pennsylvania, Maine, Illinois, Oregon, and Nevada. These concerns have resulted in significant policy changes, including:

- In August 2011, the Connecticut Department of Environmental Protection asked the state's Public Utility Regulatory Agency to suspend the proceedings of Connecticut Light & Power's proposed AMI deployment in order to develop policies required by Connecticut Public Act 11-80.[21]

- In May 2012, the Vermont legislature approved a law that prohibits utilities from charging customers a fee to opt-out of receiving a smart meter (VT is the only state to have approved such legislation).[22]

- In July 2012, the Maine Supreme Court ruled that the Maine Public Service Commission did not address safety concerns about smart meters when it ruled that Central Maine Power must provide an opt-out program.[23]

- In December 2012, the opt-out plan proposed by NV Energy was approved by the state's regulators allowing for one-time opt-out fees and monthly charges.[24]

In Illinois, ComEd announced it is "delaying key elements of its grid modernization program" following the Illinois Commerce Commission's decision to deny cost recovery on two issues. ComEd's president and CEO Anne Pramaggiore stated that the "adverse rulings on the interest rate and rate base issues significantly impair ComEd's ability to finance long-term investment programs." ComEd will delay or phase in more gradually some of the basic infrastructure programs and "delay installation of additional smart meters until 2015."[25]

3. Standards for smart grid are still developing

Development of 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, the Companies described participation in the Smart Grid Interoperability Panel ("SGIP"), a

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[21] Chartwell, 7
[22] *Ibid.*, 7
[23] *Ibid.*, 7
[24] "NV Energy opt-out plan OK'd as Nevadans pile on smart meter objections," http://www.smartgridnews.com/artman/publish/Technologies_Metering/NV-Energy-opt-out-plan-OK-d-as-Nevadans-pile-on-smart-meter-objections-5329.html, Dec. 4, 2012
[25] "ComEd Delays Grid Modernization Program Following Regulator's Decision," http://www.renew-grid.com/e107_plugins/content/content.php?content.9030#.UL5vDI_09nl.email, Oct. 4, 2012

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, the Companies have 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 the Companies 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. [26]

The Companies have representation on the GE Executive Smart Grid Steering Committee, provided input and insight to the Kentucky Smart Grid Roadmap Initiative and participated in a series of workshops at the University of Louisville and the University of Kentucky. The Companies also participate in the E-Source Smart Grid Executive Forum, which is comprised of members from the utility industry. This group gathers twice a year to discuss the smart grid landscape, smart technologies, operational opportunities, and the economic challenges.

[26] 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