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Integrated Resource Plan

Demand-Side Management Briefing

PUBLIC VERSION

Corporate Planning Department

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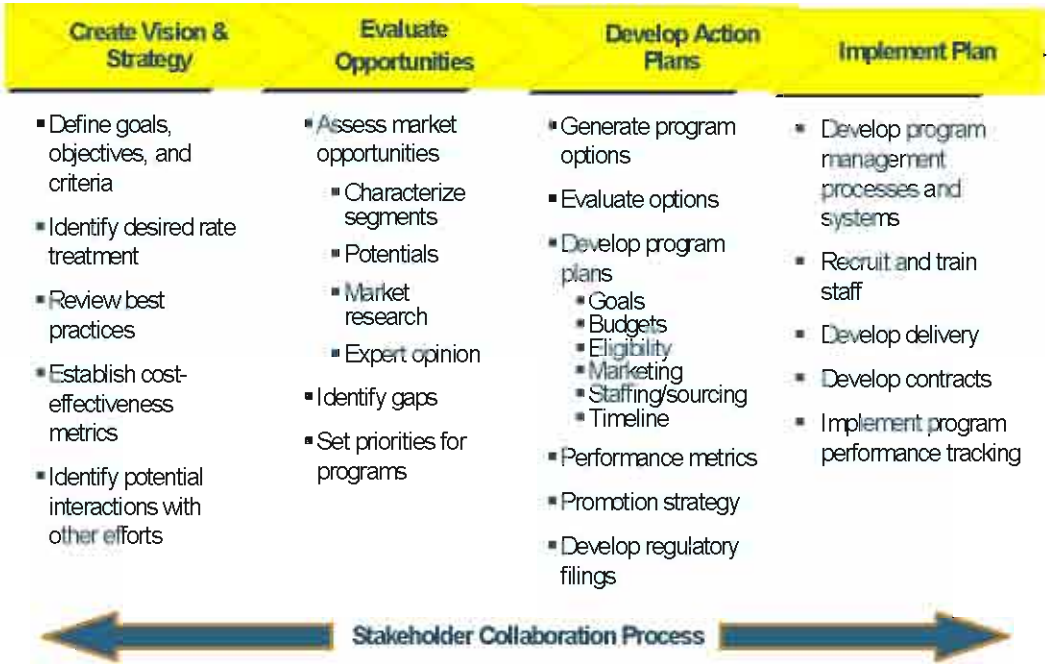
1 AMERENUE'S VISION FOR DEMAND RESPONSE AND ENERGY EFFICIENCY

AmerenUE is dedicated to providing value to our customers through the offering of cost effective energy efficiency and demand response programs.

The underlying principle for AmerenUE's vision is to create *sustainable demand response and* energy efficiency plans to reduce the need for supply resources in the long-term. AmerenUE does not expect to see immediate results in terms of reduced energy consumption and peak demand usage. AmerenUE does not intend to offer giveaways in the form of rebates and "freebies" to achieve instant results. Rather, the vision is to develop a ten-year plan to reduce the rate of growth in electricity demand by offering demand response, price response and energy efficiency options to customers. The vision is to work collaboratively with Staff, OPC, DNR, and all stakeholders to design, implement, evaluate and improve demand response and energy efficiency options to all customer classes.

AmerenUE proposes that the Missouri Public Service Commission (PSC) establish a statewide policymaking forum to develop demand response (DR) and energy efficiency (EE) as resources to meet capacity and energy needs of Missouri investor owned electric utilities (IOUs), enhance electric system reliability, reduce individual consumer costs and protect the environment. AmerenUE believes a statewide strategic approach to the orderly development of cost effective DR and energy EE will result in the development of meaningful long-term, sustainable initiatives as opposed to the short-term, relatively poorly received (by customers) initiatives of the past.

A schematic representation of how the strategic approach could be structured is as follows:



A form of a potential operating model to address a statewide approach to develop and execute DR and EE strategies may be to form three working groups. The first working group is akin to an Executive Steering Team comprised of Commissioners, Legislators, and Officers of stakeholder groups. This group would provide overall policy guidance to other groups involved in the stakeholder collaboration process. This group would focus its efforts on creating a long-term vision for the development of DR and EE in Missouri by laying out a long-term framework for the state addressing performance standards, funding mechanisms, developing goals or targets, and focusing on how DR and EE should be integrated with Missouri IOUs' resource planning processes.

The second working group could be comprised of stakeholders who are interested in developing DR and EE initiatives for large customers with the definition of the term "large" to be determined by the group.

The third working group could be comprised of stakeholders who are interested in developing DR and EE initiatives for small commercial/residential customers.

The systemic approach to develop sustainable demand response and energy efficiency resources is encouraged in Section 139 of the 2005 Energy Policy Act lends as it directs the Secretary of Energy, in association with NARUC and the state energy offices, to study the impact of state policies that encourage energy efficiency including:

1. performance standards for achieving energy use and demand reduction targets;
2. *funding sources, including rate surcharges*;
3. infrastructure planning approaches (including energy efficiency programs) and infrastructure improvements;
4. the costs and benefits of consumer education programs conducted by State and local governments and local utilities to increase consumer awareness of energy efficiency technologiesand measures; and
5. methods of:
    - *removing disincentives for utilities to implement energy efficiency programs*;
    - encouraging utilities to undertake voluntary energy efficiency programs; and
    - *ensuring appropriate returns on energy efficiency programs.*

2 OVERVIEW

The analysis of the potential for cost effective demand-side resources is as important to robust integrated resource planning analysis in 2005 as it was when the Missouri Electric Utility Resource Planning rules were first published in 1993. However, in 1993 AmerenUE and almost every investor owned electric utility in the nation had little, if any, experience in with identification of cost-effective end use measures, bundling of end-use measures into programs, the implementation of programs and the impact and process evaluation of programs. (See Appendices 4 and 5 for a complete description of the energy efficiency measure level and program level screening analyses done for the 1993 filing.)

By 2005 AmerenUE gained substantial experience with implementing and evaluating DSM pilot programs. AmerenUE invested in excess of $20 million dollars between 1995 and 2005 in DSM pilot program implementation and evaluation. In addition, since 2002 AmerenUE worked collaboratively with a broad group of stakeholders including the Missouri Public Service Commission Staff, the Office of Public Counsel, and the Missouri Department of Natural Resources to develop low-income customer assistance, weatherization, residential and commercial energy efficiency, and residential time-of-use pilot programs. AmerenUE invested approximately $17 million dollars in the collaborative effort.

The demand-side resource analysis section of the current Missouri electric utility resource planning rules were written in a manner that reflected the status of demand-side planning in 1993 – a minimal knowledge base. The rules require extensive database development, cost-effectiveness screening of end-use measures, technical potential estimation for each cost effective end-use measure and design and implementation of programs using cost effective measures. The Electric Power Research Institute (EPRI) developed specialized software, specifically DSManager, to assist in the analysis of cost-effective end-use measures. DSManager is no longer supported by EPRI or in use by electric utilities.

The reality is that in 2005 AmerenUE and many of the investor owned electric utilities in the nation have extensive knowledge databases for demand-side options. It is not necessary to re-invest millions of dollars to re-develop cost-effective end-use measures. It is not necessary to double or triple the size of a Resource Planning staff to basically handle research and development associated with building demand-side analysis capabilities from a knowledge base of zero.

With this background, AmerenUE's approach to demand-side resource analysis for purposes of its December 2005 integrated resource plan filing is to build upon "best practices" demand-side management and energy-efficiency programs both at AmerenUE and at investor-owned electric utilities across the nation. AmerenUE engaged [redacted] to assist in the preparation of evaluations of various demand-side programs as inputs to the December 2005 integrated resource plan filing.

While the ultimate form of the AmerenUE energy efficiency and demand response programs may change from those listed in the [redacted] reports, AmerenUE considers the aggregate energy

savings and peak demand reductions reflected in the [redacted] report as maximum technical potential MW and MWh "placeholders" for cost effective energy efficiency and demand response levels in its 20-year integrated resource planning process.

The reason AmerenUE considers the [redacted] reports as representing the maximum possible technical potential is due to the academic perspective of the [redacted] study that is in contrast to time-tested results from actual pilot programs. For example, as early as 2010 the [redacted] report identified a maximum technical potential for demand response programs to be approximately [redacted] MW. Of this [redacted] MW, [redacted] MW, or [redacted] percent, is attributable to programs in the real-time pricing family of demand response products.

The experience that AmerenUE has with its offerings of real time pricing (RTP) products in the industrial sector is that demand response is minimal, if any, at market prices less than $[redacted] MWh. Also, from a reliability perspective, how should AmerenUE consider RTP as capacity when market prices do not reach extreme price spikes? Clearly, it would be beneficial to have a demand-response working group discuss and decide how to account for the real-time pricing family of demand response products.

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Another critical discussion item that pertains to how to factor demand response into AmerenUE resource planning work is the issue of capacity equivalence. The concept of capacity equivalence is discussed at length in the *Integrated Resource Analysis* document of this filing. Briefly stated, capacity equivalence is the true capacity value of a program – demand response or energy efficiency. The calculation of peak load reduction may not provide an indication of the capacity, or load relief, that will be available throughout the entire year to meet customer demand.

The [redacted] reports do not account for capacity equivalence. AmerenUE made adjustments to the [redacted] modeled demand reductions in its capacity expansion plan analyses to account for capacity equivalence.

Capacity equivalence is another area where AmerenUE needs to work with the demand response working group to reach mutual understanding on how to consider capacity equivalence in the context of evaluating pilot programs.

3 APPROACH

Demand side management has two components: demand response and energy efficiency. Demand response refers to the ability to control the level of electricity demand at any point in time (or relatively small interval of time, such as five minutes to one hour). Energy efficiency refers to the ability to control consumption of electric energy over extended time periods.

Demand response resources allow utilities or their customers to quickly cut back electricity demand for short periods. It usually occurs when the marginal cost of electricity is particularly high. In contrast, energy efficiency resources may generate overall reductions in energy consumption, but are less targeted to particular time periods. Generally, energy efficiency resources are less dispatchable than demand response resources.

[redacted] conducted energy efficiency and demand response cost benefit analyses by drawing on the publicly available results of the many demand response and energy efficiency evaluations that have been conducted in the past decade and by using the information available from AmerenUE's own evaluations to "customize" these results to AmerenUE's circumstances. [redacted] analysis includes an investigation of the public records of jurisdictions including California, New York and Wisconsin. [redacted] analysis also included information from their involvement with the International Energy Program Evaluation Conference and the Electric Power Research Institute.

Conducting a screening analysis of energy efficiency programs requires the following types of input data:

- Estimated load changes as derived in prior evaluations (e.g., expected market penetration, annual energy savings and changes in hourly loads or usage in peak and off-peak periods. The load changes account for issues of free ridership, persistence and "snapback" effects
- Avoided costs (e.g., estimates of AmerenUE's marginal energy and reserves costs for relevant period of analysis, preferably with hourly or monthly TOU period detail; these avoided costs represent the benefits arising from the program load impacts
- Program costs (e.g., the cost of operating programs, including design, marketing, implementation and evaluation, the cost of energy efficiency devices, and incentive payments to customers).

The approach to analyze demand response programs is different than that used to analyze energy efficiency programs. While the approach to energy efficiency focuses on updating prior evaluations, the approach to demand response is to conduct evaluations of representative innovative retail pricing programs. [redacted] experience with developing models of customer response to pricing programs attempt to capture the essential price response and customer choice elements required to understand and quantify the impacts of pricing programs.

4 SYNOPSIS OF SCREENING ANALYSIS OF POTENTIAL ENERGY EFFICIENCY PROGRAMS

A complete description of the screening analysis of energy efficiency programs is described in Appendix 1.

The types of programs that AmerenUE evaluated in its DSM analyses in the mid-1990s, and has implemented as pilot programs, or continues to operate, are similar to those found to be most popular around the country. Combining information from AmerenUE and the ACEEE report, the following generic programs were subjected to a screening analysis.

1. *Small commercial and industrial audit program, with focus on lighting.*
2. *Large commercial and industrial audit program, with focus on lighting.*
3. *Residential new construction.*
4. *Residential appliance buy-back program.*
5. *Residential lighting.*

A description of each generic program is:

1. *Small commercial and industrial audit program, with focus on lighting.* This program would operate similarly to AmerenUE's existing commercial facility energy audit program, and be aimed at small commercial and industrial customers. It would offer reduced costs on energy audits to identify energy efficiency opportunities, and possible credits for verified energy efficiency improvements undertaken by customers as a result of the audit. The audits would have a primary focus on lighting improvements, and could also include evaluations of motor efficiency improvements for industrial customers.
2. *Large commercial and industrial audit program, with focus on lighting.* This program would operate similarly to one included in AmerenUE's last DSM assessment aimed at large commercial and industrial customers. It would offer reduced costs on energy audits to identify energy efficiency opportunities, and possible credits for verified energy efficiency improvements undertaken by customers as a result of the audit. The audits could have a primary focus on lighting improvements, and could also include evaluations of motor efficiency improvements for industrial customers.
3. *Residential new construction.* This program would involve AmerenUE working with builders, developers, contractors, and real estate agents to promote improvements in building shell and appliance efficiencies beyond basic building code and standard practice levels. The program could be operated at relatively low cost by primarily providing information and encouragement, or at a higher cost by offering financial incentives tied to specific efficiency improvements. It could be aimed at both single-family and multi-family homes.
4. *Residential appliance buy-back program.* This program would operate like AmerenUE's existing refrigerator buy-back program to provide incentives for purchase of high-

efficiency refrigerators and free disposal of old refrigerators. The program could be extended to offering incentives for high-efficiency room air conditioners along with free disposal of old units.

5. *Residential lighting*. This program would continue AmerenUE's involvement in efforts to reduce the market price and encourage customer purchase of compact fluorescent lamps. Programs of this type can carry over into the small commercial customer market to the extent that they purchase through participating hardware stores.

Note that low-income weatherization programs are not on the above list, even though AmerenUE currently operates such programs. The available data from other programs suggests that the costs of running such programs are relatively high for the load impacts achieved. However, they may well produce other social benefits that justify their funding through public benefits funds.

Energy efficiency screening analysis typically involves calculation of estimated changes in benefits and costs using a set of standard tests that are usually characterized as measuring benefits and costs from different perspectives. The two most widely used tests in the past were the Total Resource Cost (TRC) and the Ratepayer Impact Measure (RIM) tests.

5 SYNOPSIS OF SCREENING ANALYSIS OF POTENTIAL DEMAND RESPONSE PROGRAMS

A complete description of the screening analysis of potentially viable demand response (DR) programs is described in Appendix 1.

Traditional demand response programs provided a rate discount (e.g., a 50 percent discount on a demand charge) for the right to interrupt a customer's load for a limited number of hours per year usually under conditions of low reliability. The customer received no monetary incentive at the time of interruption, faced a stiff penalty for non-compliance, and received no compensation for over-complying. As a result of this type of structure, calls for interruptions were perceived as very negative events for customers.

Market-based interruptible load programs will be structured quite differently. These programs are characterized by "pay for performance," in which customers will receive an incentive tied to the wholesale price of power for each unit of load that they are willing to reduce during high-price or low-reliability periods.

Demand response programs may be classified into two broad types. One consists of **dynamic pricing options** in which consumers face retail prices that reflect wholesale market costs on a timely basis. The dynamic prices may apply all of the time, as in real-time pricing (RTP), or only during periods of unusually high wholesale costs, such as critical peak pricing (CPP).

The other broad category consists of various types of "buy-back" or **curtailable-service** programs in which consumers either receive a price discount in return for a requirement to curtail when requested, or are offered a payment in return for curtailment during high-cost or emergency conditions. This category includes traditional interruptible/curtailable (I/C) programs aimed at large customers, air conditioner cycling programs aimed at smaller customers, as well as more market-based programs that pay customers for their load curtailment performance, where the payments reflect the market value of the curtailments.

The screening analysis project proceeded in two steps. The first step involved developing a list of potentially viable programs to be subjected to a benefit-cost screening analysis, and characterizing the nature of those programs for purposes of this analysis. The second step was to conduct the screening analysis.

CANDIDATE PRODUCTS FOR SCREENING ANALYSIS

The list below presents candidate DR products for each of the three main rate classes residential, commercial, and industrial. Large customers, with general access to hourly interval metering, can use programs with hourly pricing or with signals that induce response that must be recorded on an hourly basis. Real-time pricing reflects the former while the family of I/C programs reflects the latter.

As noted above, I/C programs are classified into two main groups. The first uses market prices to identify curtailment periods as well as the basis for crediting customers for load curtailments

and charging them for the right to buy through curtailments, *i.e.* exceed contract firm power levels. Note that AmerenUE is considering all potential demand response options. This does not mean that AmerenUE considers a customer "buy through" option as a viable DR option. The second group involves mandatory curtailments in return for up-front price discounts, including some very short-notice programs typically triggered by system emergency conditions.

Smaller customers, both commercial and industrial, as well as residential, for whom hourly metering cannot be presumed, may also be candidates for demand response provided that such metering can be provided cost effectively. Two forms of time-dependent service, the traditional time-of-use (TOU) structure and the more advanced CPP products that are designed to reflect market conditions on a limited number of days of unusually high wholesale costs are included in the analysis. Additionally, in the interest of comprehensiveness, the residential air conditioner cycling programs which has been piloted at AmerenUE as the leading non-price based demand response vehicle for small consumers is included.

Large Commercial and Industrial Customers

1. Real-time pricing
2. Market-based I/C service (with buy-through)
3. Traditional I/C service
4. Short-notice/emergency I/C service

Small Commercial and Industrial Customers

1. Critical peak pricing
2. Traditional TOU service

Residential Customers

1. Critical peak pricing
2. Traditional TOU service
3. Air conditioner cycling based on price signals or market conditions

A description of each generic program follows:

1. **Real-time pricing** – This product family quotes prices for short time intervals (typically one hour) at short notice (day-ahead or hour-ahead). The most popular version at present is day-ahead hourly pricing in a two-part structure, in which the price applies to departures from a contract quantity called the customer baseline load. The CBL reflects historical usage patterns and is priced in regulated markets under the customer's standard tariff. This standard bill or "base bill" collects regulated revenue on the CBL quantity and contains an implicit hedge against RTP price variability, as the RTP price applies to load changes only. AmerenUE's RTP collaborative pilot program is an example of this family.

2. **Market-based interruptible/curtailable products** – This family offers traditional pricing except in curtailment periods. During such periods, a price reflecting market conditions applies to consumption above, and sometimes below, a contract or firm power level (FPL). Structural features to choose include: advance notice of curtailment,

duration of individual periods and maximum number of curtailments per period (month and/or year), conditions in which curtailments can be called, discount for participation (amount and form), FPL and duration of contract commitment.

An innovative product that conforms to both regulated and deregulated markets allows the customer to choose their FPL, has a contract length of a year or two, offers a modest discount from standard rates for participation, and provides payment for curtailment below FPL and charges for buy-through at prices based on and close to forecasted market price. Degree of advance notice is a matter of some discretion, depending on customer characteristics. Program acceptance can be broadened by offering customers choices among structural configurations at different prices.

Additionally, programs can allow customers to choose the price at which curtailment occurs. AmerenUE's two I/C products belong in this family, although the second is closer in spirit to the short-notice programs described below.

3. **Traditional I/C products** – This family consists of products whose unifying theme is to treat I/C customers as a peaking generation unit. Their characteristics typically include long contract periods, large (demand charge) discounts for participation, no or low (and nonmarket-based) payments for curtailment, heavy penalties for failure to curtail (i.e. no market-based buy-through). The usual choices regarding advance notice, curtailment interval duration, maximum hours of curtailment, etc. apply.

4. **Short-notice (emergency) I/C products** – This family of products covers non-price based products that obtain load reductions primarily in situations in which buy-through is prohibited. The traditional structural alternatives apply: maximum duration, maximum hours per year, length of curtailment, FPL, length of contract, etc. This family serves a special, narrow and important purpose, to provide the equivalent of spinning reserves. Again, customers are treated as peaking units and only customers with very low outage costs can provide this service or will be willing to do so. The products can be made market-oriented in that the up-front payment can be set seasonally, so that customers can opt in or out by season. However, this flexibility can conflict with the provider's desire for long-term contracting of this service. The product can be paired with other market-based products for individual customers, though. For example, Georgia Power Company offers hour-ahead RTP service and an interruptible rider of the emergency sort to its largest customers.

5. **Traditional time-differentiated service** – This family of products features pricing by season and by time of use to induce demand response relative to flat pricing, as a by-product of traditional efforts to better match cost of service to customer type. Prices are generally based on embedded cost concepts and on-peak to off-peak price ratios are often around 2:1. Such price differentiation is not typically sufficient to generate sufficient benefits to attract participants to a voluntary program. Mandatory programs tend to fare better due to the loss of the opportunity for self-selection by customers. The issue at many utilities is whether and how residential TOU pricing programs should be introduced. A traditional candidate might involve some market-based pricing (with consequently higher price ratios and narrower peak periods, perhaps, than those in current

use in the industry). In this case the market basis of prices is wholesale price forecasts for the coming year. Pricing would be updated each year in this case.

6. **Critical Peak Pricing (CPP)** -- This family consists of products in which key hours have special (high) prices assigned to them, with the announcement of key hours received at short notice. Product structure choices include: applicable time period, degree of advance notice of prices, degree of pre-specification of prices, basis of price formation, manner in which price information is used (human or automated response), number of periods of short-notice pricing and maximum duration of period. AmerenUE's Residential Time-of-Use pilot program, with its critical peak price of 30¢/kWh for Groups 2 and 3, is a member of this family.

7. **Residential air conditioner cycling programs** -- This product is a form of direct load control for small customers in that under provider-controlled conditions, whole-house air conditioners convert from a full to a partial duty cycle. A price-based variant might be one that allows customers to choose the market price at which cycling begins. Smart technologies will increase the variety of forms that this product can take, moving it away from direct load control.

The following table summarizes the cost-effectiveness of each proposed program.

Table 1.1
Net Benefits by Cost Scenario and Program ($000)

Table 1.1 presents a summary of the present discounted value of net benefits from these programs. The top half of the table reports the results for the CAIR marginal cost scenario and the bottom half reports the GGAS results. The "Base" results exclude the capacity benefits while the "Adjusted" column includes them.

"Capacity benefits" refers to a scenario that assumes that wholesale markets do not fully reflect avoided capacity costs. Consequently, a relatively modest avoided capacity cost component was added to the wholesale market price. See the Appendix for the avoided capacity costs that were assumed.

The quantitative analysis of the candidate demand response programs indicates that all are viable in one marginal cost scenario (CAIR) assuming that the assumed potential additional capacity benefits are included in the estimate. If these benefits are excluded, all but the short-notice I/C program are viable, although the AC cycling program is barely viable.

Some programs are viable under the GGAS scenario as well. RTP is viable under the basic definition of net benefits while the short-notice I/C program also succeeds in being viable under the assumption of additional capacity benefits. The other three programs are not viable under the GGAS scenario.

Demand response provides more net benefits in every program under the CAIR scenario than under GGAS, due to the relatively lower price variability of the GGAS world (due to the higher prices in all hours and lower peaks compared to base prices), which yields relatively fewer chances for obtaining price response benefits.

The estimated load impacts of DR programs are listed in Table 1.2:

Table 1.2
Load Impacts of DR Programs – MW Impact

It is important to note that Table 1.2 was created under the assumption that each program was analyzed in isolation or independent from the other programs. The reality is that multiple offerings within rate classes will reduce these benefits to some extent. Appendix 6 is a technical discussion of the basis for the preceding issue. It is important to note that AmerenUE has existing demand response programs which may further reduce the MW potential for the demand response programs listed in Table 1.2. Finally, the demand response reductions in Table 1.2 do not include an adjustment for capacity equivalence. AmerenUE does not have experience with

calculating demand response for RTP products. AmerenUE has historical data for capacity equivalence for direct residential A/C control programs and traditional interruptible programs.

AmerenUE expects to gather more intelligence on demand response through its participation in the United States Demand Response Coordinating Committee (DRCC). DRCC is a non-profit organization formed in 2004 to increase the knowledge base in the United States on demand response and facilitate the exchange of information and expertise among demand response practitioners and policy makers. In addition to its U.S. focus, the DRCC has been designated by the U.S. Department of Energy (DOE) as the official Expert Body to represent the United States. in the Demand Response Project of the International Energy Agency (IEA). DRCC members include American Electric Power, CEC/LBL PIER Demand Response Research Center, ISO-New England, Midwest ISO, National Grid, NYISO, NYSERDA, Pacific Gas & Electric, PJM Interconnection, San Diego Gas & Electric, Salt River Project, Southern California Edison, and Southern Company. Representatives from DOE, the Federal Energy Regulatory Commission (FERC), the Environmental Protection Agency (EPA) and the National Association of Regulatory Utility Commissioners (NARUC) serve on the DRCC's Advisory Board.

6 LIST OF DEMAND RESPONSE/ENERGY EFFICIENCY PROGRAMS AT AMERENUE – PAST AND PRESENT

CANCELLED PROGRAMS

Commercial Energy Savings Partnership (ESP) – ESP was a multi phase energy audit program for large commercial customers. The program began in 1993 and ran through 1998. Approximately $2 million was spent on the program.

Building Energy Efficiency Program (BEEP!) – A small commercial class energy audit pilot that provided decision makers with a technically sound, defensible and thorough information base from with to make decisions regarding the design, marketing, delivery, program costs and desired impacts from the program. By 1997, over 2600 surveys have been mailed through the program, and approximately 400 reports had been processed. The on-site audit program option had the completion of approximately 1200 audits.

MotorMaster – This program focused on replacing old industrial motors with energy efficient motors. It was cancelled due to reluctance on the part of industrial customers to part with known, proven motors for new motors.

Demand Control Seminars – This program focused on providing information and education to large commercial and industrial customers regarding fundamentals of energy management and bill reduction.

Rider G – This was an interruptible program for customers with peak demands in the 1 MW to 10 MW range. The program was discontinued in 1997 due to customers' willingness to participate only when production levels were down.

In Concert With the Environment (ICWE) – By 1996, AmerenUE completed three full years of ICWE pilot program. During this time, AmerenUE spent $1.2 million educating 32,000 students about energy-efficiency.

No Sweat – Residential A/C Cycling Program – Between 1993 and 1998, AmerenUE piloted and implemented a residential A/C Cycling program. Expenses for the pilot totaled $1.9 million from inception to termination. The equipment installation, maintenance and removal expenses represent the largest percentage of this total at 53 percent; followed by 16 percent for load management switches and metering equipment, 12 percent for the energy impact evaluations and 10 percent for participant incentives. The program used AmerenUE existing 154 MHz radio infrastructure.

Residential Website Audit – This pilot program began in the fourth quarter of 1997. Customers accessed free, do-it-yourself home energy audits from the AmerenUE website and received a report that could be printed on the customer's printer. AmerenUE contracted with VoltViewTech to provide the service.

Residential GreenKey Pilot – This pilot began in December 1995 and ran through December 1998. This is a residential new construction pilot designed to improve the building envelope of new electrically heated homes. The pilot had a $100,000 per year budget – the bulk of which provided cash incentives of $1.640 per home to people who build new homes to GreenKey specifications. Approximately 50 people participated in the program. Due to the large percentage of "free riders" (i.e., customers who would have participated in the program regardless of the cash incentive), the program was not cost effective.

Residential Energy Saver's Plan – Low Income Pilot – This program was offered in 1998. It was an extension of the Customer Assistance Program (CAP) offered by Provident Counseling to AmerenUE customers who had difficulty paying their bills. The CAP counselor determined if the customer had electric heat. If so and with the permission of the customer, an energy auditor was sent to the customer's home to do an on-site energy audit and install needed energy conservation measures at no cost to the customer. Energy conservation measures included insulation, weather stripping, caulking, water heater wraps and compact fluorescent light bulbs.

Residential Appliance Removal Program (Cold Cash) – The program provided cash reimbursement for old refrigerators and freezers. The program terminated in 1995 due to excessive free-ridership.

EXISTING PROGRAMS

Refrigerator Buy-Back Program – In 2004, AmerenUE contributed an initial $400,000 to the newly established Residential and Commercial Energy Efficiency Fund, which offered AmerenUE Missouri electric residential customers in the St. Louis area rebates for purchasing energy-efficient refrigerators and bounties for giving up old units. Through this program, AmerenUE Missouri customers also get pick-up and disposal of up to two old refrigerators.

Light Bulb Program – On Oct. 1 2003, AmerenUE contributed $170,000 to a newly established residential lighting initiative – the Change-A-Light Program, which offered electric residential customers throughout Missouri a rebate on ENERGY STAR® lighting products found in hardware stores across the state.

Energy Toolkit Program – The toolkit also allows customers to analyze their bills, calculate the savings potential of energy efficient appliances or find out what portion of their energy use goes to heating, cooling, laundry and other activities. Once customers know where energy is being used, they can learn ways to reduce energy costs. In fact, customers can even calculate what a new addition or some other change in their homes has cost – or saved – them. Creation of this Web-based tool – a $1 million, four-year initiative – is one of a number of programs that are part of the joint Missouri retail electric rate settlement.

Commercial Facility Energy Audit – The Walk-though Energy Audit program is designed to encourage customers to change their internal processes, replace inefficient energy consumption equipment or improve facilities which waste energy by providing a rebate for the costs of energy audits. The program is designed for electric commercial facilities, served by AmerenUE, which

are located in Missouri. AmerenUE will credit the customer's account for 50 percent of the initial energy audit cost up to $500.

If potential energy efficiency savings are identified, a follow-up detailed energy audit will be performed per customer's request. After the follow-up audit is performed the remaining 50 percent of the first audit cost, up to $500, will be credited to the customer account. Upon completion of some of the recommended changes identified in the audit and associated with energy efficiency improvements and verification of the changes, AmerenUE will credit the customer's account for 33 percent of the cost of energy efficiency implementation projects. The total for credits, audit costs and implementation projects cannot exceed $5,000.

Motor Miser – AmerenUE's Motor Miser program assists in the evaluation of the efficiency of existing electric motors, make effective decisions on motor replacement or repair and develop motor management systems to achieve energy savings and improve motor reliability. With Motor Miser, AmerenUE analyzes the efficiency of motors for customers or businesses that wish to expand, relocate or modernize their facilities.

BOC Certification – AmerenUE contributed $300,000 to initiate in Missouri the nationally recognized Building Operator Certification Training Program. Over the next two years, AmerenUE's support will also help 210 applicants attend 80 hours of classroom training and project work on building systems operations and maintenance to earn their Building Operator Certification (BOC).

This training provides an overview of preventive maintenance, energy efficiency principles and the fundamentals of building systems equipment and operations for commercial building operators. It focuses on energy conservation techniques and efficient lighting fundamentals. It also covers heating-ventilation-air conditioning systems and controls, indoor air quality and environmental health and safety regulations.

The Energy Center of the Missouri Department of Natural Resources, with the Midwest Energy Efficiency Alliance, provides BOC training at a cost of $2,300---but qualified applicants who are working at organizations in AmerenUE's service area will pay $1,150 thanks to the AmerenUE support.

The initial BOC classes are offered in St. Louis at AmerenUE's 1901 Chouteau Ave. Downtown St. Louis headquarters. Sessions were held at 7:30 a.m. to 3:30 p.m. on Oct. 26, Nov. 22 and Dec. 13 in 2005. In 2006 sessions are scheduled on Jan. 17, Feb. 13, Feb. 14, March 9, and April 12.

The Missouri Department of Natural Resources 1738 East Elm Street Conference Center is the site for Jefferson City sessions at 8 a.m. to 4 p.m. Sessions were held on Oct. 19, Nov. 17 and Dec. 15 in 2005. In 2006 sessions are scheduled on Jan. 26, Feb. 22, Feb. 23, March 16, April 13.

Low-Income Weatherization Funded Programs – AmerenUE contributed $4 million to the Low Income Weatherization Assistance Program administered by the Missouri Department of

Natural Resources Energy Center. The contribution is earmarked to help low-income AmerenUE Missouri electric residential customers reduce their bills by conserving energy. This ranks as the single largest private contribution ever made to this program in Missouri.

DEMAND RESPONSE PROGRAMS

Existing Programs

Voluntary Curtailment Rider (VCR) – Rider L – This Rider is applicable to industrial and large commercial customers. It started in the summer of 2000 with the purpose to provide credits to customers who, at the Company's request, voluntarily curtail electrical usage normally served by the AmerenUE. Participating customers view and accept offers via an internet based system.

Options-Based Curtailment Rider (Options) – Rider M – This Rider is applicable to industrial and large commercial customers. It started in the summer of 2000 with the purpose of providing customers the option to grant AmerenUE the right, not obligation, to call for curtailment of a certain level of customer's energy consumption based upon various curtailment options and associated prices offered by AmerenUE, selected by the customers, and specified by a contract.

Collaborative Programs

Two-Part RTP Pilot – The purpose of this program is to evaluate the viability of a non residential two part real time pricing rate as a demand response option. The pilot is a result of a collaborative group as governed by the Stipulation and Agreement in Missouri Public Service Commission Case No. EC-2002-1. The primary feature of this pilot rate application is the providing of day ahead market pricing for incremental or decremental loads from previously established hourly loads of eligible individual customers opting to participate in the pilot. This roll-out of this pilot program is on hold due to a lack of interest on the part of AmerenUE's large industrial customers.

Residential Time-Of-Use Pilot -- The purpose of this rate is to evaluate the viability of a residential time-of-use rate. This pilot is a result of a collaborative group as governed by the Stipulation and Agreement in Missouri Public Service Commission Case No. EC-2002-1. The primary feature of this pilot application is providing rates that vary during different times of the day and evaluating the customers' response to the variations in these rates.

7 BENEFIT/COST TEST DESCRIPTIONS

TOTAL RESOURCE COST (TRC) TEST

The TRC test is usually characterized as comparing the *costs* of the program and associated energy efficiency measures (to both the utility and the participating customers) to the *benefits* derived from the avoided energy and capacity costs resulting from participating consumers' energy savings.

RATEPAYER IMPACT MEASURE (RIM) TEST

The RIM test compares the *costs* to the utility of operating the program, including administrative costs and incentive payments, as well as the foregone revenues due to the program's energy savings, to the *benefits* derived from the avoided energy and capacity costs.

Applying this pair of screening criteria has traditionally caused a somewhat conflicted and arbitrary program and resource planning process. That is, the TRC test is generally used as the primary criterion for evaluating DSM energy efficiency programs, which usually results in several programs being judged "cost effective." However, applying the RIM test to the same programs often produces a negative result, implying that implementing the programs will require a rate increase to cover the utility's net cost increases.

COMPREHENSIVE NET ECONOMIC BENEFIT (NEB) TEST

Recognizing the limitation regarding appropriate measurement of DSM benefits and costs using either the TRC or RIM tests, [redacted] developed and published a comprehensive DSM benefit-cost test that used traditional economic welfare analysis to account for *all* of the changes in economic benefits and costs associated with DSM programs. Careful examination of the components of the test demonstrated that the traditional TRC and RIM tests each represent special cases of the comprehensive benefit-cost test, under different implicit assumptions. That is, all three tests can be shown to measure the same set of benefits and costs resulting from utility DSM programs, except that the TRC and RIM tests make specific assumptions regarding the value of certain key components of the test.

The comprehensive net economic benefit (NEB) test adds three new elements to the equation. From a practical standpoint, two of the elements will typically amount to relatively small and off-setting values (*i.e.*, one is typically negative and the other positive). These are 1) the loss in economic value to all consumers from reducing usage in response to *rate increases* that result from DSM cost recovery, and 2) participating consumers' gain in value from expanding their energy services through the *rebound* effect. These two elements were not considered in the screening analysis reported below.

However, the third element, which deals with an explicit accounting for the extent of *market inefficiencies* regarding energy efficiency, explains the typical substantial difference between the results of the TRC and RIM tests. Making assumptions about the degree of market inefficiencies, or imperfections, implies the need to distinguish between two alternative

characterizations of consumers' energy efficiency decisions in the absence of utility DSM programs. One assumption is that consumers make rational market-based decisions in adopting their observed levels of energy efficiency; the other is that market barriers or imperfections cause them to under-invest in energy efficiency measures that are judged to be cost effective by analysts at utilities and DSM consulting firms.

The Logic behind NEB test is in the absence of the program, customers have the opportunity to invest in the same energy efficiency measures offered through the program, but do not do so. However, by the program assumptions, they do not undertake this investment without the program. Possible reasons for not undertaking the actions may include the following:

- Based on their own business calculations, the consumers do not believe that their bill savings can be relied on to be that large.
- Their assessment of the cost of investing in the measures is greater than that estimated by the program planners.
- They may discount non-core business expenses and cost savings at a higher rate than that assumed in the screening analysis, for various reasons of business risk.
- Or, the estimated participant benefits and costs are accurate, but the consumers may be unaware of the potential cost savings that they could achieve, or are prevented from achieving them due to certain market inefficiencies, or barriers, that are often cited in the energy efficiency literature.

Applying the standard form of the TRC test makes an implicit assumption about the presence of market inefficiencies implied by the program cost and energy savings assumptions. TRC equals NEB under the assumption of extensive energy efficiency market inefficiencies.

Applying the RIM test assumes that no such market inefficiencies exist. RIM differs only by the amount of incremental economic value from increase energy efficiency induced by a program's incentive payment.

The reality lies somewhere between the two extremes assumed in the TRC and RIM calculations.

The following table summarizes the cost-effectiveness of each proposed program.

Table 1.3
Alternative Estimates of Net Economic Benefits, by Program and Scenario ($ million)

The preceding table makes mention of two scenarios, CAIR and GGAS. CAIR is an acronym for the Clean Air Interstate Rule which sets parameters for future emissions from fossil fueled powerplants. GGAS is an acronym for Greenhouse Gas Emissions. Both scenarios imply higher market prices for electricity due to more stringent emission controls required. However, GGAS scenario implies significantly higher compliance costs than CAIR due to the nature and level of an assumed carbon tax. See Appendix 3 for a complete description of the CAIR and GGAS scenarios.

Table 1.3 shows that all programs, except for the residential appliance buy-back program, are cost effective under the TRC test. Conversely, all programs under the RIM and NEB tests are not cost effective.

Table 1.4 shows the projected average annual energy savings and demand reductions for each of the above programs.

Table 1.4
Energy Savings and Demand Reductions by Program

The total annual energy savings, excluding the residential appliance buy-back program which is clearly not cost effective, are [redacted] GWh. The total annual demand reduction is [redacted] MW.

All programs, with the exception of the residential appliance buy-back program, were passed onto the integrated resource planning analysis.