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PUBLIC SERVICE COMMISSION

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February 3, 2012

RE: ***Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for a Certificate of Public Convenience and Necessity and Site Compatibility Certificate for the Construction of a Combined Cycle Combustion Turbine at the Cane Run Generating Station and the Purchase of Existing Simple Cycle Combustion Turbine Facilities from Bluegrass Generation Company, LLC in Buckner, Kentucky***
Case No. 2011-00375

Dear Mr. DeRouen:

Enclosed please find an original and ten copies of Louisville Gas and Electric Company's and Kentucky Utilities Company's Rebuttal Testimony of David S. Sinclair in the above-referenced docket.

Also enclosed are an original and ten copies of a Joint Petition for Confidential Protection and for Deviation from Filing Requirements regarding certain information contained in the Rebuttal Testimony of Mr. Sinclair.

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

Sincerely,

Rick E. Lovekamp

c: Parties of Record

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

JOINT APPLICATION OF LOUISVILLE GAS AND ELECTRIC COMPANY AND KENTUCKY UTILITIES COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY AND SITE COMPATIBILITY CERTIFICATE FOR THE CONSTRUCTION OF A COMBINED CYCLE COMBUSTION TURBINE AT THE CANE RUN GENERATING STATION AND THE PURCHASE OF EXISTING SIMPLE CYCLE COMBUSTION TURBINE FACILITIES FROM BLUEGRASS GENERATION COMPANY, LLC IN BUCKNER, KENTUCKY	)	CASE NO. 2011-00375

REBUTTAL TESTIMONY OF
DAVID S. SINCLAIR
VICE PRESIDENT, ENERGY MARKETING
KENTUCKY UTILITIES COMPANY AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Filed: February 3, 2012

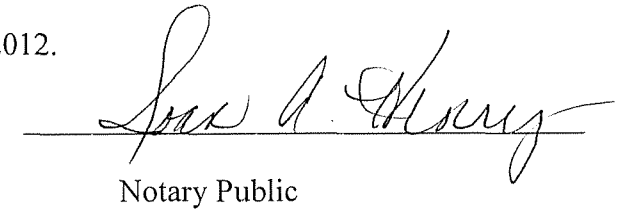
VERIFICATION

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

The undersigned, **David S. Sinclair,** being duly sworn, deposes and says he is the Vice President, Energy Marketing for Kentucky Utilities Company and Louisville Gas and Electric Company, and that he has personal knowledge of the matters set forth in the foregoing testimony, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

DAVID S. SINCLAIR

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 3rd day of February, 2012.



(SEAL) Notary Public

My Commission Expires:

July 21, 2015

Q. Please state your name, position, and business address.

A. My name is David S. Sinclair. I am Vice President, Energy Marketing for Louisville Gas and Electric Company ("LG&E") and Kentucky Utilities Company ("KU") (collectively, "Companies") and an employee of LG&E and KU Services Company, which provides services to LG&E and KU. My business address is 220 West Main Street, Louisville, Kentucky 40202. I submitted Direct Testimony in this proceeding on September 15, 2011, which contained a statement of my qualifications, experience, job responsibilities, and previous testimony before the Commission.

Q. Are you sponsoring any exhibits?

A. Yes. I am sponsoring the following exhibits:

Rebuttal Exhibit DSS-1	DSM-EE Energy Reductions
Rebuttal Exhibit DSS-2	Revenue Requirements Summary, Updated Final Phase II Analysis with Sullivan's Hypothetical DSM
Rebuttal Exhibit DSS-3	Long-term Expansion Plans
Rebuttal Exhibit DSS-4	Revenue Requirements Summary, Updated Final Phase II Analysis, with Sullivan's Hypothetical DSM and Wind
Rebuttal Exhibit DSS-5	Gas Price Forecast Comparison
Rebuttal Exhibit DSS-6	Load and Dispatch Curves for Wind and Cane Run Units 4, 5, and 6
Rebuttal Exhibit DSS-7	Load and Dispatch Curves for Wind, Cane Run Units 4, 5, and 6, and Cane Run Unit 7
Rebuttal Exhibit DSS-8	Historical Generation, Brown Units 1 & 2
Rebuttal Exhibit DSS-9	Strategist and PROSYM Data Files

Also attached to my testimony are six appendices that contain sources cited in certain footnotes.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to rebut the arguments made by Mr. Sullivan and Mr. Chernick on behalf of the Sierra Club and Natural Resources Defense Council ("Environmental Intervenors"). They recommend that the Commission not approve the Companies' request and suggest hypothetical additional Demand-Side Management and Energy Efficiency efforts ("DSM-EE") (beyond those proposed by the Companies and approved by this Commission) combined with unspecified renewable purchase power agreements ("PPAs") as alternatives to the Companies' proposal in this proceeding to build a natural gas combined cycle combustion turbine ("NGCC") at Cane Run ("Cane Run Unit 7") and acquire natural gas simple cycle combustion turbines from Bluegrass Generation Company, LLC ("Bluegrass CTs") in Oldham County. As confirmed in the Environmental Intervenors' responses to interrogatories from both the Commission Staff and the Companies, the Environmental Intervenors acknowledge that "energy efficiency alone cannot meet the Company's claimed capacity shortfall" and that the recommendations in their testimony are unsupported.[1] Despite this shortcoming, my testimony will show that, even if the Environmental Intervenors' unsupported options are considered, the Companies' proposed construction of Cane Run Unit 7 and the acquisition of Bluegrass CTs should be approved as I recommended in my Direct Testimony.

[1] Responses and Objections from Environmental Intervenors to First Information Request of Commission Staff, Response to Question 2(b) (Jan. 23, 2012).

Q. Does the Environmental Intervenors' rebuttal testimony show that the Companies' analysis already provided in this proceeding was in any way deficient?

A. It certainly does not. Rather, the Environmental Intervenors' testimony has no factual or analytical support. Instead of a careful analysis, the Environmental Intervenors provide mere speculation about what might be achieved by unsubstantiated hypothetical alternatives to the real options the Companies studied. When asked to provide specific alternatives or to provide any kind of analysis to support their claims, the Environmental Intervenors admit they have done no analysis and assert it is not their job to provide alternatives to the Companies' proposal.[2] Furthermore, their claims of potential flaws in the Companies' analysis are unsupported.

As my Direct Testimony and the testimony of the Companies' other witnesses described, determining how to meet customers' current and future energy needs requires examining what is actually available in the marketplace. The Companies conducted a wide-ranging and thorough Request for Proposals ("RFP") process to determine the real options available to meet their customers' needs. After canvassing the marketplace, the Companies analyzed all reasonable and feasible options the market presented to determine the most cost-effective resource mix and the timing of new resources to meet projected demand; that mix is what the Companies have applied for in this proceeding. It is a concrete proposal to meet customers' very real needs made in accordance with well-established Kentucky law regarding public convenience and necessity.

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[2] In response to the Companies' questions, the Environmental Intervenors responded multiple times that no analysis was performed or that requested information has not been developed or is otherwise unavailable.

Therefore, my testimony below and the analyses contained herein are not an acknowledgment that the Companies' analyses have been in any way inadequate. Rather, they are an application of analytical rigor to the Environmental Intervenors' vague generalities and unsupported assertions. Doing so demonstrates that their suggestions and positions lack any merit whatsoever.

Section 1 – Hypothetical DSM-EE Does Not Displace the Need for Cane Run Unit 7 and Bluegrass CTs

Q. Please describe your understanding of Mr. Sullivan's hypothetical DSM-EE reductions.

A. Mr. Sullivan asserts that it should be possible for the Companies to develop DSM-EE programs that will annually incrementally reduce total sales by 0.5%, 0.75% and 1.0% in 2012, 2013 and 2014 through 2017, respectively.[3] He then subtracts the Companies' existing annual incremental DSM-EE from his hypothetical DSM-EE and converts the cumulative forecasted energy savings to an annual incremental peak demand reduction using a 75% load factor.[4, 5]

Q. Do any of the Companies' current DSM-EE programs achieve savings at a 75% load factor?

A. No, not based on the way Mr. Sullivan described his hypothetical DSM-EE. There are very few programs that could achieve a 75% load factor because there are very few end use technologies that operate at this high of a load factor. The DSM-EE programs that could potentially achieve this level of savings would likely be targeted

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[3] Direct Testimony of Dylan Sullivan ("Sullivan Testimony") at Exhibit DES-2 (Dec. 20, 2011).
[4] Mr. Sullivan used the mathematical formula for calculating load factor to determine the peak reduction of his hypothetical DSM-EE.
[5] Note that Mr. Sullivan seems to use a 65% load factor to calculate the values shown on page 3 of his testimony. .

at industrial processes. The Companies' current DSM-EE portfolio of programs is focused on residential and commercial customers.

Q. Why do the Companies focus only on DSM-EE programs that impact residential and commercial customers?

A. First, approximately 9 percent of the Companies' total sales are to wholesale municipal customers in Kentucky and retail customers in Virginia that are not subject to Commission regulation and do not participate in the Companies' DSM-EE programs. Second, industrial customers make energy efficiency investments on their own to reduce costs and gain a competitive advantage in their respective industries. To date, there has not been enough interest by industrial customers to support cost effective DSM-EE programs. However, the energy-efficiency efforts of industrial customers have been incorporated within the Companies' load forecast through both direct input from large customers and economic modeling of smaller customers.

Q. Given that industrial customers have not historically participated in the Companies' DSM-EE programs, is it appropriate for Mr. Sullivan to apply his "Robust Annual Energy Efficiency Goal" to total company sales?

A. No. The Companies do not develop specific DSM-EE programs to meet an arbitrary annual sales reduction target. Instead, the Companies design programs utilizing input from their DSM Advisory Group, independent research, and the California Standards Practice Manual to determine customer interest and cost-effectiveness. Coincidentally, as shown in Rebuttal Exhibit DSS-1, the Companies' existing DSM-EE portfolio is projected to reduce incremental annual sales to residential and commercial customers by an average of 1 percent through 2017, consistent with Mr. Sullivan's 1 percent target.

Q. Are the Companies' DSM-EE programs the only way that customers' future energy-efficiency activities are captured in the load forecast?

A. No. Besides the previously mentioned activities of industrial customers, the Companies use statistically adjusted end-use models from ITRON to develop residential and small commercial use-per-customer forecasts. These models capture future appliance efficiency standards and customer appliance replacement trends.

Q. How do the Companies' DSM-EE programs compare to benchmarks?

A. The Companies' DSM-EE programs were reviewed by ICF International ("ICF") in preparation for Case No. 2011-00134 to benchmark the DSM-EE portfolio against those of similarly-sized utilities.[6] ICF concluded that the Companies' programs meet or exceed best practices for similar programs across the utility industry.

Q. Despite your reservations about Mr. Sullivan's hypothetical DSM-EE, did you evaluate the impact it would have on the Companies' need for capacity and energy?

A. Yes. As I discussed in my Direct Testimony, the Companies expect to be 877 MW short of their target reserve margin in 2016.[7] This is primarily the result of the retirement by 2016 of Cane Run Units 4, 5, and 6, Green River Units 3 and 4 and Tyrone Unit 3, which will reduce the Companies' generation portfolio by 797 MW. Further, the Cane Run and Green River units have historically generated approximately 4 million MWh annually, representing about 12 percent of the

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[6] *In the Matter of: Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for Review, Modification, and Continuation of Existing, and Addition of New Demand-Side Management and Energy Efficiency Programs*, Case No. 2011-00134, Application Vol. I, "Louisville Gas and Electric Company / Kentucky Utilities Company DSM Program Review Report," (Apr. 14, 2011). The ICF Report is attached hereto as Appendix A.

[7] Direct Testimony of David S. Sinclair at 15 (Sept. 15, 2011).

Companies' total generation. This loss of steel-in-ground generating capacity and energy compares to Mr. Sullivan's hypothetical, non-program-specific forecast of "Robust DSM" that will reduce 2016 peak by 125 MW and provide 820 thousand MWh of energy at a 75 percent load factor. Subtracting Mr. Sullivan's hypothetical DSM-EE of 125 MW in 2016 from the Companies' total capacity need of 877 MW leaves a 752 MW shortfall. This shortfall can only be only partially met by the 495 MW Bluegrass CTs, which Mr. Chernick and Mr. Sullivan do not oppose, still leaving the Companies 257 MW short of their target reserve margin.[8] However, because the Bluegrass CTs provide only peaking energy, the Companies would still face a considerable energy shortfall. Thus, even if Mr. Sullivan's DSM-EE were achieved, construction of Cane Run Unit 7 would still be necessary.

Q. Please describe how you analyzed the impact of Mr. Sullivan's hypothetical DSM-EE.

A. Mr. Sullivan indicated that he spread his hypothetical DSM-EE over 75 percent of the hours in the year.[9] However, Mr. Sullivan admits that he performed no analysis of the hourly shape or the revenue requirement impact of his hypothetical DSM-EE plan.[10] To cast Mr. Sullivan's hypothetical DSM-EE in the most favorable light possible, we spread the forecasted energy reductions over the 18 hours that typically have the greatest load (beginning at 6 a.m. and ending at midnight) and held his hypothetical DSM-EE in 2017 at that level throughout the remainder of the planning

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[8] The purchase of the Bluegrass CTs was included in the portfolio as recommended by the Companies and supported by the Environmental Intervenors. *See* Direct Testimony of Paul Chernick ("Chernick Testimony") at 3, lines 15-18 (Dec. 20, 2011); Responses and Objections from Environmental Intervenors to First Information Request of Commission Staff, Question No. 2(b) (Jan. 23, 2012).

[9] Sullivan Testimony at 7.

[10] Responses and Objections from Environmental Intervenors to First Information Request of Louisville Gas and Electric Company and Kentucky Utilities Company, Question Nos. 4 and 6 (Jan. 23, 2012).

period. Next we evaluated the impact of this hypothetical DSM-EE on the revenue requirements of three of the Updated Final Phase II options:[11]

i) SB 2x1 (640) + 3 CTs (Sale 2012)

ii) SB 2x1 (605) + 3 CTs (Sale 2012)

iii) SB 3x1 (907)

Option (i) was selected for evaluation because it was the least-cost option identified in the 2011 Resource Assessment ("Resource Assessment") and forms the basis of my recommendation that this Commission approve the construction of Cane Run Unit 7 and the acquisition of the Bluegrass CTs.[12] Option (ii) was selected for further evaluation because greater DSM-EE would likely reduce the need for capacity and thus might make a smaller NGCC more economical. Option (iii) was selected for further evaluation because, while greater DSM-EE might eliminate the need to purchase the Bluegrass CTs, the Companies would still be 752 MW short of capacity after including Mr. Sullivan's hypothetical DSM-EE and would, therefore, need a larger NGCC. Note that none of the Bluegrass PPA options were re-evaluated because the Companies did not negotiate a PPA and there is no way of knowing if that would be a viable option at this point in time. Therefore, the only impact Mr. Sullivan's hypothetical DSM-EE can have is on the choice of real options available to the Companies.

Q. What was the result of your analysis?

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[11] Utilizing the most current data presented in this proceeding, we used the following assumptions: 2011 Wood Mac/PIRA Prices, 2012 Load Forecast, updated costs for self-build alternatives and transmission facilities, and no economy purchases as detailed in the *2011 Resource Assessment*, Sections 6 and 7.

[12] The Resource Assessment was Exhibit DSS-1 to my direct testimony, filed on Sept. 15, 2011.

A. To evaluate the impact of including Mr. Sullivan's hypothetical DSM-EE plan, we utilized the same process and models employed in the Resource Assessment to evaluate the RFP responses and self-build options. First, we developed a least-cost expansion plan and the associated capital revenue requirements in Strategist for each of the three options.[13] Next, using PROSYM, we modeled the production cost revenue requirements for the three portfolios. Total system revenue requirements were then calculated including fixed O&M, gas transportation costs, and firm electric transmission costs. The present value revenue requirement ("PVRR") for each option is shown Rebuttal Exhibit DSS-2, which demonstrates that the Companies' recommendation to build Cane Run Unit 7 as a 640 MW unit and acquire the Bluegrass CTs remains the least-cost option even with the inclusion of Mr. Sullivan's hypothetical DSM-EE plan.

Q. Did you evaluate the impact of Mr. Sullivan's hypothetical DSM-EE on any of the wind proposals from the Companies' Request for Proposals ("RFP")?

A. Yes. Mr. Chernick objected that the Companies evaluated none of the RFP wind proposals in the Final Phase II process so we created an option that replaced Cane Run Unit 7 with nothing but wind proposals from the RFP. As I previously discussed, the Companies would be 257 MW short in 2016 after Mr. Sullivan's hypothetical DSM-EE and purchasing the Bluegrass CTs. Because wind conditions are usually very poor at the time of summer peak, only 15 percent of the nominal capacity rating was assumed to be available to meet this 257 MW shortfall.[14] To

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[13] The data for the Strategist and PROSYM modeling runs conducted at my direction are assembled in Rebuttal Exhibit DSS-9 hereto.

[14] The use of 15 percent of nominal rating at time of peak is actually quite generous because NERC's "2011 Summer Reliability Assessment" indicated that ERCOT, MISO, and PJM assumed that wind generators have an

meet this shortfall with wind, the Companies would have had to accept each unique proposal (note that some bidders provided multiple proposals from the same wind project) offered in the RFP but still would have only achieved 123 MW of firm summer capacity despite purchasing 820 MW of nominal capacity.[15] Even after accepting every unique wind proposal from the RFP, the Companies would still be 134 MW short of their target reserve margin in 2016.[16] To meet this remaining need and all future resource needs, we used Strategist to select the least-cost generating portfolio for the remaining years under this "hypothetical DSM-EE/wind" scenario (see Rebuttal Exhibit DSS-3 for a description of this portfolio). The revenue requirements of this new wind-based portfolio were then evaluated using the same process described above and used in the Updated Final Phase II analysis in the Resource Assessment.

Q. What was the result of this analysis?

A. This analysis showed that, even with the addition of Mr. Sullivan's hypothetical DSM-EE and purchasing the largest quantity of wind achievable from the RFP options, Strategist selected Cane Run Unit 7 in 2016 as a least-cost resource as shown in Rebuttal Exhibit DSS-3. This provides further evidence that constructing Cane Run Unit 7 is the best solution. Not only was Cane Run Unit 7 selected as a least-cost resource, but the hypothetical wind portfolio had significantly higher PVRR than

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availability of 8.7%%, 12.9%, and 13% respectively. Available at: http://www.nerc.com/files/2011%20Summer%20Reliability%20Assessment_FINAL.pdf, pages 36, 51, and 130.

[15] This analysis included Response Nos. 6C, 6F, 7D, 8C, 10, 11, and 14 as shown in the *2011 Resource Assessment*, 11.1 Appendix A – Phase I Screening Results, p. 37.

[16] To maintain consistency with previously filed testimony, figures for reserve margin shortfalls in 2016 are based on the 2011 Load Forecast. The 2012 Load Forecast was used for the rebuttal analysis. The difference between these forecasts in 2016 is relatively minor as shown in Table 23 of the *2011 Resource Assessment*, page 29.

the other three alternatives that included Mr. Sullivan's hypothetical DSM-EE as shown in Rebuttal Exhibit DSS-4. This demonstrates conclusively that the specific wind options that were proposed in the Companies' RFP are not part of the least-cost portfolio and refutes Mr. Chernick's claim that wind energy is a competitive alternative at this time in Kentucky.[17]

Q. So what do you conclude from the various analyses you performed using Mr. Sullivan's hypothetical DSM-EE and Mr. Chernick's suggestion that renewable generation, particularly wind, should replace the need for Cane Run Unit 7?

A. I conclude that even if Mr. Sullivan's hypothetical DSM-EE were to be achieved, it would not displace the need for Cane Run Unit 7 and that it would not make Mr. Chernick's proposed wind portfolio the least-cost alternative to replace retiring generating units and meet customers' future energy needs.

Section 2 – Analysis of Renewable Responses to the Companies' RFP

Q. What are Mr. Chernick's concerns with how renewable generation was evaluated in the Resource Assessment?

A. Mr. Chernick seems to be primarily concerned with how the Resource Assessment dealt with the following areas:

i) fuel price volatility,

ii) emission allowance prices for sulfur dioxide ("SO_2") and nitrogen oxides ("NO_x"), and

iii) future carbon dioxide ("CO_2") regulations and prices.

[17] Chernick Testimony at 14, lines 7-8.

Furthermore, he states that he did not find any explicit treatment of risk in the Resource Assessment.[18]

Q. Is it true that there is no "explicit treatment of risk in the Resource Assessment"?

A. No. The Companies evaluated uncertainty associated with natural gas prices, coal prices, electricity prices, and load. The Companies' recommendation to build Cane Run Unit 7 and purchase the Bluegrass CTs is robust under all of these possible futures.

Q. What are Mr. Chernick's concerns regarding fuel price volatility?

A. Mr. Chernick cites historical volatility in Northern Appalachian coal costs as evidence fuel price volatility creates "financial and economic stress of (sic) electricity consumers" and therefore that renewable generation such as wind should be preferred. There are numerous problems with Mr. Chernick's statement. First, the Companies have historically purchased very little Northern Appalachian coal because they are much closer to the coal fields of Kentucky and the Illinois Basin. Second, the Companies do not currently have any long-term Northern Appalachian coal contracts. Third, Northern Appalachian coal prices tend to be more volatile because it is a close substitute for metallurgical coal. Fourth, the Resource Assessment focused on evaluating responses to the Companies' RFP for capacity (of which only one proposal had coal price risk) and self-build options (which were all natural gas-fired) so the impact of coal price volatility on the existing generating fleet is not

[18] Chernick Testimony at 10, line 11.

going to be a material driver of revenue requirement differences between the various RFP and self-build options.

Q. What about uncertainty associated with future natural gas prices?

A. The Companies evaluated the Updated Final Phase II options under two different long-term natural gas price forecasts: a higher one prepared by PIRA and a lower one prepared by CERA.[19] The graph in Rebuttal Exhibit DSS-5 shows these two forecasts as well as one prepared by Synapse (co-authored by Mr. Chernick), a consulting firm that has testified for Mr. Chernick's clients (the Sierra Club and Natural Resource Defense Council) in a recent case in front of this Commission.[20] As one can see, the long-term Synapse price forecast falls in between the forecasts used by the Companies. Because "Mr. Chernick has not produced a forecast of future natural gas prices for this proceeding," the Companies cannot quantify the specific impact of Mr. Chernick's general assertions regarding natural gas prices.[21] Although Mr. Chernick may claim that the Companies did not evaluate various options under high or low natural gas price cases, this graph clearly shows that the PIRA and CERA forecasts the Companies used provide a broad range of possible future prices and are above and below a forecast that both Mr. Chernick and his clients have recently endorsed.

Q. What is the impact of natural gas prices on the economics of renewable generation such as wind?

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[19] See *2011 Resource Assessment*, Table 21, page 27.

[20] Synapse's AESC 2011 gas price forecast was published in the *Avoided Energy Supply Costs in New England: 2011 Report*, Synapse Energy Economic, Inc., July 21, 2011, Amended August 11, 2011, Exhibit D-9, Appendix D, p. D-10. Available at: http://www.synapse-energy.com/Downloads/SynapseReport.2011-07.AESC.AESC-Study-2011.11-014.pdf.

[21] Responses and Objections from Environmental Intervenors to First Information Request of Louisville Gas and Electric Company and Kentucky Utilities Company, Question No. 11 (Jan. 23, 2012).

A. Wind generation is typically more expensive than NGCC technology, especially when accounting for the costs associated with wind's intermittent generating characteristics and low availability at times of peak load. Still, higher natural gas prices would tend to economically benefit wind generation. That is why it is important to note that while Mr. Chernick complains that none of the wind options were evaluated under a different gas price forecast,[22] they were, in fact, evaluated under a gas price forecast that is higher than the one put forward by Synapse as shown in Rebuttal Exhibit DSS-5 and yet were still not least-cost. Furthermore, as shale gas continues to develop and put downward pressure on natural gas prices, this will make it more difficult to develop wind and other renewable resources.[23] As MIT researchers noted, "[C]heaper gas serves to reduce the rate of market penetration of renewable generation."[24, 25]

Q. What are Mr. Chernick's concerns regarding emission allowance prices for SO_2 and NO_x?

A. Mr. Chernick seems to believe that future SO_2 and NO_x allowance prices create a significant risk for the selection of Cane Run Unit 7 and Bluegrass as least-cost resources.[26]

Q. What is the impact of price of SO_2 and NO_x allowance prices on the dispatch cost of Cane Run Unit 7?

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[22] Chernick Testimony at 12, lines 1-4.
[23] Finlay, J., "Consultant: Without subsidies, renewables will get priced out by natural gas," *SNL Financial*, October 11, 2011. A copy is attached hereto as Appendix B.
[24] Jacoby, H., O'Sullivan, F, and Paltsev, S., "The Influence of Shale Gas on U.S. Energy and Environmental Policy," *Economics of Energy and Environmental Policy*, Vol. 1, No. 1, January 2012, p. 49. Available at: http://globalchange.mit.edu/files/document/MITJPSPGC_Reprint_12-1.pdf
[25] "The Future of Natural Gas: An Interdisciplinary MIT Study," MIT Energy Initiative, 2011. Available at: http://web.mit.edu/mitei/research/studies/documents/natural-gas-2011/NaturalGas_Report.pdf.
[26] Chernick Testimony at 11, lines 11-14.

A. Although CSAPR has been stayed by a federal court, prior to the stay, the EPA was forecasting that SO_2 prices would be $1,100 per ton and annual and seasonal NO_x prices would be $600 per ton and $1,500 per ton, respectively.[27] Because a NGCC such as Cane Run Unit 7 emits virtually no SO_2, the price of an allowance would have an insignificant impact on its dispatch cost. Cane Run Unit 7 will emit a small amount of NO_x, so the price of allowances at EPA's forecasted level would add about $0.33 per MWh to its dispatch cost, an immaterial amount compared to its total dispatch cost of around $35 per MWh (assuming $5 per mmBtu gas).

Q. What are Mr. Chernick's concerns regarding future CO_2 regulations and prices?

A. Mr. Chernick believes that "it is certainly possible that the costs (for CO_2 emissions) will be positive, and they may be very large," although he fails to specify what "possible" means, the timing of such regulations, and what "positive" means.[28] Furthermore, Mr. Chernick admits that he has not developed an actual "probability weighted average" of potential future CO_2 emissions costs and has not evaluated the level of CO_2 costs needed to refute the Companies' recommendation in this proceeding.[29] However, because of his belief, Mr. Chernick feels that the Companies should have included an unknown and unknowable future CO_2 cost in its evaluation of the RFP responses and its self-build options.

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[27] 2014 prices in 2007 dollars. SO_2 price is for Group 1 states. "Regulatory Impact Analysis for the final Transport Rule Docket ID No. EPA-HQ-OAR-2009-0491", U.S. EPA, June 2011, Table 7-12, p. 260. Available at: http://www.epa.gov/airtransport/pdfs/FinalRIA.pdf.

[28] Chernick Testimony at 8 lines 18-19.

[29] Responses and Objections from Environmental Intervenors to First Information Request of Louisville Gas and Electric Company and Kentucky Utilities Company, Question No. 10 (Jan. 23, 2012).

Q. Why didn't the Companies evaluate the risk of future CO_2 prices in the Resource Assessment?

A. It is not prudent to pay a premium today to address unknown and unknowable future greenhouse gas regulations. If CO_2 regulations of the type contemplated by Mr. Chernick occur at some future date, then the Companies can evaluate the least-cost options (including renewables) at that time based on the state of technology at that time (which renewable advocates claim will only get better and cheaper). Furthermore, many analysts feel that NGCC technology will at a minimum be a bridge to a lower carbon generation future.[30, 31] In that case, building Cane Run Unit 7 to replace retiring coal generation can be seen as a first step in moving the Companies' generating fleet to one with a lower carbon intensity. Finally, there is some evidence that today's wind technology is not a least-cost means to comply with CO_2 emission reduction targets. A report by Civitas concludes that when all of the costs associated with wind are included, there is no economic case for wind generation as a means to reduce CO_2 emissions.[32]

Q. Are there any risks or uncertainties associated with wind generation that were not mentioned by Mr. Chernick but that should be considered when evaluating them to meet customer needs?

A. Yes. It is important to remember that the retirement of 797 MW of capacity that historically have generated 4 million MWh a year of energy (approximately 12

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[30] Scott, M., "Shale Reserves: Gas Seen as Bridge between Old and New Forms of Power," *Financial Times*, November 25, 2011. Available at: http://www.ft.com/cms/s/0/2c71975e-142f-11e1-b07b-00144feabdc0.html.

[31] "The Future of Natural Gas" at 2. *See* n.25.

[32] Lea, R., "Electricity Costs: The folly of wind power," Civitas, January 2012, p.19. This study looks at the cost of various technologies to meet the United Kingdom's CO_2 reduction targets. Available at: http://www.civitas.org.uk/economy/electricitycosts2012.pdf.

percent of total generation) is the primary driver for the Companies' request to build Cane Run Unit 7 and purchase the Bluegrass CTs. Furthermore, Cane Run Units 4, 5, and 6 and Green River Units 3 & 4 provide a significant amount of energy to meet the on-peak (the time of day when the demand is greatest) needs of our customers. Rebuttal Exhibit DSS-6 compares a typical daily dispatch curve of Cane Run Units 4, 5, and 6 for January and July and that of a typical wind generation curve to a typical load curve.[33] As shown, wind does not supply energy when our customers typically need it the most. As I previously mentioned, wind generation simply does not have high availability during system peaks or throughout the month as can be seen in Rebuttal Exhibit DSS-6 by its low ratio of average hourly energy to nominal capacity. As a result, wind energy is often just displacing lower cost coal generation in off-peak hours and non-peak months and causing more expensive gas-based peaking generation to run in the on-peak hours.

Q. So are Cane Run Unit 7 and the Bluegrass CTs going to directly replace all of the energy that is currently being supplied by the coal stations that will be retired?

A. No. Cane Run Unit 7 has the ability to cycle daily, whereas this is not practical for the coal plants that are being retired. As a result, virtually all of the off-peak energy that is currently coming from Cane Run Unit 4, 5, and 6 and Green River Units 3 and 4 will largely be supplied by the Companies' remaining coal units running at greater capacity factors. Using the Updated Final Phase II Base Case Prices, we expect Cane

[33] The generation indices for wind were calculated by dividing the expected hourly wind generation curve (from Response #10 to the Companies' RFP) by the nominal capacity. The indices for Cane Run Units 4, 5, and 6 were derived by dividing the actual 2010-2011 average hourly generation by the units' corresponding seasonal capacity ratings. The load indices were derived by averaging the 2010-2011 indices, which were calculated by dividing the actual 2010-2011 hourly loads by the corresponding monthly peak demands for each year.

Run Unit 7 to produce about 2 million MWh in 2016. Rebuttal Exhibit DSS-7 shows the typical daily generation profile for Cane Run Unit 7 in January and July.[34] As you can see, it better matches the load needs and the lost energy from the retiring plants than does the wind profile. Finally, the Bluegrass CTs are peaking units, and, like all peaking units, they will provide limited amounts of energy--but at times of extreme load conditions when the system is most stressed and energy is needed most.

Q. Are there any potential costs associated with wind that were not reflected in the Resource Assessment but that would have been required to be evaluated more carefully had a wind offer been priced such that it made it to the Final Phase II analysis?

A. Yes. It is becoming better understood in the industry that intermittent nature of wind requires an increase in the amount of dispatchable generating capacity that must be available to quickly respond to wind's fluctuating output.[35, 36] The cost to our system of providing this increase in dispatchable generation would need to be evaluated.

Section 3 – Asset Ownership Per Se Does Not Increase Cost Risk to Customers Relative to a Purchase Power Agreement

Q. Do you agree with Mr. Chernick that the Resource Assessment did not take into account the different risks of asset ownership and PPAs?

A. No. As someone who has, over the last 15 years, personally negotiated numerous PPAs (as both a buyer and seller) involving thousands of megawatts, I can assure the Commission that the risks inherent in asset ownership and a PPA were appropriately

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[34] The indices for Cane Run Unit 7 were derived by dividing the forecasted 2016 average hourly generation by the unit's corresponding seasonal capacity rating.
[35] Makovich, L, Littlehale, P., "Recalibrating Power Supply Cost Assessments," IHS CERA, December 14, 2011, at 1. A copy is attached hereto as Appendix C.
[36] "The Future of Natural Gas" at 10. *See* n.25.

captured in the Resource Assessment. Mr. Chernick seems to have a view that PPA sellers willingly take on such risks as development, permitting, plant operations, O&M costs, capital costs, and plant availability at no cost to the buyer. This situation does not exist in the marketplace. A PPA is not a free lunch when it comes to risk. The price that a seller is willing to offer reflects the risk that the seller is taking. There is no basis to believe that the respondents to the Companies' RFP did not fully price the risk that they were undertaking. Similarly, the Companies' self-build option captures the cost of taking on similar risks in the cost of debt and equity.

Q. What about Mr. Chernick's claim that under a PPA, "If the plant does not work, the Companies and their customers do not pay," whereas if the Companies own a plant the customers pay the full cost if the plant operates or not?[37]

A. Again, this is simply not true. If a seller fails to deliver energy under a PPA, replacement power must be found. Either the Company will have to run higher cost generation or purchase energy from another party. The question then becomes, who pays for this replacement energy? Unfortunately, it is almost always the buyer in one way or another, either in the price of the power under the PPA or at the time it buys replacement energy. If the PPA has a liquidated damage ("LD") provision, then the seller will reimburse the buyer for some amount of replacement power cost. My experience in asset-based transactions is that sellers never take unlimited LD risk, so buyers usually have some replacement energy exposure. However, the risk of paying LDs is built into the price the seller charges, so the buyer, in effect, is just prepaying

[37] Chernick Testimony at 12, lines 11-13 and lines 17-19.

for a certain amount of replacement power cost through the PPA price. This is what I mean when I say that the buyer almost always pays the cost of replacement power when a seller fails to perform.

Q. Is it true that the Companies can just pass on the costs of power plants whether they operate or not as suggested by Mr. Chernick?

A. No. Regulated utilities like LG&E and KU are allowed to collect only prudently incurred costs from our customers. This is a strong incentive for the Companies to properly manage the risks associated with building and operating Cane Run Unit 7 and it caused the Companies to perform the appropriate due diligence on the condition of the Bluegrass CTs before they agreed to purchase them. Furthermore, all of the Companies' costs are subject to review by the Commission as part of the Fuel Adjustment Clause, the Environmental Cost Recovery Mechanism, and base rate cases. These proceedings help ensure that the Companies properly maintain and operate their facilities.

Q. Mr. Chernick states that the Companies would save the fixed capital and operating costs of power that is not delivered under an energy-only priced PPA.[38] Would the Companies be at risk of overpayment for these same costs if power were over-delivered in a fixed-price PPA, particularly in a non-dispatchable wind contract?

A. Yes. It is highly likely that a seller would attempt to set its fixed price assuming as low a capacity factor as possible to assure that its fixed costs were collected and that it had upside should the plant perform better. Therefore, any sales in excess of this

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[38] Responses and Objections from Environmental Intervenors to First Information Request of Commission Staff, Response to Question 7(b) (Jan. 23, 2012).

minimum amount would result in the buyer paying more than the actual fixed costs of the facility. Mr. Chernick seems to consider only the costs associated with the risk of underperformance by the seller, when, in fact, there are also costs to the buyer associated with the risk of over-performance.

Q. Are there any hard-to-quantify advantages to plant ownership that Mr. Chernick may have overlooked?

A. Yes. One key advantage to ownership is operational control and responsibility. As an owner, one can better control how a plant is maintained and can do things that might increase its performance and lower its costs over time - actions that would benefit our customers. Under a fixed-price PPA of the type favored by Mr. Chernick, any benefits from improved performance or cost management flow to the seller, who most likely priced the energy assuming costs would likely go up and performance would likely deteriorate. In other words, the seller tries to structure a PPA so that it gets all of the upside and little of the downside. Furthermore, should a significant problem occur with a plant under a PPA, the buyer's only recourse is what it was able to negotiate in the PPA, which, in my experience, is likely to give it little control over fixing a problem with a generating asset. If a significant problem does arise under a PPA, there is a material likelihood that significant litigation will follow, adding still more cost to a PPA.

Section 4 – Pending EPA Regulations Do Not Materially Impact the RFP Evaluation

Q. Mr. Chernick expresses concerns that the "Resource Assessment does not provide a clear summary of the effects of the Companies' plans for

environmental compliance on dispatch of its existing system ...."[39] Please explain how the Resource Assessment captures environmental compliance costs.

A. The impacts of the Companies' plans for environmental compliance on the dispatch of its existing system are fully reflected in the analyses supporting the Resource Assessment. These effects include the variable operating costs of new environmental equipment, as well as the associated impacts on unit capacities and emissions.

Q. How do these environmental compliance costs impact the evaluation of the RFP responses and Cane Run Unit 7?

A. Not much. It is important to remember that the Resource Assessment was primarily focused on identifying the least-cost options for meeting future load after all of the existing generation fleet had either complied with new environmental regulations or been retired. All environmental compliance costs were captured for each of the RFP responses and the various Cane Run Unit 7 self-build options. Therefore, it is the unique cost of each RFP proposal and self-build option that drives the differences among the various alternatives described in the Resource Assessment.

Q. Mr. Chernick expresses concerns about various pending or proposed environmental regulations such as CSAPR, MACT (now called "MATS"), cooling water regulation, and coal combustion residuals ("CCR"). How are these regulations relevant to the Companies' analysis of the RFP?

A. The various regulations cited by Mr. Chernick are mostly targeted at coal units and therefore largely irrelevant to the analysis of the RFP responses and the self-build options. As a gas-fired plant Cane Run Unit 7 does not have CCR, thus the CCR rule

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[39] Chernick Testimony at 6, lines 16-18.

will not affect it. Concerning water-related regulations, it will have a cooling tower and be in compliance with all regulations. All of these costs were reflected in the Resource Assessment analysis. As stated above, the Resource Assessment was not focused on environmental compliance options for the existing fleet. That was addressed in analysis supporting the just completed ECR cases.[40] The Resource Assessment was focused on evaluating the options to meet the Companies' future capacity and energy needs that arose primarily as the result of capacity being retired due to pending EPA regulations.

Q. Will Cane Run Unit 7 comply with existing EPA greenhouse gas regulations?

A. Yes. Cane Run Unit 7 will be permitted under the Title V permit process and, based on the emissions envelope of the unit, the site will net out of the Prevention of Significant Deterioration ("PSD") permit process. The Greenhouse Gas ("GHG") Tailoring Rule requires PSD permitting if a facility increases its GHG emissions (CO_2 equivalent) by more than 75,000 tons annually. GHG emissions from the Cane Run site will be significantly reduced with the installation of Unit 7 and the retirement of Units 4, 5, and 6. The EPA has postponed the release of draft GHG standards for new and existing units.

Q. How would future greenhouse gas regulations beyond those currently contemplated by EPA impact the decision to build Cane Run Unit 7?

A. As I previously mentioned, a new NGCC such as Cane Run Unit 7 is highly likely to be part of a least-cost portfolio in a world with CO_2 pricing.[41, 42, 43] Therefore, even if

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[40] Case Nos. 2011-00161 and 2011-00162.
[41] Lea at 19. *See* n.32.
[42] "EPA Analysis of the American Clean Energy and Security Act of 2009," June 2009, p. 26. Available at http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf.

a form of CO_2 pricing emerges in the future as postulated by Mr. Chernick, NGCCs such as Cane Run Unit 7 will likely be an important asset in a least-cost generating portfolio.

Q. Mr. Chernick focuses on pending regulations that could impact the cost of fossil generation. Are there any discussions regarding regulations that could impact the cost of renewable generation such as wind?

A. Yes. Last December, the American Bird Conservancy ("ABC") petitioned the Interior Department's Fish and Wildlife Service to create a mandatory permitting system for wind projects because they "pose a serious threat to various species of birds."[44, 45] For example, a proposed 100 MW wind project in California was abandoned last December because of potential impact on birds. Last November, four Washington public utility districts cancelled a proposed coastal wind farm for the same reason.[46, 47] ABC seeks "binding regulations" to protect birds and bats.[48] It is not surprising that such issues are being investigated and are becoming more important as the wind industry increases in scale.

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[43] Revis, J., "Creating a Low-Carbon Future," EPRI, July 2010. Available at: *http://mydocs.epri.com/docs/CorporateDocuments/Newsroom/Creating%20a%20Low-Carbon%20Future_EPRI%27s%202009%20Prism-MERGE%20Study.pdf*

[44] "Bird Conservationists Seek FWS Wind Permitting Rules," *Clean Energy Report*, December 4, 2011. A copy is attached hereto as Appendix D.

[45] "Massive Bird Kill at West Virginia Wind Farm Highlights National Issues," American Bird Conservancy, October 28, 2011. Available at: http://www.abcbirds.org/newsandreports/releases/111028.html.

[46] Mulkern, A., "Company Cancels California Project Over Bird Concerns," *eenews.net*, December 1, 2011. A copy is attached hereto as Appendix E.

[47] "Wash. Utilities Ax Proposed Turbine Project on Key Nesting Habitat," *eenews.net*, November 18, 2011. A copy is attached hereto as Appendix F.

[48] "Bats and Birds Face Serious Threats from Growth of Wind Energy," *New York Times*, August 8, 2011. Available at: http://www.nytimes.com/cwire/2011/08/08/08climatewire-bats-and-birds-face-serious-threats-from-gro-10511.html?pagewanted=all.

Section 5 – Cane Run Unit 7 and Uncertainty Regarding the Future of Brown Units 1 and 2

Q. Mr. Chernick expresses his concern that the Resource Assessment does not appear to account for the possibility that Brown Units 1 and 2 might be retired in the future due to EPA regulations.[49] Do you have this same concern?

A. No. The Resource Assessment was prepared after the Companies submitted their proposed environmental compliance plan to this Commission in Case Nos. 2011-00161 and 2011-00162 but before the Commission issued its order in those cases on December 15, 2011. In their proposed environmental compliance plan, the Companies demonstrated that it was least-cost to install baghouses on Brown Units 1 and 2. Despite this showing, the Companies agreed to defer the decision on environmental compliance for these units until July 2013. If the Companies ultimately decide to retire these units, their capacity shortfall in 2016 will increase by 272 MW (the combined summer net rating of Brown Units 1 and 2) and result in the loss of 1,200 GWh of annual energy based on historical operations.[50]

Rebuttal Exhibit DSS-3 shows the long-term expansion plan from the Final Phase II analysis associated with the Companies' recommendation to build Cane Run Unit 7 and purchase the Bluegrass CTs. It shows that the next unit to be added is a 3x1 NGCC in 2020 even with Brown Units 1 and 2 still part of the fleet as assumed in the Resource Assessment. Therefore, the retirement of Brown Units 1 and 2 would most likely accelerate the need for the next NGCC and would most certainly increase the value of Cane Run Unit 7.

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[49] Chernick Testimony at 7, lines 9 -12.
[50] See Rebuttal Exhibit DSS-8 for historical energy generated from Brown Units 1 and 2.

Section 6 – Conclusion

Q. Mr. Chernick recommends that the Commission "defer any approval of the Cane Run combined-cycle plant" because it "does not currently have enough information to determine whether construction of the new Cane Run plant is beneficial ...,"[51] and Mr. Sullivan recommends that more DSM-EE could offset the need for Cane Run Unit 7 and the Bluegrass CTs.[52] Do you agree with their recommendations?

A. No. For the reasons I have just discussed, even assuming that the hypothetical DSM-EE forecasted by Mr. Sullivan could be cost-effectively achieved, it does not change the least-cost options for meeting future customer needs driven primarily by the retirement of Cane Run Units 4, 5, and 6, Green River Units 3 and 4, and Tyrone Unit 3. Furthermore, the issues that Mr. Chernick and Mr. Sullivan raise are either irrelevant or not based on any analysis of the data contained in the RFP or self-build options that were used by the Companies to prepare the Resource Assessment.

Q. What is your recommendation to the Commission?

A. Based on my previously filed Direct Testimony in this proceeding, the analyses performed under my direction and contained in the 2011 Resource Assessment, as well as this rebuttal testimony, it is my recommendation that the Commission should approve the Cane Run Unit 7 construction project and the Bluegrass CT acquisition as least-cost resources for ensuring adequate generating capacity and energy while complying with current and proposed environmental laws.

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[51] Chernick Testimony at 3, lines 18-25.
[52] Sullivan Testimony at 3 and 9.

Q. Does this conclude your testimony?

A. Yes it does.

DSM-EE Energy Reductions

	2012	2013	2014	2015	2016	2017	
Energy Efficiency Reductions							
[1] Annual Energy (GWh)	197	205	253	198	198	198	
Load Forecast (GWh)							
[2] KU Residential	6,467	6,540	6,602	6,729	6,860	6,961	
[2] KU Commercial	4,725	4,820	4,889	4,993	5,085	5,155	
[3] LG&E Residential	4,352	4,386	4,441	4,505	4,577	4,636	
[3] LG&E Commercial	3,981	4,062	4,130	4,216	4,298	4,369	
Total	19,526	19,807	20,062	20,443	20,820	21,122	
							Average
EE Energy Reductions	**1.0%**	**1.0%**	**1.3%**	**1.0%**	**0.9%**	**0.9%**	**1.0%**

[1] 2011 IRP, Volume I, Section 8, Table 8.(3)(e)(3), page 8-74;
Includes energy from the 'Smart Energy Profile' program which does not accumulate.

[2] 2011 IRP, Volume I, Section 7.(4)(a), page 7-8.

[3] 2011 IRP, Volume I, Section 7.(4)(a), page 7-37.

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Revenue Requirements Summary, Updated Final Phase II Analysis, with Sullivan's Hypothetical DSM

	PVRR* ($M)							Difference from Best Option
	Production Costs	Capital	Gas Trans.	Fixed O&M	Capacity Charge	Elec Trans.	Grand Total	
No Economy Purchases								
SB 2X1 (640) + 3 CTs (Sale - 2012)	[redacted]							
SB 2X1 (605) + 3 CTs (Sale - 2012)								
SB 3X1 (907)								

* PVRR in 2011 dollars calculated through 2040

Long-term Expansion Plans

	Final Phase II Analysis - Recommended Case	**Updated Final Phase II Analysis with Hypothetical DSM and Wind**
2012	Bluegrass CTs	Bluegrass CTs
2013		Wind (480 MW)
2014		Wind (340 MW)
2015		
2016	Cane Run Unit 7 (640 MW)	Cane Run Unit 7 (640 MW)
2017		
2018		
2019		
2020	3x1 NGCC	
2021		
2022		
2023		
2024		
2025		3x1 NGCC
2026	3x1 NGCC	
2027		
2028		
2029		
2030		
2031		
2032		
2033	3x1 NGCC	3x1 NGCC
2034		
2035		
2036		
2037		
2038		
2039		Simple Cycle CT
2040	Simple Cycle CT	

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Revenue Requirements Summary, Updated Final Phase II Analysis, with Sullivan's Hypothetical DSM and Wind

	PVRR* ($M)							Difference from Best Option
	Production Costs	Capital	Gas Trans.	Fixed O&M	Capacity Charge	Elec. Trans.	Grand Total	
No Economy Purchases								
SB 2X1 (640) + 3 CTs (Sale - 2012)								
SB 2X1 (605) + 3 CTs (Sale - 2012)								
SB 3X1 (907)								
3 CTs (Sale - 2012) + Wind**								

* PVRR in 2011 dollars calculated through 2040

** Cane Run Unit 7 was chosen by Strategist in 2016

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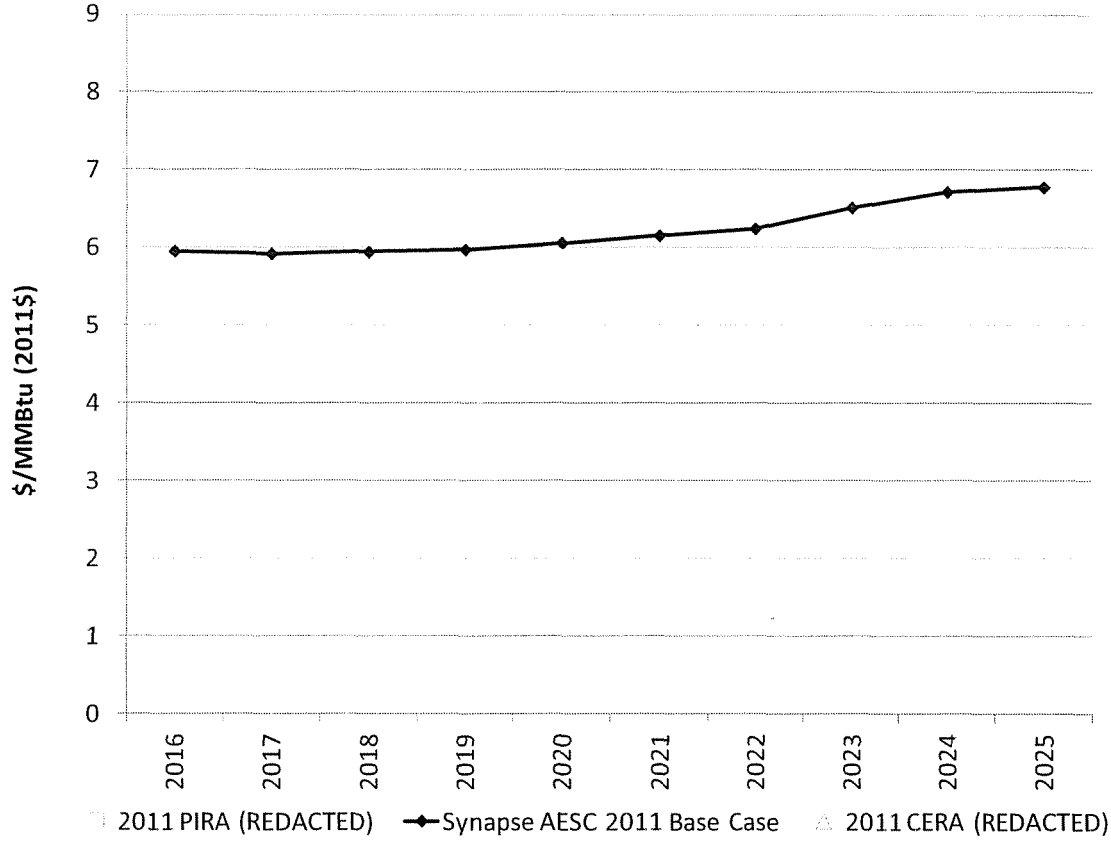
Gas Price Forecast Comparison



Note: all prices are shown in real 2011 dollars to appropriately compare to Synapse's forecast.

	2011$ Synapse AESC 2011 Base Case	2011$ 2011 PIRA (REDACTED)	2011$ 2011 CERA (REDACTED)
2016	5.96	[redacted]	
2017	5.928		
2018	5.95		
2019	5.98		
2020	6.064		
2021	6.158		
2022	6.25		
2023	6.521		
2024	6.722		
2025	6.784		

	GDP Deflator 09'=1.00	GDP Deflator 10'=1.00	GDP Deflator 11'=1.00	Nominal 2011 PIRA (REDACTED)	2011$ Real 2011 PIRA (REDACTED)	Nominal REDACTED)	2011$ Real REDACTED)
2009	1.000						
2010	1.009	1.000					
2011	1.024	1.015	1.000				
2012	1.049	1.040	1.025				
2013	1.08	1.066	1.051				
2014	1.10	1.093	1.077				
2015	1.13	1.120	1.104				
2016	1.16	1.146	1.129	[redacted]			
2017	1.18	1.171	1.154				
2018	1.21	1.198	1.180				
2019	1.24	1.225	1.207				
2020	1.26	1.252	1.234				
2021	1.29	1.279	1.260				
2022	1.32	1.309	1.289				
2023	1.34	1.328	1.309				
2024	1.37	1.358	1.338				
2025	1.39	1.383	1.362				

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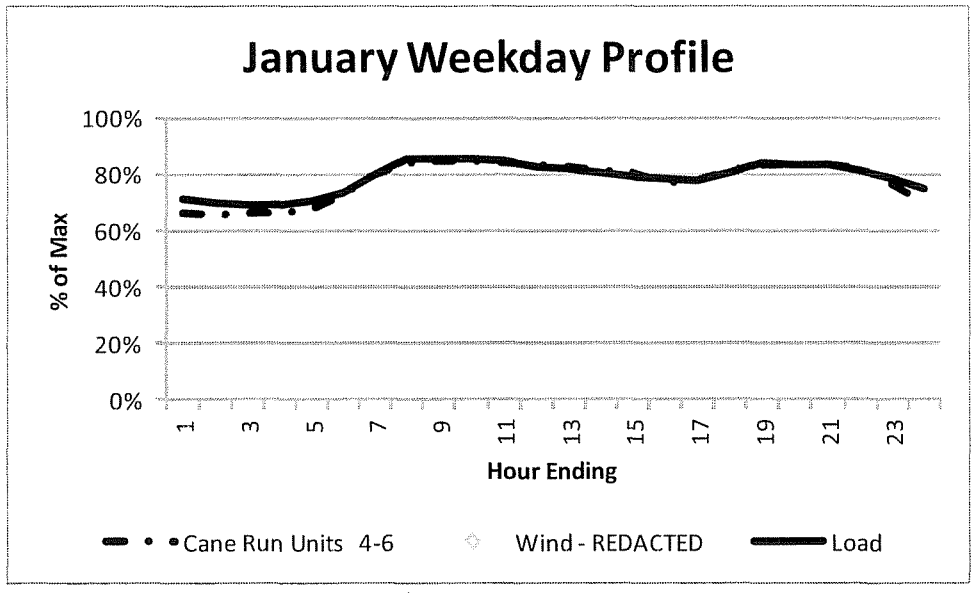
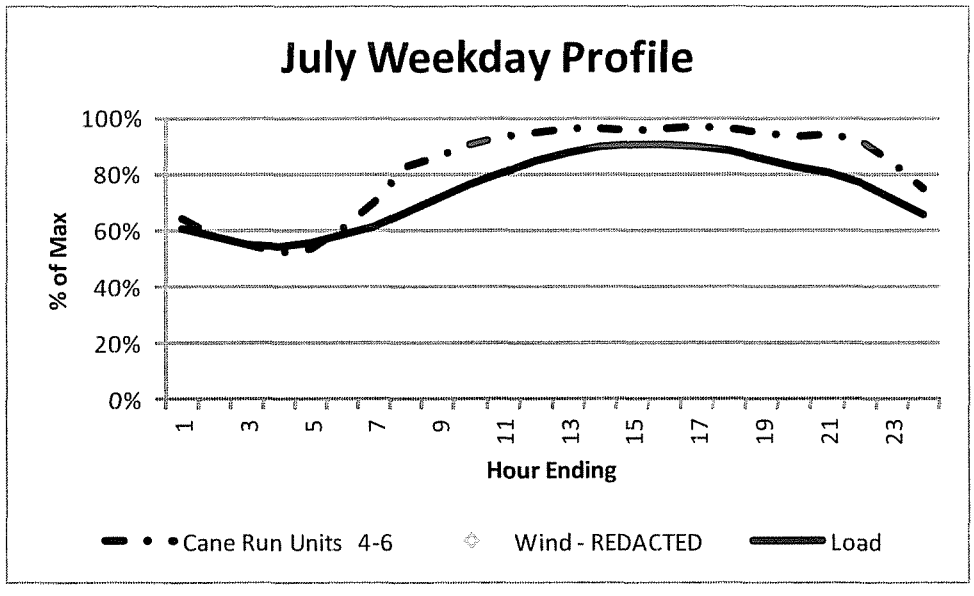
Load and Dispatch Curves – Wind and Cane Run Units 4, 5, and 6



% of Max for Load is the Monthly Peak
% of Max for Cane Run Units is the Seasonal Maximum Capacity of the Units
% of Max for Wind is the Nameplate Capacity



% of Max for Load is the Monthly Peak
% of Max for Cane Run Units is the Seasonal Maximum Capacity of the Units
% of Max for Wind is the Nameplate Capacity

Please see folder titled Exhibit DSS - 6,7 on enclosed CD for workpapers

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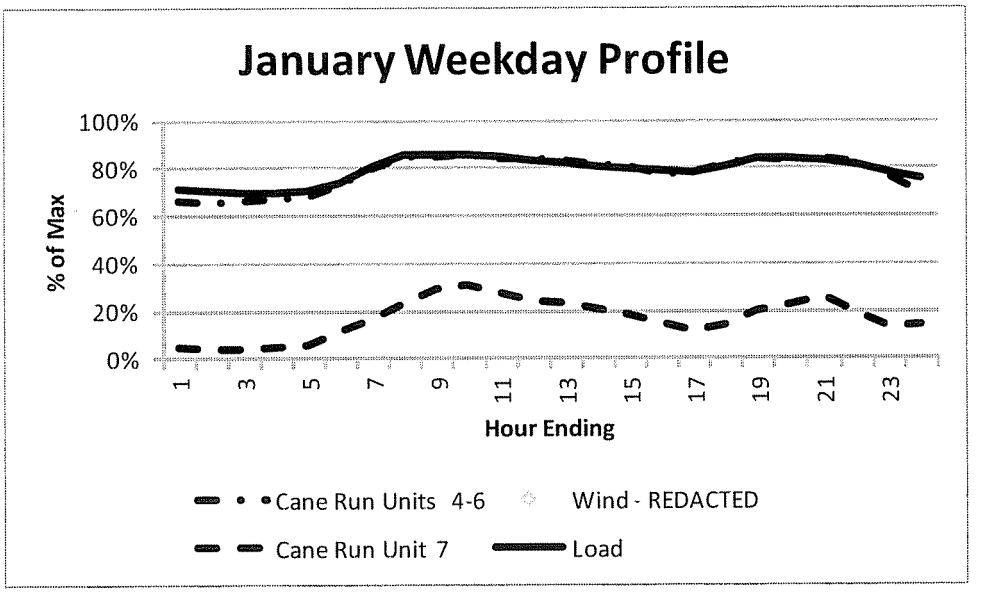
Load and Dispatch Curves - Wind, Cane Run Units 4, 5, and 6, and Cane Run Unit 7



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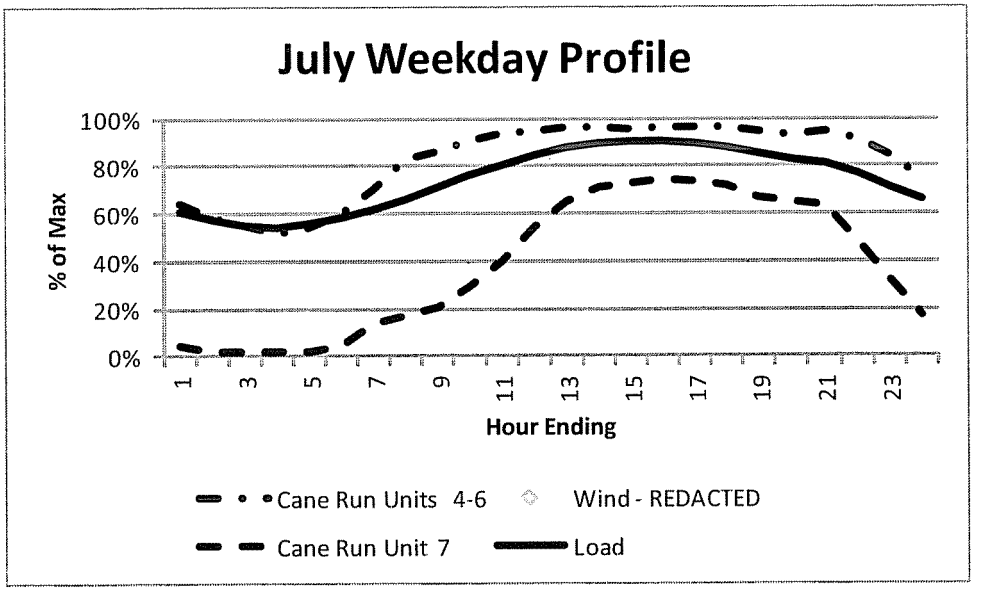

% of Max for Load is the Monthly Peak
% of Max for Cane Run Units is the Seasonal Maximum Capacity of the Units
% of Max for Wind is the Nameplate Capacity

Please see folder titled Exhibit DSS - 6,7 on enclosed CD for workpapers

Historical Generation, Brown Units 1 and 2

Generation *(GWh)*	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Average**
Brown Units 1 and 2	1,437	1,507	1,589	764	1,175	934	1,234

These data files are being provided pursuant to a Petition for Confidential Protection.

Louisville Gas and Electric Company /

Kentucky Utilities Company

DSM Program Review

Report

March 18, 2011

Louisville Gas and Electric Company / Kentucky Utilities Company

DSM Program Review

Report

March 18, 2011

Prepared for:
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Executive Summary

Louisville Gas and Electric Company (LG&E) and Kentucky Utilities Company (KU), and, hereafter referred to as "LG&E / KU" or the "Companies", engaged ICF to provide a broad review of their demand side management (DSM) plan for 2011 to 2017. This review included a detailed overview of existing programs that the Companies are enhancing and re-filing, and new programs. ICF also conducted a portfolio-level review of the Companies' overall DSM investments. Specifically, the Companies engaged ICF to:

1. Review the DSM planning materials and process as documented by the Companies.
2. Review the individual program designs developed by the Companies.
3. Compare the planning process and individual DSM program designs to known best practices and appropriate peer utilities.
4. Identify any gaps or shortcomings in the process or program designs, including specific recommendations regarding alternative approaches or designs.
5. Participate in program design and planning discussion as may be required by the Companies.
6. Prepare a report summarizing the review and providing a third-party opinion regarding the sufficiency of the process and designs.

This report is the culmination of ICF's work for this project and represents the summary report detailed in Task 6 above.

Regulatory and Policy Environment

The market for energy efficiency is evolving quickly, and nowhere in the country is this more evident than in Kentucky. Since ICF's last review of the Companies' programs in 2007, both state and federal policies have shifted strongly in favor of energy efficiency. At the state level, this was driven by Kentucky Governor Steven Beshear, who has placed energy efficiency squarely at the top of his Seven Point Energy Strategy. At the federal level, this was driven largely by the passage of 2009 American Reinvestment and Recovery Act (ARRA, or "the Stimulus package"). ARRA outlayed more than $16 billion nationwide in energy efficiency and related investments; Kentucky is slated to receive over $150 million during the three-year period spanning 2009-2011.

Commensurate with federal and state policy agendas, the Companies have made energy efficiency a high priority in their corporate strategies. In 2008, the Companies appointed a new Customer Energy Efficiency Management team, including a new director and two new department managers. The Companies also hired four additional program managers to manage new programs, and three new researchers/program analysts. These human resource investments represent a significant commitment to energy efficiency that will leave the Companies well-positioned to successfully grow their DSM portfolio in the future.

The Companies are also developing a DSM portfolio that is consistent with many of the specific actions outlined in the Governor's plan. By undertaking this review, the Companies are committed to incorporating best practices into their programs. In addition, with the new programs, the Companies are addressing the potential for energy efficiency in both the mass market and in targeted end uses.

Best Practices

Energy efficiency program *best practice* is much more a term of art than science; there simply is too much variability across objectives, regulatory structures, and program types to enable simple broad conclusions about what is *best*. Typically, best practice is considered a function of program result, such as whether the program met or exceeded its objectives. An alternative view of best practice focuses on the design and execution of essential program elements, such as marketing, service delivery, program back office efficiency, etc. For example, though a particular program might not have delivered particularly strong overall results, certain elements of its structure, such as incentive fulfillment, might be considered best-in-class. Alternatively, while difficult, it is not unheard of for a program based on inefficient or flawed processes to nevertheless deliver outstanding results.

In general, best practice programs and portfolios seek to achieve each of the following goals:

- Provide programs that are cost-effective.
- Provide a portfolio that covers hard-to-reach markets.
- Provide program budgets that are sufficient to deliver the programs effectively to market.
- Provide programs that have sufficient budgets for marketing, training and education (market transformation activities).
- Provide a portfolio that strikes an appropriate balance of mitigated risk, proven program types, and more innovative programs.
- Provide a portfolio that is flexible enough to adapt to changing market conditions in a cost-effective manner.
- Provide an evaluation, measurement, and verification (EM&V) budget for each program, and plans for program evaluations on a regular basis.

Portfolio Review

The Companies' programs satisfy each of the best practice criteria listed above. In addition, the Companies' projected program costs and savings compare favorably to the rest of the country. The Companies' overall cost of savings, expressed in dollars per first year kWh, are projected to be less expensive that the median cost of savings achieved by program administrators in the South, the Midwest, and the U.S. as a whole. In addition, the level of savings achieved by the Companies, expressed both as a percentage of annual kWh sales, and annual kW peak demand, also exceeds that of their peers.

Because the programs easily pass standard cost-effectiveness tests, and participants gain significant benefits from the programs, the Companies should continue to design and market the programs broadly, in order to increase participation and minimize the number of non-participants.

Overall Conclusions

Our review of the Companies' programs, and the context in which they were developed, leads us to the following conclusions:

- The Companies' proposed portfolio appropriately addresses evolving federal and state policies. In addition, the portfolio contains many elements of best practices, including cost-effectiveness, broad targeting, and flexible design.
- The Companies should commission a potential study or market characterization study, an action item the governor has also proposed for the state in his energy plan. The study results could be used to help plan programs that capture savings where potential is greatest and/or most cost-effective.
- Based on a market characterization study of the commercial sector, develop additional programs targeting the commercial sector.
- The Companies should continue to market their successful load control program, and offer additional demand response options.
- With their Residential Conservation/Home Energy Performance and Low Income Weatherization (WeCare) programs, the Companies should continue to leverage federal and statewide resources, where applicable, in order to maximize available funding and supplement existing program participation.
- As behavior-based programs gain entry into utility portfolios, the Companies should develop relationships with program implementers and utility program managers in order to learn from others' experiences, and adjust the design and delivery of their own behavior-based initiatives, including the Smart Energy Profile program.
- Coordinate and cross-promote their new residential programs with existing residential programs.

1. Introduction

1.1. Scope of ICF's Review

Louisville Gas and Electric Company (LG&E) and Kentucky Utilities Company (KU), and, hereafter referred to as "LG&E / KU" or the "Companies", engaged ICF to provide a broad review of their demand side management (DSM) plan for 2011 to 2017. This review included a detailed overview of existing programs that the Companies are enhancing and re-filing, and new programs. ICF also conducted a portfolio-level review of the Companies' overall DSM investments. Specifically, the Companies engaged ICF to:

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2. Review the individual program designs developed by the Companies.
3. Compare the planning processes and individual DSM program designs to known best practices and appropriate peer utilities.
4. Identify any gaps or shortcomings in the process or program designs, including specific recommendations regarding alternative approaches or designs.
5. Participate in program design and planning discussion as may be required by the Companies.
6. Prepare a report summarizing the review and providing a third-party opinion regarding the sufficiency of the process and designs.

1.2. ICF's Approach

The review began with a kick-off meeting during which ICF and the Companies discussed and clarified the objectives of the project. ICF discussed its approach to the review and provided the Companies with a data request that outlined the materials ICF required to complete the review, including: the Companies' draft DSM filing; load forecasts; integrated resource plans (IRPs); DSM program modeling inputs and outputs; and relevant reports produced by the State of Kentucky, including Governor Beshear's Energy Strategy.

Our review consisted of both bottom-up and top-down approaches. From the bottom-up, we reviewed each of the Companies' proposed programs against program best practices from around the country. These program-level reviews focused primarily on program delivery (e.g. how programs are marketed, to whom incentives are paid, etc.), but also examined key program metrics for reasonableness (e.g. program costs are appropriate for this program given market maturity in Kentucky). The top-down review included an analysis of portfolio level metrics (e.g. kWh savings as a percentage of sales) against the Companies' peers, a gap analysis to identify potential lost savings opportunities, and a portfolio best practices analysis to determine whether the Companies' proposed DSM portfolio:

- Is cost-effective;
- Targets markets and technologies where the largest potential exists;
- Targets hard-to-reach markets;
- Has sufficient marketing and education budgets – incentives are only one aspect of a program;
- Is flexible enough to adapt to changing market conditions;
- Has an appropriate mix of proven and innovative programs;

- Has an appropriate mix of energy and demand programs; and,
- Has new and modified programs that were selected through an appropriate planning process.

1.3. Report Overview

The remainder of this report is organized into the following sections: Section 2: Regulatory and Policy Environment; Section 3: Best Practices; Section 4: Portfolio Review; Section 5: Program Reviews; Section 6: Overall Conclusions.

Additional description for each section is provided below.

Section 2: Regulatory and Policy Environment explains current federal and state policy with regards to energy efficiency. The current policies help explain the context in which this report was developed. This section also includes a summary of how the Companies are responding to policy shifts. As these policies evolve, and especially as federal climate change legislation moves closer toward regulatory certainty, the Companies will need to keep abreast of these developments, and re-evaluate programs and portfolios to ensure materiality, compliance, and effectiveness.

Section 3: Best Practices defines "best practice" generally as well as how it is used in this report. As noted previously, "best practice" is a subjective label that is context-sensitive. ICF believes that the reviews included in Section 5 should be viewed as a comparative exercise, with caution given to differences in the market, climate, and administration. For each program review, several suggestions as to how the Companies can continue to improve their programs through design and delivery adjustments are offered. In addition, suggestions relating to increased engagement with national program sponsors (such as the EPA), statewide agencies, and other local stakeholders, where applicable are included.

Section 4: Portfolio Review conducts a brief overview of the Companies' complete DSM portfolio, including existing programs that were not subject to a best practice review. The portfolio is compared to its peers in the South, the Midwest, and the U.S. as a whole. In contrast with Section 3, this section contains a more quantitative comparison of portfolio savings and costs. This section also contains a discussion of regulatory treatment of program costs, and the impact of the portfolio on ratepayers.

Section 5: Program Reviews contains the reviews for enhanced existing and new programs. Each review begins by describing the Companies' existing program and proposed enhancements, if applicable. The review then describes a selection of best practice programs, and compares the Companies' programs using a variety of metrics. Finally, the review takes assessment of the differences, summarizes ICF's conclusions, and, if necessary, offers suggestions as to how to incorporate these in the future.

Section 6: Overall Conclusions includes conclusions drawn from the introduction, and recaps the individual program conclusions and suggestions contained in Section 5.

2. Regulatory and Policy Environment

The market for energy efficiency is evolving quickly, and nowhere in the country is this more evident than in Kentucky. Since ICF's last review of the Companies' programs in 2007, both state and federal policies have shifted strongly in favor of energy efficiency. At the state level, this was driven by Kentucky Governor Steven Beshear, who has placed energy efficiency squarely at the top of his Seven Point Energy Strategy. At the federal level, this was driven largely by the passage of 2009 American Reinvestment and Recovery Act (ARRA, or "the Stimulus package"). ARRA outlaid about $16.6 billion nationwide in energy efficiency and related investments; Kentucky is slated to receive over $150 million during the three-year period spanning 2009-2011.

Below is a discussion of these and other policy shifts in greater detail, the implications for the Companies' programs, and the Companies' response to this changing political environment.

2.1. Federal

There were three major developments at the federal level since ICF reviewed the Companies' portfolio in 2007. Below, are highlights of key Federal developments that have the potential to impact the Companies' DSM programs.

1. *Under cap-and-trade scenarios in pending legislation, DSM should become more cost-effective for the Companies.* However, a specific cap-and-trade scenario is unlikely to be implemented until 2011, and possibly even later. Possible options include:

    a. The American Clean Energy and Security (ACES) Act (H.R. 2454) was passed by the House of Representatives on June 26, 2009. ACES establishes a cap-and-trade program covering most U.S. greenhouse gas emissions (GHGs), a federal renewable electricity and energy efficiency standard (RES), new efficiency requirements, power plant performance standards, and other complementary measures. However, the Senate has not considered this bill and is unlikely to do so in the near future.

    b. The Senate has two other bills under consideration. The first, the Clean Energy Jobs and American Power Act (S. 1733), introduced on September 30, 2009, contains most of the same provisions as ACES with a few changes and some strategic omissions. A modified version of this bill, known as the American Power Act, has been discussed but not formally introduced. The second, Carbon Limits and Energy for America's Renewal (CLEAR) Act (S. 2877), was introduced on December 11, 2009. This "cap-and-dividend" bill would tax carbon emitters and use the revenues to provide refunds to affected ratepayers. The first bill is considered more feasible, though the actual date of passage for either bill is uncertain, and unlikely to occur in the near future.

    c. The EPA is moving forward with regulation of GHGs through the Clean Air Act (CAA), primarily through existing permitting rules that apply mostly to manufacturing facilities but also to some electricity generators. Future regulatory action by the EPA may be determined or limited by the Congress, such as legislation that would pre-empt the EPA from using the CAA to regulate GHGs.

2. *The Stimulus package provided unprecedented resources for energy efficiency and DSM nationwide.* The 2009 ARRA authorized about $16.6 billion in energy efficiency

funding that qualifying public entities—primarily states, cities, and counties—could pursue. The primary objectives of this funding are to create jobs, save energy, and build clean energy (energy efficiency and renewable energy) infrastructure for the longer term. The Department of Energy's (DOE) major allocations to Kentucky (over 2009-2011) include:

a. $70.9 million in Weatherization Assistance Program (WAP) funding;

b. $52.5 million in State Energy Program (SEP) funding;

c. $25.1 million in Energy Efficiency and Conservation Block Grants (EECBG); and,

d. $4.1 million in Energy Efficient Appliance Rebate Program funding.

In sum, this is approximately $50 million in average annual funding for energy efficiency programs in Kentucky. In 2008, the *total* energy efficiency program spending in Kentucky was $24 million.

3. *As compact fluorescent lamps (CFLs) become the baseline technology, obtaining cost-effective program savings will be more challenging.*[1] Federal lighting standards, including those for many popular lighting products like CFLs, will start to phase-in during 2012, which will diminish the impact of today's efficient lighting technologies.

2.2. State

Governor Beshear made energy efficiency a top priority within his energy strategy, *Intelligent Energy Choices for Kentucky's Future*. In this document, the governor set forth the following goal:

> *Energy efficiency will offset at least 18 percent of Kentucky's projected 2025 energy demand.*[2]

This amounts to reducing statewide energy consumption by an average of about 1 percent per year through 2025, an ambitious goal that would place Kentucky in the top tier of states in the Midwest and South in terms of DSM performance.

The governor's overall plan proposes to enact a renewable and efficiency portfolio standard (REPS) that would be set at 25 percent of the state's projected energy use in 2025. In addition to reducing projected emissions in 2025 by 50 percent, the REPS would also reduce emissions by 20 percent relative to the 1990 baseline. This aggressive goal surpasses the targets set by California's AB 32 law (2020 emissions equal to 1990), and New England's Regional Greenhouse Gas Initiative (2018 emissions 10 percent lower than 2009), and compares to the European Union's Emissions Trading Scheme (2020 emissions 20 percent lower than 1990).

[1] The Energy Independence and Security Act of 2007 (the "Energy Bill"), signed into law by President Bush on December 18, 2007, requires all light bulbs use 30 percent less energy than today's incandescent bulbs by 2012 to 2014. The phase-out will start with 100-watt bulbs in January 2012 and end with 40-watt bulbs in January 2014. By 2020, a Tier 2 would become effective, which requires all bulbs to be at least 70 percent more efficient (effectively equal to today's CFLs).

[2] Governor Steven L. Beshear. Intelligent Choices for Kentucky's Energy Future. November 2008. p. vi.

The governor's plan proposes that energy efficiency can be the primary method strategy to meet the REPS goal. Energy efficiency would offset 18 percent of the state's projected energy demand, with the remaining 7 percent coming from renewable energy and bio-fuels. In addition to the REPS that would apply to the state's utilities, the governor proposes that additional savings would result from aggressive energy savings targets for state government. The energy efficiency portion of the REPS would also include a comprehensive education, outreach, and marketing component by the state.

As a first step, the governor authorizes the Public Service Commission (PSC) to institute a proceeding that examines the impacts of an REPS. This proceeding will also identify cost-effective programs, and include recommendations for implementing them. The governor also encourages and authorizes the PSC to commit greater resources to DSM, including rules that would require the utilities to implement best practice programs, standardization of the rules regarding industrial customer opt-outs, and an increased focus on the evaluation of DSM programs. As a longer term action item (four to seven years from the plan's inception), the governor also encourages the PSC to work with the utilities on a smart grid policy.

2.3. How Is LG&E / KU Responding to State and Federal Policy Shifts?

2.3.1. Energy Efficiency is a Priority for the Companies' Upper Management

Commensurate with federal and state policy agendas, the Companies have made energy efficiency a high priority in their corporate strategies. In 2008, the Companies appointed a new Customer Energy Efficiency Management team, including a new director and two new department managers. The Companies also hired four additional program managers to manage new programs, and three new researchers/program analysts. These human resource investments represent a significant commitment to energy efficiency that will leave the Companies well-positioned to successfully grow their DSM portfolio in the future.

The Companies are also developing a DSM portfolio that is consistent with many of the specific actions outlined in the Governor's plan. By undertaking this review, the Companies are committed to incorporating best practices into their programs. In addition, with the new programs, the Companies are addressing the potential for energy efficiency in both the mass market and in targeted end uses.

2.3.2. LG&E / KU's Portfolio Is Growing and Diversifying

Table 1 and Figures 1-3 below help illustrate the recent evolution of the Companies' DSM portfolio.

- Column *b* in Table 1, "Target Sectors(s)" indicates the Companies' designations of the target market(s) for the programs in column *a*.
- Column *c*, "Program Status" includes:
    - Existing programs – Programs currently administered by the Companies that are not being modified substantially and re-filed in their DSM Plan;

- Enhanced programs - Programs currently administered by the Companies that are being modified substantially and re-filed in their DSM Plan; and,
- New programs that the Companies are proposing in their DSM Plan.

- Column *d* is an ICF-designated program label. Column *d*, "Program types," includes:
  - Resource acquisition – Programs designed primarily for the purpose of implementing efficiency measures in the marketplace;
  - Education and/or marketing – Programs designed primarily to educate the public about the Companies' DSM offerings, other efficiency programs (i.e. State and Federal), and energy efficiency, generally; and,
  - Low income – Programs that implement efficiency measures, but for which only qualified low income households are eligible.
- Column *e* is also an ICF-designated program label. Column *e*, "Risk/innovation," includes designations, based on ICF's professional judgment of the investment risk and degree of innovation in design, delivery, and technologies associated with each program. A risk/innovation designation of *low/low* means that on the risk side, the program is a very safe investment because the program is well-understood and is a proven design that has become a best practice by performing successfully (cost-effectively) in a variety of jurisdictions. On the innovation side, *low* means that the design, delivery, and technologies that comprise the program are widely understood and used successfully in programs in most jurisdictions.

  Conversely, a risk/innovation designation of *high/high* means on the risk side there is considerable uncertainty about the program's performance, either because the program has not been implemented before, or if it has, there is very little science or evaluation around program savings. On the innovation side, this means the program will employ delivery methods, technologies, or both that are novel, or at least whose performance is not well understood, but also have the potential (based on theory or pilot studies) to achieve significant savings levels.

Table 1: Existing, Revised, and New LG&E / KU Programs ("The Portfolio")

a	b	c	d	e	f	g
Program	**Target Sector(s)**	**Program Status**	**Program Type**	**Risk/ Innovation**	**Year 1 Budget**	**Year 1 Savings (MWh)**
Residential High Efficiency Lighting	Residential	Existing	Resource Acquisition	Low/Low	$3,416,046	65,150
Residential New Construction	Residential	Existing	Resource Acquisition	Med/Low	$1,102,635	2,297
Residential HVAC Tune Up	Residential	Existing	Resource Acquisition	Low/Med	$487,332	1,072
Commercial HVAC Tune Up	Commercial	Existing	Resource Acquisition	Low/Med	$411,778	1,942
Customer Education & Public Information	Res. and Com.	Existing	Education and/or Marketing	Med/Low	$3,296,660	0
Dealer Referral Network	Res. and Com.	Existing	Education and/or Marketing	Low/Med	$152,056	0
Residential Responsive Pricing (RRP)	Residential	Existing	Resource Acquisition	Med/High	$125,000	0
Program Development & Administration	Res. and Com.	Revised	Program Development & Admin.	Low/Low	$1,260,457	0
Residential Conservation (HEPP)	Residential	Revised	Resource Acquisition	Med/Med	$1,460,826	2,948
Residential Load Management	Residential	Revised	Resource Acquisition	Low/Low	$6,186,874	1,868
Commercial Load Management	Commercial	Revised	Resource Acquisition	Low/Low	$321,821	107
Residential Low Income Weatherization	Residential	Revised	Low Income	Low/Low	$2,368,462	2,632
Commercial Conservation/Incentives	Commercial	Revised	Resource Acquisition	Low/Low	$3,255,400	54,988
Smart Energy Profile	Residential	New	Resource Acquisition	Med/High	$1,370,800	29,664
Residential Refrigerator Removal	Residential	New	Resource Acquisition	Low/Low	$815,800	3,000
Residential Incentives	Residential	New	Resource Acquisition	Med/Low	$1,567,352	8,544
Total					**$27,599,300**	**174,211**

Figure 1 illustrates the distribution of the Companies' Year 1 portfolio budget across program status categories. Eighty six percent (86%) of the budget is earmarked for programs the Companies are currently operating, including existing and revised programs. The revised programs include program enhancements that the Companies believe will improve program performance, either because the Companies received feedback on the program through formal evaluation, or because after some time in the market, program staff sees opportunities that the current program is not capturing. By adapting to the marketplace through the modification of existing programs and making forays into the marketplace with new programs, the Companies demonstrate that they are seeking to improve and grow the portfolio.

Figure 1: Distribution of Year 1 Program Spending, by Program Status

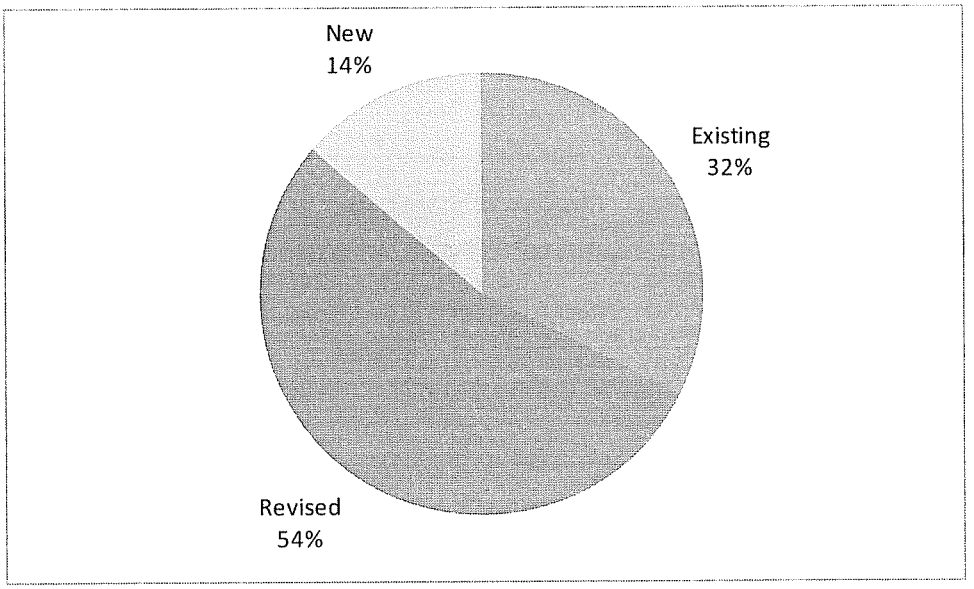


Figure 2 illustrates that the Companies will spend a large majority of their budget in Year 1 on programs designed primarily to acquire savings. It is important to note that this figure does not show the full extent of the Companies' planned marketing budget; each program budget includes funding for marketing and education activities.

Figure 2: Distribution of Year 1 Program Spending, by Program Type

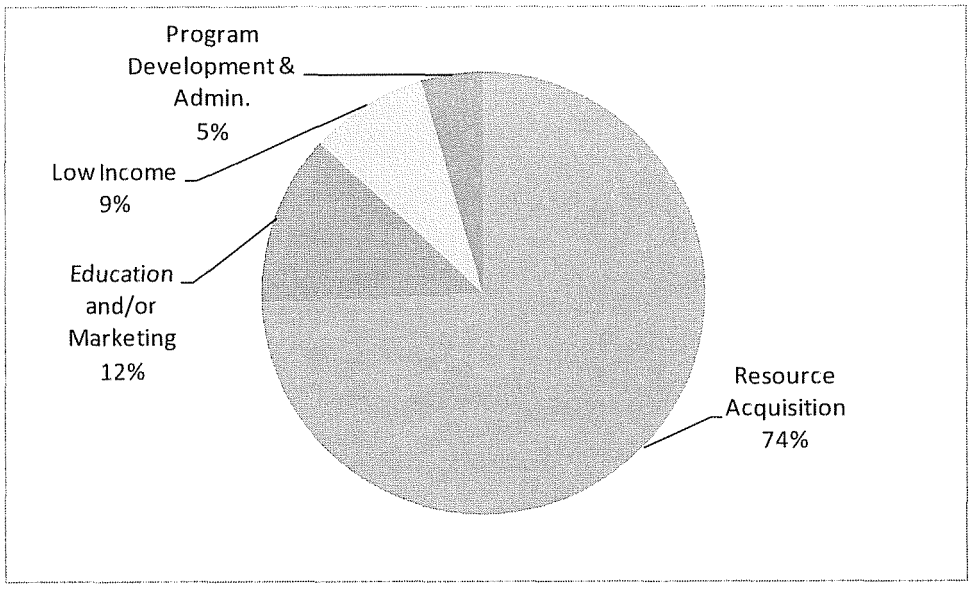
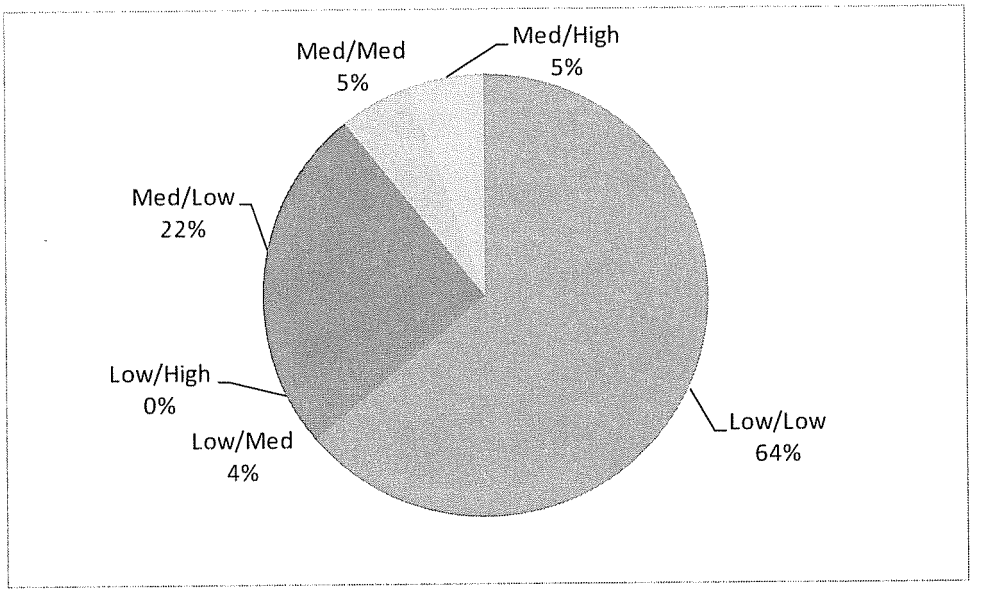


Figure 3 illustrates that the Companies' Year 1 portfolio is largely a low-risk investment, though the portfolio also includes some more innovative, though riskier elements. Overall, ICF believes that the Companies' proposed Year 1 portfolio is a relatively conservative investment that strikes an appropriate balance between low-risk programs that are well-understood (e.g. Residential HVAC-Tune Up and Commercial Conservation Rebates) and programs that have some innovative elements and are more forward looking (e.g. Smart Energy Profile and Residential Responsive Pricing), but are also more risky in that program performance is more uncertain. ICF does not characterize any of the Companies' programs as being a high risk investment.

Figure 3: Distribution of Year 1 Program Spending, by Risk/Innovation Category



3. Best Practices

3.1.1. Defining Best Practice

Energy efficiency program *best practice* is much more a term of art than science; there simply is too much variability across objectives, regulatory structures, and program types to enable simple broad conclusions about what is *best*. Typically, best practice is considered a function of program result, such as whether the program met or exceeded its objectives. An alternative view of best practice focuses on the design and execution of essential program elements, such as marketing, service delivery, program back office efficiency, etc. For example, though a particular program might not have delivered particularly strong results overall, certain elements of its structure, such as incentive fulfillment, might be considered best-in-class. Alternatively, while difficult, it is not unheard of for a program based on inefficient or flawed processes to nevertheless deliver outstanding results.

Best practice should be viewed partly as a function of the experience of the program administrator and implementer. What is best practice for a utility that has been designing and managing programs for two decades will be different in some cases from what should be viewed as best for an organization just entering the field. For example, ICF could not find one program *exactly* comparable to the Companies' proposed Residential Rebates program, but this is only because the Companies are packaging particular elements of their residential portfolio differently than other utilities. The programs that are often cited as best practice in other states (including California, New York, Oregon, Texas, Vermont, and Wisconsin) package some aspects of their portfolios in radically different ways. Although the Companies should look to these best practice states for ideas, ultimately the Companies must design a package that works best in *their own* markets.

In general, best practice programs and portfolios seek to achieve each of the following goals:

- **The programs are cost-effective.** Although cost-effectiveness can be defined in several ways, the most common method for investor-owned utilities to use is based on the California Standard Practice Manual tests. The manual contains four tests, the most comprehensive of which is the Total Resource Cost test. This test compares the net present value (NPV) of benefits (energy and demand savings multiplied by the value of avoided energy costs), with the NPV of costs (utility program costs and program participants' costs) over the lifetime of the implementation of DSM programs. If the benefit-cost ratio is greater than or equal to one (1.00), then the program provides a net benefit to the utility's ratepayers.
- **The portfolio covers hard-to-reach markets.** The portfolio must include programs that are targeted toward hard-to-reach segments, which typically include low-income and small commercial customers. Both of these customer segments face additional barriers to participation in DSM programs, including the *split incentive*. This term signifies the case where a customer would benefit from a lower utility bill but often lacks the authority to install energy-saving equipment in his leased residence or place of business.
- **Program budgets are sufficient to deliver the programs effectively to market.** Program budgets must be constructed to offer market-based incentives that will result in the expected level of participation. In addition, the budget should reflect any necessary increase of internal staffing or the use of an implementation contractor, and sufficient budgets for non-incentive and non-implementation costs (see below). In addition, program budgets should be monitored or adjusted annually to prevent over- and under-subscription of program funds.

- **Programs have sufficient budgets for marketing, training and education (market transformation activities).** A program that contains adequate funding for these activities can help customers and trade allies overcome the information barrier that is typical of energy efficiency investments. In addition, funds spent on information-related initiatives can pay dividends in the long term, when market transformation begins to take effect.
- **The portfolio strikes an appropriate balance of less risky, proven program types, and more innovative programs.** A less mature market would require more proven program types that have been implemented throughout the country, such as lighting and HVAC programs in both the residential and commercial sectors. Over time, as the market matures and savings potential decreases, new and innovative programs can be implemented. These programs can often develop from prior pilot programs or information initiatives, and can be co-marketed with proven program types.
- **The portfolio is flexible enough to adapt cost-effectively to changing market conditions.** A flexible and broad portfolio design will target all customer segments, and include a variety of program types (including rebates, direct install, demand response incentives, etc.) and energy efficiency measures (retrofit, replace-on-burnout, or new). This will ensure that economic conditions that negatively impact one customer segment will not affect the entire portfolio.
- **Evaluation, Measurement and Verification (EM&V) is budgeted for and the Companies have plans to have programs evaluated on a regular basis.** An adequate EM&V budget that results in timely process and impact evaluations should result in a feedback loop that validates program results and helps informs long-term program adjustments and design.

4. Portfolio Review

Portfolio Review Criteria	Summary Review
Intelligent Energy Choices for Kentucky's Future	
Programs will make progress toward the goal of reducing energy consumption in Kentucky by at least 18 percent below currently projected 2025 energy consumption.	Yes. The Companies' proposed portfolio savings are projected to achieve more than 0.5 percent of annual sales in Year 1. Greater savings levels may be achieved through the introduction of additional program targeting the commercial sector.
Industry Best Practice	
Programs are cost effective.	Yes. The portfolio is cost-effective from the perspective of all ratepayers (based on the results of the TRC test), the utility (based on the results of the UCT test), and program participants (based on the results of the Participant Test). Vis-à-vis the generation alternative, this portfolio will have a lower impact on customer rates over the long-term, based on the results of the UCT test.
The portfolio covers hard-to-reach markets.	Yes. The WeCare program, which targets low income customers, represents 9 percent of the total portfolio budget, increasing to 20 percent by Year 7. Further, there are a variety of other offerings that help make efficiency investments more affordable to low income customers and small businesses, including the Companies' Residential High Efficiency Lighting program, the Commercial Conservation program, and the Commercial Load Management program.
Program budgets are sufficient to deliver the programs effectively to market.	Yes. The Companies' programs are adequately sized. The programs include the necessary funds both for incentive and implementation costs. In addition, funding is consistent from year to year, which ensures program success.
Programs have sufficient budgets for marketing, training and education (market transformation activities).	Yes. The budget contains line items for each of these cost types.
The portfolio strikes an appropriate balance of less risky, proven program-types, and more innovative programs.	Yes. The Companies have a generally conservative approach to portfolio planning that is appropriate given that the market is fairly immature. Nonetheless, the Companies are making forays into more innovative, albeit more risky programs, which have the potential to capture high energy savings. This includes the social marketing-based program *Smart Energy Profile*. As a result, the Companies will be well-positioned to implement cutting-edge programs as their advanced metering infrastructure moves from planning to deployment.

Portfolio Review Criteria	Summary Review
The portfolio is flexible enough to adapt cost-effectively to changing market conditions.	Yes. One example of this is that 54 percent of the Companies' Year 1 budget is for existing programs that are being modified based on evaluations and/or the Companies' experience. The Companies have built flexibility into their program designs and is adapting programs to changing market conditions.
EM&V is budgeted for and the Companies have plans to have programs evaluated on a regular basis.	Yes. In the past, the Companies have had their programs evaluated on a regular basis, and have cancelled or adapted programs based on feedback from evaluators. Program budgets include EM&V.

4.1. Benchmarking Costs and Savings

The Companies' projected program costs and savings compare favorably to the rest of the country. Table 2 below compares the Companies' overall cost of savings, expressed in dollars per first year kWh, are projected to be less expensive that the median cost of savings achieved by program administrators in the South, the Midwest, and the U.S. as a whole.

The level of savings achieved by the Companies, expressed as a percentage of annual kWh sales, also exceeds that of their peers.[3] In Year 1, the Companies' projected programs savings will equal nearly 0.5 percent of annual sales, which is a significant step toward achieving the governor's savings goal.

Table 2: LG&E / KU's Energy Portfolio Performance versus the South, Midwest, and U.S. Median

Portfolio Metric	LG&E / KU Year 1	LG&E / KU Year 3	LG&E / KU Year 5	Southern Region Median (2008)[a]	Midwest Region Median (2008)[a]	U.S. Median (2008)[a]
$ per 1st year kWh	$0.16	$0.19	$0.17	$0.89	$0.47	$0.33
Annual kWh savings as % sales	0.5%	0.5%	0.5%	0.1%	0.1%	0.4%

[a]U.S. EIA Form 861 Data (2008); Program Administrator spending;
$1 million or more annually on DSM programs.

In addition, the level of savings achieved by the Companies, expressed as a percentage of annual kW peak demand, also exceeds that of their peers. The benchmarking study cited below was composed primarily of Midwest utilities; LG&E / KU's cost per kW, due to its successful demand response programs, is also lower than its peers.

[3] 2008 is the most recent year for which EIA Form 861 data is available.

Table 3: LG&E / KU's Demand Portfolio Performance versus Benchmarking Study

Portfolio Metric	LG&E / KU Year 1	LG&E / KU Year 3	LG&E / KU Year 5	Bench-marking Median (2007)[b]
$ per 1st year kW	$566	$682	$605	$836
Annual kW savings as % demand	0.7%	0.8%	0.8%	0.6%

[b]Summit Blue DSM Benchmarking Study. Greater Impacts at Reasonable Costs. ACEEE Summer Study, 2008

Portfolio-level metrics are a useful way to ensure that portfolio planning estimates are comparable to benchmarking and best practice studies. However, since the program mix in utility portfolios is dependent on numerous factors, including the level of market maturity, generation costs, and customer receptivity, caution should be exercised when attempting to compare a portfolio with best practice. Instead, a high-level portfolio view should be used in concert with more detailed views of individual programs.

4.2. Program Spending, by Sector

One way for the Companies to achieve even greater savings levels in the future is to target a greater percentage of their program spending on the commercial sector. Table 4 below shows estimated electricity consumption in the Companies' territories, by sector (excluding industrial), as well as projected DSM program spending levels and program costs. Residential customers consume approximately 50 percent of electricity but residential program spending is about 86 percent of total DSM program spending between Years 1 and 7.

ICF's experience is that allocation of program spending by sector is a complicated and highly political issue in most jurisdictions. Utility commissions and program administrators must balance the need to meet aggressive state savings goals against other policy priorities, including the need to target hard-to-reach populations (e.g. low income customers and small businesses), as well as the interests of ratepayer advocates, environmental organizations, the State Attorney General, and others. The Companies' proposed spending by sector may be entirely appropriate given Kentucky's political economy; however, strictly from the standpoint of potential energy savings, greater program spending on the commercial sector should result in higher-than-projected savings for the Companies. Additional spending on the commercial sector would also be cost-effective, as commercial programs tend to be less expensive than residential programs because businesses have the needs and means to make larger DSM investments than residential customers.

In discussing this topic with the Companies' staff, ICF learned that the Companies do recognize the potential within the commercial sector and, in the future, may file additional programs targeted at commercial customers. The Companies would prefer to wait and launch these programs once they have a better understanding of the local commercial market; currently the Companies are conducting such research. ICF believes that this is a reasonable strategy that is generally consistent with a conservative planning approach common for utilities that are running relatively new programs in immature markets. Such an approach helps mitigate risks to the Companies and their ratepayers, and helps ensure the long term success of the portfolio.

Table 4: Energy Consumption, Program Spending, and Program Costs, by Sector[4]

KU Customer Sector	Estimated Consumption, 2009 (GWh)		LG&E Customer Sector	Estimated Consumption, 2009 (GWh)		LG&E / KU Estimated Consumption, 2009 (GWh)		Sector	LG&E / KU Proposed Spending on DSM Programs ($M, Years 1-7)		LG&E / KU Avg Cost of Savings ($/kWh, Years 1-7)
Residential	6,353	53%	Residential	4,254	49%	10,607	51%	Residential	$218	86%	$0 21
General Service	1,835	15%	General Service	1,456	17%	3,291	16%	Commercial	$36	14%	$0 09
Large Power Service	3,910	32%	Large Commercial	2,980	34%	6,890	33%				
Total	**12,098**			**8,690**		**20,788**		**Portfolio**	**$254**		**$0.18**

Sources:
KU Elec - DSM RC Filing 12-08
LG&E Elec - DSM RC Filing 12-08
LG&E / KU Draft DSM Expansion Filing 1-11

4.3. Regulatory Treatment of Program Costs

The state of Kentucky's cost recovery mechanism is consistent with best practice, in that it includes program cost recovery and lost revenues recovery. However, the Companies must still prove that a DSM portfolio is cost-effective, which can be difficult when avoided costs are low. Similarly, customers' willingness to participate in energy efficiency program is lessened when retail rates are low, leading to longer payback periods. As demonstrated throughout this document, the Companies continue to offer cost-effective programs to each segment of the customer base. The Companies should continue to review best practice programs and look for new and innovative methods of program design and delivery that are still cost-effective.

In addition to a cost recovery mechanism, the establishment of mandatory savings or budget goals is another method that can ensure sufficient and stable funding for DSM programs. Some states, including Minnesota and Wisconsin, set a requirement that a certain percentage of sales or revenue determine the savings target or the total budget. Other states, including California and Vermont, use historical performance to set three-year budgets (which increase for each cycle) for DSM programs. Though Kentucky's utilities are not yet required to reach a savings or budget target, the governor's goal to offset at least 18 percent of the state's 2025 energy demand will necessitate consistent DSM investment and enable the Companies to set long-term DSM planning goals. The Companies should continue to work with the PSC to reach regulatory certainty and ensure their DSM investments will count toward any statewide or legislative goals.

4.4. Ratepayer Impact

ICF contends that the Companies' proposed DSM investment will have smaller impacts on customer bills than additional customer electricity use. This is illustrated by the Utility Cost Test (UCT) results for the Companies' portfolio, which are well above 1.00 (the overall ratio is 3.39). The UCT compares the costs of DSM programs incurred by the utility ("costs") against avoided costs of energy and demand ("benefits"). If the UCT Benefit-Cost (BC) ratio is greater than one, this means that the DSM program is less expensive than, and therefore a better deal to all ratepayers, than the generation alternative.

[4] Does not include the Industrial sector.

Some interveners, stakeholders, and utility commissioners contend that the Ratepayer Impact (RIM) test is the appropriate indicator of program cost-effectiveness when considering the impact of DSM investments on customers. If the RIM test BC ratio is less than 1.00, then it is likely that utility rates will increase in the short-term, either through a cost recovery factor or through a rate case, especially for non-participants. The RIM test's main advantage over other standard measures of DSM cost-effectiveness is that it is the only test that reflects revenue shifts. However, the RIM test also has serious disadvantages; as stated in the California Standard Practice Manual (CSPM):

> Results of the RIM test are probably less certain than those of other tests because the test sensitive to the differences between long-term projections of marginal costs and long-term projections of rates, two cost streams that are difficult to quantify with certainty.[5]

The other cost-effectiveness test ratios, including the Participant (PCT) test and the Total Resource Cost (TRC) test, show easily the benefits to program participants, and all ratepayers as a whole. The PCT test results for the portfolio are 8.24, showing that for each dollar that is spent on energy efficiency improvements, the participant will receive more than eight times as many benefits, through bill reductions and program incentives. Even when excluding the high PCT ratios from the existing programs, participants will still receive significant benefits from participating in the enhanced Residential and Commercial Conservation/Rebates programs.

The TRC test results for the portfolio are 3.01; this shows that for each dollar that is spent by both participants and utilities, they will receive about three times as many benefits through avoided energy costs. The TRC test (or a variation of it, the Societal Cost Test) is the primary cost-effectiveness test used in most jurisdictions, with the UCT commonly used as a secondary cost-effectiveness test.

Because the programs easily pass the TRC and UCT, and participants gain significant benefits from the programs, the Companies should continue to design and market the programs broadly, in order to increase participation and minimize the number of non-participants. The Companies should also monitor the RIM test and PCT BC ratios for cost-effectiveness; they should also use these test results with caution, and should not judge the value of individual programs using these tests exclusively.

Table 5: Benefit-Cost Ratios, by Cost-Effectiveness Test

Cost-Effectiveness Test	Benefit-Cost Ratio
TRC	3.01
UCT	3.39
RIM	0.82
PCT	8.24

[5] California Public Utilities Commission. California Standard Practice Manual for the Economic Analysis of Demand-Side Programs and Projects. October 2001. p. 15.

5. Program Reviews

The following enhanced existing, and new programs were reviewed and compared with comparable best practice programs:

The enhanced existing programs reviewed were:

- Residential Load Management Program
- Commercial Load Management Program
- Commercial Conservation/Commercial Incentives Program
- Residential Conservation/Home Energy Performance Program
- Residential Low Income Weatherization Program (WeCare)

New programs reviewed were:

- Smart Energy Profile
- Residential Incentives
- Refrigerator Removal Program

5.1. Expanded Programs

5.1.1. Residential Load Management

Description of the Companies' Program

The Companies' Load Management program utilizes one-way radio load control switches and thermostats to cycle off residential and small commercial customers' central air conditioner (CAC) and other systems during system peak times to reduce demand usage. The equipment is controlled (or cycled off) about 30 to 45 percent of each peak event. In exchange, participants who choose the switch option receive free installation of the equipment, and an annual bill credit. Participants who choose the thermostat option do not receive a bill credit incentive.

Under this program modification, the Companies are requesting the flexibility to increase the annual bill credit for CAC units for electric water heaters and pool pumps. To estimate cost-effectiveness, the Companies have proposed annual bill credit increases in Years 2 and 4; the actual increase will be determined in the future based on numerous factors. Participants who choose the thermostat option would continue to receive no annual incentive. The Companies are also proposing, beginning in Year 1, a one-time install bonus to new participants, increasing by $5 every two years. The Companies are proposing to increase the financial incentives to help increase participation compared to prior years, which has been less than half of the planned goals.

Components of Best Practice Programs

The following are components of best practice load control programs[6]:

- Multiple equipment options, such as one-way switches and two-way thermostats
- Multiple cycling options and durations
- Bill credits commensurate with reduction
- Targeting of high-use residential customers
- If applicable, incorporation of critical-peak pricing element or real-time pricing
- Monitoring of load impacts and use of interval data

Summary of Best Practice Programs

The We Energies Energy Partners program utilizes a one-way load control switch for residential customers' CAC systems. Participants can choose among three cycling options, with varying durations, with no limit to the number of events per year. The participant would receive either a $40 annual incentive for continuous cycling of four hours, or $50 for six hours, per day. The third option is a $12 annual incentive for 45 minutes cycling off and 15 minutes cycling on per hour, for up to eight hours per day. Participants can receive up to two switches per household; however, they would receive only one bill credit.

[6] Adapted from http://www.peakIma.com/files/public/CustomerPrinciples.pdf.

We Energies has received approval to introduce new equipment and cycling options in order to expand the Energy Partners program by doubling the number of participants to 60,000 by 2012. The utility plans to introduce smart thermostats, in order to give participants additional control and allow them to override the utility signal. In addition, the utility plans to offer two new cycling options based on a 50 percent control strategy. Incentives for the three existing options will increase to between $50 and $80 per year. The utility also plans to target high-use residential users, in order to increase the demand reductions per participant.

The Energy Partners program expansion seeks to achieve greater participation goals through the adoption of best practice techniques. The use of a smart thermostat may attract new participants who otherwise would not have participated. In the future, the smart thermostat may also allow the utility to introduce real time pricing into the program. In addition, the introduction of new cycling options may also attract new participants, and give the utility more flexibility regarding demand reductions during events.

Southern California Edison's (SCE) Summer Discount Program (SDP) utilizes a one-way load control switch for residential and small commercial customers' CAC systems. For both residential and small commercial customers, SCE offers two cycling options and two incentive options, for a total of four program options. The cycling options consist of 50 percent and 100 percent; the two incentive options are Base and Enhanced. In the Base option, SCE is allowed to conduct a maximum of 15 load control events, with each event lasting up to six hours. In the Enhanced option, SCE is allowed to conduct an unlimited number of six-hour load control events. The participant would then choose one cycling option and one incentive option. Participants are eligible for up to $200 in bill credits per year.

The SDP incentives structure seems proportionate to the commitment required by the participant and the benefit to the utility, consistent with the best practice program components listed above. The SDP's incentives are more than three times higher for the 100 percent cycling option than for the 50 percent cycling option. Also, the Enhanced option incentives are twice as much as the Base option incentives. In addition, the incentive structure is based on system size, which rewards participants who achieve greater demand reductions. The varying incentive may also encourage the participation of high-use customers, who can then receive a bill credit that is among the highest in the country. Similarly, SCE incurs lower program costs by limiting incentive payments to participants whose system sizes are smaller than average.

Table 6: Residential Load Management Program Comparison

		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	**LG&E / KU**	**We Energies, Energy Partners Program Start Year: 1992**	**Southern California Edison, Summer Discount Plan Program Start Year: 1985**
Program Objective(s)	Reduce peak demand, and delay the need for new generation	Provide reliable and cost-effective demand response	Provide reliable and cost-effective demand response
Target Market(s)	Residential single family homes	Residential single family homes	Residential single family homes
Market Penetration (annual)	Currently at 19%, increasing to 25% by Year 3	Estimated at 3%	Estimated at 13%
Measures Types (continuing)	One way switches and thermostats for CAC and other appliances	One way switch for CAC	One way switch for CAC
Measures Types (new)	One way switches and thermostats for CAC and other appliances	Smart thermostat	One way switch for CAC
Incentive Structure	• $20 bill credit per customer per CAC unit, flexibility to increase to $40 in Year 4 • No bill credit for thermostat option • $8 bill credit per customer per electric water heater/pool pump, flexibility to increase to $16 in Year 4 • Proposed install bonus	Ranges from $20 to $80 per year, depending on cycling strategy, size of AC unit, and choice of number of events per season	Ranges from 5 to 18 cents per day per AC system size in tons, depending on cycling strategy, size of AC unit, and choice of number of events per season
Marketing	Traditional marketing efforts through direct mail, website, bill inserts, and other activities and events	Targeting of high-use customers, in addition to traditional marketing efforts through direct mail, website, bill inserts, and other activities and events	Traditional marketing efforts; Use of targeting to high-use customers is unknown
Delivery	LG&E / KU handles marketing, and monitoring of load impacts; Implementation contractor handles all other program activities, including equipment installation, maintenance, and repair, and auditing and verification	Through an implementation contractor, which handles all activities (marketing, equipment installation, maintenance, and repair, auditing and verification, data tracking, monitoring of load impacts), except the call center	SCE handles marketing, recruitment, and call center; Implementation contractor handles all other program activities

Discussion of the Companies' versus Others' Programs

Overall, the Companies' Load Management program compares favorably to best practice load control programs. Equipment costs correspond to what is available in the market, and program costs are comparable to best practice programs. In addition, the program contains features, such as the control of multiple customer appliances, which set it apart from other programs. A comparison of savings and cost-effectiveness is more difficult due to the disparity in retail rates, avoided costs, and system peak demand between the Companies and their peers. However, ICF concludes the Companies are expanding the program correctly by increasing incentives in order to increase participation and savings and decrease program costs.

Conclusions

ICF suggests the Companies consider the following implementation strategies in the future:

1. In addition to increasing the incentives, structure the incentives based on system size, in order to reduce payments to participants with smaller CAC systems. This could also encourage customers with larger system sizes to participate in the program.
2. Target high-use residential customers, similar to what We Energies is planning to do. This could decrease the program's marketing costs per participants, as well as identify customers for participation in other programs.
3. Introduce other best practice techniques, such as the introduction of real-time pricing. The availability of real-time pricing data to the participant would be akin to a price response program, and would allow for greater participant control during an event. The Companies would be able to increase participation by promoting multiple control options to participants.

Table 7: Residential Load Management Program Results Comparison

Program Element/ Metric	LG&E / KU		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
	Year 1	Year 3	We Energies, Energy Partners 2009–2011	Southern California Edison, Summer Discount Plan 2009
Annual Energy Savings MWh	5,923	12,860	N/A	N/A
Annual Demand Reduction kW	145,000	172,000	39,000	639,800
Annual Incentive Costs	$2,260,700	$4,266,834	$3,000,000	N/A
Annual Non-Incentive Costs	$3,926,175	$5,734,218	$9,748,220	N/A
Annual Budget	$6,186,874	$10,001,052	$12,748,220	$59,106,954
Participants	131,000	157,000	30,000	343,107
kWh/Participant	45	82	N/A	N/A
kW/Participant	1.1	1.1	1.3	1.9
% Budget Incentive Costs	37%	43%	24%	N/A
% Budget Non-Incentive Costs*	63%	57%	76%	N/A
% Budget EM&V	18%	16%	2%	N/A
$/1st Year kWh	$1.04	$0.78	N/A	N/A
$/1st Year kW	$43	$58	$327	$92
Cost/Participant	$47	$64	$425	$172
NTG Ratio	1.00	1.00	0.72	N/A

*Includes % EM&V costs

Source(s): *We Energies filing, WI PSC website, Docket 05-UR-103*; *SCE filings, CA PUC website, Proceeding A0806001*

5.1.2. Commercial Load Management

Description of the Companies' Program

The Companies' Load Management program utilizes one-way radio load control switches and thermostats to cycle off residential and small commercial customers' central air conditioner (CAC) and other systems during system peak times in order to reduce demand usage. The equipment is controlled (or cycled off) about 30 to 45 percent of each peak event. In exchange, participants who choose the switch option receive free installation of the equipment, and an annual bill credit. Participants who choose the thermostat option do not receive a bill credit incentive.

Under this program modification, the Companies are requesting the flexibility to increase the annual bill credit for CAC units for electric water heaters and pool pumps. To estimate cost-effectiveness, the Companies have proposed annual bill credit increases in Years 2 and 4; the actual increase will be determined in the future based on numerous factors. Participants who choose the thermostat option would continue to receive no annual bill credit. The Companies are also proposing, beginning in Year 1, a one-time install bonus to new participants, increasing by $5 every two years. The Companies are proposing to increase the financial incentives in order to increase participation compared to prior years, which has been less than half of the planning goals.

Components of Best Practice Programs

The following are components of best practice load control programs[7]:

- Multiple equipment options, such as one-way switches and two-way thermostats
- Multiple cycling options and durations
- Bill credits commensurate with reduction
- Door-to-door recruitment of small commercial customers
- If applicable, incorporation of critical-peak pricing element or real-time pricing
- Monitoring of load impacts and use of interval data

Summary of Best Practice Programs

Both best practice comparison programs operate in the same market, California; however, the state's three investor-owned utilities (IOUs) and two largest municipal utilities have designed their direct load control programs differently. Pacific Gas & Electric (PG&E) has only been operating its current direct load control programs since 2007. PG&E's SmartAC program is targeted mostly to the residential sector (the share of small commercial customers is less than 1 percent) and is being co-marketed with SmartRate, a critical peak pricing tariff, using its recently installed smart meter technologies. Sacramento Municipal Utility District (SMUD) runs a best practice direct load control program that is open to residential customers only, while the Los Angeles Department of Water and Power (LADWP) does not run any direct load control programs.

[7] Adapted from http://www.peakIma.com/files/public/CustomerPrinciples.pdf.

San Diego Gas & Electric (SDG&E), which can be thought of as the less mature market, has only been operating its program since 2005. It has achieved a much larger share of small commercial customers due to its unique marketing approach. Southern California Edison (SCE), which can be thought of as the more mature market, has operated its program since 1985. The program has a high penetration rate in the residential sector, and a more modest penetration rate in the small commercial sector (though, with higher kW savings per participant). Although the Kentucky market has fewer system peak demand issues than California, there are some direct load control program design options that the Companies could incorporate into their programs.

SDG&E's Summer Saver program utilizes a one-way control switch for residential and small commercial customers' CAC systems. For small commercial customers, SDG&E offers two cycling options, 30 percent and 50 percent. The duration of each event is between two to four hours, with an annual maximum of 15 event days.

The Summer Saver program is SDG&E's entry into the load control market, and offers a simple design and incentive structure to small commercial customers. Since the program's initiation in 2005, it has recruited more than 5,000 small commercial participants for an estimated participation level of nearly 7 percent. SDG&E and its implementation contractor, Comverge, have undertaken traditional, as well as unique, marketing efforts, including door-to-door recruitment, and outreach to a variety of community groups. Although the number of programs that include small commercial customers is few, SDG&E has achieved a penetration rate that is higher than the direct load control programs for fellow California IOUs SCE and PG&E.

SCE's Summer Discount Program (SDP) utilizes a one-way load control switch for residential and small commercial customers' CAC systems. For small commercial customers, SCE offers three cycling options and two incentive options, for a total of six program options. The cycling options consist of 30 percent, 50 percent and 100 percent; the two incentive options are Base and Enhanced. In the Base option, SCE is allowed to conduct a maximum of 15 load control events, with each event lasting up to six hours. In the Enhanced option, SCE is allowed to conduct an unlimited number of six-hour load control events. The participant would then choose one cycling option and one incentive option. Participants are eligible for up to $200 in bill credits per year.

The SDP incentives structure seems proportionate to the commitment required by the participant and the benefit to the utility, consistent with the best practice program components listed above. The SDP's incentives are nearly three times higher for the 100 percent cycling option than for the 50 percent cycling option, which are in turn five times higher than the 30 percent cycling option. Also, the Enhanced option incentives are twice as much as the Base option incentives. The inclusion of the 30 percent cycling option, which is known as the "Maximum Comfort" option, can provide an entry for new and/or hesitant participants. In addition, the incentive structure is based on system size, which rewards participants who achieve greater demand reductions. The varying incentive may also encourage the participation of high-use customers (considering that the average reduction per participant is 11.4 kW), who can then receive a bill credit that is among the highest in the country. Similarly, SCE incurs lower program costs by limiting incentive payments to participants whose system sizes are smaller than average.

Table 8: Commercial Load Management Program Comparison

		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	**LG&E / KU**	**SDG&E, Summer Saver Program Start Year: 2005**	**Southern California Edison, Summer Discount Plan Program Start Year: 1985**
Program Objective	Reduce peak demand, and delay the need for new generation	Provide reliable and cost-effective demand response	Provide reliable and cost-effective demand response
Target Market(s)	Small commercial customers	Small commercial customers	Small commercial customers
Market Penetration (annual)	Currently at 5%, increasing to 6% in Year 3	Estimated at 7%	Estimated at 4%
Measures Types (continuing)	One way switches and thermostats for CAC and other appliances	One way switch for CAC	One way switch for CAC
Measures Types (new)	One way switches and thermostats for CAC and other appliances	One way switch for CAC	One way switch for CAC
Incentive Structure	• $20 bill credit per customer per CAC unit, flexibility to increase to $40 in Year 4 • Additional bill credit of $1 per ton per month for CAC units larger than 5 tons • No bill credit for thermostat option • $8 bill credit per customer per electric water heater/pool pump, flexibility to increase to $16 in Year 4 • Proposed install bonus	• Ranges from $9 to $15 per AC system size in tons, depending on cycling strategy, size of AC unit • Additional $10 Weekend Bonus Credit	Ranges from 1.4 to 40 cents per day per AC system size in tons, depending on cycling strategy, size of AC unit, and choice of number of events per season
Marketing	Traditional marketing efforts through direct mail, website, bill inserts, and other activities and events	Traditional marketing efforts, as well as door-to-door marketing and other direct outreach methods	Traditional marketing efforts; Use of targeting to high-use customers is unknown
Delivery	LG&E / KU handles marketing, and monitoring of load impacts; Implementation contractor handles all other program activities, including equipment installation, maintenance, and repair, and auditing and verification	Implementation contractor (Comverge) handles marketing and recruitment, and all other program activities	SCE handles marketing, recruitment, and call center; Implementation contractor handles all other program activities

Discussion of the Companies' versus Others' Programs

Overall, the Companies' Load Management program compares favorably to best practice load control programs. Equipment costs correspond to what is available in the market, and program costs are comparable to best practice. The most important feature is that the program is offered to commercial customers; most other load control programs are open only to residential customers. In addition, the program contains other features, such as the control of multiple customer appliances, which set it apart from other programs. A comparison of savings and cost-effectiveness is more difficult due to the disparity in retail rates, avoided costs, and system peak demand between the Companies and their peers. However, ICF concludes the Companies are expanding the program correctly by increasing incentives, in order to increase participation and savings, and decrease program costs.

Conclusions

ICF suggests the Companies consider the following implementation strategies in the future:

1. In addition to offering incentives based on system size, and increasing the annual incentives, the Companies should continue to monitor the incentive structures of comparable programs, and the relationship between incentives and new participants.
2. Recruit small commercial customers through unique marketing efforts, similar to what SDG&E does. In addition to increasing participation, this could decrease the program's marketing costs per participants, as well as identify customers for participation in other programs.
3. Introduce other best practice techniques, such as the introduction of real-time pricing. The availability of real-time pricing data to the participant would be akin to a price response program, and would allow for greater participant control during an event. The Companies would be able to increase participation by promoting multiple control options to participants.

Table 9: Commercial Load Management Program Results Comparison

Program Element/ Metric	LG&E / KU		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
	Year 1	Year 3	We Energies, Energy Partners 2008	Southern California Edison, Summer Discount Plan 2009
Annual Energy Savings MWh	244	564	N/A	N/A
Annual Demand Reduction kW	5,800	7,500	12,132	127,100
Annual Incentive Costs	$81,724	$152,594	N/A	N/A
Annual Non-Incentive Costs	$240,096	$325,983	N/A	N/A
Annual Budget	$321,821	$478,578	$1,968,400	$14,776,739
Participants	5,100	6,300	5,403	11,167
kWh/Participant	48	90	N/A	N/A
kW/Participant	1.1	1.2	2.2	11.4
% Budget incentive costs	25%	32%	N/A	N/A
% Budget non-incentive costs*	75%	68%	N/A	N/A
% Budget EM&V	17%	15%	N/A	N/A
$/1st year kWh	$1.32	$0.85	N/A	N/A
$/1st year kW	$55	$64	$162	$116
Cost/Participant	$63	$76	$364	$1,323
NTG Ratio	1.00	1.00	N/A	N/A
**Includes % EM&V costs*		*Source(s):*	*SDG&E filing, CA PUC website, Proceeding A0806002; Evaluations available at CALMAC.org*	*SCE filing, CA PUC website, Proceeding A0806001; Evaluations available at CALMAC.org*

5.1.3. Commercial Conservation / Commercial Incentives

Description of the Companies' program

The Companies' Commercial Conservation (Energy Audits)/Commercial Incentives program expands upon the current commercial audit program by providing additional incentives to commercial customers to make energy efficiency upgrades. In the current program, a customer receives a visit from a certified auditor, who then conducts a facility audit – either Level 1 for small commercial customers, or Level 2 or 3 for custom projects. The auditor then provides a report with recommendations for energy savings upgrades and the costs to install them. Customers can then choose to have the auditor install the upgrades, or can have another contractor implement the recommendations. Customers would receive the audit at no cost, but would have to pay for the upgrades themselves.

In the program expansion, the Companies seek to add refrigeration measures to the list of eligible projects, as well as offer incentives for custom measures. The Companies are also increasing the total amount of incentives available through the program by offering a set $100 per kW reduced incentive.

Components of Best Practice programs

The following are components of best practice load control programs:

- Inclusion of audits/assessments to educate customers and encourage participation
- Program design that includes both prescriptive and custom incentives for all measure types
- Applicability to and participation of all customer sub-sectors and sizes
- Use of trained contractors and trade allies, to market and implement the program
- Incorporation of EPA's Portfolio Manager benchmarking tool, in order to identify potential projects and monitor post-installation progress

Summary of Best Practice programs

The two programs discussed below can be considered best practice; however, the primary rationale to use them as comparison points is to detail the two models that are used most often for commercial and industrial (C&I) retrofit programs. Entergy Arkansas Inc. (EAI) has designed their C&I portfolio based on customer size, and developed custom incentives to encourage participation. On the other hand, NV Energy (comprised of Nevada Power and Sierra Pacific Power) uses a portfolio approach that segments each program based on measure type. The measure types are typically denoted as Prescriptive, Custom, and Retro-commissioning. A Prescriptive program generally includes a set incentive for a specific piece of equipment, such as $10 for a T8 lighting fixture. A Custom program typically sets an incentive according to kWh or kW saved in order to include equipment that is not covered by the Prescriptive program. Retro-commissioning programs include measures that are designed to improve building performance, and can include both prescriptive and custom incentives.

The Entergy Arkansas, Inc. (EAI) Quick Start portfolio was developed as a result of an Arkansas Public Service Commission order in 2007 for the state's investor-owned utilities to offer DSM programs to their customers. The Quick Start portfolio includes three energy efficiency programs that are targeted to commercial and industrial (C&I) customers, based on customer size and familiarity with energy efficiency upgrades.[8] The Small C&I program is available to customers with peak electricity demand of less than 100 kW. Customers can choose from a list of participating contractors, and receive a free walk-through assessment. The incentive amount is $115 per kW reduction for lighting, HVAC and chiller, and motors upgrades that are installed within 45 days. The Large C&I Energy Solutions is available to customers with peak electricity demand of 100 kW or greater. Customers are given more flexibility with regards to their energy assessment (i.e. they can choose their own contractor or have the program provide one). Similar to the Small C&I program, the incentive amount of $159 per kW reduction applies only to lighting, HVAC and chiller, and motors upgrades.

The Large C&I Standard Offer program is also available to customers with peak electricity demand of 100 kW or greater. This customer segment is assumed to be familiar with implementing energy efficiency upgrades and is given flexibility with regards to the participation process (i.e. they are not required to conduct an assessment). The process for this program is similar to other standard offer programs, where participant facilities are subject to pre- and post-installation inspections, and receive incentives based on the amount of peak demand reduced; for EAI's program, the incentive is $230 per kW reduction. For all three programs, incentives are paid by the utility following completion or verification of the project.

The advantage of this *Customer* approach is the simple design; customers are eligible for one program, and can receive incentives for the installation of upgrades for all end-uses and building types. If a customer has a peak demand of 50 kW, they know they are eligible only for the Small C&I program. They would then speak with an account representative, choose a contractor, and begin participation in the program. One disadvantage of the Customer approach is the lack of flexibility regarding program design. If, for example, because of the economic downturn, small commercial customers are not participating due to a lack of financing, the unused portion of the program budget is not easily transferable to the large customer programs. Another disadvantage is the preference given to measures that produce higher peak demand savings (HVAC, motors, etc.) versus those that produce lower peak demand savings (lighting, etc.). This would result in lost opportunities for certain energy efficiency retrofits that save energy but not demand.

NV Energy's Sure Bet Commercial Incentives program provides a variety of prescriptive and custom incentives, and technical assistance for non-residential customers across the utility's geographically-disparate Northern and Southern territories.[9] Customers submit one single pre-application form (required for large Prescriptive and all Custom projects), install the upgrades (using their preferred or an NV Energy-trained contractor), and receive incentive payments within 4-6 weeks of submitting post-installation project documentation. Through 2007, the program was utilizing 39 trained contractors.

The Prescriptive component of the program includes incentives for lighting, cooling (including HVAC units, variable speed drives for fans and pumps, and window film), miscellaneous (motor controllers

[8] More information is available at http://www.entergy-arkansas.com/energy_efficiency/business.aspx.

[9] More information is available at http://www.nvenergy.com/saveenergy/business/incentives/surebet/documents/applications/2009SureBetPP.pdf.

and pool/spa pumps), and commercial kitchen/refrigeration measures. The Custom component of the program provides incentives (for measures not covered by the Prescriptive component) of 10 cents per kWh for the first year's on-peak savings, and 5 cents per kWh for the first year's off-peak savings. The program also contains services for building optimization (similar to Retro-commissioning, as discussed above) and small commercial direct install incentives. Incentive payments to participants have a soft cap of $100,000; projects above this amount receive between 10% and 50% of the total incentive. In general, the incentives were designed to achieve a two year post-incentive payback. Program savings were nearly equal between Prescriptive and Custom projects, which show broad inclusion and participation among measure and customer types.

The advantage of this *Measure* approach is the flexibility with regards to program design. Customers are able to participate in multiple program components, while still receiving incentives for a variety of upgrades. A customer that needs both lighting upgrades and a chiller replacement would participate in both the Prescriptive and Custom components (while, at least in the Sure Bet case, submitting only one application). In addition, under this approach, programs would be unaffected by economic or other barriers that would restrict a customer segment from program participation. As explained above, in the "Customer" approach, if the Small C&I program is less popular than the Large C&I program, it would not be easy to transfer program funds from the Small C&I budget to the Large C&I budget. However, in the "Measure" approach, if lighting upgrades are less popular than HVAC upgrades within the Prescriptive component, additional funds could be used to market and install more HVAC upgrades. One disadvantage of the "Measure" approach is the additional infrastructure and costs needed to engage trade allies (manufacturers, retailers, etc.) for a Prescriptive component. In order to offer incentives for lighting and other upgrades, a utility would need to work with these trade allies to make sure their products are available in the market. However, over time, these costs should decline as the program expands.

Duke Energy Kentucky is following the *Measure* approach, and includes prescriptive incentives for lighting, motors, HVAC, refrigeration, and other measures as part of its SmartSaver program. The utility also offers an on-line benchmarking analysis. However, it does not offer any custom incentives, and incentive payments are typically capped at 50% of total project costs up to a maximum of $50,000 per customer facility. In the past few years, the number of installations has been heavily weighted towards lighting measures.

Table 10: Commercial Conservation / Commercial Incentives Program Comparison

		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	**LG&E / KU**	**Entergy Arkansas C&I Programs** Program Start Year: 2007	**Nevada Energy Sure Bet** Program Start Year: 1985
Program Objective(s)	Provide audits and rebates to qualifying commercial customers for the retrofit of less efficient equipment by adding refrigeration measures and a set per kW incentive to its existing program	Provide a suite of energy efficiency options to C&I customers, including audits, rebates, and custom incentives, including per kW	Provide prescriptive and custom energy efficiency incentives to C&I customers
Target Market(s)	Large commercial customers	All non-residential customers	All non-residential customers
Market Penetration (annual)	Estimated at 1%	Estimated at < 1%	Estimated at < 1%
Measures Types (continuing)	Facility audit, with recommendations for lighting, HVAC, and other measures	Facility energy assessments, with rebates for lighting, HVAC and chillers, and motors	Lighting, HVAC, refrigeration, and other prescriptive, as well as custom measures
Measures Types (new)	Facility audit, with incentives for lighting, HVAC, refrigeration, and custom measures	Facility energy assessments, with rebates for lighting, HVAC and chillers, and motors	Lighting, HVAC, refrigeration, and other prescriptive, as well as custom measures
Incentive Structure	$100 per kW reduced, up to an annual maximum of $50,000, or $100,000 over two years, per facility	Ranges from $115 to $230 per kW reduced	• Prescriptive – varies by measure • Custom – 5 to 10 cents per kWh reduced • Soft cap of $100,000 per participant
Marketing	Through the Business Service Center, the audit contractor, and trade allies, as well as through direct mail, newsletters, and targeting of large customers	• Small customers – through direct mail • Large customers – through Account Managers	Through the website and account executives, as well as direct outreach to CoC organizations, BOMA, etc.
Delivery	Current audit contractors will conduct audits, prepare reports with energy savings recommendations, install upgrades, or refer customers to Dealer Referral Network; Upgrades will then be installed by participating contractors	Depending on the program, both participating and non-participating contractors will conduct assessments and install upgrades	Implementation contractor (KEMA) handles all program activities, including applications, inspections and incentive processing

Discussion of the Companies' versus Others' Programs

The Companies' program is unique among the state's largest utilities, and it has historically exceeded their goals for number of audits performed, and achieved their goals for energy savings. The proposed expansion will address some of the issues detailed in the most recent evaluation report. For example, the $100 per kW incentive will likely increase the participation of large customers, whose peak demand reduction potential is greater than small customers. In addition, the inclusion of refrigeration measures will match the design of several best practice programs. Overall, the program's expansion to include additional prescriptive and custom measures makes it more similar to best practice programs in California, Nevada, Wisconsin, and other states.

Conclusions

ICF suggests the following in order for the program to reach its goals and continue program cost-effectiveness:

1. Per the most recent evaluation report, the Companies should ensure that the audits are comprehensive and are continuing to motivate customers to participate in the program. Many best practice programs also include audits and other technical assistance as a way to educate customers and market programs.
2. Monitor participation to ensure engagement with both small and large commercial customers. The incentive per kW will encourage participation from a broad mix of customers, and lead to cost-effective savings and achievement of program goals.
3. Continue to add prescriptive measures that are cost-effective, innovative, and available in the market. The Companies should also continue to work with trade allies to ensure their continued participation with and promotion of the program.
4. In the future, consider incorporating the EPA's Portfolio Manager benchmarking tool to provide customers with ongoing and post-project information regarding facility usage and savings. The tool is becoming an innovative program option in multiple utility portfolios, including California, Massachusetts, and Washington.[10] In addition, the Companies can use LG&E's experience with the *Louisville Kilowatt Crackdown* to introduce this to other parts of the territory. Since this initiative requires investment in equipment and personnel, the Companies should implement it once the expanded program has been running for a few years. This will allow the tool to be applied to a larger participant base, and ensure greater persistence of energy savings.

[10] More information is available at http://www.cee1.org/cee/mtg/06-09mtg/files/BB2Narel.pdf.

Table 11: Commercial Conservation / Commercial Incentives Program Results Comparison

			Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	LG&E / KU		Entergy Arkansas C&I Programs 2008	Nevada Energy Sure Bet 2007
	Year 1	Year 3		
Annual Energy Savings MWh	54,988	54,988	31,834	84,532
Annual Demand Reduction kW	20,689	20,689	5,610	14,140
Annual Incentive Costs	$2,000,000	$2,000,000	$1,666,835	$3,579,927
Annual Non-Incentive Costs	$1,255,400	$1,316,121	$518,441	$2,796,550
Annual Budget	$3,255,400	$3,316,121	$2,185,276	$6,376,477
Participants	880	880	52	527
kWh/Participant	62,486	62,486	612,192	160,402
kW/Participant	23.5	23.5	107.9	26.8
% Budget incentive costs	61%	60%	76%	56%
% Budget non-incentive costs*	39%	40%	24%	44%
% Budget EM&V	1%	0%	N/A	N/A
$/1st year kWh	$0.06	$0.06	$0.07	$0.08
$/1st year kW	$157	$160	$390	$451
Cost/Participant	$3,699	$3,768	$42,025	$12,100
NTG Ratio	0.80 to 0.90	0.80 to 0.90	1.00	0.63
**Includes % EM&V costs*		*Source(s):*	*EAI filing, Arkansas PSC website, Docket 07-085-TF*	*NV Energy filing, Nevada PUC, Docket 08-8011, 08-8012*

5.1.4. Residential Conservation / Home Energy Performance

Description of the Companies' program

The Companies' Residential Conservation/Home Energy Performance program expands upon the current audit program by providing additional incentives to single family customers to make energy efficiency retrofits for their homes. In the current program, a customer receives a visit from a certified auditor, who records appliance data and energy characteristics of the home. A blower door test was included in the audit in 2009. The auditor then prepares a report that includes historical energy usage, and provides a list of recommended energy upgrades and their related savings and costs. The customer would pay the $25 audit cost, and the full cost of any measure installations.

In the program expansion, customers choose from among three tiered participation options, corresponding to 10 percent, 20 percent, and 30 percent savings relative to total energy usage. Certified auditors conduct the Tier 1 audit (equivalent to the current level of service), and provide the participant with a list of Tier 2 and Tier 3 upgrades, and referrals to certified contractors. Participants can then choose to implement these upgrades at their own cost within 12 months of the initial audit, and submit post-installation rebate applications to the Companies. The rebate amounts are a maximum of $500 for Tier 2, and $1000 for Tier 3.

The current online audit would continue as part of the program. In addition to receiving the above report, online audit participants also receive a free four-pack of high efficiency light bulbs and are encouraged to participate in other components of the program to obtain additional savings.

Components of Best Practice programs

The following are components of best practice residential retrofit programs:

- Tiered efficiency options, ranging from walk-though audits to comprehensive audits (diagnostic audits that include blower-door and duct blaster tests), as well as a range of home efficiency project options
- Incentive options (with cost cap) commensurate with efficiency options, including audit with direct install to rebates
- Focus on whole-home approach
- Use of certified (e.g. RESNET or BPI) contractors, to market and implement the program
- Coordinate with statewide agencies, if applicable

Summary of Best Practice programs

The Baltimore Gas and Electric (BG&E) Smart Energy Savers portfolio includes an audit component, a Quick Home Energy Check-up, and a Home Performance with ENERGY STAR® (HPwES) component, for residential single-family customers. Customers who choose the quick audit receive a visit from a certified auditor, and can have the $40 audit fee waived by installing at least three out of five measures from a list that includes CFLs and hot water measures. The auditor also checks the insulation and air sealing levels, and the HVAC systems, and provides a list of findings and recommendations that can further reduce the participant's energy usage and costs.

Participants can also choose to receive a more comprehensive and diagnostic audit through HPwES. A BPI-certified contractor would conduct an HPwES Home Energy Audit, including blower door and duct blaster tests, and present a list of efficiency upgrade opportunities to the participant. The upgrades include air and duct sealing, insulation, and HVAC and hot water systems. The contractor would then install the agreed-upon upgrades, and receive full payment for services from the participant. After about six to eight weeks, the participant would receive partial reimbursement via the rebate check. Rebates are limited to $1300 per participant, but can exceed this amount if a new HVAC unit is installed.

The HPwES program began in Maryland in 2007 as a pilot program run by the Maryland Energy Administration (MEA). MEA's program was a success, and received an EPA Excellence in ENERGY STAR Promotion Award in 2009. Using the successful pilot as a model, BG&E's HPwES program design was submitted for and received regulatory approval in the fourth quarter of 2008, and was approved by the EPA as a Program Sponsor in the second quarter of 2009. Sponsors are able to market their programs using the nationally-known ENERGY STAR brand name, and take advantage of other support, including marketing toolkits and sales and contractor training courses. The program began operating in the third quarter of 2009 as the state's first utility-run HPwES program, and includes 25 qualified contractors.

With the use of multiple installation contractors, BG&E's program follows the HPwES market transformation model. This approach typically can take up to one year or more to ramp-up, in order to build program infrastructure, and can be more expensive in the short term than the resource acquisition model. However, in the long term, awareness of the program and its contractor network could result in lower costs and greater energy savings. BG&E's tiered approach, beginning with the Quick Home Energy Check-up, is designed to mitigate the long lead time, and provide customers with simply-designed retrofit options.

Massachusetts' MassSAVE portfolio is a public/private partnership that provides energy efficiency options to customers through their local utility. MassSAVE has contained an HPwES component since 2002, is also an HPwES Program Sponsor, and has been recognized as Best Practice by The American Council for an Energy-Efficient Economy (ACEEE). National Grid's HPwES program contains a no-cost home energy assessment (HEA) and offers rebates for efficiency upgrades. The HEA is conducted by the implementation contractor's (Conservation Services Group) certified auditors, and includes blower door and duct leakage tests. The contractor then installs the agreed-upon upgrades, and coordinates with sub-contractors for additional upgrades as necessary. Typical upgrades include air sealing, insulation, and the installation of efficient HVAC systems. Rebates are available for up to 75 percent of installation costs, with a $2000 maximum. Participants are also eligible for zero-interest financing of up to $15,000 over seven years, through MassSave's HEAT Loan program.

National Grid's retrofit program has been conducting HEAs since 1980, but the program's original focus was on education. Since the advent of the HPwES model in 2001, the program has evolved into a whole-home approach. National Grid's HPwES program follows the resource acquisition model, where typically one contractor implements the program, and installs the efficiency upgrades. This results in lower marketing and training costs, and allows the utility and the contractor to bring the program to the market more quickly. In addition, the resource acquisition model can result in more participants and installations, greater energy savings per home, and market penetration rates compared to the market transformation model.

Table 12: Residential Conservation / Home Energy Performance Program Comparison

		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	**LG&E / KU**	**BGE, Retrofit Program Start Year: 2009**	**National Grid, MassSAVE Program Start Year: 2000**
Program Objective(s)	Utilize a whole-house approach to provide single family homes with additional options for energy saving retrofits and continue the participation from current audit programs	Two-tiered approach to motivate residential single family homes to adopt comprehensive, whole-home energy retrofits	Provide a singular source for home retrofit measures through audits, incentives, and education
Target Market(s)	Residential single family homes	Residential single family homes	Residential single family homes
Market Penetration (annual)	• 0.2% in Year 1, increasing to 0.3% in Year 3 • On-line audit penetration of 0.4% (3,000 audits) in Year 1, increasing to 0.8% (6,000 audits) in Year 3	Estimated at 0.04%; Increasing to 0.2% in 2010	Estimated at 0.6%
Measures Types (continuing)	• On-line audit - 4-pack high efficiency light bulbs; On-site audit consisting of visual inspection, appliance data recording, and other home measurements • Also includes a blower door test	• Tier 1 - Quick Home Energy Check-up • Tier 2 - Home Performance with ENERGY STAR	• Tier 1 - Information only • Tier 2 - Audit, and installation of insulation, air sealing measures, programmable thermostats
Measures Types (new)	• On-line audit - 4-pack high efficiency light bulbs; Tier 1 - Similar to on-site audit, and includes CFLs, hot water and minor air sealing direct install measures • Tiers 2 and 3 - Other air sealing, insulation, and HVAC maintenance measures	• Tier 1 - Quick Home Energy Check-up • Tier 2 - Home Performance with ENERGY STAR	• Tier 1 - Information only • Tier 2 - Audit, and installation of insulation, air sealing measures, programmable thermostats
Incentive Structure	• Tier 1 - Direct install measures (corresponds to 10% savings) • Tier 2 - Post installation $500 rebate (20% savings); Tier 3 - Post-installation $1000 rebate, (30% savings)	• Tier 1 - Audit with CFL and hot water kit • Tier 2 - Prescriptive incentives with 15% measure cost cap	75% of measure costs up to $2000

Program Element/ Metric	LG&E / KU	Best Practice Program: Less Mature Market BGE, Retrofit Program Start Year: 2009	Best Practice Program: More Mature Market National Grid, MassSAVE Program Start Year: 2000
Marketing	• Traditional marketing efforts through direct mail, website, bill inserts, and other activities and events • *Prior program has had most success with bill inserts/direct mail*	Traditional marketing efforts, as well as through contractor outreach	*Through MassSave brand awareness campaign, which includes media buys and direct mail, and through implementation contractor*
Delivery	Through Dealer Referral Network, consisting of certified contractors	*Through implementation contractor, and technical sub-contractors, many of whom are HERS raters and/or BPI Building Analysts*	Through primary implementation contractor, and sub-contractors

Discussion of the Companies' versus Others' Programs

Overall, the Companies' Residential Conservation / Home Energy Performance program compares favorably to best practice home retrofit programs. The program's expansion to include multiple audit and rebate options and focus on a whole-home approach makes it similar to best practice programs in Maryland, Massachusetts, New York, Wisconsin, and other states. In addition, the Companies can take advantage of their existing relationship with the BPI network to expand program infrastructure. However, since the program is not run statewide, as is the case in other states, the Companies are at a disadvantage in that they are not able to share marketing, contractor training, and other costs.

Conclusions

ICF suggests the following in order to overcome this and continue program cost-effectiveness:

1. Investigate the option of becoming an HPwES Program Sponsor. Based on conversations with the Companies, ICF believes they have already begun researching the advantages and disadvantages of sponsorship.
2. While considering HPwES resource acquisition model and the market transformation model, also consider a hybrid approach, where the resource acquisition model eventually evolves into the market transformation model.
3. If using the market transformation model, build the program infrastructure and contractor network such that, over time, minimal involvement by the Companies will be necessary. The availability of more contractors will increase competition, decrease customers' costs, and decrease the Companies' program costs.
4. In lieu of statewide resources, take advantage of EPA national program support and expertise from utilities in other states.

Table 13: Residential Conservation/Home Energy Performance Program Results Comparison

			Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	LG&E / KU		BGE, Retrofit 2009	National Grid, MassSAVE 2007
	Year 1	Year 3		
Annual Energy Savings MWh	2,948	5,165	642	4,839
Annual Demand Reduction kW	767	1,313	190	1,169
Annual Incentive Costs	$180,000	$300,000	N/A	N/A
Annual Non-Incentive Costs	$1,280,826	$1,907,217	N/A	N/A
Annual Budget	$1,460,826	$2,207,217	$1,361,268	$5,378,468
Participants	7,200	14,000	1,716	6,000
kWh/Participant	409	369	374	807
kW/Participant	0.1	0.1	0.1	0.2
% Budget incentive costs	12%	14%	N/A	N/A
% Budget non-incentive costs*	88%	86%	N/A	N/A
% Budget EM&V	0%	0%	0%	3%
$/1st year kWh	$0.50	$0.43	$2.12	$1.11
$/1st year kW	$1,905	$1,681	$7,165	$4,601
Cost/Participant	$203	$158	$793	$896
NTG Ratio	1.00	1.00	0.90	N/A
**Includes % EM&V costs*		*Source(s):*	*BGE filing, MD PSC, Case 9154*	*National Grid filing, MA DOER website; ACEEE Compendium of Champions report, 2008*

5.1.5. Residential Low Income Weatherization (WeCare)

Description of the Companies' program

The Residential Low Income Weatherization Program (WeCare) is designed to reduce energy consumption for LG&E and KU's low income customers. The program provides energy audits, energy education, performs blower door tests, and installs weatherization and other energy conservation measures on qualified houses. The modified WeCare program presented in this filing is the third generation of the Companies' Low Income weatherization initiative. The original Energy Partners Program (EPP) pilot (1994) was modified to increase cost-effective savings based on EM&V findings; the program evolved into the WeCare Low Income Weatherization Program in 2001. The third generation program (also called WeCare) builds upon the Companies' experience with this hard-to-reach sector by adding HVAC unit replacement and envelope sealing measures to their list of offerings. The Companies are proposing this expansion in WeCare's offerings because the program has found that for a portion of eligible customers, there is a significant need for, and significant savings potential associated with installing a new HVAC unit and/or envelope sealing. In addition, the Companies are committed to the expansion of the program by more than tripling the budget and number of participants between Year 1 and Year 7 of program operation.

Components of Best Practice programs

Low income weatherization programs have been implemented by both public and private organizations for decades. Therefore, there is a wealth of literature on best practices.

Best practices in the delivery of low income weatherization program include:

- Leveraging efforts of other programs, e.g. local LIHEAP and WAP programs;
- Making the program stable and consistent;
- Setting clear expectations with auditors/contractors;
- Auditing a statistically significant sample of weatherized homes;
- Developing a network of local auditors and installers who are committed to high-quality standards;
- Controlling for free-ridership through periodic market studies, and consumer surveys; and,
- Offering a mix of services and measures attractive to homeowners.[11]

Summary of Best Practice programs

It is standard practice in the U.S. that DSM portfolios include at least one program that provides energy efficiency services to low income customers. Even though these programs are typically less cost-effective (have lower TRC and UCT test results) than other programs, most utility commissions make exceptions to their cost-effectiveness rules under certain circumstances. In the case of low income programs, commissions also consider fairness criteria in order to ensure that DSM services are made available to each market segment. Further, most commissions also

[11] Many of these best practices were drawn from Best Practice Benchmarking for Energy Efficiency Programs: Residential Single-Family Comprehensive Weatherization Best Practices Report. Available at, http://www.eebestpractices.com/pdf/BPSummaryTable_R4.PDF.

require the DSM portfolio as a whole to be cost-effective so that more expensive low-income, education and pilot initiatives are offset by other programs that are less expensive such that the end result is a portfolio of DSM programs that passes the TRC and/or the UCT test(s).

ICF chose three programs against which to compare WeCare. These programs are operated in states with different levels of market maturity; California (most mature), Colorado (somewhat mature), and Texas (less mature).

The PG&E, Xcel (Public Service), and AEP-Texas North (TNC) low-income weatherization programs have many common elements, including:

- Comprehensive audit and weatherization services;
- Customer education;
- Coordination with local LIHEAP of WAP programs; and,
- Reliance on weatherization contractors to deliver program services.

Based on our understanding of these utilities' low income initiatives, each program conducts all of the seven best practices listed above.[12]

The main differences between these programs are the extent of their coordination with other low income programs and the range and extent of program marketing. Xcel's program, for example, is heavily leveraged by state and federal low income programs; in fact, the program was designed to complement the services of, and acquire additional savings beyond those achieved by public programs. PG&E promotes their program heavily in communities throughout its large service territory. Program representatives travel to community forums and conduct presentations on the utility's low income energy efficiency offerings and the "CARE" tariff (mandated by the CPUC), which is available to qualified low income customers. TNC's program is a requirement set forth by the State Senate to provide weatherization services and efficiency education to low income customers. Participating agencies verify customer eligibility, audit homes, and determine which measures to install based on savings-to-investment ratios (SIRs). home, and market penetration rates compared to the market transformation model.

[12] One exception noted by ICF is that it is not clear how often and at what level of detail the Xcel and TNC programs are evaluated.

Table 14: Residential Low Income Weatherization (WeCare) Program Comparison

		Best Practice Program: Market Maturity High	Best Practice Program: Market Maturity Mid	Best Practice Program: Market Maturity Mid-to-Low
Program Element/ Metric	**LG&E / KU**	**PG&E, Energy Partners Program Program Start Year: 1983**	**Xcel Energy Colorado, Single Family Low-Income Weatherization Program Program Start Year: NA**	**AEP North Texas (TNC), Targeted Low-Income Program Start Year: NA**
Program objective(s)	(1) Reduce customer energy consumption and expenditures, and arrearages (2) Provide program participation opportunities for hard-to-reach markets	Increase low income customer comfort while reducing their energy consumption, costs and economic hardship.	Provide no-cost energy efficiency services to income-eligible customers, seniors and disabled. Increase and expand education among low income customers on the importance of energy efficiency and the value of taking action to improve efficiency in their homes.	Cost-effectively reduce the energy consumption and energy costs of TNC's low income residential customers.This program is required per TX State Senate Bill 712 "Weatherization Program"
Target Market(s)	Households at or below LIHEAP Federal Poverty level. Both homeowner and renters are eligible. There are 3 Tiers of participants: A, B, and C. Customers in Tier A have the lowest energy use and those in Tier C have the highest. The higher use clients (Tiers B and C) are initially identified by their annual gas or electric consumption. These clients usually receive multiple visits from the Weatherization Audit Contractor.	Low income households as defined by the CA Public Utilities Commission (CPUC). 2006 threshold was household income less than or equal to 200% of poverty level.	Households with median income below 80% of area median income. Participants must first apply for LIHEAP funding. Customers meeting DOE WAP funding guidelines are also automatically considered eligible	To be eligible, customers must meet current DOE Weatherization Assistance Program (WAP) income eligibility guidelines (200% of poverty level in 2009), receive electric power from TNC, and have electric air conditioning.
Market penetration (annual)	1,200 homes/year, increasing to 4,200 homes/year in Year 7	66,000 homes (approximately 2% of qualified homes)	1,958 single family homes	39 homes

Program Element/ Metric	LG&E / KU	Best Practice Program: Market Maturity High PG&E, Energy Partners Program Program Start Year: 1983	Best Practice Program: Market Maturity Mid Xcel Energy Colorado, Single Family Low-Income Weatherization Program Program Start Year: NA	Best Practice Program: Market Maturity Mid-to-Low AEP North Texas (TNC), Targeted Low-Income Program Start Year: NA
Measure types (continuing)	Weatherization, appliances, HVAC repair, hot water, CFLs	Weatherization, appliances, HVAC repair, hot water, CFLs	Services can include an energy audit, attic, wall and crawlspace insulation, air leakage reduction, appliance safety inspections, forced air efficiency assessment, high efficiency lighting surveys and other safety inspections.	Weatherization, other cost-effective measures.
Measures types (new)	HVAC (replacement) and envelope repair	NA	NA	NA
Incentive structure	All program services and measures are free to participants. Measure caps vary by customer Tier.	All program services and measures are free to participants.	All program services and measures are free to participants.	Measures are installed based on measure savings-to-investment (SIR) ratio. Installed measures are free to participants.
Marketing	The Weatherization Audit Contractors (WACs) are the primary marketing arm of the program, conducting direct marketing through mail and telephone solicitation. The primary source of participants is a targeted list prepared by LG&E / KU. Secondary sources of clients include, LIHEAP clients, referrals from local WAP programs, and referrals by local community-based organizations.	The program is promoted primarily through auditors/contractors, but PG&E also conducts extensive community outreach, in addition to traditional marketing collateral telemarketing, and promotion through the program Web site. Participation in community events has been extensive. Presentations promote both the weatherization services as well as the state's special billing rate for low income populations.	The program is promoted through local low income service providers. The program Web site directs interested customers to appropriate agencies. Xcel customers are informed of the program when they sign up for LIHEAP funding.	The program conducts targeted outreach to weatherization service providers in TNC's territory.

		Best Practice Program: Market Maturity High	Best Practice Program: Market Maturity Mid	Best Practice Program: Market Maturity Mid-to-Low
Program Element/ Metric	**LG&E / KU**	**PG&E, Energy Partners Program Program Start Year: 1983**	**Xcel Energy Colorado, Single Family Low-Income Weatherization Program Program Start Year: NA**	**AEP North Texas (TNC), Targeted Low-Income Program Start Year: NA**
Delivery	The program is delivered primarily by the WACs. All participants (Tiers) receive an initial visit during which the WAC performs a walk through audit and installs low-cost measures. WACs recommend additional measures and the program pays for any recommended projects implemented, up to the cap for the customer's Tier. For all projects completed, the auditor conducts a post-installation inspection and education session.	All participants receive a comprehensive energy analysis of their home. Customers are asked to commit to at least 3 energy conservation practices. CFLs are directly installed. Participants are eligible installation qualified measures recommended by the auditor.	During the weatherization process auditors provide participants with education materials historical energy use data, and a billing analysis.	Weatherization service providers verify customer eligibility, conduct an assessment of eligible customer homes, and install cost-effective measures.
Leveraging of Federal funds for low income weatherization	WeCare coordinates with the local Weatherization Assistance Program (WAP). Coordination efforts are focused on Tier A WeCare customers who are eligible for fewer WeCare incentives than Tier B and C customers.	Program coordinates with local LIHEAP and WAP programs, as well as other low income programs run by state agencies.	Xcel's program complements federal weatherization (WAP) grants to produce incremental, cost-effective energy savings, and develops annual contracts wit the eight weatherization agencies within their territory.	The program coordinates with the local WAP program.

Discussion of the Companies' versus Others' Programs

ICF finds that the Companies' WeCare program is consistent with best practice in low income weatherization program design. Amongst others, best practices exhibited by WeCare include (1) Leveraging federal funds for Weatherization; and, (2) Offering a mix of services and measures attractive to homeowners. This is very challenging market in which to achieve cost-effective savings, but the Companies have learned from their experience and adapted the program to changing market conditions, making WeCare more cost-effective than most comparable programs around the country.

The differences in program delivery between WeCare and the other programs primarily reflects state rules about low-income programs, or are implementation strategies found to be effective in those particular territories. For example, WeCare's tiered approach to low-income program services helps the Companies maximize program cost-effectiveness.

The Companies' tiered approach to program delivery helps ensure that low income program dollars are spent cost-effectively by spending more on homes that are the most energy-intensive (Tier C, customers using more than 16,000 kWh). This does not preclude other low income customers from receiving program services. Tier A (customers who use up to 11,499 kWh annually) and Tier B (customers who use between 11,500 and 16,000 kWh annually) customers are also eligible to receive a comprehensive audit, education and free measures (spending caps are lower for Tier A and B customers).

WeCare also compares favorably against other programs in terms of spending levels. Most low income program cost at least $1 per first year kWh, but the Companies have managed to keep overhead low, maintain high quality services, and deliver results. Although Xcel's program is less expensive, this largely reflects the explicit role of Xcel's low income programs within the state of Colorado – its program is heavily leveraged by federal and state funds.

Approximately 9 percent of the Companies' proposed portfolio budget is dedicated to low-income customers for weatherization and related services; this amount increases to nearly 20 percent in Year 7. ICF finds that the Companies' initial level of spending on low income energy efficiency services is reasonable and appropriate, given the maturity of the market in the Companies' territory, given the levels of federal spending and program activity (WAP and LIHEAP) in Kentucky, and balanced against the Companies' need to meet the governor's aggressive energy savings goals.[13]

ICF also commends the Companies for increasing the program's participation and budget goals each year of program implementation. Since the State of Kentucky received an influx of WAP dollars through the federal Stimulus bill, ICF recommends that the Companies continue coordination efforts with local WAP and LIHEAP programs so that ratepayer dollars dedicated to the Companies' low-income initiatives are not wasted on supplemental program services. In addition, ICF recommends that the Companies monitor and evaluate the program to ensure that spending is efficient, and is generating consistent impacts over time.

[13] As stated in "Intelligent Choices for Kentucky's Energy Future", the goals are to reduce energy consumption in Kentucky by at least 18 percent below currently projected 2025 energy consumption.

Conclusions

Based on a review of the proposed WeCare modification in this filing, and the existing WeCare program implementation manual, ICF concludes that WeCare implements the following best practices:

1. Leveraging efforts of other programs, e.g. local LIHEAP and WAP programs. WeCare coordinates with these programs intelligently by leveraging federal dollars where is the Companies are spending less – on Tier A customers. ICF hopes that the Companies continue to carefully coordinate with local WAP and LIHEAP programs to ensure that WeCare's services complement those provided by the federal programs as these public programs grow through funds provided by the Stimulus package.
2. Making the program stable and consistent. WeCare's core program services have remained stable over time. Changes and new offerings were/are being made consistent with EM&V results and market demand.
3. Auditing a statistically significant sample of weatherized homes. WeCare conducts a technical process review (TPR) of each project. TPRs take place on 100 percent of participant jobs within one week of the field work.
4. Offer a mix of services and measures attractive to homeowners. The Companies continue to add and change program offerings over time to capitalize on existing market conditions and demand. Adding HVAC replacement measures further diversifies the Companies' measure mix available to low-income customers.

Table 15: Residential Low Income Weatherization (WeCare) Program Results Comparison

Program Element/ Metric	LG&E / KU		Best Practice Program: Market Maturity High	Best Practice Program: Market Maturity Mid	Best Practice Program: Market Maturity Mid-to-Low
	Year 1	Year 3	PG&E, Energy Partners Program 2006	Xcel Energy Colorado, Single Family Low-Income Weatherization Program 2009 (from DSM Plan0	AEP North Texas (TNC), Targeted Low-Income 2008
Annual Energy Savings MWh	2,632	4,825	24,300	1,983	95
Annual Demand Reduction kW	262	481	NA	175	31
Annual Incentive Costs	$0	$0	NA	$666,421	$131,300
Annual Non-Incentive Costs	$2,368,462	$3,956,847	NA	$83,049	$21,700
Annual Budget	$2,368,462	$3,956,847	$90,000,000	$749,470	$153,000
Participants	1,200	2,200	66,000	1,958	39
kWh/Participant	2,193	2,193	368	1,013	2,436
kW/Participant	0.2	0.2	NA	0.1	0.8
% Budget incentive costs	0%	0%	NA	89%	86%
% Budget non-incentive costs*	100%	100%	NA	11%	14%
% Budget EM&V	5%	3%	NA	2%	NA
% Portfolio budget dedicated to low income weatherization services	9%	11% (increases to 20% in Year 7)	California PUC rules treat low income programs separately from resource, or "impact" programs. The Low Income Energy Efficiency (LIEE) programs have their own portfolio and cost-effectiveness standards.	4%	15%
$/1st year kWh	$0.90	$0.82	$3.71	$0.38	$1.38
$/1st year kW	$9,033	$8,231	NA	$4,278	$4,935
Cost/Participant	$1,974	$1,799	$1,364	$378	$3,923
NTG Ratio	1.00	1.00	1.00	0.96	1.00
**Includes % EM&V costs*		*Source(s):*	*ACEEE. 2008 Compendium of Champions*	*Xcel Energy. 2009/2010 DSM Biennial Plan. Docket No 08A-366EG. Public Service Commission of Colorado. February 2009.*	*AEP North Texas (TNC). 2009 Energy Efficiency Plan and Report. April 1, 2009.*

5.2. New Programs

5.2.1. Smart Energy Profile

Description of the Companies' program

The Smart Energy Profile (SEP) program is unique amongst energy report-type initiatives in its foundations in social marketing research, and its built-in experimental design. The program will select large samples of test and control customers and directly mail the report to the test group on a monthly basis. Savings will be estimated through an econometric analysis comparing energy use between the test and control group. The program will specifically target high-use customers, at least in initial program years.

The Companies will use existing customer data, such as service point information, account information and current energy consumption to develop targeted, customer Smart Energy Profiles that will be mailed to customers at regular intervals throughout the year (e.g. monthly). Elements that are presented in the report may include a comparison of the customer's energy use vis-à-vis their peers (residents with similar home/building characteristics), presentation of the customer's current energy use versus their historical use, as well as customized and targeted messages to help the customer reduce energy use. The report will promote and recommend program and efficiency measures likely to benefit the customer based on individual household energy usage patterns.

Components of Best Practice programs

There are not any established best practices for social marketing-type programs, as these represent a relatively new type (or at least, less-evaluated) form of DSM initiative. Based on ICF's professional judgment and experience implementing DSM programs nationwide, we believe the following activities comprise best practices in the delivery of a Smart Energy Profile program:

- A clear and careful experimental design. Precise measurement of program savings requires early coordination with an EM&V contractor to ensure that the test and control groups are properly selected.
- Longitudinal data collection. Evaluations can demonstrate that first year program savings are significant and very cost-effective. However, savings persistence is not as well understood. For the program to learn and improve over time, both test and control group energy use data should be tracked and evaluated once customers have stopped receiving the report.
- Identify and target high-use customers. Research has shown the biggest energy reduction comes from this group.
- Deliver information in the reports in a manner than minimizes the boomerang effect. Often, customers that find out their energy use is less than their peers can subsequently increase their energy use. Some programs have found that the means of delivering information about peer energy use can minimize this effect.[14]

[14] Hunt Alcott. Social Norms and Energy Conservation. Departments of Economics and Sloan School of Management, Massachusetts Institute of Technology (MIT). October 2009.

Summary of Best Practice programs

These programs are not necessarily *best practice*, for reasons discussed above. Rather, they represent two distinct approaches to Smart Energy Profiles implemented by program administrators.

Connexus Energy in central Minnesota began implementing its HER program in 2008. Connexus' program provides a monthly report to a large group of residential customers; the report contains two modules (1) The Social Comparison Module, which compares household electricity consumption over the past twelve months to the mean of its comparison group in the twentieth percentile, and (2) The Action Steps Module, which includes energy conservation tips (behavioral) and retrofit measures offered through Connexus' other programs. A recent evaluation of Connexus' HER program, which compared changes in household energy use in the test group to that of the control group (who did not receive the report) showed annual electricity savings of approximately two percent in the test group (those receiving the report for a year).

Duke Energy Kentucky's Personalized Energy Report (PER) pilot program also delivers customized home energy use information to residential customers. The PER program is provided to qualified residential customers who complete a basic home energy survey, either on-line or mailed-in. The PER is then produced on-line, or mailed to participants, depending on the customer's preference. The PER the report evaluates energy usage in the entire home and provides recommendations, many of which are very low cost, to the consumer who may later undertake some of these actions. Participants also receive six free CFLs.

Connexus' program design and costs are very similar to the Companies' proposed SEP program, as shown in Tables 15 and 16. Note that while the data shows higher first year market penetration for Connexus' program, they are also a much smaller utility than the Companies, totaling 96,000 residential customers. Because of the similarity in program design, we would expect the Companies' program to perform similarly to Connexus', as well to a similar pilot run by the Sacramento Municipal Utility District (SMUD), which also resulted in evaluated annual energy savings of approximately two percent in for the test group receiving the Smart Energy Profile.[15]

Based purely on program design, ICF believes that the Companies' proposed energy report program is superior to Duke's PER pilot. The SEP program will have significant market penetration, which will be challenging for the PER pilot to achieve since participants enroll voluntarily.[16] The SEP program also contains a social marketing component (comparing peer energy use), which research shows has been very effective at reducing customer energy use. Further, the SEP program has a built-in experimental design that helps ensure precise measurement of participant savings.

[15] Summit Blue Consulting. Impact Evaluation of Positive Energy SMUD Pilot. May 2009.

[16] Note that programs similar in design to the Companies' have shown very low opt-out rates (less than one percent).

Table 16: Smart Energy Profile Program Comparison

		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	**LG&E / KU**	**Connexus Energy (Central Minnesota), Home Energy Report Program Start Year: 2008**	**Duke Energy Kentucky, Personalized Energy Report (PER) Program Start Year: FY2009**
Program Objective(s)	The objective of this program will be to educate customers about their energy consumption, encourage them to reduce consumption and empower them with tools, techniques and technology to use energy more wisely.	The objective of this program is to reduce customer home energy use through targeted, customized residential energy use education and marketing.	This program was designed to overcome market barriers amongst residential customers such as lack of consumer education and knowledge of specific ideas for reducing energy usage. The customized energy report is designed to help customers better manage their energy costs.
Target Market(s)	Residential. High energy users.	Residential. Those receiving the report must have one full year of electricity bill history as of the program start.	Residential single family customers who have not received measures through Duke's Home Energy House Call or Residential Conservation & Energy Education programs within the last three years.
Market penetration	14% after Year 1, 50% after Year 3	41%	NA
Measures	There are no specific measures offered by this program beyond the provision of the home energy report. The report will recommend measures available through other LG&E / KU programs based on the customer's energy use profile.	There are no specific measures offered by this program beyond the provision of the home energy report. The report will recommend measures available through other utility programs based on the customer's energy use profile.	In addition to the home energy report, participating customers will also receive 6 free CFLs.
Incentive structure	There are no specific incentives offered by this program beyond the provision of the home energy report. The report will recommend incentives available through other LG&E / KU programs based on the customer's energy use profile.	There are no specific incentives offered by this program beyond the provision of the home energy report. The report will recommend incentives available through other utility programs based on the customer's energy use profile.	The report will recommend incentives available through other utility programs based on the customer's energy use profile. Participating customers will also receive 6 free CFLs.
Marketing	The report will promote and recommend program and efficiency measures likely to benefit the customer based on individual household energy usage patterns	The report will promote and recommend program and efficiency measures likely to benefit the customer based on individual household energy usage patterns	The paper PER program begins with a letter to the customer offering the paper PER if they return a short energy survey about their home.

		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	LG&E / KU	Connexus Energy (Central Minnesota), Home Energy Report Program Start Year: 2008	Duke Energy Kentucky, Personalized Energy Report (PER) Program Start Year: FY2009
Delivery	The Companies will use existing customer data, such as service point information, account information and current energy consumption to develop targeted, customer home energy reports that will be mailed to customers at regular intervals throughout the year (e.g. monthly). Elements that are presented in the report may include a comparison of the customer's home energy use vis-à-vis their peers (residents with similar home/building characteristics), presentation of the customer's current energy use versus their historical use, as well as customized and targeted messages to help the customer reduce energy use. The report will promote and recommend program and efficiency measures likely to benefit the customer based on individual household energy usage patterns.	The program mails a monthly report to participants separate from their utility bill. The report has two parts. The first part compares the customer's monthly energy use against that of their peers (similar households), and against their own historical energy use. The second part includes action steps that suggests behavioral and retrofit measures to reduce customer energy use; these suggestions are targeted to different households based on historical energy use patterns and demographic characteristics.	The customer completes an energy survey and this data is used to generate a personalized energy report based on information the customer provided. The report is either mailed to the consumer or created in real time online. The report evaluates energy usage in the entire home and provides recommendations, many of which are very low cost, to the consumer who may undertake some of these actions.

Discussion of the Companies' versus Others' Programs

The Companies' proposed SEP program is an innovative customer education initiative based on social marketing concepts that have proven successful when applied to other business models.[17] The SEP program is designed after comparable pilot programs implemented by other utilities across the nation that show promising evaluated savings results of approximately two percent average annual savings per participant.[18] The Companies are in the advantageous position of not being the "guinea pig" implementing this innovative program while the program is still "cutting-edge" – to ICF's knowledge, no other IOU in Kentucky has proposed the same program design.

ICF finds that the Companies' proposed SEP program is designed consistent with similar innovative social marketing programs implemented in by other program administrators that have

[17] Research shows the peer pressure is a powerful motivator. The SEP program applies this research by presenting to the test group their home energy use vis-à-vis. that of their "peers" (customers with similar homes).

[18] Note that savings persistence attributable to this program is not well-understood.

resulted in significant, very cost-effective residential energy savings. The Companies' planned costs and savings are reasonable and consistent with that of similar programs.

Connexus' program design and costs are very similar to the Companies' proposed SEP program, as shown in Tables 16 and 17. Note that while Table 15 shows higher first year market penetration for Connexus' program, they are also a much smaller utility than the Companies, totaling 96,000 residential customers. Because of the similarity in program design, we would expect the Companies' program to perform similarly to Connexus', as well to a similar pilot run by the Sacramento Municipal Utility District (SMUD), which also resulted in evaluated annual energy savings of approximately two percent in for the test group receiving the Smart Energy Profile.

Based purely on program design, ICF believes that the Companies' proposed energy report program is superior to Duke's PER pilot. The SEP program will have significant market penetration, which will be challenging for the PER pilot to achieve since participants enroll voluntarily. The SEP program also contains a social marketing component (comparing peer energy use), which research shows has been very effective at reducing customer energy use. Further, the SEP program has a built-in experimental design that helps ensure precise measurement of participant savings.

Conclusions

The Companies' proposed SEP program is innovative and designed for success. In order to help ensure its success, ICF suggests that the Companies follow the best practices listed above. Further, persistence of savings is not well understood for these types of programs; therefore the EM&V plan should include an approach for estimating SEP program savings beyond the first year.

Table 17: Smart Energy Profile Program Results Comparison

			Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	LG&E / KU		Connexus Energy (Central Minnesota), Home Energy Report 2008–2009	Duke Energy Kentucky, Personalized Energy Report (PER) FY2010
	Year 1	Year 3		
Annual Energy Savings MWh	29,664	58,078	12,675	NA
Annual Demand Reduction kW	5,693	11,117	NA	NA
Annual Incentive Costs	$0	$0	NA	NA
Annual Non-Incentive Costs	$1,370,800	$2,240,807	NA	NA
Annual Budget	$1,370,800	$2,240,807	$507,000	$153,000
Participants	105,000	205,000	39,000	NA
kWh/Participant	283	283	325	NA
kW/Participant	0.1	0.1	NA	NA
% Budget incentive costs	0%	0%	NA	NA
% Budget non-incentive costs*	100%	100%	NA	NA
% Budget EM&V	0%	0%	NA	NA
$/1st year kWh	$0.05	$0.04	$0.04	NA
$/1st year kW	$241	$202	NA	NA
Cost/Participant	$13	$11	$13	NA
NTG Ratio	NA	NA	NA	NA
		Source(s):	*Hunt Alcott. Social Norms and Energy Conservation. Departments of Economics and Sloan School of Management, Massachusetts Institute of Technology (MIT). October 2009.*	*Duke Energy. Annual Status Report and Adjustment of the 2009 DSM Cost Recovery Mechanism. Case No. 2009-00444. Filed with the Kentucky Public Service Commission November 16, 2009.* *Hamilton Consulting. Plans for EM&V, Duke Energy.*

**Includes % EM&V costs*

5.2.2. Residential Incentives

Description of the Companies' Program

The Companies' proposed Residential Incentives program will deliver a wide range of energy efficiency measures and services that are cost-effective, but are not included in the Companies' other residential offerings. The program would promote and provide incentives for ENERGY STAR appliances, efficient HVAC equipment, and window film. ICF's understanding is that the Companies are proposing to promote these measures not only because the measures are cost-effective, but because the Companies received feedback from customers that there is demand for these efficient products. The Companies have conducted research on the relevant market channels and end-users and believes that it has sufficient understanding of the market to effectively deliver a program around these measures.

Components of Best Practice Programs

Residential Incentives contains distinct program elements, each of which has unique best practices: these include elements of ENERGY STAR Products-type programs and Efficient HVAC-type programs:

Best practices of programs that promote ENERGY STAR products include:

- Leveraging of the ENERGY STAR brand. This can be achieved by becoming an ENERGY STAR Program Sponsor and/or building public awareness of the ENERGY STAR brand. Activities key to building ENERGY STAR brand awareness include:
  a. Educating retailers and ensuring that ENERGY STAR is promoted on retail floors; and
  b. Developing partnerships with suppliers.
- Spending incentive dollars upstream and midstream, where possible. Such a top-down approach helps transform the market throughout the product stream and makes participation easy for customers through point-of-purchase (instant) rebates.

The following summarizes components of program delivery common amongst best practice residential HVAC programs:

- The use of HVAC contractors as the main vehicle for program deployment. Contractors receive program training and are paid incentives for installing efficient units. This helps keep participation simple for customers. Contractors are also the main delivery method for window film installation.
- Training and education of HVAC distributors;
- Quality Install (QI) training and incentives;
- An AC tune-up element, or cross-promotion with an AC tune-up program; and
- A process for verifying contractor work, including on-site inspections.

Summary of Best Practice Programs

ICF choose three distinct program types to compare to the Companies' proposed Residential Incentives program since the program contains elements of each of these program types, but is

not directly comparable to any one program type. The three best practice programs we selected are: San Diego Gas & Electric's (SDG&E) Residential Retrofit Single Family program, the U.S. EPA's Rapid Deployment Energy Efficiency (RDEE) Residential Efficient Heating and Cooling program (which was reviewed as a best practice program by the National Action Plan on Energy Efficiency in the course of EPA's development of the RDEE Toolkit, in spring 2009), and the Residential Retail Products program, which is run jointly by Connecticut Light & Power (CL&P) and United Illuminating (UI).

SDG&E's Residential Retrofit Single Family program is part of a California statewide program effort of the same name. In 2004, the Residential Lighting and Home Energy Efficiency Rebates (HEER) Programs were combined to form the Statewide Single-Family Energy Efficiency Rebate (SFEER) Program to streamline internal operations for the utilities. The SFEER Program includes a diverse array of energy efficiency measures including home improvement products, heating and cooling equipment, lighting, appliances, and pool equipment. The 2004-2005 Program targeted all residential customers paying a Public Goods Charge and residing in dwellings of four units or less, including condominiums and mobile homes.[19]

The objectives of the RDEE Residential Efficient Heating and Cooling program are to increase sales of efficient (ENERGY STAR qualified, or better) heating and cooling equipment in replace-on-burnout, retrofit, and new construction opportunities, and to improve the operating efficiency of equipment through tune-ups of existing units and Quality Installation (QI) of new units. HVAC contractors are the main vehicle for deployment of this program. Contractors must complete trainings for AC tune-ups (refrigerant charge, coil cleaning, filter change, and a blower speed test), AC quality installation (proper sizing, refrigerant charge, and air flow test), furnace quality installation (proper sizing, air flow adjustment, furnace on-rate check), and other program requirements.[20]

CL&P and UI's Residential Retail Products program is essentially an ENERGY STAR Products program than provides incentives for CFLs and ENERGY STAR appliances. In both the lighting and appliances segments, the program uses Negotiated Cooperative Promotions (NCPs), which the Companies' find to be a successful approach to increase stocking and sales of efficient products at considerably lower cost than traditional coupons and rebates. NCPs involve partnerships between the program and retailers and manufacturers and are structured with underlying memoranda of understanding (MOUs) that tie payment of incentives to the Companies' receipt of store-level sales data.[21]

[19] Itron. 2004/2005 Statewide Residential Retrofit Single-Family energy Efficiency Rebate Evaluation. October 2, 2007.
Best Practice Benchmarking for Energy Efficiency Programs. Summary Profile Report. CA Single Family EE Rebates. http://www.eebestpractices.com/Summary.asp?BPProgID=R24E.
San Diego Gas & Electric Company – Statewide residential Single Family Home Energy Efficiency Rebates (PGC) – SDGE service area – IOU Statewide Program – Jan-06 Report.

[20] U.S. EPA. Rapid Deployment Energy Efficiency Toolkit, Planning and Implementation Guides. October 2009.

[21] Connecticut Light & Power and United Illuminating. 2009 Conservation and Load Management Plan. October 2008.

Table 18: Residential Incentives Program Comparison

		Best Practice Program: Market Maturity High	Best Practice Program: Market Maturity Mid	Best Practice Program: Market Maturity Mid-to-Low
Program Element/ Metric	**LG&E / KU**	**San Diego Gas & Electric (Sempra), Residential Retrofit Single Family Program** Program start year: 2001	**U.S. EPA, Rapid Deployment Energy Efficiency (RDEE) Toolkit, Residential Efficient Heating and Cooling Program** Program start year: NA	**Connecticut Light & Power and United Illuminating, Residential Retail Products** Program start year: 2000
Program Objective(s)	Encourage customers to purchase various ENERGY STAR products, HVAC equipment and window films.	Achieve energy savings and demand reduction.	The objectives of this program are to increase sales of efficient (ENERGY STAR qualified, or better) heating and cooling equipment in replace-on-burnout, retrofit, and new construction opportunities, and to improve the operating efficiency of equipment through tune-ups of existing units and quality installation of new units.	Build awareness, acceptance and market share of ENERGY STAR lighting, appliances and electronics.
Target Market(s)	Residential	All residential customers paying a Public Goods Charge and residing in dwellings of four units or less, including condominiums and mobile homes.	This program targets HVAC contractors and homeowners with central air conditioners and furnaces.	Residential
Market Penetration	Build to 20,500 rebates per year by Year 3	NA	4% after 3 years	2,409,313 (units)
Measures	HVAC, ENERGY STAR appliances, window films.	HVAC, lighting, appliances, home improvement products, pool pumps.	ENERGY STAR Heating and Cooling equipment. AC Tune-ups. Quality Install (QI) of HVAC units.	ENERGY STAR lighting (CFLs), appliances, and electronics
Incentive Structure	Incentives will be paid directly to customers via mail-in rebates.	Lighting, upstream (manufacturers). Appliances, midstream (retailers). HVAC, midstream (installation contractors).	Incentives paid mid-stream to HVAC contractors (typically 50-75% of measure incremental costs)	Point of purchase and mail-in rebates.

		Best Practice Program: Market Maturity High	Best Practice Program: Market Maturity Mid	Best Practice Program: Market Maturity Mid-to-Low
Program Element/ Metric	**LG&E / KU**	**San Diego Gas & Electric (Sempra), Residential Retrofit Single Family Program** Program start year: 2001	**U.S. EPA, Rapid Deployment Energy Efficiency (RDEE) Toolkit, Residential Efficient Heating and Cooling Program** Program start year: NA	**Connecticut Light & Power and United Illuminating, Residential Retail Products** Program start year: 2000
Marketing	Marketing will include retailer training and point-of-purchase displays, among other activities and collateral. A full marketing plan will be developed pending program approval.	Bill inserts direct mail, newspaper and radio advertising, email blasts, community events, and information from their web sites and phone centers. The IOUs also coordinated with market actors including manufacturers, distributors, retailers, contractors, and others.	Consumer collateral. Program Web site. HVAC contractor & distributor recruitment and training. Call center.	Direct mail. Publications in community and business newsletters. Attendance at ENERGY STAR sales events. General promotion of the ENERGY STAR label.
Delivery	The Companies will hire, through an RFP process, a 3rd party contractor to develop the appropriate application and documentation supporting customer purchases, provide QA/QC of rebate applications, and process rebate checks. All documentation will be submitted to the Companies for auditing and data retention. The Companies will have customer verification/audit rights as well.	For lighting, the program worked with lighting manufacturers to buydown the cost of CFLs. For appliances, the program worked with manufacturers to buydown the cost of the units in some areas; mail in rebates were used otherwise. For HVAC measures, the program worked with HVAC contractors, who received training and were paid incentives.	HVAC contractors are the main vehicle for deployment of this program.	Midstream and upstream partnerships with retailers and manufacturers - Negotiated Cooperative Promotions (NCPs).

Discussion of the Companies' versus Others' Programs

In general, ICF finds that Companies' analytical methodology leading to this proposed program is sound and consistent with our own experience planning similar programs in other jurisdictions, including Louisiana, Maryland, and Wisconsin. Further, ICF finds that the Companies' planned costs and savings are reasonable and appropriate for a new program of this nature operating in a relatively immature market.

Residential Incentives contains some distinct elements of best practice programs described above. There are many models for delivering residential programs of this nature; some utilities combine all program elements into an umbrella residential mass market program that includes lighting, HVAC, appliances, and home performance; others include each of these as distinct programs; some utilities combine lighting and appliances into one ENERGY STAR Products program. Ultimately, each utility needs to package and market its programs in a manner that results in the most cost-effective savings that can be achieved within its own territory. The packaging usually changes over time as markets and technologies evolve; this is a key reason why it is important for program administrators to retain flexibility in how they deliver their programs.

While ICF could not find one program exactly comparable to the Companies' proposed Residential Incentives initiative, this is only because the Companies are packaging particular elements of their residential portfolio differently from other utilities. Further, the Companies' cost and savings assumptions, which ICF reviewed and finds reasonable, show the program is cost-effective.

Conclusions

ICF suggests the Companies consider the following possible strategies for delivering each component of the proposed Residential Incentives program.

1. Coordinate and cross-promote the new HVAC equipment rebates together the existing AC tune-up program. This would allow the Companies to capitalize on their existing relationships with AC contractors developed through the AC tune-up program.
2. Coordinate and cross-promote the appliance rebate and window film elements of the Residential Incentives initiative with the existing Residential High Efficiency Lighting program. This could allow new Residential Incentives elements (appliance, window film) to be co-branded along with CFLs, and allow the Companies to capitalize on existing retailer relationships achieved through the current CFL program. If the Companies plan on promoting window film as a low-cost DIY measure that will eventually replace some portion of CFL savings, window film should be promoted, where possible, in the same retail channels as CFLs (e.g. Lowe's, Home Depot, hardware stores).

Table 19: Residential Incentives Program Results Comparison

Program Element/ Metric	LG&E / KU Year 1	LG&E / KU Year 3	Best Practice Program: Market Maturity High — San Diego Gas & Electric (Sempra), Residential Retrofit Single Family Program 2004–2005	Best Practice Program: Market Maturity Mid — U.S. EPA, Rapid Deployment Energy Efficiency (RDEE) Toolkit, Residential Efficient Heating and Cooling Program 2009	Best Practice Program: Market Maturity Mid-to-Low — Connecticut Light & Power and United Illuminating, Residential Retail Products Program start year: 2007
Annual Energy Savings MWh	8,544	16,291	CFLs: 60,457 (net) Non-lighting: 2,672 (net)	NA	62,000
Annual Demand Reduction kW	1,477	3,042	CFLs: 4,450 (net) Non-lighting: 1,257	NA	968
Annual Incentive Costs	$942,500	$1,772,500	$6,254,533	NA	$4,438,000
Annual Non-Incentive Costs	$642,852	$873,230	$1,907,380	NA	$1,524,000
Annual Budget	$1,567,352	$2,645,730	$8,161,914	NA	$5,962,000
Participants	11,700	20,500		10,000	2,409,313
kWh/Participant	730	795	NA	2,000 (varies by climate zone and fuel type)	26
kW/Participant	0.1	0.1	NA	0.2 (varies by climate zone)	<.01
% Budget incentive costs	60%	67%	77%	60%	74%
% Budget non-incentive costs*	40%	33%	23%	40%	26%
% Budget EM&V	5%	2%	3%	4%	NA
$/1st year kWh	$0.18	$0.16	$0.08	$0.17	$0.10
$/1st year kW	$1,061	$870	$470	$1,900	$6,159
Cost/Participant (rebate)	$134	$129	NA	$400	$2
NTG Ratio	0.87 (average across all measures types)		CFLs: 0.62 Non-lighting: 0.56	0.80	NA

Program Element/ Metric	LG&E / KU		Best Practice Program: Market Maturity High	Best Practice Program: Market Maturity Mid	Best Practice Program: Market Maturity Mid-to-Low
	Year 1	Year 3	San Diego Gas & Electric (Sempra), Residential Retrofit Single Family Program 2004–2005	U.S. EPA, Rapid Deployment Energy Efficiency (RDEE) Toolkit, Residential Efficient Heating and Cooling Program 2009	Connecticut Light & Power and United Illuminating, Residential Retail Products Program start year: 2007
*Includes % EM&V costs		Source(s)	Itron. 2004/2005 Statewide Residential Retrofit Single-Family energy Efficiency Rebate Evaluation. October 2, 2007. Best Practice Benchmarking for Energy Efficiency Programs. Summary Profile Report. CA Single Family EE Rebates. http://www.eebestpractices.com/Summary.asp?BPProgID=R24E. Retrieved 11-09. San Diego Gas & Electric Company – Statewide residential Single Family Home Energy Efficiency Rebates (PGC) – SDGE service area – IOU Statewide Program – Jan-06 Report.	U.S. EPA. Rapid Deployment Energy Efficiency Toolkit, Planning and Implementation Guides. October 2009.	Connecticut Light & Power and United Illuminating. 2009 Conservation and Load Management Plan. October 2008.

5.2.3. Residential Refrigerator Removal

Description of the Companies' program

The objectives of the Companies' proposed Residential Refrigerator Removal program are to remove and recycle old and inefficient working secondary refrigerators and freezers from the grid, and to reduce environmental impacts associated with improper appliance disposal. The Companies' proposed program is based on a proven, cost-effective program design that has been run successfully by numerous program administrators around the country.

Components of Best Practice Programs

The following summarizes components of program delivery common amongst best practice residential appliance recycling programs; best practice programs:

- Partner with an experienced appliance recycling company who can provide cost-effective, turn-key program services.
- Have procedures in place (e.g., random inspections) to ensure that participants' units are working and in-use prior to pick-up.
- Ensure that scheduling is made simple for customers and that pick-ups are timely.
- Cross-promote other utility programs.
- Plan with evaluators early to ensure they have access to an appropriate sample of units for data logging.

Summary of Best Practice Programs

ICF chose two existing programs to compare against the proposed program: Oncor's Refrigerator Round-Up program, and Southern California Edison's (SCE) Appliance Recycling program. These programs represent best practice in program implementation in two different energy efficiency markets, one more mature (California) and one less mature (Texas). Both these programs partner with appliance recycling companies who provide turn-key program services, including:

- Scheduling
- Pick-up
- Recycling
- Program tracking
- Incentive fulfillment
- Assistance with program marketing

Oncor partners with the Appliance Recycling Centers of America (ARCA) to implement the Refrigerator Roundup program, which launched in 2004. The program offers an incentive of $50 per working unit to customers. In 2008, the program recycled nearly 5,000 refrigerators and freezers in the Dallas region.

SCE's Appliance Recycling Program launched in 1994, and partners with both ARCA and JACO Environmental to manage the program's recycling services. This program removes over 100,000 old units from the grid in the Southern California region every year.

Table 20: Residential Refrigerator Removal Program Comparison

		Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	**LG&E / KU**	**Oncor, Refrigerator Round-up Program Start Year: 2004 Data year(s): 2008**	**Southern California Edison, Appliance Recycling Program Program Start Year: 1994 Data year(s): 2004–2005**
Program Objective(s)	Remove and recycle old and inefficient working secondary refrigerators and freezers from the grid. Reduce environmental impacts associated with improper appliance disposal.	Remove operating spare refrigerators and freezers from customers' homes.	Reduce customer bills. Remove inefficient units from the grid. Reduce CFC emissions. Eliminate "hassle factor" of removing appliance(s) for customers.
Target Market(s)	Residential	Residential	Residential and small business
Market Penetration	Build to 10,000 units per year by Year 3	4,900 units recycled	120,000 units recycled
Measures	Refrigerator and freezer removal and recycling	Refrigerator and freezer removal and recycling	Refrigerator and freezer removal and recycling; limit of 2 units per customer per year; window ACs also eligible
Incentive Structure	$30 per working unit	$50 per working unit	$35 per working unit (note: this amount was increased to $50/unit in 2006)
Marketing	Targeted direct mail; full marketing plan developed	Direct mail, website, mass media, appliance dealers	Direct mail, media outlets; website, appliance dealers
Delivery	Turn-key program implementation through appliance recycling company.	Turn-key program implementation through appliance recycling company.	Turn-key program implementation through appliance recycling company.

Discussion of the Companies' versus Others' Programs

The Companies' proposed program is very similar in design to the example programs, as shown in the table below.[22] The Companies propose that an established appliance recycling company will provide turn-key program services. All similar programs use this program delivery method, to ICF's knowledge. There are only two major appliance recycling companies in the U.S. who are experienced at working with utilities on efficiency programs. The Companies will benefit from lessons learned by either of these firms should it move forward with this initiative.

[22] ADM Associates et al. Evaluation of the 2004-2005 Statewide Residential Appliance Recycling Program. Final Report. April 2008. Southern California Edison – Residential Appliance Recycling – SCE service area – IOU Statewide Program – Jan-06 Report

At this planning stage, the only difference between the proposed program and the example programs' is the incentive level. The Companies' proposed incentive is somewhat lower than incentives offered by other utilities; however ICF believes that the Companies' proposed incentive is appropriate in initial program years within the Companies' territory, which is a relatively immature market for energy efficiency. Because the program has not been offered before, customers will likely find an incentive of $30 for removing and properly disposing of their old appliance to be an attractive offer. Note that SCE' per unit incentive in 2004-2005 was $35, when the program was new, and was increased in subsequent years.

In general, ICF finds that the Companies' planning assumptions for program costs and savings are reasonable and appropriate. As shown below, based on The Companies' proposed program costs and net savings estimates, The Companies' program will cost approximately $0.27 per kWh in Year 1, which is similar to the net cost of SCE's program; Oncor's cost per kWh is somewhat lower, although Oncor's savings estimates do not include free-riders (which, if included, would drive cost-effectiveness down). The Companies' total cost per unit ($204) is also higher than SCE's ($158), though not unreasonably high.[23]

Conclusions

The Companies' proposed Refrigerator Recycling program contains many elements of best practice programs and the planned cost and savings are reasonable for such a program entering a relatively immature market. Although we believe the program plan generally reflects best practices, below, ICF provides some suggestions for The Companies' consideration

1. Establish a procedure for ensuring program compliance. The primary concern here is ensuring that the vendor is paying incentives only for working units.
2. Work with an evaluator from the start. Typically, program savings are estimated through a combination of data logging and participant and non-participant surveys. The evaluator will need to work with the recycling vendor to have a sample of units set aside for data logging.
3. Cross promote other programs. This program results in customer contacts at a number of points in the participation process, each of which provides an opportunity to promote other efficiency programs; one obvious synergy is the Residential Rebate program, which rebates ENERGY STAR appliances, including refrigerators and freezers.

[23] ADM Associates et al.

Table 21: Residential Refrigerator Removal Program Results Comparison

			Best Practice Program: Less Mature Market	Best Practice Program: More Mature Market
Program Element/ Metric	**LG&E / KU**		**Oncor, Refrigerator Round-up** Program Start Year: 2004 Data year(s): 2008	**Southern California Edison, Appliance Recycling Program** Program Start Year: 1994 Data year(s): 2004–2005
	Year 1	**Year 3**		
Annual Energy Savings MWh	3,000	7,500	7,131 (gross)	120,949 (net)
Annual Demand Reduction kW	339	849	1,100 (gross)	NA
Annual Incentive Costs	$120,000	$300,000	$471,416	NA
Annual Non-Incentive Costs	$695,800	$1,655,829	$89,316	NA
Annual Budget	$815,800	$1,955,829	$560,732	NA
Participants	4,000	10,000	4,900 (units)	
kWh/Participant	750	750	1,466 per refrigerator (gross; 1,701 per freezer (gross)	1,776 per refrigerator (gross; 1,415 per freezer (gross)
kW/Participant	0.1	0.1	0.26 per refrigerator (gross; 0.18 per freezer (gross)	NA
% Budget Incentive Costs	15%	15%	84%	88%
% Budget Non-Incentive Costs	85%	85%	16%	12%
% Budget EM&V	0%	0%	NA	3%
$/1st Year kWh	$0.27	$0.26	$0.16	$0.22
$1st Year kW	$2,414	$2,304	$956	$1,298
Cost/Participant	$204	$196	$114 per unit	$158 per unit
NTG Ratio	1.00	1.00	NA	0.72
**includes %EM&V costs*		*Source(s):*	*Oncor 2009 Energy Efficiency Plan and Report. April 1, 2009*	*ADM Associates, et al. Evaluation of the 2004–2005 Statewide Residential Appliance Recycling Program. Final Report, April 2008. Southern California Edison – Residential Appliance Recycling – SCE Service Area — IOU Statewide Program — January 2006 Report*

6. Overall Conclusions

Our review of the Companies' portfolio, and the context in which they were developed, leads us to the following conclusions:

- The Companies' proposed portfolio is consistent with evolving federal and state policies. In addition, the portfolio contains many elements of best practices, including cost-effectiveness, broad targeting, and flexible design.
- The Companies should commission a potential study or market characterization study, an action item the governor has also proposed for the state in his energy plan. The study results could be used to help plan programs that capture savings where potential is greatest and/or most cost-effective.
- Based on a market characterization study of the commercial sector, the Companies should develop additional programs targeting the commercial sector. Though the Companies continue to offer cost-effective programs, the portfolio could improve its cost-effectiveness through additional commercial programs. These could be achieved through the continuation of proven program types related to lighting, HVAC, and motors measures, or through the identification and targeting of customers interested in custom projects.

Our review of the Companies' proposed programs leads us to the following conclusions:

- Load Control Management - The Companies currently operate a successful load control program for residential and commercial customers, and are appropriately proposing to increase incentives to increase participation. The Companies should also consider and promote additional program options that would result in greater participation, lower program unit costs, and greater cost-effectiveness. Examples of these options include an enhanced incentive structure (that targets larger and high-use customers), multiple control options, and a real-time pricing element. In addition, because the program has significant market penetration, the Companies can use points of contact with these current participants to market other programs. In addition, the Companies' experience with demand response programs will help to develop a successful and cost-effective strategy for any eventual AMI deployment.

- Commercial Conservation / Commercial Incentives - The Companies should ensure that the audits are comprehensive and are continuing to motivate customers to participate in the program. In addition, the Companies should monitor the incentive structure and participation to ensure a broad mix of customer participation, which will result in cost-effective savings and achievement of program goals. The Companies should also continue to add prescriptive measures and work with trade allies to ensure their continued participation with and promotion of the program. In the future, the Companies should consider incorporating the EPA's Portfolio Manager benchmarking tool to provide customers with ongoing and post-project information regarding facility usage and savings. Since this initiative requires investment in equipment and personnel, the Companies should implement it once the expanded program has been running for a few years. This will allow the tool to be applied to a larger participant base, and ensure greater persistence of energy savings.

- Residential Conservation/Home Energy Performance program - The Companies should continue to consider Program Sponsorship through the EPA, in order to take advantage of existing resources and expand program participation. The Companies should also consider

the benefits of sponsorship in the context of a program design that uses the resource acquisition model, the market transformation model, or a hybrid approach (where the resource acquisition model evolves into the market transformation model). Through the market transformation model, the Companies would be able to build the program infrastructure and contractor network and reduce their day-to-day involvement. The availability of more contractors will increase competition, decrease customers' costs, and decrease the Companies' program costs.

- Low Income Weatherization (WeCare) program – The Companies should continue to coordinate carefully with local WAP and LIHEAP programs to ensure that WeCare's services complement those provided by the federal programs. Consistent with existing practice, the Companies should ensure that program funding is stable and consistent over time. The Companies should also continue to modify program offerings, based on EM&V or TPR, and existing market conditions and demand. To the extent that this program is similar to the Residential Conservation/Home Energy Performance program, in terms of measure types and contractor networks, the Companies should identify and implement additional cost efficiencies.

- Smart Energy Profile – ICF concludes that the SEP program's social marketing component will result in significant participant savings, and its built-in experimental design will help ensure precise measurement of these savings. As behavior-based programs gain entry into utility portfolios, the Companies should develop relationships with program implementers and utility program managers in order to adjust the design and delivery, or gain experience for their SEP program. The Companies should also incorporate other innovative pilots or programs, such as an in-home display program, into their portfolio.

- Residential Incentives – The Companies should coordinate and cross-promote their new residential programs with their existing residential programs. For example, the new HVAC equipment component is complementary with the existing AC tune-up program. This would allow the Companies to capitalize on their existing relationships with AC contractors. The Companies should also coordinate and cross-promote the appliance rebate and window film elements with the existing Residential High Efficiency Lighting program. This could allow new Residential Incentives elements (appliance, window film) to be co-branded along with CFLs, and allow the Companies to capitalize on existing retailer relationships achieved through the current CFL program.

- Refrigerator Recycling - ICF concludes that the program contains many elements of best practice programs and the planned cost and savings are reasonable for such a program entering a relatively immature market. ICF also suggests that the Companies establish procedures to ensure that the vendor is paying incentives only for working units. ICF also recommends that the vendor work with an evaluator from the start, in order to have a sample of units set aside for data logging. In addition, similar to the other residential programs, the Companies should engage in cross promotion. This program results in customer contacts at a number of points in the participation process, each of which provides an opportunity to promote other efficiency programs.

SNL SNLFinancial

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Consultant: Without subsidies, renewables will get priced out by natural gas

By JP Finlay

A reduction in federal subsidies for renewable generation will cause the solar industry to "bust" and wind energy development to slow down, Strategic Energy and Economic Research Inc. President Michael Lynch said Oct. 11 at a Washington, D.C., conference sponsored by the U.S. Association for Energy Economics and the International Association for Energy Economics.

Citing a long list of issues, Lynch said natural gas-fired power generation will reduce carbon considerations and price out unsubsidized renewable generation. SEER is a Winchester, Mass.-based energy consulting firm.

Adam Sieminski, chief energy economist at Deutsche Bank Securities Inc. and moderator of the panel that featured Lynch, said in an interview that power generation and grid reliability come into national focus only when problems arise.

"Seems like it always takes a crisis," Sieminski said when asked about the impact on the transmission grid from a changing energy supply picture. "If you're going to have wind and solar, how do you get the power from where it is generated?"

Many states across the country have developed renewable energy standards and mandates over the past few years. Sieminski predicted an increase in electricity prices due to those renewable standards, especially if Lynch's assertion proves correct and subsidies for renewable energy dry up. "It just means that electricity is going to become more expensive," he said.

International Monetary Fund adviser Thomas Helbling said natural gas continues to change the energy landscape. "In terms of gas, we are in the midst of a revolution," he said. "It has the potential to really change the energy supply mix."

Much of the new energy supply will eventually meet demand in emerging economies around the world, he added.

Sara Banaszak, vice president and chief economist at America's Natural Gas Alliance, said the industry is "at the beginning of a revolution" but natural gas resource estimates are still evolving.

Banaszak said the U.S. should continue to retire old coal-fired power plants and replace them with natural gas-fired plants. "How do we grow natural gas demand? So far, the answer has been in the power sector, switching from coal generation to natural gas," she said, adding that U.S. EPA regulations make natural gas a better alternative for power generation.

This report is being provided pursuant to a Petition for Confidential Protection.

Inside EPA's
CLEAN ENERGY REPORT
EXCLUSIVE REPORTING ON THE ENVIRONMENTAL POLICIES SHAPING THE LOW-CARBON ENERGY DEBATE

Blogging Clean Energy

Bird Conservationists Seek FWS Wind Permitting Rules

Posted: December 14, 2011

A leading U.S. bird conservation group is petitioning the Interior Department's Fish and Wildlife Service (FWS) for new regulations to create a mandatory permitting system for wind energy projects, escalating a clash between the wind industry and conservationists over the stringency of regulations needed to protect numerous bird species.

In a nearly 100-page Dec. 14 petition to FWS, the American Bird Conservancy (ABC) -- a non-profit bird protection advocacy group -- details its arguments that wind projects "pose a serious threat to various species of birds, including large birds of prey and raptors," such as the Bald Eagle and Golden Eagle. Therefore FWS should "establish a permitting scheme that would regulate the impacts of wind power projects on migratory birds" to comply with the Migratory Bird Treaty Act.

Earlier this year, ABC lambasted draft voluntary wind power siting guidelines developed by FWS, arguing that the guidelines should be mandatory and represent an abdication of the agency's wildlife protection mission. The petition seeks to force mandatory rules instead of voluntary guidelines.

In its petition, ABC writes that it "recognizes that properly sited and operated wind energy projects may be an important part of the solution to climate change, a phenomenon that indisputably poses an unprecedented threat to species and ecosystems." However, the group says wind projects pose a serious threat to birds and must be more strictly regulated.

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Company cancels Calif. project over bird concerns

Anne C. Mulkern, E&E reporter

Published: Thursday, December 1, 2011

This story first appeared in E&ENews PM.

A wind project in Yolo County, Calif., will be abandoned because of potential impact on birds, including golden and bald eagles, developer Pattern Energy said last week.

The proposed 100-megawatt development located near Sacramento had not yet entered construction, but company studies showed that it would be environmentally problematic.

"This would have been a strong source of wind power for California, which needs more renewable energy, but the right thing to do is abandon this project," Pattern Energy CEO Mike Garland said in a statement. "Pattern is committed to environmentally-responsible wind development and our view is that the risk to sensitive species at this project site outweighs the project benefits."

Pattern, a private company based in San Francisco, said the project was "mid-stage," after a few years of research.

The company this summer had applied for a permit to install two 198-foot towers to test wind measurements in Yolo County. Those towers usually need to be up for at least a year to gather enough data to make determinations about wind, said Kelly Fuller, wind campaign coordinator with American Bird Conservancy.

The company never installed the towers and instead opted to use Sonic Detection and Ranging, or SODAR, a meteorological instrument on the ground that can measure wind speed above the ground, said Pattern spokesman Matt Dallas.

Those studies showed that the project would have been economically feasible, Dallas said.

At the same time, the company did its own scientific studies of impacts on species and determined that there would be negative effects without the option of mitigation, Dallas said. It marks the third project in two years that the company has abandoned for environmental reasons, he said. He did not immediately have the information on the other two canceled projects.

The project has not met strong local opposition. Conservation group Tuleyome in June filed a letter with Yolo County urging that Pattern consult with bird groups before moving forward.

"It is vital to have several years of data with respect to biological resources that occur on or near the proposed project," wrote Bob Schneider, senior policy director with the group, in that letter. Tuleyome at that point was neutral on the project.

Schneider noted that many companies "went and staked out everything everywhere, any where a breeze might have blown in the last 10 years," but then do not go forward with many projects.

Wash. utilities ax proposed turbine project on key nesting habitat

Published. Friday November 18 2011

Four Washington public utility districts have cancelled a plan to build the state's first coastal wind farm amid critical nesting habitat for a threatened bird species.

Energy consortium Energy Northwest first proposed the wind project in 2007, suggesting state forest trust land near Willapa Bay as the development site.

Four state utility districts later joined the proposal to build 45 wind turbines across 3,000 acres once used as a radar installation. The power companies provided most of the funding for the planned 80-megawatt project.

But the proposal met opposition from the outset because the land houses nesting grounds for the federally listed marbled murrelet. The government listed the species as threatened in 1992 because logging operations had decimated its old-growth habitat.

Energy Northwest's proposed wind farm sat squarely in the middle of the birds' last remaining southwest Washington nesting grounds.

A 2008 U.S. Fish and Wildlife Service study found 89 occupied murrelet sites on the location of the proposed project and said a wind farm would decrease those numbers.

"Murrelets may be highly vulnerable in localized areas from energy development and production" including "direct mortality from strikes, as well as loss of habitat and fragmentation and impacts to reproductive success through changes in prey base, marine habitat and disturbance," the agency said in a 2009 review.

After the FWS study, Energy Northwest proceeded to conduct its own murrelet study in preparation for an environmental impact statement.

Last year, one of the utility districts withdrew its funding for the wind farm, and last week, all four of the districts decided to ax the project altogether.

Environmental groups celebrated the decision.

"This decision is a major victory in the ongoing work to restore critical habitat for murrelets," said Shawn Cantrell, executive director of Seattle Audubon. "The key for any wind-power project is appropriate siting, and the Radar Ridge project was proposed in absolutely the wrong location" (Kathie Durbin, **Vancouver [Wash.] *Columbian/Seattle Times***, Nov. 17). –