The Empire District Electric Company

High Level DSM Evaluation Plan

April, 2008

INTRODUCTION

This document contains descriptions of a series of high level evaluation plans for the demand side management (DSM) programs that have been approved by the Empire DSM Collaborative. These evaluation plans include both impact and process. Another common term for this activity is measurement and verification (M&V). High level can be defined as following:

- Best Practices – DSM evaluation approaches that follow current industry best practices.

- Flexibility – Evaluation approaches will be flexible to allow evaluation contractors the ability to offer different approaches with various budgets.

- Level of Effort – Evaluation plans will reflect an appropriate level of effort given the overall budget for each program.

APPROACH & TIMING

The Collaborative agreed to begin evaluation activities at the beginning of Year 3 (2009) in the implementation cycle. Waiting approximately 24 months will provide a rich source of program history and data to support a comprehensive process, impact and market transformation evaluation. It will also allow a sufficient amount of funds to be available for comprehensive evaluation activities.

While Empire will issue an RFP for evaluation services, opportunities for teaming with other utilities and leveraging evaluations for similar programs that have already been in the field, will also be investigated. Given Empire's relatively small size, undertaking comprehensive evaluations will limit the scope of the work that can be conducted. Teaming with other utilities or using other evaluations will help mitigate the funding limitations.

By using an outside contractor, Empire will ensure that the evaluation is independent and objective. An outside contractor will facilitate candor on the part of delivery agents and customers alike and provide credibility with outside parties. The outside contractor can provide an unbiased view and offer recommendations for program improvements. While specific approaches for evaluating each program will be contained in the contractor's proposals, guidance on methodology will be provided in this document which can be incorporated into an RFP.

LEVERAGING/TEAMING WITH OTHER UTILITIES

Many of the programs that Empire will be implementing are industry standard and are already being offered in Missouri, other Midwest utilities and other utilities throughout the United States. Given Empire's relatively small size, and the generic natures of some of its programs, it would be advantageous and cost effective to look for opportunities for:

- Work with other utilities on joint program evaluations and/or
- Leveraging other utilities' evaluations where such information is deemed to be relevant and accurate for Empire's programs.

Specific reference is made later in this document for those programs where leveraging and teaming opportunities should be investigated.

EVALUATION ACTIVITIES

The overall evaluation can be divided into three components: process, impact and market transformation. Every program will undergo a process and impact evaluation. As discussed further on in this document, not all programs are candidates for a market transformation study. In order to maximize the value of the evaluation activities, the evaluation contractor will be required to provide interaction between the three study areas. Linking findings between each of these three evaluation components provides the most useful recommendations for program improvements.

PROCESS EVALUATION

A process evaluation assesses the process which a program undergoes during implementation. The process evaluation documents program goals and objectives from a variety of perspectives. It describes program strengths and weaknesses so that success can be maintained and weaknesses corrected.

While each program will undergo its own process evaluation, there will some overlap. Specifically, interviews with Empire staff can cover all programs. Any contractors that are implementing Empire's DSM programs will be interviewed as well. Participant research will be on a program by program basis. The specific type of research will be determined by the evaluation experts that provide Empire with proposals. Research techniques that bidders will be asked to consider include interviews; observation visits; site visits; mail, Internet and telephone surveys; and focus groups.

The evaluation contractor will be expected to:

1. Review background documents and resources.

2. Interview the Program Manager and have them describe the program start to finish from the perspectives of the:
    a. Participating customer – describe how a customer would find out about and participate as an end-user in the program.
    b. Delivery agents – describe how a contractor would find out about and participate as a delivery agent in the program.

3. Conduct observation visits – accompany a delivery person on an actual site visit (home energy audit, post installation inspection, etc.).

IMPACT EVALUATION

Impact Evaluation is used to quantify the demand and energy savings, market effects, and the environmental and economic costs and benefits that result from a DSM program. The estimated savings can be expressed on a broad total-program basis or, more specifically, on an individual customer's project basis. Savings are typically reported on a gross and net basis.

Each DSM program will have its own impact evaluation approach. The approaches that are used will be cost effective and reflect a level of effort that maximizes accuracy with cost. For example, if we believe that a $25,000 study can provide a result that is within 80% of actual, while a $50,000 study can get us within 90% of actual, is it worth the additional cost to achieve another 10% of accuracy. This level of effort and associated cost will also be based upon a "rule of thumb" budget which allocates a percentage of total program costs for evaluation activities. Empire will look to spend no more than 5% of total program costs on evaluation activities.

Any impact evaluation that Empire's evaluation contractor conducts will include the following activities:

- Gather/review program background and savings information
- Develop sampling/analysis approach
- Conduct surveys and interviews
- Conduct project site data collection
- Analyze data to develop measure and project level gross savings
- Develop gross and net energy and demand savings by program

Impact evaluations will include baseline measurements to characterize what the market (or household or business) looked like before the program intervention. Examples of baselines include pre-program availability (stocking of product in stores, how many stores carry the product), program prices, awareness levels,

trade ally practices and quality of installation.

Impact evaluations will also address approaches to measuring the net-to-gross impacts including free-ridership and spillover. Not all programs are subject to these phenomena and bidders will be asked to specify which programs they will attempt to measure these factors for.

Impact evaluations can be based on different analytical approaches. Evaluation contractors will be required to specify which approach they will use for each program. The evaluation contractors will be asked to consider at least the following "industry best practice" analytical approaches:

- Engineering analysis techniques which rely on data from equipment manufacturers, program application forms and project files, or secondary data from other evaluations or research. Where appropriate, customer surveys can be used to refine input assumptions such as facility and equipment operating characteristics (e.g., hours of operation).

- Billing analysis based upon metered data. This impact evaluation technique requires statistical modeling procedures to identify and measure changes in energy consumption directly attributable to program measures. A sufficient number of sample points are required. Ideally, the energy savings should be 10 percent or more of the metered data to be measurable. If pre- and post-measure installation data are not available, such as for new homes, a comparison group of similar non-participating facilities is necessary to estimate program impacts.

- Direct "end use" metering for large DSM measures. End use metering would only be considered where the accuracy of the results can be justified by the cost.

MARKET ASSESSMENT AND MARKET TRANSFORMATION

Market Assessment looks at the broader market for energy efficiency products and services n which a program operates. It is typically done before or as part of program design. It can be done as an evaluation activity when looking at the broader market effects of a program. For example, a rebate program may increase product availability and drive product prices down.

Market transformation is a goal for energy efficiency programs that seek to overcome significant barriers to adoption in the marketplace. When successful, a DSM program will move a product or technology market along the "S" curve of market adoption either at an accelerated pace and/or to a higher level of adoption along the curve. Market assessment seeks to make products more accessible, through improved availability and lower pricing and/or better

financing, so that more customers will buy and install them. They can also be used to "jump start" new technologies and/or accelerate the adoption of products.

The RFP for an evaluation contractor will ask for a proposed approach to measure market transformation, by program, where applicable. Not all of Empire's programs will be appropriate for this analysis. Specifically, the programs that Empire will target for market transformation analysis are:

- Home Performance with Energy Star®
- Residential High Efficiency CAC Program
- Energy Star® Homes

Market transformation studies require a fairly lengthy program history. Based on experience, three years of full scale implementation is generally the minimum amount of time that is required for this analysis.

For the programs that undergo a market transformation analysis, the evaluation contractors will be required to identify and measure key barriers including:

- Affordability
- Availability
- Awareness
- Accessibility
- Acceptance

The table on the following page contains a description of the different methodologies that can be used for different evaluation components by program type.

• Program Type	• Impact Evaluation Methodology	• Process Evaluation Methodology	• Market Assessment Methodology
• **Direct Installation**	• Project file reviews • Engineering calculations • Monthly billing analysis • Building simulation modeling • Free rider/spillover surveys • On-site inspections/data collection	• Design and Delivery staff interviews • Customer mail, telephone, or internet survey • Sales data analysis	• Customer mail, telephone, or internet survey • Customer focus groups (optional) • Sales data analysis
• **Incentives and Financing** •	• Project file reviews • Engineering calculations • Monthly billing analysis • Building simulation modeling • Free rider/spillover surveys • On-site inspections/data collection	• Design and Delivery staff interviews • Customer mail, telephone, or internet survey • Customer focus groups (optional) • Sales data analysis	• Customer mail telephone, or internet survey • Customer focus groups (optional) • Trade ally mail or telephone survey, focus groups, or stocking survey • Sales data analysis
• **Demand Response/Load Control** •	• Project file reviews • Engineering calculations • Metering/load research • Hourly load data analyses	• Design and Delivery staff interviews • Customer mail, telephone, or internet survey	• Customer mail, telephone, or internet survey • Customer focus groups (optional)
• **Rate Strategies**	• Project file reviews • Engineering calculations • Monthly billing analysis • Hourly load data analyses	• Design and Delivery staff interviews • Customer mail, telephone or internet survey • Customer focus groups (optional) • Mall-intercept interviews (optional)	• Customer mail, telephone, or internet survey • Customer focus groups
• **Informational**	• Project file reviews • Audit data analysis (pre-/post) • Engineering calculations • Monthly billing analysis	• Design and Delivery staff interviews • Customer mail, telephone, or internet survey • Customer focus groups (optional) • Mall-intercept interviews (optional)	• Customer mail, telephone, or internet survey • Customer focus groups •

PROGRAM SPECIFIC EVALUATION CONSIDERATIONS

Each program has unique features that will need to be considered in the design and execution of its evaluation. Implementation data critical for the evaluation will need to be collected at the time of customer participation. The following are program-by-program issues that evaluation contractors will be asked to consider in their proposed approaches:

- Low Income Efficiency Program – Local CAP agencies handle the implementation of this program and will thus be part of the focus of the process evaluation. Data required for the evaluation will include the list of the measures (NEAT audit outputs will have this information) for each home that Empire's funds are used for. Since the NEAT audit provides estimates of savings, impact evaluation can be based upon this information. This program is similar to many other low income programs that are being implemented in both Missouri and well as other states, therefore leveraging and teaming opportunities should be investigated.

- Low Income New Home Program – Implementation of this program requires the assistance of non-profit organizations such as Habitat for Humanity and local government community development organizations**.** The program will provide financial incentives for the installation of efficiency measures. Engineering analysis would appear to be the most appropriate method upon which to measure savings.

- Home Performance with ENERGY STAR® – This program will focus on the private-sector contractors and service professionals, who currently replace HVAC systems, install insulation, windows, etc. Once Empire has certified auditors available in its service territory, they will track each whole-house evaluation that is performed in their service territory. The results of these audits will provide estimates of savings. Empire should leverage its evaluation funds by working with other utilities in Missouri or neighboring States, as well as reviewing evaluations performed by ENERGY STAR®.

- Change a Light – Empire partners with MEEA to offer incentives to residential customers who purchase CFLs. This program will be phased out in 2012, once Federal efficiency guidelines begin to take effect. Empire should leverage its evaluation funds by working with MEEA, EPA and/or ENERGY STAR® in evaluating this program.

- Residential High Efficiency CAC Program – This program encourages residential customers to purchase and install energy-efficient central air

conditioning and heat pumps by providing financial incentives to offset a portion of the equipment's higher initial cost. The program's long-range goal is to encourage contractors/distributors to use energy efficiency as a marketing tool, thereby stocking and selling more efficient units and moving the entire CAC and heat pump market toward greater energy efficiency. An additional feature of the program will be to offer training in Manual J calculations and System Charging and Airflow for HVAC contractors. Evaluation contractors will be required to evaluate all aspects of this program from both the participant and trade ally perspectives. The evaluation should include some on-site inspections. Spot metering and runtime data collection can also be proposed as a means to verify the connected load and full load hour estimates used in the engineering analysis

- ENERGY STAR® Homes – This program will advance the use of proven technologies and advanced building practices to ensure a new home is as energy efficient as possible. ENERGY STAR® labeled homes must pass a stringent evaluation, including computer-based energy analysis, inspections, and certification testing. Once Empire has this infrastructure available in its service territory, they will track each qualifying home in their service territory. Empire should leverage its evaluation funds by working with other utilities in Missouri or neighboring States, as well as reviewing evaluations performed by ENERGY STAR®.

- C&I Rebate program – This program provides rebates to commercial & industrial (C&I) customers that install, replace or retrofit qualifying electric savings measures including HVAC systems, motors, lighting, pumps, etc. Evaluation contractors will be required to evaluate all aspects of this program from both the participant and trade ally perspectives. The evaluation should include on-site inspections. Metering can also be proposed as a means to verify the impacts used in the engineering analysis. A review of all engineering analysis used to calculate the custom rebates should also be conducted.

- Building Operator Certification (BOC) Program – This is a professional development program in the efficient operations of buildings. To receive certification an individual must attend a series of one to two-day classes in facility maintenance and operation and demonstrate competence in technical areas by completing course tests and projects. Evaluation contractors will be asked to propose an impact evaluation methodology. Since this program is offered throughout the Midwest, there will be amply opportunity to leverage other utility evaluations.