



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

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APR 08 2010

**PUBLIC SERVICE
COMMISSION**

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April 8, 2010

**RE: *Application of Kentucky Utilities Company for an Adjustment of Its
Base Rates – Case No. 2009-00548***

Dear Mr. DeRouen:

Please find enclosed and accept for filing the original and ten (10) copies of the Response of Kentucky Utilities Company to Community Action Council for Lexington-Fayette, Bourbon, Harrison and Nicholas Counties, Inc. (CAC) Supplemental Request for Information dated March 26, 2010, in the above-referenced matter.

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

Sincerely,

Lonnie E. Bellar

cc: Parties of Record

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF KENTUCKY UTILITIES)	CASE NO.
COMPANY FOR AN ADJUSTMENT OF)	2009-00548
ITS BASE RATES)	

RESPONSE OF
KENTUCKY UTILITIES COMPANY
TO THE
SUPPLEMENTAL REQUEST FOR INFORMATION
ON BEHALF OF COMMUNITY ACTION COUNCIL FOR
LEXINGTON-FAYETTE, BOURBON, HARRISON AND NICHOLAS
COUNTIES, INC. (CAC)
DATED MARCH 26, 2010

FILED: April 8, 2010

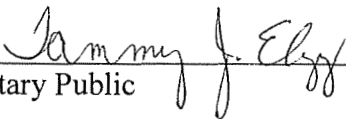
VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Lonnie E. Bellar**, being duly sworn, deposes and says that he is Vice President, State Regulation and Rates for Kentucky Utilities Company and an employee of E.ON U.S. Services, Inc., 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.


Lonnie E. Bellar

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 1st day of April 2010.

 (SEAL)
Notary Public

My Commission Expires:

November 9, 2010

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Butch Cockerill**, being duly sworn, deposes and says that he is Director – Revenue Collection for E.ON U.S. Services, Inc., 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.

Butch Cockerill
Butch Cockerill

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 31st day of March 2010.

Victoria B. Haynes (SEAL)
Notary Public

My Commission Expires:
Sept 20, 2010

KENTUCKY UTILITIES COMPANY

CASE NO. 2009-00548

**Supplemental Request For Information on Behalf of CAC
Dated March 26, 2010**

Question No. 1

Responding Witness: Butch Cockerill

Q-1. As a follow up to the Company's response to CAC's Initial Request for Information, Question 1, please list the ZIP Codes in which Kentucky Utilities Company operates and the number of residential customers in each. If possible, provide this data in an electronic format preferably Microsoft Excel.

A-1. See attached CD in folder titled Question No. 1.

KENTUCKY UTILITIES COMPANY

CASE NO. 2009-00548

Supplemental Request For Information on Behalf of CAC

Dated March 26, 2010

Question No. 2

Responding Witness: Butch Cockerill

Q-2. Regarding the Company's responses to CAC's Initial Request for Information, Questions 3, 4, 5, 7 and 9, please provide this data in an electronic format preferably Microsoft Excel.

A-2. See attached CD in folder titled Question No. 2.

KENTUCKY UTILITIES COMPANY

CASE NO. 2009-00548

**Supplemental Request For Information on Behalf of CAC
Dated March 26, 2010**

Question No. 3

Responding Witness: Lonnie E. Bellar

Q-3. Regarding the Company's response to CAC's Initial Request for Information, Question 2, regardless of terminology, the Company is seeking to increase its basic customer charge and to increase the energy usage charge by a lesser percentage. Mr. Seelye has testified that one purpose of this is to reduce the disincentive for the utility to promote conservation. When does the Company plan another demand-side management filing and what programs for low-income customers are likely to be included?

A-3. The Company filed and received approval to expand its energy efficiency and demand-side management programs in KPSC Case No. 2007-00319 approved on March 31, 2008. As part of this filing, the Residential Low Income Weatherization Program (WeCare) was extended and funded through 2014. In addition to this program, the Company expanded its offering to all residential customers by offering the following: Residential Conservation (Energy Audits); Residential Demand Conservation; Residential High Efficiency Lighting; Residential New Construction; and Residential AC Diagnostic & Tune-up programs.

The Company outlined an additional expansion of energy efficiency programs beyond this filing in KPSC Case No. 2008-00148, the Company's 2008 Integrated Resource Plan filed on April 28, 2008.

On September 10, 2009, the Company organized a meeting with the DSM Advisory Group in order to receive feedback on various energy efficiency program expansion opportunities. A copy of the programs discussed at this meeting is attached to this data response. Based on the feedback of this group the Company is currently evaluating the scope and timing for a future filing with the KPSC to expand its customer offerings.



Energy Efficiency Advisory Group

Programs to be Analyzed for Next DSM Filing

E.ON U.S.

September 10, 2009

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1. Home Performance with Energy Star

Overview

Home Performance with Energy Star (HPwES) is an Energy Efficiency Program that takes a whole-house approach when assessing the potential for energy efficiency measures, and employs contractor certification and quality-assurance mechanisms to assure reliable contracting work. The program would target existing housing stock. A customer would hire an auditor to carry out a comprehensive audit, which would typically last 3 to 4 hours. The auditor would use program-approved modeling software to list energy retrofit recommendations based on cost-effectiveness or payback period.

This is similar to the current residential audit program available to LG&E and KU customers, but HPwES is at once a more comprehensive audit and an effective means to see that the recommendations put forth in the audit are successfully implemented. The majority of installed measures would have a rebate available from LG&E and KU based on the demand reductions and energy savings achieved, and there would be additional potential for funding a portion of the audit cost.

HPwES differs from the current audit program by using Certified Auditors. These auditors meet an agreed national standard approved by the BPI (Building Performance Institute) and RESNET. In addition, certified software and the latest diagnostic tools enable high-quality audit reports.

There are two potential approaches to implementing HPwES:

1. Consultant Model – Auditors are independent of measures being carried out
2. Contractor Model – Auditors carry out installation of some measures

The two models involve a trade-off for the consumer. The contractor model provides a start-to-finish approach which can provide a higher level of customer service for the customer and increased adoption of recommended measures, whereas the consultant model guarantees the independence of the auditor and therefore removes any appearance of conflict of interest when an auditor creates his own scope of work.

Rationale

Kentucky State Government is proposing a pilot of HPwES in partnership with all large utilities in Kentucky. This pilot could be funded through American Recovery and Reinvestment Act Funds and has a target of 240 home projects per year, over the course of 2½ years. The state

government proposes that utilities will fund homeowner rebates through this period and then take over operational running of the program after the pilot period is concluded. LG&E and KU recognize the benefits of working with the state government to promote energy efficiency.

The program is a natural extension of the current residential audit program, but it would build upon that program by giving customers more options for energy efficiency measures while providing a higher quality audit. One particular reason is that a whole-house approach examines the potential trade-offs of installing multiple measures, and provides the least costly and safest path to energy efficiency upgrades. Rebates offered and support provided to customers through the audit and contractor recommendation process should ensure that customers follow through with recommendations at a higher conversion rate than has previously been seen.

The current plan for filing would be to calculate rebates available through further analysis using the California tests. These will be provided through both the pilot period and the operational period thirty months later.

One proposal is to certify homes that have achieved a minimum level of energy savings. Homes could be targeted with achieving, for example 10% / 20% / 30% savings thresholds, and would receive official recognition from the utility and/or the state government. This certificate could be presented when selling a house to encourage participation and recognition of the program.

HPwES has a significant effect on heating and cooling costs, since reductions in a home's heating and cooling loads (usually through increased insulation and reduced air infiltration) are often the first measures that are addressed. Another result is the reduction of peak demand, which is driven primarily by summer air conditioning use. Both usage and demand reduction benefits would be reflected through the rebates available.

Audience

The program will be open to all residential customers in the KU and LG&E service territories. The target audience will be middle to upper income households, with homes over twenty years old offering the greatest opportunities for energy savings. Lower income households will continue to be directed to the WeCare Program, which would provide its own subsidies.

Exact numbers would depend on customer demand, the general economic climate and level of rebates. Further analysis and research is required in this area. The program is not restricted by heating or fuel type.

Risks

One of the main risks is that the program, as currently drafted by the State, offers no low-interest finance option. Financial mechanisms enable customers to offset the upfront capital expenses through energy savings over an extended period of time. LG&E and KU are not established in this area of business and there is no legislative framework to encourage on-bill or property-tax financing, as has been developed in other parts of the country. The lack of financing options may reduce the number of measures carried out, especially regarding large, system-based improvements.

A second risk relates to providing easy-to-understand rebates to customers and to effectively communicating this process. Since each report is customer-specific, a balance must be struck between designing the rebate structure such that it is easy for customers to participate while not over-simplifying and standardizing the recommended actions to the point where their validity is compromised. In addition, providing up-to-date information on state and federal grants must be tied in with the rebate process.

Benefits

There are a variety of benefits in implementing Home Performance with Energy Star. One of the main benefits is the recognition of the Energy Star brand. Energy Star is a trusted brand with which consumers strongly identify. This program would fit well with the current Energy Star for New Homes program operated across LG&E and KU and would provide the opportunity for all housing stock to achieve an Energy Star rating. The New Homes program is achieving a high level of registrations despite the current economic downturn.

The whole-house approach of HPwES has been implemented in over twenty other states, including New York, California and Pennsylvania. LG&E and KU are already in contact with consultants supporting Energy Star who can bring over best practice from these programs. By identifying risks and successes from previous programs and by closely monitoring the pilot program this would enable an effective launch of HPwES across the service territory.

The program will support the creation of green energy jobs in Kentucky, by creating an infrastructure of skilled auditors and qualified contractors with long term growth prospects. Partnerships with universities in the state are already being developed to achieve this goal.

2. Behavioral Marketing Program

Overview

The objective of the Behavioral Marketing Program is to provide residential customers of LG&E/KU with a customized matrix of tips, tools and energy efficiency programming recommendations that are based on individual household energy consumption. This method of customer centric marketing will be a new program for the LG&E/KU, DSM portfolio.

The Behavioral Marketing Program will use available customer data and technology to create an individualized household report that contains a collection of customized information. The information included in the report will help the customer understand and make better informed choices as it relates to energy usage and associated costs.

Rationale

The Behavioral Marketing Program will be designed to increase customer participation in DSM energy efficiency programming. By utilizing existing customer data, such as service point information, account information and current energy consumption, targeted information can be disseminated to the customer. Elements that are presented in the report will include a comparison of the customer's energy usage to that of their neighbors (collectively), a comparison to the customer's own energy usage in the prior year as well as customized and targeted marketing and messages. The Behavioral Marketing Program is different from the current residential audit program offered by LG&E/KU. Where the current residential audit program needs to be initiated by the customer either through use of an online tool or scheduling of an in-home energy audit, the proposed Behavioral Marketing Program will utilize available data points for 100% of LG&E/KU targeted customers and generate fully customized energy usage report. Based on the customer energy usage report, targeted marketing and message information is presented to the customer that will include specific rebate programs as well as energy efficiency recommendations that will be based on the individual household energy usage patterns.

The goal of the Behavioral Marketing Program is to provide a customized program for LG&E/KU residential customers that is designed to reduce consumption. When displayed comparatively, the customer will have a clear concept and understanding of their household energy usage.

Audience

The audience for the Behavioral Marketing Program will encompass residential customers of Louisville Gas and Electric/Kentucky Utilities Company.

Risks

Potential implementation risks included in the Behavioral Marketing Program can include the feasibility of coordinating all of the necessary data points to accurately capture and create customized energy consumption reports of this magnitude.

Benefits

Municipal, Cooperative and Investor owned utilities across the United States have behavioral marketing programs in place for residential customers. Utilities such as Dominion Resources, San Diego Gas and Electric, Southern California Edison Company, Commonwealth Edison, Lake Country Power (Minnesota), Austin Public Utilities (Minnesota), National Grid, Southern California Public Power Authority, Xcel Energy, Sempra (Southern California Gas), Connexus Energy (Minnesota) and Owatonna Public Utilities (Minnesota).

As evidenced by an independent evaluation of Sacramento Municipal Utility District's behavioral marketing program, findings clearly demonstrate that implementation of a combination of energy efficiency, behavioral science and direct marketing tools to the residential customer are successfully achieving an average annual demand reduction of 2.2%. Data also indicates that demand reduction is across all households, not just a specific customer segment.

The proposed LG&E/KU Behavioral Marketing Program will be a highly comparable program to those currently deployed with other utilities. Using available data from the existing behavioral marketing programs across the United States, it is reasonable that the LG&E/KU Behavioral Marketing Program will also yield measurable savings that will support the Companies in meeting the increasing regulatory efficiency targets.

3. Energy Education Center

Overview

The objective of the Energy Education Center (The Center) is to provide the residents of the Commonwealth that are Louisville Gas and Electric/Kentucky Utilities Company customers with a superior learning experience that will increase public awareness and understanding of both the urgent need for more efficient use of energy and the environmental and financial impacts created by climate change issues. The Center will be an educational destination that will be an expansion of the current Customer Education and Public Information element of the 2008-2014 Energy Efficiency Program Plan.

The Center will provide an “energy themed” building design and floor plan that includes high quality, useful and relevant learning opportunities through interactive *Learning Exhibits* that provide hands on and engaging learning experience for all attendees. Exhibits will demonstrate energy related concepts of matter and electricity transfer of energy, energy efficiency, alternative energy sources and new energy technologies. *Training Room(s)* will be utilized to provide a variety of formalized training and development opportunities for the customer base. A fully operational *Research and Development Facility* will include a working laboratory for technology research and development.

Rationale

The Center is designed to increase customer awareness and encourage utilization of energy efficiency products and services. Public awareness and acceptance that inefficient use of electricity and natural gas is adversely impacting the environment are essential drivers for behavioral and technology changes in energy usage. Additionally, consumers will learn and understand the cost advantages of addressing electric system load growth by embracing energy efficiency programs relative to the higher costs associated with adding generating assets and/or environmental compliance. The Center will inform consumers that energy efficiency initiatives can provide opportunities for them to maintain their comfort and level of service while reducing energy bills. A comprehensive and interactive learning experience for the consumer will provide a foundation for customers to make sound energy use decisions, increase control over energy bills, and empower them to actively manage their energy usage.

The Center will provide a state of the art, comprehensive and interactive venue in which LG&E/KU can deliver: information on energy and energy related concepts; demonstration of how energy is created and transferred; provision of high quality interactive learning experiences

for children and adults; provision of energy related training and development to a variety of audiences; provision of a demonstration center for industry leaders to collaborate on the development of new energy technologies.

Through the dynamic educational experience provided by The Center, both current and future consumers will understand that participation in developed energy efficiency programs costs less than construction of new power plants and has less impact on consumer rates and the environment.

Audience

The Center will provide an energy education destination that will be designed to meet the learning needs of a broad constituency that includes the general public which includes residential and commercial customers; school children and their families; K-12 educators; post secondary educators; and other utility industry leaders.

Risks

There are a couple of potential implementation issues that will need to be taken into consideration.

LG&E/KU will need to be able to identify a geographic location within the service territory for the Energy Education Center. The identified location will need to be able to effectively meet the learning needs of residential and commercial customers; school children and their families; K-12 educators; post secondary educators; and other utility industry leaders.

In addition to location, there may be some risk associated with routinely updating the facility and its contents as new energy efficiency technologies emerge. For example, if a green roof is initially put on the building and a year later we want to replace it with a newly developed solar roof. To prevent The Center from becoming obsolete, routine updating will be necessary.

Benefits

Several utilities across the country have embarked on constructing Education Centers of sorts. Utilities such as the Exelon's, Renewable Energy Education Center located in Fairless Hills Pennsylvania and Duke Energy's, World of Energy and Energy Exploratorium located in Seneca South Carolina, are designed to engage families and student audiences in grades 4-8. This level of education center provides interactive exhibits about the production of energy, how energy is

converted into electricity for home use as well as learning to use energy wisely. Other utilities such as Duke's Envision Center located in Erlanger, Kentucky; PG&E's Pacific Energy Center; Southern California Edison's Edison Customer Technology Education Center; Bonneville Power Administration's Technical Training Center; and Con Edison's Learning Center have specialized learning geared toward other constituents and professionals. The targeted audiences in these centers provide learning opportunities such as gas and electric operations, construction of energy efficient buildings and environments, demonstrations and events showcasing the latest developments in energy efficient technologies, as well as apprentice programs for electrical engineers.

LG&E/KU's proposed Energy Education Center will be the first of its kind. The Center will be a comprehensive learning venue that addresses all segments of the customer population which includes families, students and professionals alike. Given the demonstrated success of the individual aforementioned Education Centers, which are very singular in terms of the customer segments educational programming offered (i.e. only providing learning opportunities for families and student audiences; only providing learning for professionals; only providing demonstrations of new technologies and on providing training programs) it is reasonable that the LG&E/KU Energy Education Center will experience at least the same level of success due to the comprehensive nature of the learning environment being proposed. The Center will effectively address the energy education need of all customer population segments in one single location.

4. Full Advanced Metering Infrastructure Deployment

Overview

North American utilities are poised to rapidly grow their investments in advanced metering infrastructure (AMI) over the next few years as many more utilities enter volume deployments of these multi-year initiatives. Many utilities want their new AMI network infrastructures to serve multiple future smart grid applications. These could be located anywhere from the grid itself to residential customer's homes.

LG&E/KU is considering a full deployment of smart meter technology as a pre-requisite for smart grid preparations. Full implementation of two-way advanced metering infrastructure (AMI) will enable LG&E/KU to modernize its electricity grid, create economies of scale for renewable energy and promote consumer efficiency.

Rationale

The rationale behind full deployment of smart meters is simple – by making it clear to consumers how much energy they are using and exactly what it is costing them, they are empowered to cut their usage and thus their bills. LG&E/KU meanwhile, will benefit from a two-way flow of data which enables them to manage electricity use more efficiently. With significant technological progress and encouragement from lawmakers and regulators, full deployment of smart metering can revolutionize energy management. Furthermore, it enables a partnership between the utility and the customer that drives energy efficiency and increased grid reliability.

Full deployment of AMI will also enable LG&E/KU to gain greater familiarity with different network technology segments. AMI networks are segmented by function. The major network segments include home area network (HAN), collector network, backhaul network and, crucial to the value of AMI, enterprise/meter data management system (MDMS). In addition, full deployment of smart meters will allow LG&E/KU to plan for key metrics, such as distribution and transmission automation, as well as distributed generation and energy storage, in order to optimize asset utilization, efficient operation and power quality.

With bi-directional flows of energy and coordination through these communication and technology mechanisms, a fully deployed grid should help balance supply and demand and enhance reliability by modifying the manner in which customers use and purchase electricity. These modifications can be the result of consumer choices that motivate shifting patterns of

behavior and consumption. These choices will involve new technologies, new information regarding electricity use, and new pricing and incentive programs.

Audience

Currently, consumers trying to manage their footprint face hurdles at every step, ranging from a lack of data on their own usage, to the difficulty of researching and assessing the carbon efficiency of products and services in the marketplace.

From the standpoint of the consumer, energy management in a fully deployed AMI environment involves making economic choices based on the variable cost of electricity, the ability to shift load, and the ability to store energy. When customers are motivated by economic incentives through dynamic pricing structures or other programs, their investments in “smart” devices could facilitate reductions or shifts in energy consumption.

Also, fully deployed AMI systems will allow LG&E/KU to operate more efficiently and optimize design and operation of its electricity infrastructure.

Risks

There are a few critical issues that LG&E/KU needs to consider.

On the customer front, customer education and awareness of fully deployed AMI and smart grid benefits as well as receptiveness of time of use/dynamic pricing continue to pose a challenge.

Many new communication standards and continually evolving technology need to be closely evaluated, as obsolescence is a concern. Flawless installation of all assets is desired, but not always realistic.

AMI technology is the most important development facing a smart grid. Failure to successfully deploy this technology that captures bi-directional power flow rather than net consumed energy, as well as dynamic pricing support, will make for the future smart grid to not function as desired regardless of other successful technical deployments, such as distributed generation, demand-response measures, or automated distribution schemes.

Benefits

Currently, there are AMI blueprint initiatives taking place in Maryland, Delaware, District of Columbia and New Jersey.

There have already been several major AMI installations in Europe. These include the largest installation in the world, now encompassing more than 30 million meters in Italy. In the United States, widespread deployments of AMI began in 2009, and will take years to complete. At present, investor-owned utilities in California, Texas, Michigan, and the Southeast have large volume AMI deployments underway. Several Canadian utilities, especially in Ontario, also have volume deployments underway. These utilities envision a four-year to six-year migration from existing meters to a completely new and advanced metering infrastructure. LG&E/KU desires to use its experience, gained through its current smart metering pilot, and start executing a full AMI deployment.

AMI technology puts decision making in the hands of customers. Improved information, programs and pricing options will allow customers to make informed energy choices. This technology provides better information about usage, conservation options, costs and prices. It also integrates smart thermostats, in-home displays, appliances and other consumer devices.

Full integration of AMI will automatically accommodate for changing conditions such as fault isolation, quick automatic restoration, rerouting power flows, changing load patterns, improving voltage profiles, etc. More importantly, it will allow LG&E/KU to operate the system with greater efficiency, reliability and security.

So, the potential benefits of AMI are enormous. And not just in terms of increasing efficiency. Grid adaptability is also very important. Electricity grid must be capable of integrating advanced electricity storage and peak shaving technologies, including plug-in electric and hybrid electric vehicles. As we step into the new world of renewable energy, we need a smart, flexible system that can manage intermittent sources of clean energy such as wind and solar and employ them in tandem with more traditional sources.

5. Existing Demand Conservation Program Redesign

Overview

The existing Demand Conservation Program is voluntary and has been operational since 2001. Demand Conservation employs switches and thermostats in homes and small businesses to help reduce the demand for electricity during peak times. The Program uses one-way paging signals to communicate with the switches and thermostats to cycle central air conditioning units, heat pumps, electric water heaters and pool pumps off and on through a predetermined sequence. If an air conditioner is cycled off for thirty minutes in a one hour period, it is considered a 50% control strategy. The strategy has been to control between 30% and 45% depending on temperature and customer equipment.

Marketing efforts are extremely costly and proving less fruitful as time goes on due to increasing market saturation of the program. As a result, enrollments have not been as high as desired. There are two identified solutions that could potentially provide more achievable targets: improved incentives, and restructuring enrollments (i.e. possibly with multiple tiers of control groups).

Rationale

The Demand Conservation Program has proven to be an economical means of reducing load at peak times and delays construction of generation assets. This program targets peak demand and is utilized during summer periods only since LG&E and KU collectively are summer peaking. This ability to curtail load has also proven to be beneficial in responding to emergency situations, such as a forced outage of a generating unit.

Demand savings are estimated to be approximately 1 kW per air conditioner device and approximately 0.6 kW per water heater switch. As the program has achieved higher customer participation saturation point it has become necessary to meet the current program goals. Modification of the existing program is necessary to allow the previously established goals to be achieved as outlined in the 2007 DSM Filing. Offering more enrollment options that may better fit each customer's personal comfort may increase their willingness to participate and result in a more desirable outcome for the program.

Audience

This program will be available to residential and commercial customers only. Some customers will not have access to the program due to their location within the service territory where the paging communications are not reliable.

Risks

Incentives and choices may not be adequate enough to move customers to enroll in the Demand Conservation Program. Low subscription rates will not fully provide the estimated demand reduction targets and ultimately require earlier construction of generation assets.

Benefits

Demand Conservation Program success will provide economical and environmental benefits through the delay of constructing generation assets. Offering more choices to the customer could provide higher satisfaction and reduce customer-requested removals from the program.

Increasing the number of thermostats installed will produce demand and energy savings. The customer will benefit by reduced demand during the highest load periods and also save throughout the year if educated on the benefits of the thermostat.

6. Existing Demand Conservation FM Radio Solution

Overview

Some remote areas of LG&E and KU service territory cannot receive the paging communications currently utilized in the existing Demand Conservation Program. Customers in these areas could benefit from the use of a frequency modulation radio data system (FM RDS) subcarrier technology. RDS technology enables the communication of messages between LG&E or KU and its customers via an FM RDS receiver module embedded into a standard load control switch or thermostat. This technology would allow electricity consumers participating in demand conservation programs to respond to RDS signal containing load control event information during periods of peak demand. This could provide a technology solution for the Demand Conservation Program and potentially enhance enrollments.

Rationale

By providing demand side power management through direct load control of consumer air conditioning (AC) and other loads, LG&E and KU electricity infrastructure will be safeguarded against overload which can result in expensive and laborious plant failures. To use the FM network to communicate to customers requires no new network infrastructure since FM radio stations already exist and service other industries, and importantly, continue to operate during outages (assuming in-home smart devices are battery-powered, of course). More importantly, FM's robust delivery network and large coverage foot print will allow the company to enroll customers from more isolated parts of its service territory, in addition to standard customer base, thus providing for a fully deployed and more effective demand conservation program.

Audience

LG&E and KU customers in remote and hard to penetrate areas of electric service territory will benefit from being able to easily participate in direct load control programs offered by the company.

Furthermore, the solution gives the company another flexible technology choice that can operate cost-effectively in parallel with future advanced metering infrastructure (AMI) system deployments.

Risks

There are a few potential technical and operational issues. For example, load impacts must be managed at the onset and conclusion of load control events to ensure a smooth return of AC load to the system. Also, standard messages for activating control must be finalized so manufacturers can design software to ensure a compatible statewide solution. Furthermore, negotiating with the identified FM radio stations (including operational support) and securing sufficient RDS subcarrier frequency bandwidth to support the proposed demand conservation program have to be considered as well.

Benefits

Across North America, utilities and government agencies are looking for innovative solutions that will reduce electricity demand during peak periods, keeping high-priced peak periods to a minimum, and offsetting the short-term need for additional investment in grid infrastructure or new generation capacity. Currently, FM RDS pilots and programs are taking place in California, Texas and Ontario. In Texas, CPL Retail Energy has launched a first-in-kind demand-response and energy efficiency pilot program for residential customers. The pilot, which marries residential demand-response through the cycling of air conditioning systems with whole-home energy efficiency measures, leverages the FM solution-enabled thermostats to achieve and measure peak period reductions.

FM RDS solution is an inexpensive one-way communications technology for load control programs and has significant advantages over pager-based solutions (which are currently being utilized by LG&E and KU and most other U.S. utilities with direct load control programs) in terms of signal coverage. Not only is the delivery network more robust, it has a larger footprint and increased data capacity.

FM solution can also provide customers the option to earn money through voluntary participation in load control and other demand response programs that pay for participation and/or performance.

In addition, it can provide a new bridge of messaging capabilities from LG&E and KU to our customers and another method to communicate during disaster or emergency periods. Other non-emergency supported messaging programs will allow the customer to respond to appeals for conservation and voluntary curtailment events.

7. HVAC Rebates

Overview

The HVAC Rebates Program will be designed to provide financial incentives for the installation of qualifying energy efficient HVAC equipment for residential and commercial customers. Rebates available to all customers in this program's rate classes may be developed based upon a dollar value per kW for calculated efficiency improvements.

Efficiency of the HVAC equipment is often rated by the Seasonal Energy Efficiency Ratio (SEER). Higher SEER represents more efficient operation. As of January 2006, all residential central air conditioning units sold in the United States must have a minimum SEER of 13, with a SEER of 14 necessary to meet Energy Star Standards. There are two incentive calculation options: SEER of the newly installed HVAC equipment may be compared to the replaced equipment; or a standard rebate based on the SEER of the new HVAC equipment. Room air conditioners may also be considered in this program.

Rationale

The HVAC Rebates are incentives for installation of high efficiency HVAC equipment to promote energy savings and reduce energy demand at peak times during the year. Since air conditioning is a major part of the load requirements during LG&E and KU summer peak, efficiency improvements in this area could prove to be beneficial long term in conjunction with the existing Residential and Commercial HVAC Diagnostic and Tune Up Program.

Installation of HVAC equipment with higher efficiency will provide energy savings for the customer through shorter equipment operation times. More efficient HVAC equipment could place less load demand on the system and could assist to delay the construction of new generating units while providing environmental benefits and additional customer economic benefits.

The HVAC Rebates Program will promote the purchase and installation of energy efficient equipment. Incentives should increase as efficiency of the HVAC equipment increases.

Audience

This program will be available to residential and commercial customers only. The minimum SEER considered for this application is 14. The program should first target those customers with

aging and less efficient equipment and can benefit from information obtained through the existing Residential and Commercial HVAC Diagnostic and Tune Up Program.

Risks

It may be difficult to persuade customers to install new high efficient equipment because of the equipment and installation costs, regardless of long term energy savings.

Benefits

The HVAC Rebates Program will reward customers for the purchase and installation of energy efficient equipment. A reduction in energy usage will provide benefits to the environment and will reduce the customer's energy expenses. Replacing aging HVAC equipment with Energy Star products will place less stress on the system at the more critical times in the year.

8. Residential Appliance Rebates

Overview

The Appliance Rebates Program will be designed to provide financial incentives for the installation of qualifying Energy Star appliances for residential customers. Rebates available to all customers in this program's rate classes may be developed based upon a dollar value per kW for calculated efficiency improvements.

The Appliance Rebate Program may focus on any or all of the following: refrigerators, clothes washers or dryers, dishwashers, electric water heaters, freezers. New construction may qualify for the rebates if not part of the existing Energy Star New Homes Construction Program. There may be a specified maximum rebate per premise per year.

Rationale

The Appliance Rebates are incentives for installation of Energy Star equipment to promote energy savings and reduce energy demand at peak times during the year. Energy Star rated appliances will provide long term benefits and reduce the reliance on fossil fuels. A rebate may provide enough incentive for the customer to choose a more energy efficient model.

Audience

This program will be available to residential electric customers. All appliances must be Energy Star qualified. Refrigerators and electric water heaters will produce the greatest energy savings since each is generally responsible for over 10% of a household's energy usage.

Risks

Disposal of old appliances may bring about other environmental obligations. Slow rebate processing could result in low customer satisfaction. The rebate amounts may not be large enough to move customers to higher efficiency appliances; instead, they may choose less efficient models because of the immediate cost savings and ignore long term energy savings.

Benefits

The Appliance Rebates Program will reward customers for purchasing Energy Star qualified appliances. Reduced energy utilization will provide benefits to the environment and will assist in the reduction of the customer's energy expenses. Several applicable appliances would use significantly less water thereby providing additional environmental and economical benefits.

9. Refrigerator Removal Program

Overview

The Refrigerator Removal Program will provide removal and recycling of old and inefficient secondary refrigerators from LG&E and KU customer households. This service will be offered free to LG&E and KU customers. The program will involve targeting customers who are likely to own a secondary refrigerator which is typically stored in a garage or a basement. A vendor will collect the refrigerator at a convenient time and deliver the refrigerator to an approved recycling center. The recycling center will then break the unit down into parts and properly dispose of potential hazardous materials such as oil, refrigerant and mercury.

As the Refrigerator Removal Program develops, it is conceivable to extend removal services to include other second appliances as well as a potential connection to new appliance purchase to maximize customer response. Other utilities have paid a small incentive upon collection to increase response rates (typically \$25 to \$50).

Rationale

Recycling secondary refrigerators is an easy way to reduce energy consumption and demand while saving customers money. Often secondary refrigerators are kept after a new appliance purchase if removal and recycling of the old appliance is not convenient option. Some refrigerators are kept as additional storage but research suggests that lack of convenient removal is the overriding factor. Ease of arranging the removal of the unneeded or unwanted appliance is the key driver which includes making contact and time scheduling transportation.

Secondary refrigerators will often be considerably inefficient in comparison with modern models. Refrigerator models of the late 1970s use in excess of 1500 kWh annually and 1980s models over 1000 kWh. Modern Energy Star model refrigerators use around 500 kWh annually. This means a home with a new refrigerator and one from the 1970s could reduce overall refrigeration costs by over 75% by having the older model removed.

Refrigerators are in constant operation. The removal of a refrigerator lowers peak demand during the summer. Savings achieved typically represent around 40% to 60% of the refrigerator collected as not all refrigerators would have continued usage; this is known as the net to gross conversion.

The overall complexity of operating the program should be straightforward as refrigerator removal requires no technological knowledge in comparison with other programs where

measures are installed. A number of successful programs have been introduced in North Carolina and California. There is a substantial amount of data which can be used to support this particular program design.

Audience

All LG&E and KU Residential customers throughout the state of Kentucky would be entitled to use the program. The program will be marketed to all consumers through low cost channels such as a bill insert.

Risks

Assessment of current recycling facilities for refrigerators in Kentucky has not been carried out and would be required before the program could be implemented. Due to the nature of KU's service territory some consumers in more rural areas may be difficult to service at a low cost because they may be a considerable distance from a recycling center.

Collecting data and measuring energy savings may prove challenging due to the net to gross conversion mentioned above. This effect is caused by the various routes that people take when disposing of a refrigerator. For example, a secondary refrigerator can be sold by the consumer, given away to a charitable organization, sold by used appliance dealers, etc. Understanding these various routes is important if the actual program savings are to be measured.

Used appliance dealers and charitable organizations may object to the implementation of such a program as it could remove valuable second hand appliances from circulation which they could potentially sell or donate. Educating and supporting these groups (potentially with rebates) would be important to deliver a successful program. A possible solution to this risk could be to assist these groups with identifying more efficient second hand models.

The program would need to be tied in with any local, state or federal ordinances on recycling refrigerators.

10. Residential Window/Door Replacement & Window Film Rebates

Overview

Historically, as heating and air conditioning systems became more powerful and less expensive, the right balance between the benefits of natural light and ventilation and the disadvantages of drafts and maintenance changed. Thus, energy efficiency was no longer the top priority. Now, there are a multitude of options when it comes to replacement windows and films. For replacement windows, the range runs from advanced glass options and coatings as well as hybrid material frame mixtures. Many of these options offer a large array of features that can provide many of the advantages that customers want, while minimizing the disadvantages. Further, there are a multitude of choices available for replacement windows that range in price from low to high. For window films, the same is true.

Most of these options can result in reduced energy demand and ultimately energy savings for the customers. The rebate program would work by providing an incentive to the customer for the purchase and installation of one of these products. This program could utilize the Dealer Referral Network as described in the 2007 DSM Filing. Rebates available to all customers in this program's rate classes may be developed based upon a dollar value per kW for calculated efficiency improvements.

Rationale

The objective of the program is to promote energy savings and reduce energy demand at peak times during the year. The amount of energy that can be wasted due to old or drafty windows over their lifetime can be substantial. Also, the uncomfortable result in one's home due to cold drafts in the winter or "hot rooms" in the summer can be a continual problem. Installations of replacement windows or films provide the full range of cost solutions to achieve energy savings. There are already many available products and suppliers/installers to enable high participation and minimal delays for installations. This can be a win-win situation for both parties. A company program can be an excellent way to raise the awareness and profile of the many options around films and window replacements and the benefits that can result.

Audience

Residential customers who have replacement windows or films installed and meet the necessary requirements of the program are eligible to receive a rebate. Due to the wide-reaching nature of these projects, it is likely that there could be large numbers of projects and participants.

Risks

One drawback of the program could be due to the large influx of participants. Based on the rebates offered, the administrative requirements and possible rapid depletion of funds could prove to be difficult and costly. The actual rebate offered will be crucial to the program's success. One that is too low or too high could have negative implications.

Benefits

There are many benefits from replacement windows and films. Replacement windows can increase resale value of the home and increase the energy efficiency of the structure. Often, replacement windows replace non-functioning windows (those that can not be opened). These old windows have either been painted shut or have deteriorated over time. Replacement windows allow customers to maintain a comfortable temperature in the home on those milder days. This can save on energy costs and even prolong the life of HVAC equipment.

In addition to energy savings, all window films typically offer up to 99% Ultraviolet (UV) light reduction. This results in significant fade protection and reduced deterioration for furniture, carpet, draperies, and fabrics. The increased shatter resistance contributes to increased safety for inhabitants. Some films are heavy gauge security films which offer significant benefits such as a scratch resistant hard coating to protect against wear and tear that even performs well in all climates. Metalized and/or solar control window films can provide significantly reduced solar heat gain resulting in increased comfort, glare reduction, and daytime privacy.

11. Commercial Customized Rebates

Overview

The Commercial Customized Rebates Program will be designed to provide financial incentives for qualifying commercial customers to assist with the replacement of less efficient equipment. Commercial Customized Rebates will meet the needs of customers with less typical technologies and those installations not covered by the existing Commercial Conservation/Rebate Program. Rebates available to all customers in this program's rate classes may be developed based upon a dollar value per kW for calculated efficiency improvements. This program will likely be administered through the existing Commercial Conservation/Rebate Program.

Rationale

The program is designed to reduce demand and usage of energy by assisting commercial customers via financial incentives for installation of energy efficient equipment within their businesses. The ultimate success of the program comes from customers' implementation of energy savings measures. The program would be designed to allow for a maximum benefit per facility per year. Commercial Customized Rebates will promote energy efficient technologies in the commercial sector that are not addressed in the existing Commercial Conservation/Rebate Program. Providing rebates may entice customers to make a more energy conscious decision when installing new equipment.

Audience

This program will be available to Commercial customers only. The rebates will be available to those customers who are replacing existing equipment with more energy efficient equipment.

Risks

Communication of the program is vital to the program's success. It may be difficult to provide incentives that would move a customer to an installation upgrade where replacement is not necessary.

Benefits

Commercial Customized Rebates will incent customers to implement energy efficient technologies not currently covered in the existing Commercial Conservation/Rebate Program.

Reduced energy utilization will provide benefits to the environment and will assist with the reduction of the commercial customer's operating expenses. The program will promote energy efficiency and provide incentives for making measurable energy efficiency improvements.

12. Commercial Refrigeration Rebates

Overview

A Department of Energy (“DOE”) study shows that grocery stores account for about one-third of refrigeration energy use. This main segment is a combination of display cases and the central refrigeration system including the mechanical equipment and controls. The next largest segment is walk-in coolers and freezers. Thus, the energy saving potential is vast. The range of choices to improve the efficiency of commercial refrigeration is as varied as the original refrigeration options. Some common solutions are installing new door gaskets, night covers, strip curtains, or automatic door closers. Even replacing older units with more efficient products can help to reduce energy costs. Finally, regular maintenance and cleaning of the equipment (i.e. the coils) can provide savings for relatively minimal expense. The no to low cost options can be as simple as providing setup, design, and stocking tips as well as employee education and training. Most of these options can result in reduced energy demand and ultimately energy savings for the customer. The rebate program would work by providing an incentive to the customer for the installation of one of these products or performing additional maintenance. Rebates available to all customers in this program’s rate classes may be developed based upon a dollar value per kW for calculated efficiency improvements.

Rationale

The objective of the program is to promote energy savings and reduce energy demand at peak times during the year. The amount of energy that is wasted due to old or inefficient products over their lifetime can be substantial. Throughout the service territory of LG&E and KU are numerous large and small groceries, convenience stores, and warehouses. Due to the large energy usage associated with this sector, the potential for increased efficiency and ultimately energy savings is significant.

Audience

Any commercial customer who installs refrigeration covers or implements efficiency improvements that meet the necessary requirements of the program is eligible to receive a rebate covering a portion of the cost. Though the pool of participants is limited to those with commercial refrigeration, the potential impact could be significant since each participant likely

has multiple locations from which to benefit. This could allow for a targeted campaign with minimal costs to market and administer.

Risks

The main risk of the program stems from its design. The rebate must be significant enough to spur participation but not over incentive. Due to the potential large nature of these projects in terms of cost and scale, funding must be adequate. While there are some low-cost options possible, the majority of projects would tend to be relatively expensive in nature. To ensure there are participants in the program, some buy-in is needed from them specifically to better understand what hurdles might be encountered. One topic might be to fully understand the recent trend to switch to uncovered display cases.

Benefits

There are many benefits that can be achieved from refrigeration covers and other efficiency improvements. In addition to lowering one's energy bills by using less energy, the customer can benefit by increasing profitability and competitiveness with lower operating costs. This is also derived from extended equipment life and lower maintenance costs. Stores can increase the comfort level in refrigeration aisles for both customers and employees. Other benefits include reduced product spoilage by maintaining consistent temperatures. Any minor inconveniences to store customers could be easily explained by the overall environmental benefits and ultimately lower food prices.

13. Energy Star Manufactured Homes

Overview

Manufactured homes make up a significant minority of the housing stock across the service territory of LG&E and KU. In an effort to improve the energy performance of this sector, Energy Star® has implemented efficiency standards for new manufactured homes. These standards take a whole-home approach to ensuring efficiency in water heating, space heating and cooling. This is achieved through a variety of measures, including delivering adequate insulation, minimal air leakage and efficient appliances.

In comparison to Home Performance with Energy Star (“HPwES”) and Energy Star for New Homes, Energy Star certification for manufactured homes is achieved at the factory, which allows these homes to be sold and branded as Energy Star. Quality control is measured both at the manufacturing stage and through sampled testing of homes in the field. Federal and State governments offer tax rebates for purchasing Energy Star manufactured homes. The incentive could be implemented at the dealer and/or owner level.

Rationale

The rationale for implementing Energy Star Manufactured Homes is to widen the participation of customers and to allow a greater proportion of households the opportunity to live in an energy efficient building. With Energy Star for New Homes already in operation and State government seeking to launch HPwES, the program becomes a natural continuation.

Current sales of Energy Star manufactured homes are around 500 annually in Kentucky, a number which could reasonably be increased to 1,000 or 2,000 homes, or 10% to 20% of sales. Typical energy savings for an Energy Star unit would be a 20% to 30% reduction over a typical home.

Energy Star manufactured homes have a significant effect on heating and cooling costs, since reductions in a home’s heating and cooling loads (usually through increased insulation and reduced air infiltration) are often the first measures addressed. Another result is the reduction of peak demand, which is driven primarily by summer air conditioning use. Both usage and demand reduction benefits would be reflected through the rebates available.

Audience

Current annual sales of manufactured homes in the state of Kentucky are between 5,000 and 6,000 units, with approximately 10% of these purchases being Energy Star qualified, according to the Kentucky Manufactured Housing Institute. The average price is \$55,000.

The target audience will be those people purchasing a manufactured home who would like to purchase an Energy Star product but do not have the funds available. A rebate supplied by LG&E or KU may enable more customers to make the Energy Star selection. Rebate level would typically vary by the square footage of the home. There are 160 manufactured home retailers in Kentucky who could be included in program according to Kentucky Manufactured Housing Institute.

Risks

Program overhead costs and organizational challenges may be too great in relation to the small size of the potential market. Additionally, the incentives available may not be adequate to shift the purchasing decisions of prospective homebuyers. Another potential effect of the program is to merely provide an extra subsidy to customers who would have purchased an Energy Star manufactured home in any event (the “free rider” principle).

The most effective rebate programs offer the discount at point of purchase. With any other arrangement, customers have to sustain funding for the period between time-of-purchase and rebate payment. Given the nature of KU’s service territory (scattered across many counties) it may be difficult to offer the rebate at purchase due to the inherent risk of mistakenly providing funds to non-customers.

Benefits

There are a variety of benefits to implementing the Energy Star for Manufactured Homes Program. One of the main benefits is the recognition of the Energy Star brand. Energy Star is a trusted brand with which consumers strongly identify. This program would fit well with the current Energy Star for New Homes Program operated across LG&E and KU service areas and would provide the opportunity for all housing stock to achieve an Energy Star rating. The New Homes program is achieving a high level of registrations despite the current economic downturn.

A second factor relates to the high cost and comparatively low potential for energy savings on manufactured home energy retrofits; the only true opportunity for energy efficiency in this sector is to “get it right the first time.” Also, since manufactured homes are based on only a small variety of standard floor plans, each has the potential to be pre-approved by Energy Star and to achieve high standards of accuracy and predictability regarding energy and demand savings.

14. Commercial Cool Roof Rebates

Overview

There are several variations of cool roofs that can result in reduced energy demand and ultimately energy savings for those customers. Cool roofs typically fall into three types:

- Inherently cool roofs (reflective)
- Coated roofs
- Green roofs

Inherently cool and coated roofs use non-traditional materials (i.e. reflective materials, paints, or sprays) in order to decrease energy needs by better insulating the roof. These differ from green roofs in that the non-traditional roofing material is non-organic (i.e. there is no living vegetation as part of the roof). Green roofs are vegetated covered roofs, with plant life taking the place of typical roofing materials such as shingles or tiles. All green roofs include a single to multi-ply waterproofing layer, drainage, soil or growing media and the plants, covering the entire roof deck surface.

The rebate program would work by providing an incentive to the building owner for the installation of one of these types of cool roofs. Though the installation price of a cool roof can be higher than that of a traditional roof, this program aims to incentivize the building of cool roofs and increase awareness of their long-term savings potential. This is accomplished by offering rebates to offset the short-term drawback of higher up-front install costs associated with a cool roof.

Rationale

The objective of the program is to promote energy savings and reduce energy demand at peak times during the year. The amount of energy required to heat and cool a building can account for a significant portion of the total utility bill. Installations of cool roofs provide energy savings to the customer and reduced energy demand for the utility. This can be a win-win situation for both parties. As with many programs, the economics tend to be the determining factor of the program's success.

Audience

Any commercial customer who installs a cool roof that meets the necessary requirements of the program is eligible to receive a rebate covering a portion of the cost. Due to the large and costly nature of these projects, it is likely that there would be limited numbers of projects and participants.

Risks

The main drawback of the program rests in the significant up-front expense of retrofitting existing structures. The time it takes to recover one's costs as well as the additional costs not captured by the rebate received are hurdles of the program. For new construction, this is somewhat less of a problem due to the additional costs that result amount to smaller percentage of the total budget for the project as a whole. These factors can determine how successful the program can be.

Benefits

There are many benefits derived from a cool roof. All types of cool roofs can lead to reduced energy consumption. This can also offset the problems created by an "urban heat island." Additionally, green roofs can reduce sewage system loads by assimilating large amounts of rainwater. Also, green roofs absorb air pollution, reduce noise pollution, collect airborne particulates, and store carbon. Green roofs can double the life of a roof so replacement costs can be cut significantly. This is due to their ability to minimize the extreme temperature variations present. They can serve as a natural habitat that provide space for birds and other small animals and offer an attractive alternative to traditional roofs, addressing growing concerns about urban quality of life.

15. Geothermal Heat Pump Rebates

Overview

Geothermal heat pumps (GHP) are one of the most energy efficient and environmentally friendly electric heating and cooling systems available. According to the EPA, a GHP can reduce energy consumption and corresponding emissions up to 44% compared to air-source heat pumps, and up to 72% compared to electric resistance heating with standard air-conditioning equipment. GHPs use the constant temperature of the earth as the exchange medium instead of outside air temperature.

The rebate program works by providing an incentive to the customer for the installation of a GHP. The installation price of a GHP can be substantially higher than that of a traditional air-source system. This program aims to increase awareness of the long-term savings potential of a GHP system by offering rebates to offset the short-term drawback of higher up-front costs. Rebates available to all customers in this program's rate classes may be developed based upon a dollar value per kW for calculated efficiency improvements.

Rationale

The objective of the program is to promote energy savings and reduce energy demand at peak times during the year. Installations of GHPs provide energy savings to the customer and reduced energy usage for the utility. This provides a win-win situation for both parties. The goal of the program is to encourage as many GHP installations that would not otherwise occur without the program and rebate.

Audience

Any commercial or residential customer who installs a GHP that meets the necessary requirements of the program is eligible to receive a rebate covering a portion of the cost.

Risks

The drawbacks to the program could stem from its design and bring up some key questions.

- Will the rebate offered incentivize the customer to proceed?

- How many years will it take for the customer to recover the cost with the rebate?

Both of these answers will determine how successful the program can be. The up-front additional cost of a GHP versus a traditional system is a large hurdle that must be overcome. The rebate would offset this hurdle, but only on a partial basis. The longer the time needed to recover costs should correlate (inversely) with the participation rate.

Benefits

One of the main benefits of a GHP is increased efficiency. Geothermal heat pump efficiency is measured by the Coefficient of Performance (COP). The COP is equal to the amount of heat provided by the heat pump divided by how much energy it consumes. Properly designed and operating heat pump systems routinely achieve a seasonal COP of 2.5 – 3.0 (or 250% to 300% efficient). To compare, a high-efficiency natural gas furnace has a COP of about 0.92 (or 92% efficient), and a conventional electrical heating system has a maximum COP of 1.0 (or 100% efficient). Geothermal heat pumps have been recognized by the U.S. Environmental Protection Agency as one of the most environmentally friendly options available today. An added value is space optimization in that GHPs maximize office, living or retail space because they require less room than traditional mechanical systems. Lastly, in new buildings, heat pump systems can eliminate the need for unsightly smoke stacks and rooftop chillers, reducing a roof's structural requirements and saving money.

16. Power Factor Correction

Overview

Power factor is the ratio of the real power to apparent power and represents how much real power electrical equipment utilizes. It is a measure of how effectively electrical power is being used. Low power factor is caused by inductive loads (such as transformers, electric motors, and high-intensity discharge lighting), which are a major portion of the power consumed in commercial environments. Unlike resistive loads that create heat by consuming kilowatts, inductive loads require the current to create a magnetic field, and the magnetic field produces the desired work.

With power factor correction (PFC), a situation can be achieved in which only the necessary active power is transported, both in the transmission and distribution systems as well as applicable customer networks.

Rationale

Power generation utilities, such as LG&E and KU, must make the apparent power available and also transmit it. This means that generators, transformers, power lines, switchgear, etc. must be sized for greater power ratings than if the load only drew active power. Low power factor also reduces distribution capacity by increasing current flow and causing voltage drops. Utilities are therefore faced with extra expenditure on equipment and additional power losses. In some instances, they make additional charges for reactive power if this exceeds a certain threshold.

LG&E and KU could consider a Power Factor Correction Program that would consider rebates or incentives for purchasing PFC equipment that may lower customer's energy bill. These rebates could be combined with state or federal incentives to allow for an even greater reward of the upfront investment. However, this PFC equipment needs to meet the specific requirements and industry governing body certifications to even be considered for a rebate.

Audience

Power factor correction must take place rapidly and close to the load (i.e. directly at the machine generating the reactive power) to achieve the optimum effect of the load reduction on the transmission channels and the reduction of losses.

Currently, PFC equipment is being used primarily in commercial and industrial applications where the customer may have a large number of electrical motors that would have a significant effect on the power factor of utility transmission lines, which span much longer distances than the cables inside homes of residential customers. In addition, many appliance manufacturers are incorporating PFC circuitry into their finished products, thus eliminating the need for extra PFC devices in the home. The primary customers for PFC would be the large commercial sector.

Risks

PFC equipment is widely available and advertised, but its influence on energy consumption is arguable. Furthermore, the energy savings accrued through PFC would have to justify the upfront investment made into these devices. PFC devices improve power quality but do not generally improve energy efficiency. Currently, there is no solid data supporting the benefits of power factor correction. Residential customers are not charged for KVA-hour usage, but by kW-hour usage. Therefore, any savings in energy demand do not directly result in lowering a residential customer's utility bill. Potential for real energy savings could only occur if the PFC device was to be installed in the circuit while a reactive load (i.e. electric motor) was running, and then taken out of the circuit when the motor is not running. This is impractical, given that there are several motors in a typical home that can come on at any time (refrigerator, washer, air conditioner, HVAC blower, vacuum cleaner, etc.).

For commercial facilities, PFC could prove to be rarely cost-effective based on energy savings alone. The bulk of cost savings power factor correction can offer is in the form of avoided utility charges for low power factor. This could be performed by minimizing operation of idling or lightly loaded motors, avoiding operation of equipment above its rated voltage, operating energy-efficient motors near the rated capacity or installing capacitors in AC circuit to decrease the magnitude of reactive power. Energy savings alone do not tend to make an installation of PFC equipment cost effective.

Benefits

There are very few examples of utilities nationwide that have embarked on PFC programs driven by rebates and/or incentives.

City of Ames Electric Services, located in Ames, Iowa, offers a rebate of 50% of the equipment cost of installing power factor correction equipment in industrial and commercial facilities. Their rebate amount does not exceed \$100 per KVAR. Reedsburg Utility Commission (a member of

WPPI Energy) from Wisconsin offers power factor correction services to help commercial and industrial customers maximize their energy dollars.

17. Solar Thermal and Photovoltaic

Overview

Solar thermal is the use of a solar array to assist with hot water heating which can eliminate hot water costs during the summer and lower usage of the hot water tank in winter. The solar array is linked to the hot water tank through a pump. Solar thermal must have maintenance every 5 years to keep the pump work and the pipes clean.

Solar photovoltaic (“PV”) arrays generate electricity which offsets demand required from the utility. At peak solar intensity, a household that is producing more electricity than it is consuming has the opportunity for the auxiliary power to be fed back to the grid through a net metering arrangement.

This program would offer rebates to customers who install either solar thermal or solar PV. This may either be a direct rebate at or after purchase, or a rebate tied into signing up for load control (this method has been used successfully in Florida). One potential approach would be to limit rebates only to solar thermal and have these aligned with appliance rebates. Rebates available to all customers in this program’s rate classes may be developed based upon a dollar value per kW for calculated efficiency improvements.

Rationale

Solar thermal and PV is a long term investment with long payback periods. With the introduction of standard net metering tariff, it is logical that LG&E and KU might support the purchase of solar thermal and PV. This would enable LG&E and KU to support a technology from beginning. Currently the State of Kentucky does not have feed-in-tariffs to support the purchase of solar PV unlike other states such as California. Net metering tariffs pay customers a higher than market rate for electricity sold back to the grid. A rebate program would prepare LG&E and KU for involvement in solar PV should net metering be introduced.

In addition, the appliance rebate program if rolled out, will subsidize the purchase of a high efficiency water heater which presents solar thermal water heating as an option to the customer.

Moving forward it is expected that solar thermal and PV prices will drop as larger manufacturers and retailers enter the market this year and next.

Both the state and the federal government offer tax credits. The state offers \$500 for residential and \$1,000 for commercial while the federal government offers a 30% credit on total cost. An LG&E and KU program would further support these government efforts.

Audience

Currently there are only 16 solar PV arrays which are signed up to the net metering tariff. There are other arrays which are not attached to the grid. Solar thermal volumes are estimated to number in the hundreds across the state. Further research would be required to analyze this should the program be approved.

In theory, any free standing house or business with adequate roof space can install either solar thermal or PV arrays. Solar thermal costs around \$6,000 and solar PV starts at \$8,000 upwards depending on the wattage. Due to the significant upfront cost to purchase this technology, it will limit the audience to customers with a high income, committed environmentalists and commercial buildings.

Solar thermal is currently estimated to be out selling solar PV by a ratio of 2:1. This is likely to continue as the payback period for solar thermal is typically around 5 years in comparison with 10 to 20 the years for solar PV.

Risks

Program overhead costs and organizational challenges may be too great in relation to the small size of the potential market. Additionally, the incentives available may not be adequate to shift the purchasing decisions of prospective homebuyers. Another potential effect of the program is to merely provide an extra subsidy to customers who would have purchased solar PV or thermal in any event (the “free rider” principle).

Running a solar rebate program combined with a load control program may prove a difficult program to implement due to the complicated marketing message to consumers and cross subsidization of measures (e.g. if a customer wants to have a switch removed at a later date).

KENTUCKY UTILITIES COMPANY

CASE NO. 2009-00548

**Supplemental Request For Information on Behalf of CAC
Dated March 26, 2010**

Question No. 4

Responding Witness: Butch Cockerill

- Q-4. In response to CAC's Initial Request for Information, Question 19, the Company states that it provides "training for customer service representatives and assistance agencies" to help customers understand how the Company's customer service system issues double credits which may result in very small bills that don't accurately reflect the amount owed. Please describe the training provided to assistance agencies specifically with regard to this issue, including where, when and what agencies were trained in the Kentucky Utilities service area.
-
- A-4. On September 22, 2009, Community Action Kentucky (CAK) hosted a LIHEAP training program for their directors and staff members of the various CAK agencies. KU's Customer Commitment staff attended this meeting and explained the pledge payment process in the new Customer Care Solution system. All CAK agency personnel in attendance were advised the dollar value of pledges would show on the customer's account immediately, as a credit, even though KU had not yet received the payment. It was also explained that it was possible for the customer to see the pledge amount credited to the bill twice until the pledge was fulfilled. In addition, the KU Customer Commitment staff informed the attending CAK members that, effective with the 2009/2010 heating season, pledge payments would be automatically cancelled if not paid within sixty (60) days.