NP

2010-2029 Integrated Resource Plan
for
The Empire District Electric Company

Volume IV
Demand-Side Resources Analysis (4 CSR 240-22.050)

September 2010

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

List of Tables

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Figures

S.0 Volume IV Summary

Demand-side management (DSM) programs are designed to encourage consumers to modify their level and pattern of electricity usage. The utility must analyze, plan, implement, market, and monitor the various DSM programs offered through its demand-side portfolio. Empire has a range of DSM programs implemented in each of Missouri, Kansas, Oklahoma and Arkansas. The existing programs are described in this volume. In addition, a slate of candidate DSM programs was evaluated as demand-side options in the optimization modeling in the IRP. These candidate programs, which include energy efficiency and energy management programs as well as demand response programs, are documented in this volume. The candidate programs, identified in the "Demand-Side Resource Potential Study" conducted for Empire by Applied Energy Group (AEG) (submitted electronically as Appendix D), include all major end uses across all classes of customers and resulted from a detailed process in which DSM programs were identified and screened for cost effectiveness.

In addition to the programs summarized by state in this volume, energy calculators are available on line for all Empire District Electric (Empire) customers to use. These calculators enable customers to determine their approximate electricity use by major appliance, for their entire home, or for their business. The calculator is customized to their local weather profile and size/type of application.

S.1 Missouri

In Missouri, prior to 2005, Empire's Experimental Low Income Program ("ELIP") and the Interruptible Service Rider were in effect. Later, Empire established three additional DSM programs that became effective on October 14, 2005: the ENERGY STAR® Change a Light program, the Residential Weatherization program, and the Missouri Commercial Facility Energy Audit Program. In addition, Empire participated in the Missouri Residential Market Assessment.

In 2005, Empire formed a Customer Programs Collaborative (CPC) with the Missouri Public Service Commission (MPSC) staff, Office of Public Counsel, Missouri Department of Natural Resources (MDNR), and other interested parties. The CPC was charged with making decisions pertaining to the development, implementation, monitoring, and evaluation of Empire's affordability, energy efficiency, and demand response programs. In 2006, under the auspices of the CPC, a collection of DSM programs was identified as cost effective for implementation over a five-year horizon and implementation was begun. These programs included:

- Low Income Efficiency Program
- Low Income – New Home Program
- Home Performance with ENERGY STAR® Program
- ENERGY STAR® Change a Light
- Residential High Efficiency Central Air Conditioning (CAC)
- ENERGY STAR® Homes

- Commercial and Industrial (C&I) Rebate
- Building Operator Certification Program
- C&I Peak Load Reduction

As a result of the 2007 IRP, additional DSM programs, and enhancements to those DSM programs for which implementation had begun, were identified and modeling parameters developed for each. The programs that were selected during the 2007 IRP modeling as cost effective have been implemented. These programs include:

- Low Income Efficiency
- Low Income New Homes
- Home Performance with ENERGY STAR®
- ENERGY STAR® Change a Light
- Residential High Efficiency CAC Program
- ENERGY STAR® Homes
- C&I Rebate
- Building Operator Certification Program
- C&I Peak Load Reduction Program
- Interruptible Service Rider

Efforts undertaken to date and planned efforts on this range of DSM programs are shown on Table S-1.

Table S-1
DSM Program Implementation –Missouri

Program	2006	2007	2008	2009	2010	2011	2012
Low Income Weatherization	x	x	Xe	x	x		
Change a Light	x	x	Xe	x	x		
Low Income New Homes		x	x	x	Xe	x	
Central AC		x	x	Xe	x	x	
C&I Rebate		x	x	Xe	x	x	
Building Operator Certification			x	x	Xe	x	x
Home Performance with ENERGY STAR®				x	x	Xe	x
ENERGY STAR® Homes				x	x	Xe	x
C&I Peak Load Reduction				x	x	x	x
Notes: x = program implemented. Xe – evaluation year based on portfolio plan.							

After an identification and screening process as documented in the Demand-Side Resource Potential report, the following DSM programs are resource options for the 2010 IRP that will be evaluated in the integrated resource planning analysis. This means that these programs are demand-side candidates in the resource expansion optimization modeling process of the integration phase of this IRP:

- **Residential**
  - Low-Income Assistance Program
  - Residential High Efficiency Lighting
  - Residential High Efficiency Cooling Program
  - Refrigerator Pickup Program
  - Home Performance with ENERGY STAR®
  - Home Energy Comparison Reports
  - ENERGY STAR® Appliance Rebates
    - Refrigerators
    - Washing Machines
    - Dehumidifier
  - Direct Load Control
- **Commercial and Industrial**
  - Commercial Prescriptive Rebate Program
  - Commercial Custom Rebate Program
  - Large C&I Turnkey Energy Efficiency Program
  - Small Business Direct Install
  - Building Owner Certification Program
  - Large C&I Voluntary Interruptible/Peak Load Reduction Program

S.2 Kansas

On January 29, 2010, Empire filed an Application with the Kansas Corporation Commission (KCC) for approval to implement its portfolio of energy efficiency and demand response programs for its Kansas customers. On June 3, 2010, a Joint Motion to Approve the Stipulation and Agreement was filed with the KCC with a requested effective date of July 1, 2010. The motion was approved and all programs were implemented July 1, 2010 as pilot programs – with three-year lives.

Empire's DSM programs in Kansas are designed to:

- offer programs across all customer classes and income levels
- follow current industry best practices and incorporate them in program design
- provide education to customers
- include challenging goals
- include sufficient budget
- demonstrate cost effectiveness

In the development of its DSM portfolio for its Kansas customers, Empire has striven to ensure compliance with KCC guidelines for evaluation, measurement and verification (EM&V). In compliance with KCC Order 422, each direct impact program has undergone benefit/cost screening consistent with the California Standard Practice Manual. All five perspectives – Total Resource Cost, Societal, Participant, Ratepayer Impact Measure (RIM), and Utility Cost – have been analyzed. Two benefit/cost analyses have been conducted for each program and for the portfolio as a whole.

The programs in the portfolio are:

- Low Income Efficiency Program
- Residential High Efficiency CAC Program
- C&I Rebate Program
- Building Operator Certification Program
- C&I Peak Load Reduction Program

S.3 Oklahoma

Empire's slate of four DSM programs in Oklahoma is designed to help customers improve their energy efficiency, reduce their peak demand, and save money. This portfolio of programs resulted from an energy efficiency potential study undertaken for Empire's Oklahoma customers. Together, they provide incentives that cover the major end uses for all customer classes. In addition, the programs strike a balance between energy efficiency and demand response programs, and do not promote fuel switching. All of these programs have been successfully deployed in many other electric utility service territories throughout the U.S. The four programs are:

- Low Income Weatherization Program
- Air Conditioning Tune-Up and Replacement Program
- C&I Prescriptive Rebate Program
- C&I Interruptible Rider Program

S.4 Arkansas

Empire offers two DSM programs that are offered statewide in Arkansas – Energy Efficiency Arkansas and Arkansas Weatherization Program. These are "Quick Start" programs as categorized under the general list of initial program categories as defined in the Energy Efficiency Rules Docket No. 06-004-R Order 18. In addition, since October 2007, Empire has offered its Arkansas customers the opportunity to participate in the C&I Prescriptive Rebate program and the Air Conditioning Tune-Up program. In July 2009, Empire proposed adding the Air Conditioning Replacement Rebate and the Programmable Setback Thermostat to the Rebate program. These additions have been approved and implemented along with the C&I Interruptible Program.

Introduction

1.1 Background

The Empire District Electric Company (Empire) is an operating public utility engaged in the generation, purchase, transmission, distribution and sale of electricity in parts of Missouri, Kansas, Oklahoma and Arkansas. Empire's service territory includes an area of about 10,000 square miles with a population of over 450,000. The service territory is located principally in southwestern Missouri and also includes smaller areas in southeastern Kansas, northeastern Oklahoma and northwestern Arkansas. The principal activities of these areas include light industry, agriculture and tourism.

Empire's total 2009 retail electric revenues were derived approximately 89.1% from Missouri customers, 5.1% from Kansas customers, 3.0% from Oklahoma customers and 2.8% from Arkansas customers. Empire supplies electric service at retail to 120 incorporated communities and to various unincorporated areas and at wholesale to four municipally owned distribution systems. The largest urban area served is the city of Joplin, Missouri, and its immediate vicinity, with a population of approximately 157,000. Empire's system hit a new maximum hourly demand of 1,199 MW on January 8, 2010. The previous maximum demand of 1,173 MW was set on August 15, 2007. Empire's 2009 native customer load was 5,263,206 MWh (net system input or NSI). Empire's electric operating revenues in 2009 were derived as follows: residential 41.6%, commercial 31.4%, industrial 15.2%, wholesale on-system 4.2%, wholesale off-system 3.3% and other 4.3%.

1.2 DSM Overview

Demand-side management (DSM) programs are designed to encourage consumers to modify their level and pattern of electricity usage. The utility must analyze, plan, implement, market, and monitor the various DSM programs offered through its demand-side portfolio. Empire has a range of DSM programs implemented in each of Missouri, Kansas, Oklahoma and Arkansas. The existing programs are described in this volume. In addition, a slate of candidate DSM programs was evaluated as demand-side options in the optimization modeling in the IRP. These candidate programs, which include energy efficiency and energy management programs as well as demand response programs, are documented in this volume. The candidate programs, identified in the "Demand-Side Resource Potential Study" conducted for Empire by Applied Energy Group (AEG) (submitted electronically as Appendix D), include all major end uses across all classes of customers and resulted from a detailed process in which DSM programs were identified and screened for cost effectiveness.

1.2.1 Missouri DSM

Prior to 2005, Empire's Experimental Low Income Program ("ELIP") and the Interruptible Service Rider were in effect. The ELIP is classified as a customer assistance program. The Interruptible Service Rider is a DSM program. Later, Empire

established three additional DSM programs that became effective on October 14, 2005: the ENERGY STAR® Change a Light program, the Residential Weatherization program, and the Missouri Commercial Facility Energy Audit Program. Empire also participated in the Missouri Residential Market Assessment.

In 2005, Empire formed a Customer Programs Collaborative (CPC) with the Missouri Public Service Commission (MPSC) staff, Office of Public Counsel, Missouri Department of Natural Resources, and other interested parties. The CPC was charged with making decisions pertaining to the development, implementation, monitoring, and evaluation of Empire's affordability, energy efficiency, and demand response programs. In 2006, under the auspices of the CPC, a collection of DSM programs was identified as cost effective for implementation over a five-year horizon and implementation was begun. These programs included:

- Low Income Efficiency Program
- Low Income – New Home Program
- Home Performance with ENERGY STAR® Program
- ENERGY STAR® Change a Light
- Residential High Efficiency Central Air Conditioning (CAC)
- ENERGY STAR® Homes
- Commercial and Industrial (C&I) Rebate
- Building Operator Certification Program
- C&I Peak Load Reduction

As a result of the 2007 IRP, additional DSM programs, and enhancements to those DSM programs for which implementation had begun, were identified and modeling parameters developed for each. The programs that were selected during the 2007 IRP modeling as cost effective have been implemented. These programs include:

- Low Income Efficiency
- Low Income New Homes
- Home Performance with ENERGY STAR®
- ENERGY STAR® Change a Light
- Residential High Efficiency CAC Program
- ENERGY STAR® Homes
- C&I Rebate
- Building Operator Certification Program
- C&I Peak Load Reduction Program

Efforts undertaken to date and planned efforts on this range of DSM programs are shown on Table 1-1.

Table 1-1
DSM Program Implementation – Missouri

Program	2006	2007	2008	2009	2010	2011	2012
Low Income Weatherization	x	x	Xe	x	x		
Change a Light	x	x	Xe	x	x		
Low Income New Homes		x	x	x	Xe	x	
Central AC		x	x	Xe	x	x	
C&I Rebate		x	x	Xe	x	x	
Building Operator Certification			x	x	Xe	x	x
Home Performance with ENERGY STAR®				x	x	Xe	x
ENERGY STAR® Homes				x	x	Xe	x
C&I Peak Load Reduction				x	x	x	x
Notes: x = program implemented. Xe – evaluation year based on portfolio plan.							

1.2.1.1 Customer Programs Collaborative - Missouri

Empire has been working with a Customer Programs Collaborative (CPC) that resulted from previous regulatory interactions. The CPC is comprised of representatives from:

- Staff of the MPSC
- Office of the Public Counsel
- Missouri Department of Natural Resources – Energy Center
- Praxair, Inc.
- Explorer Pipeline Company

The CPC is charged with making decisions pertaining to the development, implementation, monitoring, and evaluation of Empire's affordability, energy efficiency, and demand response programs. Currently, Empire meets with and provides quarterly updates to the CPC.

The CPC's oversight includes:

- Customer Programs Objectives Development
- Consultant Selection
- Capacity Balance and Supply-Side Cost Review
- Design, Screening, and Pre-implementation Evaluation of Potential Customer Programs
- Customer Program Portfolio Choice
- Post-implementation Evaluation of Customer Programs

This group has selected an implementation consultant to assist in the selection of additional DSM and affordability programs for Empire's Missouri customers. The CPC

has also selected an evaluation consultant to evaluate Empire's DSM and affordability programs with the exception of the Experimental Low Income Program (ELIP). This evaluation consultant will ensure that appropriate data are collected for each DSM and affordability program to facilitate such evaluation.

The implementation consultant has evaluated DSM programs including those listed below. The programs selected by the CPC on May 2, 2006 for implementation by Empire over the next five years are underlined in the following list. None of these programs, developed from a baseline that reflected programs in Empire's Energy Efficiency Portfolio, include renewable energy sources or energy technologies that substitute for electricity at the point of use.

- Low Income Efficiency Program
- Low Income – New Home Program
- Home Performance with ENERGY STAR® Program
- Change a Light
- Residential High Efficiency CAC
- ENERGY STAR® Homes
- Online Energy Information and Analysis Program Using Nexus®
- C&I Custom Rebate
- Building Operator Certification Program
- Air Conditioner Cycling
- C&I Peak Load Reduction

This portfolio of DSM programs does not include any load building programs.

1.2.2 Kansas DSM

On January 29, 2010, Empire filed an Application with the Kansas Corporation Commission (KCC) for approval to implement its portfolio of energy efficiency and demand response programs for its Kansas customers. On June 3, 2010, a Joint Motion to Approve the Stipulation and Agreement was filed with the KCC with a requested effective date of July 1, 2010. The motion was approved and all programs were implemented July 1, 2010 as pilot programs – with three-year lives.

Empire's DSM programs in Kansas are designed to:

- offer programs across all customer classes and income levels
- follow current industry best practices and incorporate them in program design
- provide education to customers
- include challenging goals
- include sufficient budget
- demonstrate cost effectiveness

In the development of its DSM portfolio for its Kansas customers, Empire has striven to ensure compliance with KCC guidelines for evaluation, measurement and verification

(EM&V). In compliance with KCC Order 422, each direct impact program has undergone benefit/cost screening consistent with the California Standard Practice Manual. All five perspectives – Total Resource Cost, Societal, Participant, Ratepayer Impact Measure (RIM), and Utility Cost – have been analyzed. Two benefit/cost analyses have been conducted for each program and for the portfolio as a whole.

The programs in the portfolio are:

- Low Income Efficiency Program
- Residential High Efficiency CAC Program
- C&I Rebate Program
- Building Operator Certification Program
- C&I Peak Load Reduction Program

1.2.3 Oklahoma DSM

Empire's slate of four DSM programs in Oklahoma is designed to help customers improve their energy efficiency, reduce their peak demand, and save money. This portfolio of programs resulted from an energy efficiency potential study undertaken for Empire's Oklahoma customers. Together, they provide incentives that cover the major end uses for all customer classes. In addition, the programs strike a balance between energy efficiency and demand response programs, and do not promote fuel switching. All of these programs have been successfully deployed in many other electric utility service territories throughout the U.S. The four programs are:

- Low Income Weatherization Program
- Air Conditioning Tune-Up and Replacement Program
- C&I Prescriptive Rebate Program
- C&I Interruptible Rider Program

1.2.4 Arkansas DSM

Empire offers two DSM programs that are offered statewide in Arkansas – Energy Efficiency Arkansas and Arkansas Weatherization Program. These are "Quick Start" programs as categorized under the general list of initial program categories as defined in the Energy Efficiency Rules Docket No. 06-004-R Order 18. In addition, since October 2007, Empire has offered its Arkansas customers the opportunity to participate in the C&I Prescriptive Rebate program and the Air Conditioning Tune-Up program. In July 2009, Empire proposed adding the Air Conditioning Replacement Rebate and the Programmable Setback Thermostat to the Rebate program. These additions have been approved and implemented along with the C&I Interruptible Program.

1.2.5 Online Energy Calculators

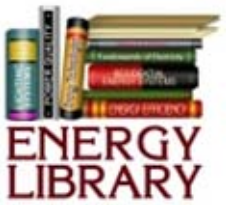
Empire has made available online energy calculators for use by its customers across all jurisdictions. Online calculators are available for specific appliances, rooms or

applications. They are appropriate for customers' homes or businesses. Linked to the home energy tab is the "fun" tab which provides energy efficiency educational information for children.

Figure 1-1

Energy Calculators

Residential **Commercial**



1.3 Regulatory Requirements - Missouri

1.3.1 4 CSR 240-22.050 Demand-Side Resource Analysis

PURPOSE: This rule specifies the methods by which end-use measures and demand-side programs shall be developed and screened for cost-effectiveness. It also requires the ongoing evaluation of end-use measures and programs, and the use of program evaluation information to improve program design and cost-effectiveness analysis.

(1) Identification of End-Use Measures. The analysis of demand-side resources shall begin with the development of a menu of energy efficiency and energy management measures that provide broad coverage of—
   (A) All major customer classes, including at least residential, commercial, industrial and interruptible;
   (B) All significant decision-makers, including at least those who choose building design features and thermal integrity levels, equipment and appliance efficiency levels, and utilization levels of the energy-using capital stock;

(C) All major end uses, including at least lighting, refrigeration, space cooling, space heating, water heating and motive power; and

(D) Renewable energy sources and energy technologies that substitute for electricity at the point of use.

(2) Calculation of Avoided Costs. The utility shall develop estimates of the cost savings that can be obtained by substituting demand-side resources for existing and new supply-side resources. These avoided cost estimates, expressed in nominal dollars, shall be used for cost-effectiveness screening and ranking of end-use measures and demand-side programs.

(A) Supply Resource Cost Estimates. The utility shall use the cost estimates developed pursuant to 4 CSR 240-22.040(2) to calculate the following two (2) estimates of avoided cost: avoided utility costs and avoided utility costs plus avoided probable environmental costs.

1. The choice of new generation options used to calculate avoided costs shall be limited to those which will meet the need for capacity under the base-case load forecast at approximately the lowest present value of utility revenue requirements over the planning horizon. The utility shall document the basis on which the timing and choice of the new generation options were determined to be approximately least cost.
2. The utility shall calculate the annual capacity cost of each new generation option and new transmission and distribution facilities as the sum of the levelized capital cost per kilowatt-year and the fixed operation and maintenance cost per kilowatt-year.
3. The utility shall calculate the direct running cost of each generation option as the sum of fuel costs, sulfur dioxide emission allowance costs, and variable operation and maintenance costs per kilowatt-hour (kWh). The probable environmental costs calculated pursuant to 4 CSR 240-22.040(2)(B) shall also be expressed on a per-kilowatt hour basis for both existing and new generation resources.

(B) Avoided Cost Periods. The utility shall determine avoided cost periods by grouping hours on a seasonal (for example, summer, winter and transition) and time-of-use basis (for example, on-peak, off-peak, super-peak or shoulder-peak) as required to adequately reflect significant differences in running costs and the type of capacity being utilized to maintain required reserve margins.

(C) Calculation of Avoided Capacity and Running Costs. Avoided costs shall be calculated as the difference in costs associated with a specified decrement in load large enough to delay the on-line date of the new capacity additions by at least one (1) year.

1. Avoided running cost. For each year of the planning horizon and for each avoided cost period, the utility shall calculate the avoided direct running cost per kWh (including sulfur dioxide emission allowance costs) and the avoided probable environmental running cost per kWh due to the specified load decrement.
2. Avoided capacity costs. The utility shall calculate and document the avoided capacity costs per kilowatt-year for each year of the planning horizon.

A. This calculation shall include the costs of any new generation, transmission and (B) Avoided Cost Periods. The utility shall determine avoided cost periods by distribution facilities that are delayed or avoided because of the specified load decrement.
B. For each year of the planning horizon, the utility shall determine the avoided cost periods in which the avoided new generation, transmission and distribution capacity was utilized, and shall allocate a nonzero portion of the annualized avoided capacity costs to each of the periods in which that capacity was utilized.

(D) Avoided Demand and Energy Costs. The utility shall use the avoided capacity and running costs (appropriately adjusted to reflect reliability reserve margins, demand losses and energy losses) to calculate the avoided demand and energy costs for each avoided cost period. Demand periods shall be defined as the avoided cost periods in which there is a significant probability of a loss of load (for example, periods which require the use of peaking capacity to maintain power pool reserve margins). Non-demand periods are the avoided cost periods in which there is not a significant probability of a loss of load.

1. Demand period avoided demand costs. Avoided demand costs per kilowatt-year for the demand periods of each season shall include avoided transmission and distribution capacity costs, plus the smaller of the avoided generation capacity cost allocated to the demand period or the avoided capacity cost of peaking capacity.
2. Demand period avoided energy costs. Any capacity cost per kilowatt-year allocated to the demand periods but not included in the avoided demand cost shall be converted to an avoided energy cost by dividing the avoided capacity cost per kilowatt-year by the number of hours in the associated demand period. The utility shall add this converted avoided capacity cost to both of the running cost estimates developed pursuant to paragraph (2)(C)1. to calculate the demand period direct energy costs and the probable environmental energy costs.
3. Non-demand period avoided demand cost. The avoided demand cost for the non-demand periods is zero (0).
4. Non-demand period avoided energy costs. Avoided capacity cost per kilowatt-year allocated to the non-demand periods within each season shall be converted to a per-kilowatt-hour cost by dividing the avoided capacity cost per kilowatt-year by the number of hours in the associated non-demand period. The utility shall add this converted avoided capacity cost to both of the running cost estimates developed pursuant to paragraph (2)(C)1. to calculate the non-demand period direct energy costs and the probable environmental energy costs.
5. Annual avoided demand and energy costs. Annual avoided demand costs shall include avoided transmission and distribution capacity costs, plus the smaller of the annual avoided generation capacity costs or the avoided capacity cost of peaking capacity. Annual avoided energy costs shall include annual avoided running costs plus any avoided capacity costs not included in the annual demand cost.

(3) Cost-Effectiveness Screening of End-Use Measures. The utility shall evaluate the cost-effectiveness of each end-use measure identified pursuant to section (1) using the probable environmental benefits test. All costs and benefits shall be expressed in nominal dollars.

(A) The utility shall develop estimates of the end-use measure demand reduction for each demand period and energy savings per installation for each avoided cost period on a normal-weather basis. If the utility can show that subannual load impact estimates are not required to capture the potential benefits of an end-use measure, annual estimates of demand and energy savings may be used for cost-effectiveness screening.

(B) Benefits per installation of each end use measure in each avoided cost period shall be calculated as the demand reduction multiplied by the levelized avoided demand cost plus the energy savings multiplied by the levelized avoided energy cost.

1. Avoided costs in each avoided cost period shall be levelized over the planning horizon using the utility discount rate.
2. Annualized benefits shall be calculated as the sum of the levelized benefits over all avoided cost periods.

(C) Annualized costs per installation for each end-use measure shall be calculated as the sum of the following components:

1. Incremental costs of implementing the measure (regardless of who pays these costs) levelized over the life of the measure using the utility discount rate;
2. Incremental annual operation and maintenance costs (regardless of who pays these costs) levelized over the life of the measure using the utility discount rate; and
3. Any probable environmental impact mitigation costs due to implementation of the end-use measure that are borne by either the utility or the customer.

(D) Annualized costs for end-use measures shall not include either utility marketing and delivery costs for demand-side programs or lost revenues due to measure-induced reductions in energy sales or billing demands between rate cases.

(E) Annualized benefits minus annualized costs per installation must be positive or the ratio of annualized benefits to annualized costs must be greater than one (1) for an end-use measure to pass the screening test. The utility may relax this criterion for measures that are judged to have potential benefits which are not captured by the estimated load impacts or avoided costs.

(F) End-use measures that pass the probable environmental benefits test must be included in at least one (1) potential demand-side program.

(G) For each end-use measure that passes the probable environmental benefits test, the utility also shall perform the utility benefits test for informational purposes. This calculation shall include the cost components identified in paragraphs (3)(C)1. and 2..

(4) The utility shall estimate the technical potential of each end-use measure that passes the screening test.

(5) The utility shall conduct market research studies, customer surveys, pilot demand-side programs, test marketing programs and other activities as necessary to estimate the technical potential of end-use measures and to develop the information necessary

to design and implement cost-effective demand-side programs. These research activities shall be designed to provide a solid foundation of information about how and by whom energy-related decisions are made and about the most appropriate and cost-effective methods of influencing these decisions in favor of greater long-run energy efficiency.

(6) The utility shall develop a set of potential demand-side programs that are designed to deliver an appropriate selection of end-use measures to each market segment. The demand-side program planning and design process shall include at least the following activities and elements:
   (A) Identify market segments that are numerous and diverse enough to provide relatively complete coverage of the classes and decision-makers identified in subsections (1)(A) and (B), and that are specifically defined to reflect the primary market imperfections that are common to the members of the market segment;
   (B) Analyze the interactions between end-use measures (for example, more efficient lighting reduces the savings related to efficiency gains in cooling equipment because efficient lighting reduces intrinsic heat gain);
   (C) Assemble menus of end-use measures that are appropriate to the shared characteristics of each market segment and cost-effective as measured by the screening test; and
   (D) Design a marketing plan and delivery process to present the menu of end-use measures to the members of each market segment and to persuade decision-makers to implement as many of these measures as may be appropriate to their situation.

(7) Cost-Effectiveness Screening of Demand-Side Programs. The utility shall evaluate the cost-effectiveness of each potential demand-side program developed pursuant to section (6) using the total resource cost test. The utility cost test shall also be performed for purposes of comparison. All costs and benefits shall be expressed in nominal dollars. The following procedure shall be used to perform these tests:
   (A) The utility shall estimate the incremental and cumulative number of program participants and end-use measure installations due to the program and the incremental and cumulative demand reduction and energy savings due to the program in each avoided cost period in each year of the planning horizon.
      1. Initial estimates of demand-side program load impacts shall be based on the best available information from in-house research, vendors, consultants, industry research groups, national laboratories or other credible sources.
      2. As the load-impact measurements required by subsection (9)(B) become available, these results shall be used in the ongoing development and screening of demand-side programs and in the development of alternative resource plans;
   (B) In each year of the planning horizon, the benefits of each demand-side program shall be calculated as the cumulative demand reduction multiplied by the avoided demand cost plus the cumulative energy savings multiplied by the avoided energy cost, summed over the avoided cost periods within each year. These calculations shall be performed using the avoided probable environmental costs developed pursuant to section (2);

(C) Utility Cost Test. In each year of the planning horizon, the costs of each demand-side program shall be calculated as the sum of all utility incentive payments plus utility costs to administer, deliver and evaluate each demand-side program. For purposes of this test, demand-side program costs shall not include lost revenues or costs paid by participants in demand-side programs;

(D) Total Resource Cost Test. In each year of the planning horizon, the costs of each demand-side program shall be calculated as the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions) plus utility costs to administer, deliver and evaluate each demand-side program. For purposes of this test, demand-side program costs shall not include lost revenues or utility incentive payments to customers;

(E) The present value of program benefits minus the present value of program costs over the planning horizon must be positive or the ratio of annualized benefits to annualized costs must be greater than one (1) for a demand-side program to pass the utility cost test or the total resource cost test. The utility may relax this criterion for programs that are judged to have potential benefits that are not captured by the estimated load impacts or avoided costs; and

(F) Potential demand-side programs that pass the total resource cost test shall be considered as candidate resource options and must be included in at least one (1) alternative resource plan developed pursuant to 4 CSR 240-22.060(3).

(8) For each demand-side program that passes the total resource cost test, the utility shall develop time-differentiated load impact estimates over the planning horizon at the level of detail required by the supply system simulation model that is used in the integrated resource analysis required by 4 CSR 240-22.060(4).

(9) Evaluation of Demand-Side Programs. The utility shall develop evaluation plans for all demand-side programs that are included in the preferred resource plan selected pursuant to 4 CSR 240-22.070(6). The purpose of these evaluations shall be to develop the information necessary to improve the design of existing and future demand-side programs, and to gather data on the implementation costs and load impacts of programs for use in cost-effectiveness screening and integrated resource analysis.

(A) Process Evaluation. Each demand-side program that is part of the utility's preferred resource plan shall be subjected to an ongoing evaluation process which addresses at least the following questions about program design:

1. What are the primary market imperfections that are common to the target market segment?
2. Is the target market segment appropriately defined or should it be further subdivided or merged with other segments?
3. Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target segment?
4. Are the communication channels and delivery mechanisms appropriate for the target segment? and
5. What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

(B) Impact Evaluation. The utility shall develop methods of estimating the actual load impacts of each demand-side program included in the utility's preferred resource plan to a reasonable degree of accuracy.

1. Impact evaluation methods. Comparisons of one (1) or both of the following types shall be used to measure program impacts in a manner that is based on sound statistical principles:
   A. Comparisons of preadoption and postadoption loads of program participants, corrected for the effects of weather and other intertemporal differences; and
   B. Comparisons between program participants' loads and those of an appropriate control group over the same time period.
2. The utility shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination: monthly billing data, load research data, end-use load metered data, building and equipment simulation models, and survey responses or audit data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics.

(C) The utility shall develop protocols to collect data regarding demand-side program market potential, participation rates, utility costs, participant costs and total costs.

(10) Demand-side programs and load-building programs shall be separately designed and administered, and all costs shall be separately classified so as to permit a clear distinction between demand-side program costs and the costs of load-building programs. The costs of demand-side resource development that also serve other functions shall be allocated between the functions served.

(11) Reporting Requirements. To demonstrate compliance with the provisions of this rule, and pursuant to the requirements of 4 CSR 240-22.080, the utility shall prepare a report that contains at least the following information:

(A) A list of the end-use measures developed for initial screening pursuant to the requirements of section (1) of this rule;

(B) The estimated load impacts, annualized costs per installation and the results of the probable environmental benefits test for each end-use measure identified pursuant to section (1);

(C) The technical potential and the results of the utility benefits test for each end-use measure that passes the probable environmental benefits test;

(D) Documentation of the methods and assumptions used to develop the avoided cost estimates developed pursuant to section (2) including:

1. A description of the type and timing of new supply resources, including transmission and distribution facilities, used to calculate avoided capacity costs;
2. A description of the assumptions and procedure used to calculate avoided running costs;
3. A description of the avoided cost periods and how they were determined;
4. A tabulation of the direct running costs and the probable environmental running costs for each avoided cost period in each year of the planning horizon; and

5. A tabulation of the avoided demand cost, the avoided direct energy costs and the avoided probable environmental energy costs for each avoided cost period in each year of the planning horizon;

(E) Copies of completed market research studies, pilot programs, test marketing programs and other studies as required by section (5) of this rule and descriptions of those studies that are planned or in progress and the scheduled completion dates;

(F) A description of each market segment identified pursuant to subsection (6)(A);

(G) A description of each demand-side program developed for initial screening pursuant to section (6) of this rule;

(H) A tabulation of the incremental and cumulative number of participants, load impacts, utility costs and program participant costs in each year of the planning horizon for each demand-side program developed pursuant to section (6) of this rule;

(I) The results of the utility cost test and the total resource cost test for each demand-side program developed pursuant to section (6) of this rule; and

(J) A description of the process and impact evaluation plans for demand-side programs that are included in the preferred resource plan as required by section (9) of this rule and the results of any such evaluations that have been completed since the utility's last scheduled filing pursuant to 4 CSR 240-22.080.

Table 1-2 shows where in this volume of the IRP report a specific portion of 4 CSR 240-22.050, the IRP Rules for Demand-Side Resource Analysis, has been addressed.

Table 1-2
Summary of Compliance with the Reporting Requirements for the Missouri IRP Rule for Demand-Side Resource Analysis (4 CSR 240-22.050 (11))

Rule	Description	Location in Report
22.050 (11) (A)	List of end-use measures	Appendix A
22.050 (11) (B)	Results of end –use measures	Section 3.0, Section 4.0
22.050 (11) (C)	Info for programs passing probable environmental benefits test	Section 4.0
22.050 (11) (D)	Document avoided cost estimates	Section 4.2
22.050 (11) (E)	Copies of completed studies	Appendix C, Appendix D
22.050 (11) (F)	Market segment description	Market segments are the three revenue classes – residential, commercial, industrial. Programs for each segment have been identified as shown in Appendix A and Appendix D. See Section 3.0
22.050 (11) (G)	DSM programs screened	Section 3.0, Section 4.0
22.050 (11) (H)	Tabulation of DSM program data	Section 3.0, Section 4.0
22.050 (11) (I)	Results of tests	Section 3.0, Appendix D
22.050 (11) (J)	Process and impact evaluation plans	Section 2.0, Appendix C, Section 3.0

1.3.2 Follow up to the 2007 IRP Unanimous Stipulation and Agreement (dated May 6, 2008)

In the 2007 IRP Unanimous Stipulation and Agreement dated May 6, 2008, Empire agreed to undertake the following actions relative to DSM prior to or as a part of its next IRP filing:

1. Analyze renewable energy sources and energy technologies that substitute for electricity at the point of use.
2. Conduct an Appliance Saturation Survey, followed by a Commercial End-Use Inventory prior to the next IRP filing. Identify market segments unless granted a waiver from this requirement or there is a change in this part of the IRP rule.
3. Analyze the interaction between end-use measures unless granted a waiver from this requirement or there is a change in this part of the IRP rule.
4. Consider a broader universe of DSM programs, including joint delivery programs where Empire cooperates with gas utilities that operate in its service territory.

5. All demand-side programs that pass demand-side screening will be included in at least one alternative resource plan unless Empire is granted a waiver from 4 CSR 240-22.050(7)(F) or there is a change in this part of the IRP rule.
6. Outline the menu of energy efficiency and energy measures. For each measure listed, the measure's (1) base technology, (2) base efficiency definition, (3) efficient technology, and (4) efficient technology definition will be included.

Table 1-3 shows where in this volume of the IRP report a specific portion of the requirements from the 2007 IRP Unanimous Stipulation and Agreement has been addressed.

Table 1-3
Summary of Compliance with the Requirements of the 2007 IRP Unanimous Stipulation and Agreement

Description	Location in Report
Analyze renewable energy technologies that substitute for electricity usage	Appendix A, Appendix D
Analyze energy technologies that substitute for electricity usage	Appendix A, Appendix D
Conduct an Appliance Saturation Survey	Appendix C
Conduct a Commercial End-Use Inventory	Appendix D
Identify market segments	Appendix A, Appendix D
Analyze interaction between end-use measures	Appendix D
Broader universe of DSM programs including joint delivery programs with gas utilities	Appendix A, Appendix D
Every DSM program that passes screening to be included in at least one alternative resource plan	Scenarios described in Supply-Side Resource Analysis, Volume III.
Outline the menu of energy efficiency and energy measures. Include 4 items: base technology, base efficiency definition, efficient technology, efficient technology definition.	Appendix A

2.0 Existing DSM Programs - Missouri

Prior to 2005, Empire's Experimental Low Income Program ("ELIP") and the Interruptible Service Rider were in effect. The ELIP is classified as a customer assistance program. The Interruptible Service Rider is a DSM program. As a result of the Stipulation and Agreement in Case No. ER-2004-0570, Empire established three additional DSM programs that became effective on October 14, 2005: the ENERGY STAR® Change a Light program, the Residential Weatherization program, and the Missouri Commercial Facility Energy Audit Program. The HVAC Rebate Program was a part of the original portfolio but was never implemented. Empire also participated in the Missouri Residential Market Assessment.

In 2006 and through the 2007 IRP process, under the auspices of the Customer Programs Collaborative (CPC), a collection of DSM programs was identified as cost effective for implementation over a five-year horizon and implementation was begun. These programs included:

- Low Income Efficiency Program
- Low Income – New Home Program
- Home Performance with ENERGY STAR® Program
- ENERGY STAR® Change a Light
- Residential High Efficiency Central Air Conditioning (CAC)
- ENERGY STAR® Homes
- Commercial and Industrial (C&I) Rebate
- Building Operator Certification Program
- C&I Peak Load Reduction

Efforts undertaken to date and planned efforts on this range of DSM programs are shown on Table 2-1.

Table 2-1
DSM Program Implementation – Missouri

Program	2006	2007	2008	2009	2010	2011	2012
Low Income Weatherization	x	x	Xe	x	x		
Change a Light	x	x	Xe	x	x		
Low Income New Homes		x	x	x	Xe	x	
Central AC		x	x	Xe	x	x	
C&I Rebate		x	x	Xe	x	x	
Building Operator Certification			x	x	Xe	x	x
Home Performance with ENERGY STAR®				x	x	Xe	x
ENERGY STAR® Homes				x	x	Xe	x
C&I Peak Load Reduction				x	x	x	x
Notes: x = program implemented. Xe – evaluation year based on portfolio plan.							

2.1 Experimental Low Income Program (ELIP) – Missouri

The Experimental Low Income Program (ELIP), a Residential class program, was established as a result of the Unanimous Stipulation and Agreement in Case No. ER-2002-424 and became effective April 30, 2003. The program was designed to provide affordable home electric service to low-income customers so that they could afford to pay their bills in a full, timely, and regular fashion. ELIP provides eligible customers with a fixed credit on their monthly bill for up to 12 months. Customers may reapply at the end of the twelve-month period and may receive the ELIP credit for up to 24 months.

2.2 Interruptible Service Rider – Missouri

The Interruptible Service Rider, a Commercial and Industrial (C&I) class program, has been in effect since April 14, 1999, with modifications effective October 2, 2001. This program pays participants for the ability to interrupt their service in anticipation of peak demands, and anticipated system emergencies due to generation shortages, and/or for economic reasons. Empire requests participating customers to curtail demand for a maximum of six hours per day, but no more than 200 hours per year. The request notice is provided at least one hour prior to demand reduction. Participants are provided credits on demand reduction based upon their type of metering (substation, primary, or secondary). The special "One-Time" Interruptible Credit Section is the only portion of this tariff that is currently being used.

2.3 ENERGY STAR® Change a Light Program – Missouri

The objective of the Energy Star® Change a Light Program, a Residential class program, is to encourage the replacement of inefficient energy consuming lights by providing a rebate for a portion of the costs of ENERGY STAR® compact fluorescent light (CFL) bulbs. The program is designed to educate consumers on the energy and money saving benefits of CFL bulbs, torchiere lamps, and other ENERGY STAR® products through marketing and media outreach efforts as well as to offer an instant rebate towards the purchase of an ENERGY STAR® lighting product. ENERGY STAR® is a label awarded for energy efficiency.

Through 2009, Empire participated in the Change a Light Campaign each year, administered by the Midwest Energy Efficiency Alliance (MEEA). Results for the three program years 2006-2007, 2007-2008, and 2008-2009 are shown on Tables 2-2, 2-3 and 2-4.

Table 2-2
Change A Light Program Year 1 – 9/06 – 8/07

9/06-8/07	CFLs	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	10,000	$25,000	$15,000	$0	$40,000
Actual	9,867	$18,657	$2,513	$0	$21,170
Delta	133	$6,343	$12,487	$0	$18,830

Table 2-3
Change a Light Program Year 2 9/07 – 8/08

9/07-8/08	CFLs	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	10,000	$25,500	$16,000	$0	$41,500
Actual	10,954	$23,031	$9,510	$0	$32,541
Delta	(954)	$2,469	$6,490	$0	$8,959

Table 2-4
Change a Light Program Year 3 9/08 – 8/09

9/08-8/09	CFLs	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	10,000	$26,000	$17,000	$4,300	$47,300
Actual	9,860	$22,897	$9,093		$31,990
Delta	140	$3,103	$7,907	$4,300	$15,310

The MidWest Energy Efficiency Alliance (MEEA) released evaluation reports for 2007 (dated April 15, 2008) and for 2008 (dated April 15, 2009). These reports are provided in Appendix C and contain some limited Empire-specific data.

The MEEA notified Change a Light participants in early 2009 that the program is being discontinued. MEEA believes that a focus on Lights for Learning (L4L) is more congruent with ENERGY STAR's youth focus for the Change the World campaign. Lights for Learning is an educational fundraiser that involves school children or youth organizations selling CFLs and LEDs.

The CPC agreed that some type of energy efficiency lighting program should be continued, and that the L4L is probably not the desired route. Future Empire CFL initiatives will not be conducted in conjunction with MEEA. While examining whether the lighting technology being promoted for programs in the future should be CFLs or some other technology, Empire is distributing a 4-pack of 13 watt CFLs to each residential customer residing in the Branson area. The CFLs were distributed to households in August 2010 and include educational material on the proper selection of CFL bulbs and the proper disposal of CFLs. Information on other Empire residential energy efficiency programs was also included. Additional CFL events are being planned during 2010 that will include distribution of bulbs along with educational information on proper selection and disposal of CFLs.

2.4 Low Income Efficiency Program – Missouri

Qualifying lower income customers can receive help in managing their energy use and bills through Empire's Low Income Weatherization and High Efficiency Program, a Residential class program. The program works directly with local community action partnership (CAP) agencies that already provide weatherization services to low income customers through the U.S. Department of Energy (DOE) and other state agencies.

Empire provides supplemental funds to the CAP agencies to cover the cost of weatherization measures. This program is administered by the CAP agencies and follows the protocol under current federal and state guidelines.

Participants can be an Empire residential customer in a one to four-unit structure and have an income that is up to 200% of federal poverty guidelines. CAP agencies expect to spend an average of $1,200 (escalated by $50 per year) of Empire funds to go along with their DOE funds.

Empire funds focus on measures that reduce electricity usage such as electric heat, air conditioning, refrigeration, lighting, and so forth. CAP agencies have discretion to use the funds as they wish for weatherization and heating equipment. In addition, they may also spend up to $200 towards the purchase of an ENERGY STAR® rated refrigerator and $100 towards the purchase of ENERGY STAR® rated compact fluorescent light bulbs (CFL) and lighting fixtures.

This program helps low income customers reduce their energy costs at no cost to the customer. CAP agencies offer a cost effective implementation capability, which allows most of the funds allocated to this program to go directly to the purchase and installation of energy efficiency measures.

The program was approved September 5, 2006. The results for the three program years completed to date, 2006-2007, 2007-2008, and 2008-009 are shown on Tables 2-5 – 2-7.

Table 2-5
Low Income Efficiency Program 10/06-9/07 Results

10/06-9/07	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	125	$172,500	$22,250	$0	$194,750
Actual	117	$131,257	$1,306	$0	$132,563
Delta	8	$41,243	$20,944	$0	$62,187
	31	$36,547	Completed during 06-07 contract year using prior year's funds		

Table 2-6
Low Income Efficiency Program 10/07-9/08 Results

10/07-9/08	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	125	$179,700	$22,970	$0	$202,670
Actual*	138	$204,591	$2,444	$0	$207,035
Delta	(13)	($24,891)	$20,526	$0	($4,365)
*Actual includes $41,242.65 from prior year's budget					

Table 2-7
Low Income Efficiency Program 10/08-9/09 Results

10/08-9/09	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	125	$186,900	$23,690	$0	$218,510
Actual	122	$212,584	2,954	$0	$215,538
Delta	3	$(25,684)	$20,736	$0	$(4,948)
	11	$16,332	from prior years		
		$29,950	additional funds – variance $		

An evaluation of the Low Income Weatherization Program was completed by TecMarket Works on March 16, 2009. The evaluation report covering the period October 2006 through September 2008 is found in Appendix C. The primary findings of the evaluation report are:

1. The net savings from the weatherization services are an average of 2,052 annual kWh, or a 13.4% decrease in consumption. The electric savings for the participant group are estimated at 1,819 kWh annually, equal to an 11.8% reduction in electricity consumed. The comparison group increased their annual consumption by 233 kWh.

2. Seventy-four out of the 100 participants (74%) studied decreased their consumption of electricity by an average of 3,141 kWh (adjusted for comparison group) after their homes were weatherized. This is an approximate monthly savings of 262 kWh. The other 26% increased their energy consumption by an average of 3,128 kWh.

3. The evaluation found no significant correlation between blower door test results and program-level whole house energy savings, the costs of weatherization, or the number of weatherization measures installed. This indicates that while a blower door test may help identify measures to be installed, the installation of those measures in themselves do not provide enough total savings to greatly influence the total amount of savings achieved. Likewise, installing higher numbers of measures do not necessarily result in lower infiltration. This is most likely due to the overall condition of the homes before weatherization and the ways in which the homes are used by the occupants (number of occupants, high-use medical equipment, etc.).

4. The highest energy savings are realized by those homes receiving lighting upgrades (CFLs). However, there were a small number of homes getting CFLs, so this finding is not significant due to a low sample size.

The primary recommendation from the evaluation report is:

The weatherization program in the Empire territory should include CFLs in the mix when possible, as lighting improvements will likely result in greater energy savings for the customer and Empire, and lower utility bills for its low-income customers.

2.6 Low Income New Home – Missouri

The Low Income New Home Program, a Residential class program, is a partnership between Empire and non-profit organizations, including Habitat for Humanity and local government community housing development organizations, to achieve energy efficient affordable new housing for the low income community. Incentives are available for improved insulation, high efficiency central air conditioning (CAC), heat pumps and refrigerators. Financial incentives are set at the full incremental cost for CAC and heat pumps. A $200 incentive will be available towards the purchase of an ENERGY STAR® rated refrigerator. Finally, up to $100 is available towards the purchase of ENERGY STAR® rated lighting fixtures. The total incentive is capped at $1,100 per home, with an assumed average of $500 per home.

This program was approved on April 4, 2007. The results for 2007-2008, 2008-2009, and 2009-2010 are shown on Tables 2-8 – 2-10.

Table 2-8
Low Income New Homes 4/07-3/08 Results

4/07-3/08	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	10	$5,000	$7,500	$0	$12,500
Actual	1	$400	$609	$0	$1,009
Delta	9	$4,600	$6,891	$0	$11,491

Table 2-9
Low Income New Homes 4/08-3/09 Results

4/08-3/09	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	10	$5,000	$5,000	$0	$10,000
Actual	4	$1,437		$0	$1,437
Delta	6	$3,563	$5,000	$0	$8,563

Table 2-10
Low Income New Homes 4/09-3/10 Results

4/09-3/10	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	10	$5,000	$5,500	$1,050	$11,550
Actual	1	$724		-	$724
Delta	9	$4,276	$5,500	$1,050	$10,826

No evaluation has been conducted. Although an evaluation was planned, the number of participants is too small for an effective evaluation.

2.7 Home Performance with ENERGY STAR® – Missouri

Home Performance with ENERGY STAR®, a Residential class program, is a unique program that enhances the traditional existing home energy audit service. This program uses the ENERGY STAR® brand to help encourage and facilitate whole-house energy improvements to existing housing. This program focuses on the private-sector contractors and service professionals who currently work on existing homes – replacing heating, ventilation, and air conditioning (HVAC) systems, adding insulation, installing new windows, and so forth. The Missouri Home Performance with ENERGY STAR® Initiative requires contractors to be accredited under Building Performance Institute (BPI) standards. Technicians must possess appropriate skills and are field-tested to obtain certification, further lending credibility to services offered. Empire will assist contractors in becoming accredited and certified by BPI. In addition, Empire will arrange to have a random sample of jobs inspected. This program was approved August 28, 2009.

The program strives to provide homeowners with consumer education, value and a whole-house approach. A participating BPI-certified Home Performance contractor can identify and fix a variety of home energy efficiency problems, including poor insulation, air leaks through cracks and gaps, and ineffective moisture control by first performing a home assessment. [1] Upon completion of the inspection, the contractor will provide an itemized cost estimate for each suggested improvement.

Contractors are trained to provide "one-stop" problem solving that identifies multiple improvements that, as a package, will increase the home's energy efficiency. While the program goal is saving energy, it is a market-based approach and the message focus is on addressing a variety of customer needs – comfort, energy savings, durability, and health and safety. It also encourages the development of a skilled and available contractor/provider infrastructure that has an economic self-interest in providing and promoting comprehensive, building science-based, retrofit services.

The benefits for a customer who participates in the program include:

- Significant savings on energy bills
- Higher home resale value
- A quieter, more comfortable living environment
- Improved air quality for better health
- Greater home durability with lower maintenance
- Increased environmental safety and energy efficiency

[1] A BPI-Certified Home Performance Contractor must be certified by the Building Performance Institute (BPI), a national resource for building science technology that sets standards for assessing and improving the energy performance of homes. A certified Home Performance contractor can performance-test a home using the most advanced whole house testing technologies and produce a Comprehensive Home Assessment report. Note that Empire does not warrant the products and/or services of participating contractors.

Empire will try to leverage its funds by allying with similar programs in Missouri or neighboring states. Partnership discussions are ongoing with several entities.

Year-to-date results for Program Year 1 are shown in Table 2-11.

Table 2-11
Home Performance with ENERGY STAR® 9/09-8/10 Year-to-Date Results

9/09-8/10	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	-	$44,500	$10,000	$0	$54,500
Actual	13	$5,200	$210	$0	$5,410
Delta	(13)	$39,300	$9,790	$0	$49,090

2.8 Residential High Efficiency CAC Program – Missouri

The Residential High Efficiency CAC 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.

Incentives are set at approximately 50% of incremental cost. Incentives will be available for systems that meet the following criteria:

Split Central Air Conditioner
Seasonal Energy Efficiency Ratio (SEER) greater than or equal to 15
Energy Efficiency Ratio (EER) greater than or equal to 12.5

Air Source Heat Pump
SEER greater than or equal to 15
Heating Season Performance Factor (HSPF) greater than or equal to 8.5

The program also offers training in Manual J calculations and System Charging and Airflow for HVAC contractors. Manual J is the industry standard residential load calculation method.[2] The training offers step-by-step examples of properly sizing equipment and also addresses principles of heat transfer. The training teaches HVAC contractors to accurately perform and document cooling load calculations and reduces over-sizing. The System Charging and Airflow course addresses airflow and charging procedures and standards and includes hands-on training in the use of testing equipment. Beginning in January 2009, Empire will require that contractors have undergone Manual J training and system charging and airflow training for customers to qualify for rebates.

[2] Manual J is titled "Residential Load Calculation," is in its Eighth Edition and is published by the Air Conditioning Contractors of America (ACCA).

This program was approved June 4, 2007. The results for 2007-2008, 2008-2009, and 2009-2010 are shown on Tables 2-12, 13 and 14.

Table 2-12
Residential High Efficiency CAC Program 6/07-5/08 Results

6/07-5/08	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	520	$208,000	$60,000	$0	$268,000
Actual	167	$70,850	$10,725	$0	$81,575
Delta	353	$137,150	$49,275	$0	$186,425

Table 2-13
Residential High Efficiency CAC Program 6/08-5/09 Results

6/08-5/09	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	650	$260,000	$62,500	$0	$322,500
Actual	181	$76,200	$8,541	$0	$84,741
Delta	469	$183,800	$53,959	$0	$237,759

Table 2-14
Residential High Efficiency CAC Program 6/09-5/10 Results

6/09-5/10	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	780	$312,000	$65,000	$37,700	$414,700
Actual	344	$145,100	$12,225	$43.251	$200,576
Delta	436	$166,900	$52,775	($5,551)	$214,124

An evaluation of the Central Air Conditioning program was completed and the report released on December 8, 2009. The evaluation report, prepared by TecMarket Works is contained with this report in Appendix C. The key findings were:

1. The Residential CAC Program operates efficiently and smoothly with high levels of satisfaction from the contractors.

2. The training sessions are working for most of the contractors. They report high levels of satisfaction (9.6 on a 10-point scale) with the knowledge of the instructor, and the lowest (7.8 out of 10) with the convenience of attending the session.

3. Of the contractors surveyed, 92% of them are very satisfied with the communications they have had with Empire.

4. Contractors report that increased sales and profits is the primary benefit of their participation in the program, and that their business has improved through increased sales, profits, and exposure. Some of them have added other energy efficiency equipment to their offerings, such as high-efficiency water heaters and programmable thermostats.

The following recommendations were contained in the evaluation report:

1. Empire should modify its web site to make information about the Residential CAC program and other efficiency programs easier to locate and that location more intuitively obvious. This will decrease the number of phone calls that the program managers have to field.

2. Contractors would like to be able to submit the applications online.

3. Contractors would like to have printed materials to share with their customers.

4. Greater efforts need to be made to ensure contractors understand the range of home AC units covered by the program including geothermal heat pumps and others.

5. Greater promotional efforts to reach all contractors in the Empire service territory could increase program participation.

6. Empire should consider adding AC tune-up rebates to program offerings.

7. Empire should consider adding duct testing and sealing training and rebates to program offerings.

8. Empire should consider establishing a documentation path for contractors to demonstrate expertise and experience conducting manual J calculations and exempt those contactors from the training if they demonstrate skill in this area.

9. Empire should also consider providing incentives for attendance at the workshop so that the experienced manual J contactors do not feel it is a waste of their time and a drain on profits.

10. Empire needs to clearly state that inclusion on the list is not an endorsement of the performance of the contactor or their work and state that inclusion is only an indication that the contractor has demonstrated the ability to properly size units covered under the program to the conditions of the home.

11. Empire may need to consider increasing rebate levels for geothermal systems. Alternatively, Empire might want to remove geothermal systems from the program due to their high cost and the small percentage of those costs represented by the rebate under this program.

12. In order to ensure that all contractors in the service territory have been reached, Empire may wish to consider purchasing a list of contractors to work from.

2.9 ENERGY STAR® Homes – Missouri

ENERGY STAR® Homes, a Residential class program, use proven technologies and advanced building practices that 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. Only those homes that meet high efficiency standards are certified as ENERGY STAR®. ENERGY STAR® Homes use tried and true technologies that have been employed in hundreds of thousands of homes across the U.S. Homes built to these standards provide greater comfort, are quieter and have healthier indoor air quality.

ENERGY STAR® Labeled Homes are "performance tested." While builders may claim to build "energy efficient" homes, only builders of ENERGY STAR® labeled homes can prove it. Homes in this program are required to be tested by a Home Energy Rater to ensure that they perform to the ENERGY STAR® Labeled Homes Program standard.

Energy savings on heating, cooling, and hot water energy use and are typically achieved through a combination of building envelope upgrades, high performance windows, controlled air infiltration, upgraded heating and air, conditioning systems, tight duct systems, and upgraded water-heating equipment.

The ENERGY STAR® Homes program will offer technical services and financial incentives to builders while marketing the homes' benefits to buyers. Scaled incentives will be provided to homes that qualify as ENERGY STAR® homes.

Manufactured homes that are ENERGY STAR® compliant will also be available for incentives.

This program was approved April 20, 2009. The results for 2009-2010 are shown on Table 2-15.

Table 2-15
ENERGY STAR® Homes 4/09-3/10 Results

4/09-3/10	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	-	$40,000	$40,000	$0	$80,000
Actual	15	$18,000	-	$0	$18,000
Delta	(15)	$22,000	$40,000	$0	$62,000

2.10 C&I Rebate Program – Missouri

The C&I Rebate program provides rebates to commercial & industrial (C&I) customers that install, replace or retrofit qualifying electric savings measures including HVAC systems, motors, lighting, pumps, and so forth.

As part of this program, Empire offers rebates to customers to cover up to 50% of the cost of an energy audit. In order to receive the rebate, the customer must implement at least one of the audit recommendations that qualify for a rebate. The energy audit rebate is set at 50% of the audit cost up to $300 for customers with facilities less than 25,000 square feet and up to $500 for customers with facilities over 25,000 square feet. Energy audits must be performed by a certified (CEM, licensed PE or equivalent) commercial energy auditor. Customers may choose their own auditor or Empire can recommend one. Customers with multiple buildings will be eligible for multiple audit rebates. Chain accounts will be limited to two audits per program year.

A limited number of prescriptive rebates for lighting (e.g., fluorescent fixtures and controls, HID fixtures and controls), cooling (e.g., unitary A/C and split systems) and motors are available for small commercial customers (defined as customers with peak billed demands under 40 kW[3]).

All C&I customers, including those that qualify for prescriptive rebates, are eligible for custom rebates. The custom rebates will be individually determined and analyzed to ensure that they pass the Societal Benefit/Cost Test (defined as a test result of 1.05 or higher).

Custom rebates are calculated as the lesser of the following:

- A buydown to a two-year payback
- 50% of the incremental cost
- 50% of lifecycle avoided demand and energy costs

The C&I rebate program was approved May 7, 2007. The results for 2007-2008, 2008-2009, and 2009-2010 are shown on Tables 2-16, 2-17, and 2-18.

Table 2-16
C&I Rebate Program 5/07-4/08 Results

5/07-4/08	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	75	$229,000	$50,000	$0	$279,000
Actual	19	$220,512	$17,903	$0	$238,414
Delta	56	$8,489	$32,097	$0	$40,586

Table 2-17
C&I Rebate Program 5/08-4/09 Results

5/08-4/09	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	100	$289,000	$55,000	$0	$344,000
Actual	37	$221,415	$5,211	$0	$226,626
Delta	63	$67,586	$49,789	$0	$117,375

[3] Rates codes CB (Commercial Service) and SH (Small Heating Service).

Table 2-18
C&I Rebate Program 5/09-4/10 Results

5/09-4/10	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	125	$349,000	$62,000	$41,100	$452,100
Actual*	59	$378,905	$2,543	$52,176	$433,624
Delta	66	($29,905)	$59,457	($11,076)	$18,477
*Actual includes portion of $35,000 from 08-09.					

An evaluation of the C&I Rebate Program was completed and the report released on December 8, 2009. The evaluation report, prepared by TecMarket Works is contained with this report in Appendix C. The key findings were:

1. The incentive rebate is capped at $20,000 per year, per customer. This means that the customer can do the same measure during the second year of their participation, such as completing a lighting project in another part of the plant. However, it also means that participants who have significant savings potentials may be forced to delay their projects, waiting for Empire's rebate period requirements to pass. This restriction can slow savings for customers with large savings potentials unless all of the portfolio's allocated funds are spent each year. This can result in non-acquisition of cost effective energy resources for Empire's customers that must be provided with higher cost conventional supplier. This rule, while helping to stretch resources over the program period, essentially increases costs to the program and to the customer and slows acquisition of cost effective resources.

2. The majority of the customers that were surveyed learned of the program from their contractors or electricians, or from an Empire employee directly. Only 2 out of 39 customers that we surveyed said that they learned of the program through a direct mailing from Empire.

3. Thirty-three of the customers surveyed (85%) indicated that the rebate was the primary or an important reason for the decision to install the energy efficient option.

4. The customers have a high level of satisfaction (9.08 out of 10) for the program overall.

The following recommendations were contained in the evaluation report:

1. Empire should consider changes to the energy audit rebate structure to increase the benefits of participation for potential large savers. The rebate levels can be calibrated to achieve cost effective energy resources. Empire should consider a scaled audit rebate structure calibrated to the square feet of the participating facility or other size metric (kW/kWh). Empire should consider rebates for medium and large customers over a specific size (square feet of facility or kW or

kWh) that must be accompanied by a financial commitment from the participant to take at least some of the recommended actions over a specific period of time to cost effectively recover the added incentive.

2. Add the Large Power rate class to the list of qualified customers. Currently, the largest customers are not eligible to participate. If they are included, potential participation and energy savings from the program will likely dramatically increase.

3. Develop a technical reference manual to guide energy savings calculations submitted by contractors and applicants. The manual should provide standard values for engineering calculations such as lighting fixture watts, heating and cooling full-load hours by building type, and other reference data to assist customers and contractors in preparing their applications.

4. Add LED lighting to the measures covered by the prescriptive program.

5. Add contact information for an Empire or AEG staff person on the application so that applicants with questions can easily find this information if they have questions about the program or the application. This would allow those customers that don't know how to calculate estimates of savings to receive the assistance they need.

6. Add a statement on the application that makes it clear that the rebates are only to cover measures that would not be installed without the rebate to offset the installation/measure cost.

2.11 Building Operator Certification Program – Missouri

The Building Operator Certification (BOC) Program, a C&I program, is a professional development program in the energy and resource 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.

There are two levels of certification: Level I - Building System Maintenance and Level II - Equipment Troubleshooting and Maintenance. Development support for BOC was originally provided by the Northwest Energy Efficiency Council (NEEC), a non-profit group of electric utilities, state governments, public interest groups, and industry representatives committed to promoting affordable, energy-efficient products and services. Today, the NEEC is leading efforts to make BOC a nationally recognized standard.

The Midwest Energy Efficiency Alliance (MEEA) is administering BOC in the Midwest region with support from the Illinois Department of Commerce and Economic Opportunity, Missouri Department of Natural Resources, the Minnesota Department of

Commerce, and the Ohio Department of Development. BOC courses should be available in both Kansas City and St. Louis (through KCP&L and Ameren). It is recommended that Empire use these locations (or another neighboring utility) to best leverage their program funds.

The program is targeted towards customers with facilities that employ full-time building operators.

The program was approved February 21, 2008. The results for 2008-2009 and 2009-2010 are shown on Tables 2-19 and 2-20.

Table 2-19
Building Operator Certification Program 2/08-1/09 Results

2/08-1/09	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	20	$20,000	$12,500	$0	$32,500
Actual	13	$17,003		$0	$17,003
Delta	7	$2,997	$12,500	$0	$15,497

Table 2-20
Building Operator Certification Program 2/09-1/10 Year-to-Date Results

2/09-1/10	Participants	Delivery/Incentives	Marketing/Project Management	Evaluation	Total Budget
Budget	20	$20,000	$13,000	$0	$33,000
Actual	11	$14,903		$0	$14,903
Delta	9	$5,097	$13,000	$0	$18,097

2.12 C&I Peak Reduction Program – Missouri

The C&I Peak Load Reduction Program is a partnership between businesses and Empire to assure that electric demand can be met on certain days during the summer and winter when customer demand for electricity might exceed the available supply. The mechanism to provide this capability already exists under the Interruptible Service Rider IR which has been effective since April 14, 1999. Under the current tariff, revised February 19, 2009, there exists a provision for customers to receive credits for interruption in special situations if they agree to voluntarily remove demand from the Company's system upon request by the Company. Customers who are eligible to participate in this voluntary program must have an amount of load available for interruption of at least 50 kW. Such load must be available for interruption during the most likely peak demand periods. The seasonality of the load and the ability of the Customer to shift load to off-peak periods will be taken into consideration by the Company in deciding whether to request interruption. Customers with stand-by generation facilities of at least 50 kW are eligible for this provision.

If interruption is agreed to between the Customer and the Company under this provision, the Customer will be compensated by a one-time credit on the Customer's next bill equal to 45 ¢/kWh of requested load curtailment.

The amount of the actual interruption in kW shall be calculated by comparing the Customer's highest metered demand in the 24 hours immediately preceding the interruption to the highest demand the customer experienced during the requested voluntary interruption. In the event the Customer does not have appropriate metering, the Customer must be capable of demonstrating the agreed upon reduction to the Company's satisfaction.

Another component of the Interruptible Service Rider IR is a contract option available to all commercial or industrial customers being served under the Total Electric Building (TEB), General Power Commercial/Industrial Service (GP), or Large Power (LP) rates. Customers under those rates who volunteer to participate in this program must have a minimum monthly billing demand of 200 kW and an anticipated minimum load curtailment capability of 200 kW.

Customers who participate will be required to enter into a contract for a term of one, three, or five years with an automatic renewal for the same term of the contract unless notification is given by either the customer or the Company at least 30 days prior to expiration of the contract. Availability of this rider is also subject to the economic and technical feasibility of the installation of required Company equipment. The total MW contracted for under this program will not exceed 50 MW.

The contract year will be June 1 through May 31. Curtailments will typically occur during, but not necessarily be limited to, the hours of 12:00 noon through 10:00 pm, Monday through Friday. The maximum number of curtailment events will be ten per curtailment year and each event will last no less than two but no more than eight consecutive hours. Unless there is a system reliability event that needs to be addressed, there will not be more than one event per day. Participating customers will be provided with a curtailment notice of at least four hours prior to the start of an event. Curtailments may be called for either operational or economic reasons.

Compensation: For each curtailment year, a participating customer shall receive a payment or bill credit based upon the contract term. The Monthly Program Participation Payment per kW of Interruptible Demand (ID) will be as shown on Table 2-21.

Table 2-21
Monthly Payments for C&I Interruptible Rider Program – Missouri

Contract Term	$/kW of ID per Month
One year	$0.51
Three years	$1.27
Five years	$2.02

In addition to the payments shown in Table 2-21, participating customers will receive additional compensation equal to $0.30/kW of ID for each hour of actual curtailment during the curtailment year.

Customers will be responsible for monitoring their load to comply with the terms of the contract. Penalties are assessed for failure to curtail. If a customer fails to reduce per the terms of the contract during three or more curtailment events during a contract year, the customer shall be ineligible to participate for a period of two years from the date of the third failure.

This program is intended as a voluntary load shedding strategy to be used in system emergency situations such as extreme weather conditions placing loads on the system or the loss of a generating facility or transmission facility during a period of peak demand. The purpose of such load shedding is to avoid the occurrence of involuntary load curtailments and/or excessive purchased energy prices.

In addition to standby generation, customer may also reduce demand by:

- Reducing Cooling
- Reducing Lighting
- Deferring production to a later time or shift
- Shutting down non-essential equipment

Empire estimates that 33 customers could shed about 20 MW. Given the relatively low prices that are offered for load shedding, it is expected that no more then 25% of this potential would actually be realized during an event. This would produce a net savings of 5 MW.

In 2009, two customers, totaling 800 kW, signed contracts to participate in this program. One additional customer signed up in 2010, bringing the total curtailable load under contract to 3,100 kW.

2.13 Other DSM Efforts - Missouri

In 2006, Empire participated in the Missouri Residential Market Assessment conducted by RLW Analytics for the electric utilities in the state. The effort was designed to provide baseline information on residential appliance, building, equipment and lighting saturations and efficiencies. This information can then be used to understand future energy savings potential in the residential sector. The final report and supporting data were received and used as part of the process for the selection of future DSM programs for its residential customers in Empire's 2007 IRP.

Empire contracted with Opinion Research Specialists, LLC of Springfield, Missouri, in 2008 to conduct a survey of a sample of Empire residential customers. The purpose of this survey was to determine the age and types of appliances along with the attitudes and practices of customers regarding energy efficiency. This survey was completed and presented to Empire is September, 2008. The findings from this survey were incorporated into the Potential Study performed by Applied Energy Group. The final report from Opinion Research Specialists is included in Appendix C.

2.13.1 Energize Missouri Appliance Rebate Program

The Energize Missouri Appliance Rebate Program is designed to help Missourians buy appliances at lower costs, reduce home utility expenses and benefit Missouri businesses by stimulating sales of energy efficient appliances. The program is being conducted by MDNR. MDNR will receive $5,672,000 in federal funds from the U.S. Department of Energy as part of the American Recovery and Reinvestment Act of 2009 (the stimulus package). The money is designated for the establishment of state ENERGY STAR® appliance rebate programs. The program started April 19, 2010 and provided rebates for those appliances shown in Table 2-22. Rebate amounts were revised at the end of May 2010. The revised rebates are also shown on Table 2-21. All old appliances must be recycled.

Table 2-22
Energy Missouri Appliance Rebate Program

	Appliance Type	Old Rebate Amount	New Rebate Amount
Category 1:			
	Gas Furnaces	$125	$250
Category 2:			
	Central Air Conditioning	$100	$200
	Air Source Heat Pumps	$250	$300
Category 3 (Water Heaters):			
	Gas Storage	$100	$150
	Gas Tankless	$100	$175
	Electric Heat Pump	$150	$200
	Solar (With Gas Backup)	$500	$500
	Solar (With Electric Backup)	$500	$500
Category 4:			
	Clothes Washers	$75	$125
Category 5:			
	Dishwashers (table top models excluded)	$75	$125

The Energize Missouri Appliance Rebate Program is a program of MDNR. Although Empire customers were welcome to and probably did participate in the program, the tracking mechanisms established for conducting the rebate program did not track the electric utility provider for those customers requesting rebates. Thus, Empire cannot adjust its load forecast to properly account for or track the energy efficiency achieved by its customers who participated in this program.

3.0 Analysis of DSM Portfolio - Missouri

In preparation for the 2010 IRP, Applied Energy Group (AEG) performed a technical potential study to evaluate all potential DSM programs that would prove cost effective for Empire to implement within the next five years. The analysis conducted by AEG and the programs determined to be cost effective for Empire to analyze as candidate demand-side resources for its 2010 IRP are documented in this section.

3.1 Analysis Overview

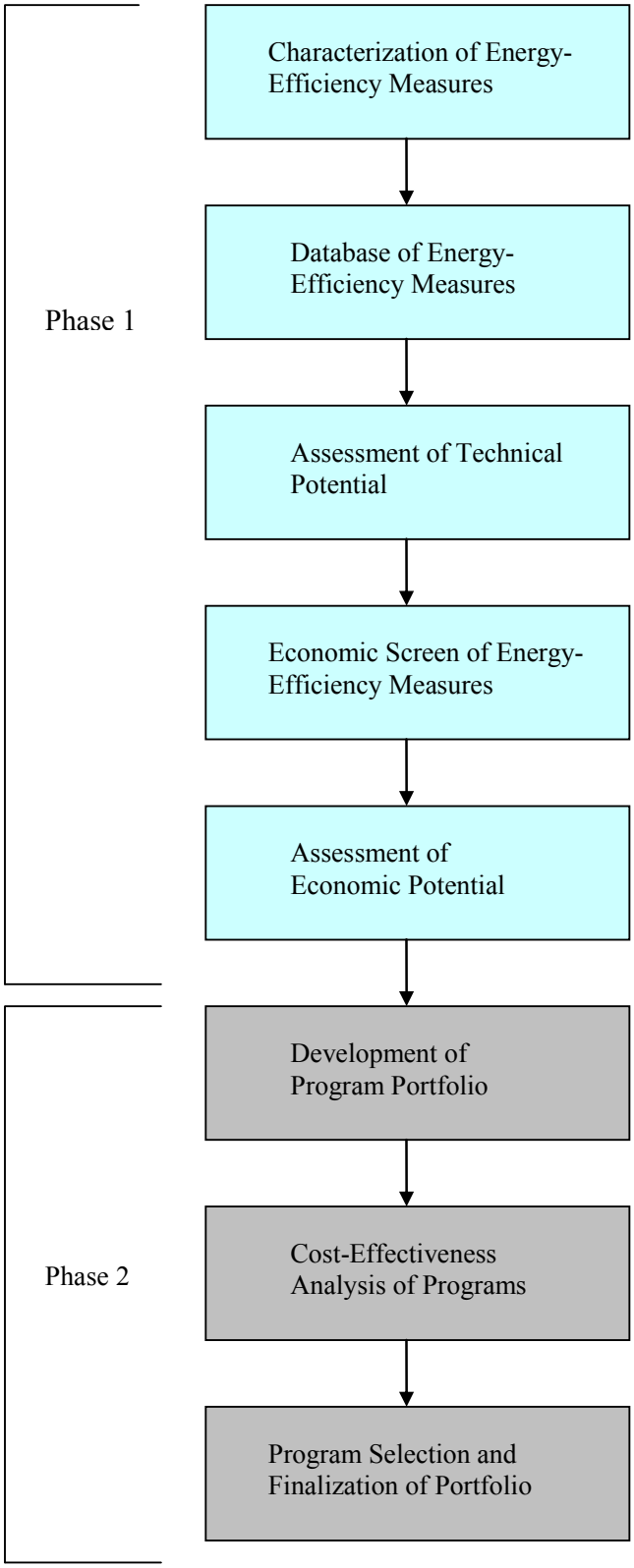
Figure 3-1 documents the steps undertaken in performing the demand-side resource potential study (contained in Appendix D). In the first phase, assessments were produced of the technical, economic, and achievable potential for DSM across Empire's service territory. Input parameters for DSM savings were employed, with savings estimates calibrated to Empire's customer and load forecasts. During the second phase, the results of the potential assessments were combined with other elements to develop a portfolio of DSM programs.

The steps shown in Figure 3-1 follow a specific sequence where the results of one activity will impact the next. However, the final portfolio of DSM programs is dependent on multiple criteria that influence many of the planning process steps. This is because measure identification and measure applicability is part art and part science. AEG used a combination of factors, including informed judgment based on experience in other jurisdictions and reported results from best-in-class programs as well as primary research in conducting the DSM potential study.

To facilitate the study process, AEG undertook the following tasks:

- Commercial Baseline Study – Development of a commercial baseline study audit sample which was used to perform on-site data collection in commercial customer facilities. The results from the approximately 120 sample audits were compiled and reviewed and used to develop a library of load shapes.
- Benefit/Cost Test Development – For each program, sector and for Empire as a whole, AEG developed estimates for typical participant size, description, annual energy, peak/off-peak energy breakdown by month, non-coincident peak, coincidence factor, coincident peak and participant counts. These were then used in the benefit/cost tests and decision to include the programs ultimately comprising the DSM portfolio, and for sector and portfolio totals.
- Program Impact Projections – For each program, sector and total company portfolio, annual energy, monthly and annual peak contributions and program costs were developed and compiled by year and for cumulative totals for 20 years.
- Hourly load shapes – For each program, sector and for Empire's portfolio, hourly load shapes for a year for use in the planning computer models.

Figure 3-1
Program Planning Process



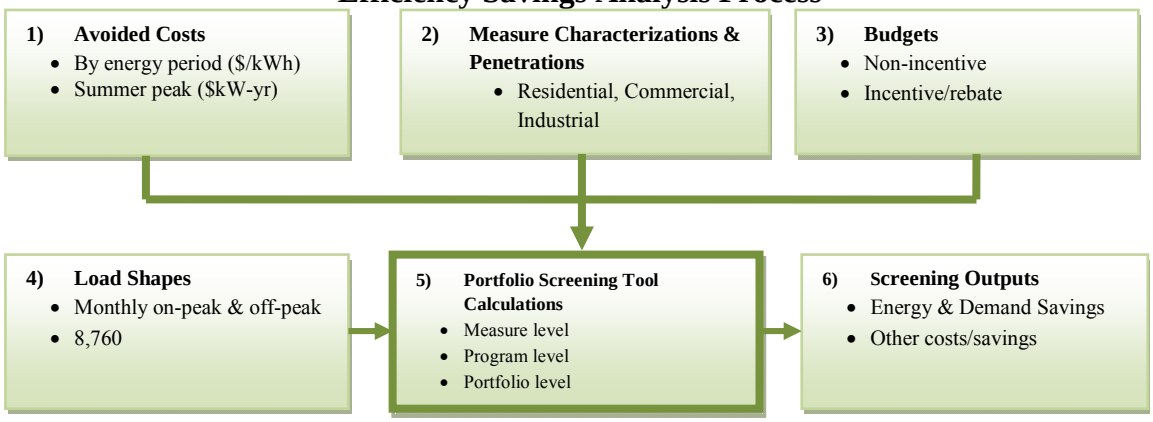
3.2 Assessments of Potential

AEG determined the technical, economic, and achievable potential for DSM programs in Empire's service territory. The analysis was conducted by class of service and estimates of potential energy savings were made for a twenty-year period (2011-2030). The efficiency potential was evaluated at three levels:

- **Technical potential** – the total feasible efficiency savings using all DSM technologies and design practices – unconstrained by budgets or cost effectiveness
- **Economic potential** – the feasible efficiency savings unconstrained by budgets, but using only cost-effective DSM measures (based on the societal cost-effectiveness tests)
- **Achievable potential** – the efficiency savings feasible using cost-effective DSM measures within specific budget targets (budget-constrained potential).

Figure 3-2 shows the analysis process used to arrive at the efficiency savings available from the universe of DSM measures.

Figure 3-2
Efficiency Savings Analysis Process



At the core of the analysis is AEG's benefit-cost measure, program and portfolio screening tool (Ben-Cost), a computer model for calculating the costs and benefits associated with various DSM measures, both technologies and design practices. The analysis of energy-efficiency potential, whether technical, economic or achievable, can be summarized as follows:

1. Identify the avoided costs of energy, line loss factors and related inputs to the DSM model (e.g., retail rates, stakeholder discount rates).
2. Determine the potential efficiency measure characterizations, including costs and savings relative to the baseline of not implementing the efficiency measures. Determine measure penetration rates based on analysis by market sector.
3. Identify program budgets (for each of the avoided cost scenarios).
4. Develop load shapes for distributing energy savings.

5. Apply these inputs into Ben-Cost, which calculates both the energy and demand savings, and other costs and savings, by DSM measure and for the total portfolio.

Empire and AEG developed the general input dataset for the model. These included: the avoided costs of electric energy, demand savings, line loss factors; and the nominal discount rate for discounting the value of future benefits and costs.

3.2.1 DSM Measure Characterizations

AEG relied upon DSM measure characterizations based on the recent residential appliance saturation survey conducted by Empire and the commercial customer surveys recently conducted by Empire. In addition, AEG conducted independent analysis. AEG also relied on its experience and research for similar potential studies completed elsewhere. When appropriate, AEG adjusted the measure energy savings based on cooling and heating degree days for the Empire service territory. Characterizations of DSM measures rely on current and comprehensive information to ensure accuracy. The data used by AEG to determine measure impacts include:

- Measure lives
- Incremental implementation cost (over the baseline of standard, non-efficient equipment)
- Annual energy (kWh) savings
- Maximum load (kW) reduction and associated peak coincidence factor
- For retrofit measures:
    - the deferred replacement cost, which is a benefit that eliminates the need to replace the existing (retrofitted) equipment at the end of its normal life, due to implementation of the DSM measure, and
    - An adjustment of savings at the time the existing equipment would have been replaced, due to having more efficient baseline equipment at that time.
- Operation and maintenance savings (or increased costs)
- Free ridership (the portion of program participants who would have installed efficient equipment even without a DSM program) and spillover (those who install efficient equipment due to the program being in place, but never collect the incentives). AEG's estimates of achievable potential include free ridership and spillover effects.

AEG's DSM planning framework provides for the implementation of DSM measures in four general markets (three for existing buildings and one for new construction):

- Existing buildings
    1. Retrofit opportunities, for which functioning equipment is replaced with more efficient equipment
    2. Equipment purchase or replacement due to equipment failure, expansion, performance concerns or similar drivers

3. Remodeling/renovation, similar to equipment replacement, but affecting an entire system or multiple systems

- New construction

Any specific DSM measure may have very different characteristics depending upon the market. For example, in the residential sector, a homeowner would evaluate the full cost of a new ENERGY STAR® washing machine when considering the replacement of an old, inefficient, but serviceable unit; in the new home market or someone looking to purchase a new washing machine (i.e., their current one no longer operates), the cost of the ENERGY STAR® unit is only the additional cost above a standard-efficiency unit. The energy and demand savings also differ – the savings for a retrofit are compared to the old, inefficient unit (at least until the homeowner would have needed to replace the unit at the end of its life), while the savings for new construction or replacement are compared to a new, standard unit.

3.2.2 Top-down and Bottom-up Approaches to the Analysis

Analysis of the actual potential savings started with a review of sales data for the service territory by sector: residential, commercial, and other industrial. For the residential sector, AEG disaggregated sales by end-use based on various types of information including insights from Empire staff, Census information, and data from other utilities located in states near Missouri.

AEG disaggregated sales by building type and end-use for the commercial sector. The disaggregation was based on the results of the commercial audits that Empire conducted in conjunction with publicly available data from sources such as the Commercial Buildings Energy Consumption Survey (CBECS) census data from the Energy Information Agency, and experience with similar potential studies elsewhere[4].

In many studies, sales forecasts serve as the basis for a "top-down" analysis of the efficiency potential, which arrives at measure savings by determining the percentage of the electric sales forecast that may be offset by the installation of a given DSM measure in each year. The top-down approach develops costs relative to energy savings, and then multiplies that "cost per energy saved" by the measure's energy savings each year to determine each year's installed costs. For the commercial and industrial sectors, sales are disaggregated by building type and end-use, and by existing buildings and new construction. Each commercial and residential DSM measure is characterized based on these disaggregated sales projections.

For the residential and commercial/industrial sectors, AEG applied a "bottom-up" analysis, which develops savings information for a specific measure (e.g., the installation of one compact fluorescent lamp), and then multiplies those costs and savings by the number of measures (lamps) installed. The bottom-up approach was suitable for the analysis since data were available to estimate the number of residential and non-residential buildings and the expected rates for adopting efficiency measures. Although

[4] Specifically: Black Hills Power, KCPL, Rochester Gas & Electric, Cheyenne Light Fuel and Power

commercial and industrial buildings vary greatly in size and in their energy usage, in this instance, suitable data were available to use a bottom-up approach.

Regardless of approach, all methodologies need to develop factors for the following measure characteristics:

- **Applicability** using a bottom-up analysis is the number of customers eligible for a given measure.
- **Feasibility** is the fraction of the applicable number of customers or end-use sales for which it is technically feasible to install the DSM technology. Numbers less than 100% reflect engineering or other technical barriers that would preclude adoption of the measure. Feasibility is not reduced for economic or behavioral barriers that would reduce penetration estimates. Rather, it reflects technical or physical constraints that would make measure adoption impossible or ill advised.
- **Turnover** is the number or percentage of existing equipment that will be naturally replaced each year due to failure, remodeling, or renovation. This only applies to replacement/purchase and remodel/renovation markets. In general, turnover factors are assumed to be one (1) divided by the measure life (e.g., assuming 10% of existing stock of equipment is replaced each year for a measure with a 10-year estimated life.)
- **Baseline Adjustment** adjusts the savings downward in future years for retrofit measures to account for the fact that newer, standard equipment efficiencies are higher than older, existing stock efficiencies (e.g., the phase out of incandescent lighting).

Using these factors together provides a maximum (technical) potential savings for each measure. The appropriate measures and penetration rates are then applied to determine each of the efficiency potentials, technical, economic and achievable.

3.2.3 Stock Adjustments and Measure Interactions

New measures can be installed in existing buildings either on an early retirement (retrofit) basis, at the time of natural replacement, or at the time of renovation or remodeling. To avoid double counting, AEG's planning framing tracks the eligible stock of equipment over time, based on the assumed measure penetrations for each existing building market. This is particularly applicable for planning horizons that extend out twenty years. For example, if 10% of existing lighting fixtures are retrofitted with high efficiency models in 2011, then only 90% of the original population of lighting remains eligible for efficiency upgrades in non-retrofit markets during 2012. However, assuming the fixtures had only a 5-year measure life, the original 10% of lighting fixtures would again become eligible for replacement in 2016 (five years after the original installation date). Similarly, once a building is renovated or remodeled, the opportunity for retrofit is diminished until the end of the measure lives for those measures installed under the market-driven (non-retrofit) scenarios.

Some of the technologies modeled are mutually exclusive – one or the other could be installed, but not both. For example, standard metal halide high-bay fixtures can be replaced with pulse start metal halides or fluorescent high-bay fixtures. When two or more measures compete with one another, an estimate of the penetration of the measure offering the most per unit savings was first estimated. The penetration of the next competing measure is then estimated based on the remaining potential.

3.3 Technical Potential

Technical potential is typically defined as the total energy-efficiency potential unconstrained by budgets or measure cost-effectiveness. Note that the same technical potential savings could be achieved by a different mix of DSM measures. For example, the savings due to retrofit measures could be replaced by savings due to market-driven (non-retrofit) measures. Given the methodology for selecting measures and maximizing penetration rates, the results should be viewed with a focus on the total savings results rather than on the specific measures used to achieve them.

A listing of all of the measures considered in the DSM evaluation is provided in Appendix A.

3.4 Economic Potential

The economic potential starts with the same list of potential DSM measures as the technical potential, but includes only those DSM measures that are found to be cost-effective as determined using the Societal Test[5]. This test compares the total costs and benefits to society – including the utility and its customers.

Societal costs include:

- incremental installed cost (above baseline equipment)
- non-incentive programs costs (e.g., administration and marketing)

Societal benefits include:

- avoided costs of electric energy savings and demand reduction
- operation and maintenance savings
- deferred replacement credit (for retrofit measures)
- electric externalities (e.g., due to reduced air pollution)

Measure incentives are considered a pass-through payment from one party to another, thus they are not considered to be a cost or a benefit. Electric externalities were assumed at four different levels.

The societal costs and benefits are determined for each year of the measure life and discounted back to the base year (2011). Cost-effectiveness is measured by the Net

[5] The Societal and other cost-effectiveness tests are described in the *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects*, revised July 2002.

Benefits, equal to the benefits minus the costs. A measure is considered to be cost-effective if the net benefits are greater than or equal to one.

Measures that failed the Societal Cost-effectiveness Test in most markets or building types (for Commercial measures) were removed from the analysis. For example, some measures were not cost effective in the "no future carbon cost case" (scenario 1) but were cost effective in the higher carbon cost cases (scenario 3 or scenario 4).

3.5 Achievable Potential

The achievable potential represents AEG's best estimate of what Empire can achieve given the information that is known about the service territory. The achievable potential measure budgets were based on the avoided cost inputs for each scenario applied at the level of representative programs. The goal of the achievable analysis was not to develop a program design, but measures were assigned to representative programs for the purpose of allocating associated program costs. AEG's experience was used to determine the non-measure (non-incentive) program costs as a portion of the incentive budgets (which were determined directly from the measure incentives and penetration rates). AEG's experience is based on results from established DSM programs in other service territories.

Once the achievable potential for each measure was estimated, the measures were bundled into a mix of program offerings. AEG selected a typical set of DSM programs for this analysis, but with the understanding that the program design significantly affects the savings that can be achieved for a given budget. A different program design would likely result in different overall savings, and different savings by sector or customer group.

The programs that were considered for the achievable potential analysis include:

- **Residential**
  - Low-Income Assistance Program
  - Residential High Efficiency Lighting
  - Residential High Efficiency Cooling Program
  - Refrigerator Pickup Program
  - Home Performance with ENERGY STAR®
  - Home Energy Comparison Reports
  - ENERGY STAR® Appliance Rebates
    - Refrigerators
    - Washing Machines
    - Dehumidifier
  - Direct Load Control
- **Commercial and Industrial**
  - Commercial Prescriptive Rebate Program
  - Commercial Custom Rebate Program
  - Large C&I Turnkey Energy Efficiency Program

- Small Business Direct Install
- Building Operator Certification Program
- Large C&I Voluntary Interruptible/Peak Load Reduction Program

The achievable potential was based upon the most cost-effective relevant DSM measures found in successful DSM programs elsewhere. AEG set penetration rates at levels deemed appropriate for the programs and their specific measures given the characteristics of Empire's service territory. The total portfolio savings were calculated with AEG's Ben-Cost model, and the penetration rates set at levels comparable to other successful utility DSM programs.

Note that there is a great deal of variability in the DSM measures that could be selected depending on the program design. Many other combinations and permutations of programs and measures are possible. The actual mix of measures and their installation rates will depend on the measures and incentives offered to customers, how the DSM programs are marketed, the level of engagement with third-party contractors and many related factors. These and other factors should be taken into consideration as part of the program design.

It should also be noted that an analysis of renewable technologies including solar photovoltaics and packaged wind solutions was also conducted. Neither of these technologies had characteristics (energy savings, demand savings, associated costs, etc) that made these technologies cost effective. Therefore, neither one is included in the achievable potential analysis.

3.6 General Program Design

The objective of the DSM program design was to create a comprehensive and innovative set of programs to serve the needs of Empire's customers.

3.6.1 Delivery Mechanisms

The primary mechanism for program delivery consists of customers purchasing high-efficiency equipment and/or services directly from existing market actors (i.e., contractors, equipment dealers, and retailers). Consequently, the successful promotion and administration of programs requires going beyond a "customer-only" focus. Targeting trade allies and leveraging Empire's relationships with them will increase both awareness among consumers and the availability of high-efficiency equipment.

Although the emphasis continues to be customer incentives, components of several programs include strategies to encourage cooperation with trade allies, other utilities, and state and local agencies. In some programs, for example, portions of the budget have been reserved to conduct training and informational outreach activities with trade allies, including dealers and providers of maintenance services. These activities are intended to keep the key trade allies apprised of the changes in the various programs, which will

allow them to provide assistance to customers and to ensure that the key trade allies maintain high-efficiency equipment in their stock.

3.6.2 Qualifying DSM Measures

Qualifying DSM measures represent either more efficient models of end-use appliances, such as a central air-conditioner or compact fluorescent lighting, or technological improvements that can make an end-use appliance more efficient in its use of energy, such as an energy management system. Nearly all the programs encourage the adoption of at least one energy efficiency measure (EEM). DSM measures that qualify for each program are intended to represent a substantial improvement over the standard efficiency available on the market.

3.6.3 Participation

Establishing a participation goal for each program requires a balancing of numerous factors, including the pool of eligible participants, the available budget, and past program performance. Each program budget is developed in a way that balances best practices, including the share of technology costs paid directly by participants as compared to the incentive subsidy. Incentives need to be sufficiently large to encourage participation, yet be of a size that maximizes available resources. Similarly, marketing and administrative budgets should be adequate to promote and operate the programs, but not be so large they negatively impact cost-effectiveness.

Finally, in setting goals for participation, two additional factors need to be considered. First, experience with previous programs in other states has served as a guide to which programs have been able to meet or exceed their goals and which have fallen short. Given that similar incentive and outreach structures are proposed for Empire's DSM measures, we expect to achieve participation consistent with other efforts. The second factor to consider is that several new programs are being proposed in the Empire service territory.

3.6.4 Impacts

These programs seek to save energy and peak demand and the portfolio has been designed to aggressively pursue this goal. Throughout this process, Empire has sought to identify targets where energy savings can most effectively be achieved. The knowledge derived from these efforts has influenced the program design; programs are designed to address the major end-uses in the residential and C&I sector where technologies exist to significantly improve energy-efficiency.

Because impacts are driven primarily by participation and the respective savings of qualifying DSM measures, these components have been tailored to maximize the program's total impacts. The overall portfolio includes programs that capture a wide variety of potential savings. Programs have been designed to maximize participation given best practice marketing and incentive designs. In addition to ensuring participation

while efficiently using budget resources, incentives have been targeted to promote the adoption of DSM measures that maximize savings and minimize lost opportunities. In many cases, incentives have been structured to encourage the adoption of DSM measures with the highest levels of efficiency.

3.6.5 Eligibility

Eligibility has been defined as broadly as possible to make the programs inclusive. For most residential programs, eligible participants include customers living in every type of residential structure, including single-family, multifamily, and manufactured homes. Though the low-income program has specific income requirements, low-income customers are not precluded from participation in the other residential programs. For other programs, the only limitations on participation are circumstances where a customer has recently participated in a program and repeated participation would not render sufficient savings to justify the expense.

3.6.6 Training

To improve participation and quality of service, training will be a high priority in the implementation of Empire's DSM programs. Empire is committed to contractor and trade ally education and training. The training sessions will be on a variety of topics and are anticipated to include:

- Proper sizing and installation of HVAC equipment
- New construction practices/programs
- Green building techniques

3.6.7 Budgets

Program budgets include to the following categories of expenses:

- Administrative costs, including planning and design
- Delivery
- Marketing
- Incentives, both customer and trade ally
- Evaluation costs

3.6.8 Program Evaluation

Evaluation is a necessary component of each DSM program. At a minimum, evaluations help determine if the overall portfolio is achieving its objective. Verification of energy savings for the programs via impact evaluations establishes whether a program is achieving the intended impacts. At a higher level, process evaluations reveal when a program is not operating as well as it could; hence timely and effective evaluations can contribute to significant improvements in performance. All programs will have both impact and process evaluations to ensure the portfolio does not fall short of its goals.

3.7 Programs Selected

Based on the Achievable Potential Study, a portfolio of DSM programs was developed. The twenty-year DSM portfolio represents the "base case". Participation rates reflect the need to develop necessary infrastructure, trade ally relationships and marketing momentum to support full-scale implementation levels.

Empire's portfolio DSM programs reflect the following:

- Tested Program Design – DSM program designs are based upon other utilities' successful program designs including Empire's experience in the states it serves.

- Coverage – The programs provide services to all classes of customers for all income levels.

- Goals – Participation goals are reasonable, based upon Empire's service territory and other utilities' experience.

- Budgets – Budgets include sufficient funds to properly manage, administer, and market the programs.

- Cost Effectiveness – All measures contained in the different programs have undergone benefit/cost screening consistent with the California Standard Practice Manual.

- Program Design Assumptions – All measures and associated costs, which were developed in the achievable potential analysis, have been bundled into different programs by customer class. These assumptions include consideration of all of the following factors:

    - Administrative costs – The overall annual costs for the utility to implement the program. This includes the utility cost for incentives, administration, and evaluation for each year that the program is planned. Utility incentives must be provided separately as these costs are handled differently from other utility costs in certain benefit/cost tests.

    - Direct Participant Cost – The incremental cost of each energy savings measure ($ per measure) before utility incentives. This represents what the customer would have to pay to achieve the benefits of the specified DSM measure. This is a one-time cost.

    - Project Life – The estimated lifetime that a project/measure will yield energy savings (years). Measure life should be consistent with

equipment life but in some instances the utility may choose to limit the savings to a predetermined life (e.g., 15 years maximum) for analysis purposes.

- Demand Savings – The amount of demand reduction that the particular measure will yield (kW).

- Coincidence Factor – A factor applied to Demand Savings to determine the value of demand reduction that will be achieved during the hour of the utility peak (in percent).

- kWh/Participant Savings – The energy savings component of a particular measure (annual kWh).

- Number of Participants – The participation goal for a particular program.

- Incentive per Participant – The value of the utility incentive for each particular measure included in program. This value multiplied by the Number of Participants will yield the total utility incentive.

- General Project Management and Marketing – These are costs that are not specific to an individual program, such as preparation of regulatory filings, general oversight, broad-based message marketing, and so forth.

- Evaluation – Program evaluation is budgeted at 5% of program costs per year.

- Program Descriptions – Each program write-up contains the following information:

  - Program Description – A general overview of the program.

  - Peak Demand and Energy Savings – This is an estimate of the kW and kWh savings that can be expected to occur given the assumptions for each particular program.

  - Participation – The participation targets reflect the results of the Achievable Potential Study.

  - Program Budgets – Each program budget contains categories for program administration, delivery, marketing, incentives and evaluation.

3.7.1 Low-Income Assistance Program

Program Description

Qualifying lower income customers can receive help in managing their energy use and bills through Empire's Low Income Assistance Program. The program will work directly with local CAP agencies that already provide weatherization services to low-income customers through the DOE and other state agencies.

Empire will provide funds for customers with income levels as specified by the federal Low Income Weatherization Assistance Program ("LIWAP"). While the CAPs will provide many of the leads for this program, Empire will supplement their efforts through its own marketing. CAP agencies offer a cost-effective implementation capability, which allows most of the funds allocated to this program to go directly to the purchase and installation of energy-efficiency equipment. Participants can be an Empire residential customer in a one to four-unit structure. CAP agencies expect to spend an average of $2,000 of Empire funds (including measures and delivery) to go along with their DOE funds. Empire funds will focus on measures that reduce electricity usage such as electric heat, air conditioning, refrigeration, lighting, and so forth. In addition, CAP agencies will have discretion to use the funds as they wish for weatherization. They may also spend up to $200 towards the purchase of an ENERGY STAR® rated refrigerator and $100 towards the purchase of ENERGY STAR® rated CFLs and lighting fixtures.

While the CAPs will have the primary responsibility for obtaining leads for this program, Empire can supplement their efforts, as necessary, by targeting low income customers in arrearage that would benefit from reduced utility bills.

This program helps low income customers reduce their energy costs at no cost to the customer. CAP agencies offer a cost effective implementation capability, which allows most of the funds allocated to this program to go directly to the purchase and installation of energy efficiency measures.

The participation and expected demand and energy savings for the Low Income Assistance Program are shown on Table 3-1. The program budget and effectiveness are shown on Table 3-2.

Table 3-1
Low-Income Assistance Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
100	41	144,903

Table 3-2
Low-Income Assistance Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$144,500	$30,000	$15,000	$0	$10,000	$199,500	0.55	$1.38

Since this is a direct install program that pays money directly to the CAP agencies, no funds are listed under customer incentives. The budget assumes an administration cost of 15% and marketing costs of 7.5%.

Evaluation

The evaluation budget assumed is 5% of annual project cost. CAP agencies will be required to provide a list of the measures for each home served for which Empire's funds were used. This program is similar to many other low-income programs that are being implemented throughout the U.S. The impact evaluation should reflect the actual mix of all electric homes (electric space heat). A process evaluation will be conducted during the second year of implementation and every other year thereafter.

3.7.2 Residential High Efficiency Lighting

Program Description

ENERGY STAR® encourages every American to change out the fixtures they use most at home (or the light bulbs in them) to ENERGY STAR® qualified lighting. The most frequently used lights typically include the kitchen ceiling dome light, living room table lamp, living room floor lamp, bathroom vanity light and outdoor porch or post lamp.

Not only do ENERGY STAR® qualified compact fluorescent lamps (CFLs) use up to 75% less energy than typical incandescent light bulbs, but CFLs also offer superior performance by lasting up to 10 times longer than incandescent bulbs, reducing the need to change hard-to-reach light bulbs. The current generation of CFLs offer bright and warm light and are available in a wide variety of shapes and sizes. CFL technology continues to mature, with recess lighting lamps costing little more than incandescent and 3-way CFL lamps becoming more affordable.

This program offers residential customers the ability to purchase up to ten CFLs at a local retailer at a reduced cost. The assumption used in this analysis is that rebates would be limited to one per household per year. Specific rebate levels will be determined through arrangements negotiated with retailers in the service territory.

Rebates would be available for different wattage sizes, different configurations (standard and recessed), and different styles (3-way). Rebate levels may vary depending upon the type of CFL and its associated retail cost.

In 2012, the Electricity-Related Provisions in H.R. 6 "Energy Independence and Security Act of 2007"[6] will take effect. Starting in 2012, incandescent lamps will require lower wattages as shown in Table 3-3:

Table 3-3
Incandescent Lighting standards

Year Effective	Typical Wattage	New Standard	% Reduction
2012	100	75	25.00
2013	75	53	29.33
2014	60	43	28.33
2014	40	29	27.50

Because of this legislation, the Residential High Efficiency Lighting Program will be eliminated in 2018. While a customer will be eligible to purchase up to ten CFLs per year, the energy savings assumptions assume that the average customer will purchase six CFLs.

The participation and expected demand and energy savings for the Low Income Assistance Program are shown on Table 3-4. The program budget and effectiveness are shown on Table 3-5.

Table 3-4
Residential High Efficiency Lighting – Participation, Energy and Demand Savings

Lamps per Year	Demand (kW)	Energy (kWh)
10,000	75	2,885,232

Table 3-5
Residential High Efficiency Lighting – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$6,000	$3,500	$5,000	$60,000	$3,500	$78,000	6.14	$0.03

Evaluation

The evaluation budget assumed is 5% of annual project cost. Empire can compare its program to evaluations conducted by the EPA and ENERGY STAR®. A process

[6] Subtitle B - Lighting Energy Efficiency; Sec. 321 -Efficient Light Bulbs. Amends Section 321 (30) of EPCA to mandate new energy efficiency standards for general service incandescent light bulbs, intermediate base lamps, and candelabra base incandescent lamps initially excluded from these standards, including appliance lamps, bug lamps, reflector lamps, rough service lamps, and 3-way incandescent lamps.

evaluation will be conducted in the second year of implementation and every other year thereafter.

3.7.3 Residential High Efficiency Cooling Program

Program Description

The Residential High Efficiency Cooling Program will encourage residential customers to purchase and install energy-efficient evaporative coolers, 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 market toward greater energy-efficiency.

As part of the program, contractors will be provided incentives for "quality installs" that will focus on air and duct sealing. Empire may require that HVAC contractors participate in training to be eligible to install eligible equipment for this program. Empire will randomly inspect installations to ensure measures are implemented properly.

Customer incentives will be offered for the measures shown in Table 3-6.

Table 3-6
Residential High Efficiency Cooling Program – Incentives by Measure

Measure	Incentive
a) Split Central Air Conditioners: SEER ≥ 14.5 and EER ≥ 12 b) Air Source Heat Pumps: SEER ≥ 14.5 and EER ≥ 12, HSPF ≥ 8.5 c) Ductless Mini Split Systems: SEER ≥ 14.5 and EER ≥ 11.5	$250
a) Split Central Air Conditioners: SEER ≥ 15 and EER ≥ 12.5 b) Air Source Heat Pumps: SEER ≥ 15 and EER ≥ 12.5, HSPF ≥ 8.5 c) Ductless Mini Split Systems: SEER ≥ 15 and EER ≥ 12	$400
a) Split Central Air Conditioners: SEER ≥ 16 and EER ≥ 13 b) Air Source Heat Pumps: SEER ≥ 16 and EER ≥ 135, HSPF ≥ 8.5 c) Ductless Mini Split Systems: SEER ≥ 16 and EER ≥ 12.5	$600

An additional feature of the program will be to offer training in Manual J calculations and System Charging and Airflow for HVAC contractors. Manual J is the industry standard residential load calculation method. The training offers step-by-step examples of properly sizing equipment and also addresses principles of heat transfer. The training teaches HVAC contractors to accurately perform and document cooling load calculations and reduces over-sizing. The System Charging and Airflow training course covers airflow and charging procedures, standards and includes hands-on training in the use of

testing equipment. Once enough contractors have undergone this training, Empire may mandate that these calculations take place in order to qualify for the incentive.

Program delivery costs cover the contractor training courses in Manual J calculations and System Charging and Airflow. Administration is set at approximately 3% of program costs which is a lower percentage than in other programs. The Company's assumption is that program administration can be leveraged across residential programs. Marketing is assumed to be 7.5% of program cost.

The participation and expected demand and energy savings for the Residential High Efficiency Cooling Program are shown on Table 3-7. The program budget and effectiveness are shown on Table 3-8.

Table 3-7
Residential High Efficiency Cooling Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
400	368	319,726

Table 3-8
Residential High Efficiency Cooling Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$10,000	$3,500	$10,000	$100,000	$6,500	$130,000	2.43	$0.41

Program delivery costs include contractor training courses in Manual J calculations and System Charging and Airflow.

Evaluation

The evaluation budget assumed is 5% of annual project cost. The evaluation will include on-site inspections. Spot metering and runtime data can also be collected to verify the connected load and full load hour estimates used in engineering analysis. A process evaluation will be conducted in the second year of implementation and every second year thereafter.

3.7.4 Refrigerator Pickup Program

Program Description

The Refrigerator Pickup Program will encourage residential or small business customers to turn in old inefficient refrigerators. Refrigerators must be between 10 and 30 cubic feet in size. The refrigerators must also be in operating condition. The program's goal is to get these inefficient refrigerators off the electric system and dispose of them in an

environmentally safe and responsible manner. The Company's consultant, AEG has had preliminary discussions with JACO Environmental, a company that specializes in this program and has access to a disposal facility in Albuquerque which they could use for this program.

As part of the program, an incentive will be provided to the customer. Initially, a $30 rebate will be offered per qualifying unit.

The contractor would handle scheduling, transportation and disposal. The contractor would also provide nameplate data on units to assist in impact evaluation.

Program delivery costs for the contractor are budgeted at $110/unit. Marketing and program administration costs are budgeted at approximately $15 per unit. Based on discussions with JACO Environmental regarding participation levels that they have experienced with other utilities, Empire has set an annual goal of 750 units.

The participation and expected demand and energy savings for the Refrigerator Pickup Program are shown on Table 3-9. The program budget and effectiveness are shown on Table 3-10.

Table 3-9
Refrigerator Pickup Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
750	82	662,802

Table 3-10
Refrigerator Pickup Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$82,500	$11,750	$11,750	$22,500	$6,500	$135,000	2.67	$0.20

Evaluation

The evaluation budget assumed is 5% of annual project cost. Evaluations may include measurement of energy use on equipment. A process evaluation will be conducted in the second year of implementation.

3.7.5 Home Performance with ENERGY STAR®

Program Description

Home Performance with ENERGY STAR® is a unique program that enhances the traditional existing home energy audit service. This program uses the ENERGY STAR® brand to help encourage and facilitate whole-house energy improvements to existing

housing. This program focuses on the private-sector contractors and service professionals who currently work on existing homes – replacing HVAC systems, adding insulation, installing new windows, etc. The Missouri Home Performance with ENERGY STAR® Initiative requires contractors to be accredited under Building Performance Institute (BPI) standards. Technicians must possess appropriate skills and are field-tested to obtain certification, further lending credibility to services offered. Empire will assist contractors in becoming accredited and certified by BPI. In addition, Empire will arrange to have a random sample of jobs inspected.

The program strives to provide homeowners with consumer education, value, and a whole-house approach. A participating BPI-certified Home Performance contractor[7] can identify and fix a variety of home energy efficiency problems, including poor insulation, air leaks through cracks and gaps, and ineffective moisture control by first performing a home assessment. Upon completion of the inspection, the contractor will provide an itemized cost estimate for each suggested improvement.

Contractors are trained to provide "one-stop" problem solving that identifies multiple improvements that, as a package, will increase the home's energy efficiency. While the program goal is saving energy, its market-based approach and message focus on addressing a variety of customer needs – comfort, energy savings, durability, and health & safety. It also encourages the development of a skilled and available contractor/provider infrastructure that has an economic self-interest in providing and promoting comprehensive, building science-based, retrofit services.

The benefits for a customer that participates in the program include:

- Significant savings on energy bills
- Higher home resale value
- A quieter, more comfortable living environment
- Improved air quality for better health
- Greater home durability with lower maintenance
- Increased environmental safety and energy efficiency

Empire will work to leverage program funds by "piggybacking" with similar programs used by neighboring utilities.

The participation and expected demand and energy savings for the Refrigerator Pickup Program are shown on Table 3-11. The program budget and effectiveness are shown on Table 3-12.

[7] A BPI-Certified Home Performance Contractor must be certified by BPI, a national resource for building science technology that sets standards for assessing and improving the energy performance of homes. A certified Home Performance contractor can performance-test a home using the most advanced whole house testing technologies and produce a Comprehensive Home Assessment report. Note that Empire does not warrant the products and/or services of participating contractors.

Table 3-11
Home Performance with ENERGY STAR® – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
150	87	304,552

Table 3-12
Home Performance with ENERGY STAR® – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$112,500	$15,000	$15,000	$0[8]	$7,500	$150,000	1.19	$0.49

Evaluation

The evaluation budget assumed is 5% of annual project cost. Empire will track whole-house evaluations that are performed by certified contractors in its service territory. Evaluations performed by ENERGY STAR® or other utilities with the same program can be monitored and used to estimate the benefits from this program. A process evaluation looking at best practices could be conducted at the beginning of the second year and every three years thereafter.

3.7.6 Home Energy Comparison Reports

Program Description

This is a program that uses a software platform that combines energy usage data with customer demographic, housing and GIS data to develop specific, targeted recommendations that educate and motivate consumers to reduce their energy consumption.

One company offering such a platform is OPower's Home Energy Reporting System. The Home Energy Reporting System is a proven energy efficiency program that successfully leverages large-scale consumer engagement to drive measurable, predictable and sustainable energy savings.

The Home Energy Reports are a targeted direct mailing to a utility's customers that provide specific recommendations and incentives to motivate recipients to reduce their energy consumption. The individualized reports show customers:

- Electricity use compared to the average of 100 neighbors in similar-sized homes with similar characteristics.

[8] All customer benefits are included in program delivery. However, Empire is in the process of considering whether a portion of the delivery costs should be paid to customers in the form of an incentive.

- Targeted efficiency recommendations based on analysis of the household's energy usage, demographics and housing characteristics.
- How recipients can easily take action to reduce their consumption based on their individual circumstances.

In addition, the selected vendor for this program will be required to deploy an online tool suite that gives customers greater insight into their energy consumption and what they can do to become more energy efficient. It is anticipated that the online suite would include:

- Customer electricity usage
- Efficiency recommendation database with ratings and reviews.
- Customer comments collected and analyzed regionally on which tips work best for customers in the region.

The participation and expected demand and energy savings for the Home Energy Comparison Reports are shown on Table 3-13. The program budget and effectiveness are shown on Table 3-14.

Table 3-13
Home Energy Comparison Reports – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
10,000	78	3,002,778

Table 3-14
Home Energy Comparison Reports – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$74,500	$15,000	$15,000	$0	$5,500	$110,000	1.28	$0.04

Evaluation

The evaluation budget assumed is 5% of annual project cost. A combination of bill analysis and process evaluations will be conducted on an annual basis.

3.7.7 ENERGY STAR® Appliance Rebates

Program Description

The goal of this program is to acquire cost-effective energy efficiency by increasing sales of certain ENERGY STAR® qualified appliances to residential (and is some cases small business customers). Under this program, Empire will be educating consumers (build

awareness and branding) through advertising and promotions to purchase ENERGY STAR® qualified refrigerators and clothes washers.[9]

Participating customers will receive a rebate of $25 for each qualifying refrigerator or washing machine purchased.

The participation and expected demand and energy savings for the ENERGY STAR® appliance rebates are shown on Table 3-15. The program budget and effectiveness are shown on Table 3-16.

Table 3-15
ENERGY STAR® Appliance Rebates – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
1500[10]	28	222,270

Table 3-16
ENERGY STAR® Appliance Rebates – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$2,250	$1,000	$2,000	$37,500	$3,500	$46,250	1.07	$[11]

Evaluation

The evaluation budget assumed is 7.6% of annual project cost, which is higher than other programs. However, the total budget for evaluation is relatively low even at the allocation used. Empire can compare its program to evaluations conducted by the EPA and ENERGY STAR®. A process evaluation will be conducted in the second year of implementation and every other year thereafter.

3.7.8 Direct Load Control

Program Description

An Direct Load Control or A/C Cycling Program can reduce residential and small commercial air conditioning load during peak summer days. This reduction is achieved by sending a signal to a control device attached to the customer's air conditioner. The control device then turns the air conditioner off and on over a period of time depending on the control and load reduction strategy establish by Empire. There are a number of

[9] For Scenarios 1 and 2 this program is not part of the Company's portfolio. Under Scenario 4 this program would also include ENERGY STAR®-qualified dehumidifiers
[10] For program planning purposes, it was assumed that there would be 1,000 participants purchasing refrigerators and 500 participants purchasing washing machines.
[11] Cost per kWh is $0.32 for refrigerators and $0.13 for washing machines.

different products in the market. The primary differences are control type (thermostat versus outside control switch) and communications (two-way versus one-way). While the achievable savings are similar from the different options, the ability to market, keep customers in the program, and verify the savings differ significantly. A one-way communication protocol was assumed for Scenarios 1-3. For Scenario 4, a 2-way communication protocol was used.

The participation and expected demand and energy savings for Direct Load Control are shown on Table 3-17. The program budget and effectiveness are shown on Table 3-18.

Table 3-17
Direct Load Control – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
2,500	2,717	80,145

Table 3-18
Direct Load Control – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$735,500	$50,000	$50,000	$0	$40,000	$875,000	1.74	$10.92

Evaluation

The evaluation budget assumed is 5% of annual project cost. Annual evaluations to assess customer participation are conducted, providing that the program is activated.

3.7.9 Commercial Prescriptive Rebate Program

Program Description

The Commercial Prescriptive Rebate Program will provide standardized pre-determined rebates to commercial customers that install, replace or retrofit electric savings measures of pre-qualified performance. These measures include lighting, HVAC, chillers, and electric motors, including variable frequency drives. Measures are proven technologies that are readily available with known performance characteristics. This includes T5 fluorescent lighting systems, high performance T8 lamp and ballast combinations, high bay fluorescent fixtures, pulse start metal halide lamps, high efficiency unitary HVAC and NEMA premium electric motors. A $40,000 cap will be imposed per facility or building for the first nine months of each program year cycle. However, if funds are still available in the last three months of the program year, the cap may be exceeded.

All commercial customers are eligible to participate in this program. The same customer can participate multiple times, e.g., retrofit a lighting system and upgrade to a more efficient HVAC system. Different end-uses have different potential participation levels. Lighting equipment can be replaced at any time, thus all customers are eligible to

participate immediately. Conversely, motors and HVAC equipment are generally only replaced at the end of their useful lifetime, thus the eligible participants would be 10% of all customers in any given year assuming a 10-year life for the equipment. A two-year roll up to full scale program participation levels has been assumed as well.

Table 3-19 through 3-24 contain a list of measures that will be eligible for prescriptive rebates. This list is similar to what other utilities with similar programs are currently offering.

Table 3-19
Commercial Prescriptive Rebate Program – Chillers Measures and Rebates

Equipment	Minimum Efficiency	Base Unit Incentive per ton	Additional Incentive
Air Cooled Chiller with condenser ≥ 30 and ≤ 300 tons	10 EER and IPLV 12 EER	$20	$5/ton for each 0.1 EER point above minimum criteria
Water Cooled Chiller≥ 30 and < 150 tons	.72 kW/ton and IPLV .62 kW/ton	$12	$8/ton for each .01 kW/ton below minimum criteria
Water Cooled Chiller≥ 150 and < 300 tons	.63 kW/ton and IPLV .51 kW/ton	$12	$2/ton for each .01 kW/ton below minimum criteria
Water Cooled Chiller with condenser ≥ 300 and ≤ 1000 tons	.56 kW/ton and IPLV .51 kW/ton	$5	$4/ton for each .01 kW/ton below minimum criteria

Table 3-20
Commercial Prescriptive Rebate Program – Variable Frequency Drives Measures and Rebates

Equipment	Rating	Incentive
VFD rebates used for HVAC fans, pumps, cooling towers, process equipment and industrial fans. Equipment needs to operate in excess of 4,000 hours annually to qualify.	1 hp to 200 hp	$30 per hp

Table 3-21
Commercial Prescriptive Rebate Program – Lighting Measures and Rebates

Measure and Description			Rebate	
Fluorescent T8 Lamps with Electronic Ballasts				
Replace incandescent or T12 systems with T8 systems	4' or less	1-2 lamps	$5	per system
		3-4 lamps	$9	per system
	5' to 8'	1-2 lamps	$8	per system
High Performance T8				
Lamps must have mean lumens of ≥90 and be matched with selected instant start or programmed start electronic ballast		1-2 lamps	$9	per system
		3-4 lamps	$18	per system
Low-Wattage Fluorescent T8 Lamps				
4', 28 watt or less lamp		T8	$0.50	per lamp
Fluorescent w/specular reflectors				
Each unit shall have a minimum reflectivity of 87%		4'	$12	per fixture
		2-4' tandem wired	$12	per fixture
		8'	$16	per fixture
		2-8' tandem wired	$16	per fixture
High-bay Fluorescent Lamps with Electronic Ballasts				
Replace 400W HID systems with 6-8 lamp T8 or 4-5 lamp T5HO systems.	T8, 4'	6-8 lamps	$75	per fixture
	T5HO, 4 ' or less	4-5 lamps	$75	per fixture
	T5HO, 4' or less	6 lamp	$40	per fixture
Replace 100W HID systems with 12-18 lamp T8 or 8-14 lamp T5HO systems	T8, 4'	12-18 lamps	$125	per fixture
	T5HO, 4' or less	8-14 lamps	$125	per fixture
Hardwired or Modular Compact Fluorescent Fixtures				
Replace incandescent systems with hardwired or modular CFL systems. Does not include screw-base CFLs.		18w or less	$8	per fixture
		19w to 32w	$18	per fixture
		33w or greater	$24	per fixture
Industrial Multi-CFL Fixtures				
Replace fluorescent T12 or HID systems with Multi-CFL systems.			$25	per fixture
Pendant & Wall Mounted Indirect				
Fixture efficiency must meet or exceed 80% and contain no more than 3 lamps with an indirect or direct/indirect distribution		T8 or T5	$24	Per 4' section
Recessed Indirect				
Fixture efficiency must meet or exceed 80% and contain no more than 3 lamps with an indirect or direct/indirect distribution		T8 or T5	$16	per fixture

Table 3-21 (continued)
Commercial Prescriptive Rebate Program – Lighting Measures and Rebates

Measure and Description		Rebate	
High-Efficiency Fluorescent			
Fixture efficiency shall meet or exceed 75% for parabolic and 83% for prismatic and shall contain no more than 3 lamps	1 lamp	$4	per fixture
	2 lamps	$8	per fixture
	3 lamps	$8	per fixture
Metal Halide			
Replace incandescent, high pressure sodium or mercury vapor with Metal Halide	150w or less	$17	per fixture
	151w to 250w	$28	per fixture
	251w or greater	$45	per fixture
Pulse-Start Metal Halide Fixtures			
Replace incandescent, mercury vapor, high pressure sodium, or metal halide systems with pulse-start metal halide systems	175w or less	$25	per fixture
	176w to 319w	$40	per fixture
	320w to 749w	$55	per fixture
	750w or greater	$65	per fixture
Fluorescent Controls			
Passive infrared and/or ultrasonic detector. Units with manual "ON" overrides are not eligible	Ceiling Mounted	$30	per control
	Wall Mounted	$12	per control
Daylight Controlled On/Off	Photosensor	$12	per control
Unit shall be mounted on fixture with an On/Off Control	Fixture Mounted	$28	per control
HID Controls			
Each unit shall control HID Lamps. Fixtures controlled On/Off are not eligible.	Occupancy controlled Hi-Low	$35	per fixture
	Daylight controlled dimming	$35	per fixture

Table 3-22
Commercial Prescriptive Rebate Program – HVAC/Heat Pumps/Geothermal Measures and Rebates

Equipment Type and Size	Minimum Efficiency	Rebate ($/ton)
Package A/C & Split Systems		
Single Phase Package or Split Systems < 5.4 tons	14 SEER	$92
Package or Split Systems >5.4 tons and ≤11 tons	11.5 EER	$73
Package or Split Systems > 11 tons and ≤20 tons	11.5 EER	$79
Package or Split Systems > 20 tons and ≤30 tons	10 EER	$79
Water Source Heat Pump Systems		
≤30 tons	14 SEER	$64
Geothermal Heat Pumps		
New Installation - ≤150 tons	16.5 EER	$480
Replacement - ≤150 tons	16.5 EER	$70

Table 3-23
Commercial Prescriptive Rebate Program – Open-Drip Proof (ODP) Motors
Measures and Rebates

Motor Size (hp)	Speed (rpm)			Incentive ($/Motor)
	1200	1800	3600	
	NEMA Nominal Efficiency			
1	82.5%	85.5%	77.0%	$10
1.5	86.5%	86.5%	84.0%	$15
2	87.5%	86.5%	85.5%	$20
3	88.5%	89.5%	85.5%	$25
5	89.5%	89.5%	86.5%	$35
7.5	90.2%	91.0%	88.5%	$50
10	91.7%	91.7%	89.5%	$65
15	91.7%	93.0%	90.2%	$75
20	92.4%	93.0%	91.0%	$100
25	93.0%	93.6%	91.7%	$125
30	93.6%	94.1%	91.7%	$150
40	94.1%	94.1%	92.4%	$200
50	94.1%	94.5%	93.0%	$250
60	94.5%	95.0%	93.6%	$300
75	94.5%	95.0%	93.6%	$350
100	95.0%	95.4%	93.6%	$450
125	95.0%	95.4%	94.1%	$500
150	95.4%	95.8%	94.1%	$550
200	95.4%	95.8%	95.0%	$600

Table 3-24
Commercial Prescriptive Rebate Program – Totally Enclosed Fan-Cooled (TEFC) Motors Measures and Rebates

Motor Size (hp)	Speed (rpm)			Incentive ($/Motor)
	1200	1800	3600	
	NEMA Nominal Efficiency			
1	82.5%	85.5%	77.0%	$10
1.5	87.5%	86.5%	84.0%	$15
2	88.5%	86.5%	85.5%	$20
3	89.5%	89.5%	86.5%	$25
5	89.5%	89.5%	88.5%	$35
7.5	91.0%	91.7%	89.5%	$50
10	91.0%	91.7%	90.2%	$65
15	91.7%	92.4%	91.0%	$75
20	91.7%	93.0%	91.0%	$100
25	93.0%	93.6%	91.7%	$125
30	93.0%	93.6%	91.7%	$150
40	94.1%	94.1%	92.4%	$200
50	94.1%	94.5%	93.0%	$250
60	94.5%	95.0%	93.6%	$300
75	94.5%	95.4%	93.6%	$350
100	95.0%	95.4%	94.1%	$450
125	95.0%	95.4%	95.0%	$500
150	95.8%	95.8%	95.0%	$550
200	95.8%	96.2%	95.4%	$600

The participation and expected demand and energy savings for the Commercial Prescriptive Rebate Program are shown on Table 3-25. The program budget and effectiveness are shown on Table 3-26.

Table 3-25
Commercial Prescriptive Rebate Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
60	139	705,279

Table 3-26
Commercial Prescriptive Rebate Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$7,750	$5,000	$3,000	$165,000	$9,000	$189,750	1.18	$0.27

Evaluation

The evaluation budget assumed is 5% of annual project cost. Impacts are generally based upon engineering analysis which can be specific for building type. Site visits will be conducted for a random sample of each technology type. A process evaluation will be conducted in the second year of implementation and every second year thereafter.

3.7.10 Commercial Custom Rebate Program

Program Description

All equipment that does not qualify for a prescriptive rebate will be eligible for a custom rebate. The Commercial Custom Rebate Program evaluates the costs and benefits of individual projects against program benchmarks, and rebates are paid based on the following criteria:

Custom rebates are calculated as the lesser of the following:

- 50% of the incremental cost[12]
- $0.30 per kWh savings[13]

The cost per kWh criterion provides a cap on incentives for projects that are relatively expensive for the amount of kW and kWh saved.

One customer may submit multiple custom rebate applications for different measures. Each individual measure will be evaluated on its own merits. Similar measures that are proposed in different facilities or buildings will be evaluated separately. A $40,000 cap will be imposed per facility or building for the first nine months of each program year cycle. However, if funds are still available in the last three months of the program year, the cap may be exceeded. This cap includes any incentives received through the Commercial Prescriptive Rebate Program.

Custom rebates will cover measures that do not fall under the Commercial Prescriptive Rebate Program.

The participation and expected demand and energy savings for the Commercial Custom Rebate Program are shown on Table 3-27. The program budget and effectiveness are shown on Table 3-28.

[12] Incremental cost will be based on the difference in cost between a baseline ("standard efficiency" option) and the proposed high-efficiency option. The baseline will vary according to the technology and end-use. Customer savings will be based on the estimated reduction in billed energy and demand.

[13] $.30 represents, conceptually, the upper limit of cost effective projects requiring utility investment.

Table 3-27
Commercial Custom Rebate Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
10	100	511,072

Table 3-28
Commercial Custom Rebate Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$7,750	$5,000	$3,000	$130,250	$8,000	$154,000	1.52	$0.30

Evaluation

The evaluation budget assumed is 5% of annual project cost. Depending upon the specific project, various levels of engineering analysis will be required to estimate the incentives for this project. For larger projects, Empire may wish to conduct some metering. A process evaluation will be conducted in the second year of implementation and every other year thereafter.

3.7.11 Large C&I Turnkey Energy-Efficiency Program

Program Description

Empire has a wide variety of large commercial and industrial (C&I) customers. Industrial customers are characterized by complex operations, specialized processes and equipment, and very diverse end-uses. The large C&I turnkey energy-efficiency program utilizes a two-pronged design approach:

1. Energy Auditing and Technical Assistance
The first part of the program offers detailed energy audits and technical support to eligible customers. One of the most common needs among industrial energy users is objective technical expertise. Very few of these users have access to the kind of information needed to make decisions about energy-efficiency projects. As a result, many efficiency opportunities are lost. To assist in program delivery, local energy-efficiency experts could be engaged to provide auditing services through Empire. Empire could also train or contract with energy-efficiency experts to evaluate customer sites and potential projects. Energy audits may be provided on a cost-shared basis to encourage participation. Audits should be targeted to manufacturers with multiple processes and end-uses.

2. Incentives and Continued Technical Support
The program would evaluate the costs and benefits of individual projects against program benchmarks, and rebates would be paid on the same basis as described for the

Commercial Custom Rebate Program. The rebates will be paid based on the following criteria:

Rebates are calculated as the lesser of the following:

- 50% of the incremental cost[14]
- $0.25 per kWh savings

The cost per kWh criterion provides a cap on incentives for projects that are relatively expensive for the amount of kW and kWh saved.

One customer may submit multiple custom rebate applications for different measures. Each individual measure will be evaluated on its own merits. Similar measures that are proposed in different facilities or buildings will be evaluated separately. A cap may be imposed per facility for the first nine months of each program year cycle. However, if funds are still available in the last three months of the program year, the cap may be exceeded.

Monitoring and verification (M&V) audits should be conducted for a sample of all projects to ensure customer compliance with program rules.

The average rebate per participant for this program is assumed to be about $80,000. Program delivery is set at almost 20% of incentive cost. This will cover the informational, audit and engineering support required to implement this program.

The participation and expected demand and energy savings for the Large C&I Turnkey Energy-Efficiency Program are shown on Table 3-29. The program budget and effectiveness are shown on Table 3-30.

Table 3-29
Large C&I Turnkey Energy-Efficiency Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
4	453	2,094,465

Table 3-30
Large C&I Turnkey Energy-Efficiency Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$60,666	$15,000	$7,500	$326,667	$12,000	$408,333	2.27	$0.19

[14] Incremental cost will be based on the difference in cost between a baseline ("standard efficiency" option) and the proposed high-efficiency option. The baseline will vary according to the technology and end-use. Customer savings will be based on the estimated reduction in billed energy and demand.

Evaluation

The evaluation budget assumed is 3% of annual project cost. Depending upon the specific project, various levels of engineering analysis will be required to estimate the incentives for this project. For larger projects, Empire may wish to conduct some metering. Given the low number of targeted customers, process evaluations will not be conducted.

3.7.12 Small Business Direct Install[15]

Program Description

The small business sector has historically been a very difficult sector to effectively reach with DSM. This is due to many factors, including a general lack of energy information, lack of available capital, lack of time to investigate energy saving opportunities and options, lack of time to effectively select and manage an installation contractor and others. This program is specifically designed to address these barriers by simplifying this process as much as possible while including a customer commitment (20% of the cost) to insure that value in the process is maintained.

The purpose of this program is to directly reduce the electric consumption of small commercial facilities (less than 40 kW) in Empire's service territory, facilitating both the understanding of savings options available and the actual installation of energy savings measures. This will be accomplished through a "One Stop Shop" process that will include (a) a free on-site building energy assessment, (b) actually installing energy efficient measures such as lighting, refrigeration/cooling improvements, and equipment control (EMS, sensors, setbacks, etc.) and (c) referring additional potential efficiency improvement measures to the C&I rebate programs if applicable.

After receiving the free energy assessment, the customer will be eligible for the installation of energy saving measures by agreeing to a co-payment equal to 20% of the installation cost. The remaining 80% of the installation costs will be borne by this program.

The participation and expected demand and energy savings for the Large Small Business Direct Install are shown on Table 3-31. Under Scenario 4, the assumed budget for the program is $318,500 and the program has an estimated benefit to cost ratio of 1.76.

Table 3-31
Small Business Direct Install – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
125	186	948,386

[15] This program is only included in the scenario with the highest assumed carbon dioxide costs (Scenario 4). However, Empire believes this is a potential program offering and wanted to provide a general description.

3.7.13 Building Operator Certification Program

Program Description

The Building Operator Certification (BOC) Program is a professional development program in the energy and resource 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.

There are two levels of certification: Level I - Building System Maintenance and Level II - Equipment Troubleshooting and Maintenance. Development support for BOC was original provided by the Northwest Energy Efficiency Alliance (NEEC), a non-profit group of electric utilities, state governments, public interest groups, and industry representatives committed to promoting affordable, energy-efficient products and services. Today, the NEEC is leading efforts to make BOC a nationally recognized standard.

The Midwest Energy Efficiency Alliance (MEEA) is administering BOC in the Midwest region with support from the Illinois Department of Commerce and Economic Opportunity, Missouri Department of Natural Resources, the Minnesota Department of Commerce, and the Ohio Department of Development. Empire is currently operating this program independently in Missouri with verbal agreements that customers may participate with some neighboring utilities, including KCP&L. The program is targeted towards customers with facilities that employ full-time building operators.

The participation and expected demand and energy savings for the Building Operator Certification Program are shown on Table 3-32. The program budget and effectiveness are shown on Table 3-33.

Table 3-32
Building Operator Certification Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
20	39	181,663

Table 3-33
Building Operator Certification Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$23,500	$5,000	$5,000	$0	$1,500	$35,000	0.82	$0.19

Evaluation

The evaluation budget assumed is 3% of annual project cost. Empire will keep track of each customer that participates in the program. Impacts can be based upon methodologies developed by other utilities and stakeholders (e.g., the Missouri Department of Natural Resources). A process evaluation could be conducted at the beginning of the third year of implementation and every three years thereafter.

3.7.14 Large C&I Voluntary Interruptible/Peak Load Reduction Program

Program Description

The C&I Voluntary Interruptible/Peak Load Reduction Program is a partnership between businesses and Empire to assure that electric demand can be met on certain days during the summer and winter when customer demand for electricity might exceed the available supply. The program would be multi-tiered based on length of contract. The voluntary load shedding program would require customers to interrupt a minimum of 50 kW, while the contract programs would require the ability to interrupt a minimum of 200 kW. The customer's load must be available for interruption during the most likely peak demand periods. Each interruption will be a minimum of four hours in duration.

This program is intended as a load shedding strategy to be used where system peak demand exceeds available capacity or extreme energy prices are expected. The purpose of such load shedding is to avoid the occurrence of involuntary load curtailments and/or excessive purchased energy prices. The specifics of the program have yet to be decided, however, a representative scenario of the program might be: under the voluntary program, the Customer will be compensated by a one-time credit on the Customer's next bill equal to 45 ¢/kW per hour of requested load curtailment. Under the contract program, customers will be compensated by a credit of 19 ¢/kW per hour of verified curtailed load. These customers will also receive monthly credits ranging from $1.25 to $2.75 per kW of contracted curtailable load.

In addition to standby generation, customers may also reduce demand by:

- Reducing Cooling
- Reducing Lighting
- Deferring production to a later time or shift
- Shutting down non-essential equipment

The participation and expected demand and energy savings for the C&I Voluntary Interruptible/Peak Load Reduction Program are shown on Table 3-34. The program budget and effectiveness are shown on Table 3-35.

Table 3-34
C&I Voluntary Interruptible/Peak Load Reduction Program – Participation, Energy and Demand Savings

Participants per Year	Demand (kW)	Energy (kWh)
10	5,435	160,291

Table 3-35
C&I Voluntary Interruptible/Peak Load Reduction Program – Program Budget, Cost Effectiveness and Cost per kWh

Program Delivery	Admin.	Marketing	Customer Incentives	Evaluation	Total	TRC	Cost per kWh (year 1)
$21,500	$10,000	$5,000	$30,000	$3,500	$70,000	9.31	$0.44

Evaluation

The evaluation budget assumed is 3% of annual project cost. All participants will have hourly load recorders. The impact of the program can be measured through statistical analysis of the data from the recorders. Evaluations are done every year as long as the program has been activated.

3.4 Total Portfolio Summary

Summary information for the entire portfolio are provided in Tables 3-36, 3-37, and 3-38. Total program budgets for the first year of the programs are provided in Table 3-36. These budgets are across the four scenarios evaluated in the process of conducting the IRP and reflect varying assumptions for the level of carbon dioxide tax implemented and associated natural gas and market prices. Table 3-37 reflects the projected first year savings in energy across the same four scenarios. Table 3-38 reflects the projected first years savings in demand across all four scenarios.

Table 3-36
Total Portfolio Summary – First Year Program Budgets

Program	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total All Programs	**$1,187,800**	**$2,108,217**	**$2,682,917**	**$4,669,667**
Total Residential	**$826,300**	**$1,226,300**	**$1,723,750**	**$3,174,750**
Low-Income Assistance	$99,750	$99,750	$199,500	$399,000
Residential High Efficiency Lighting	$7,800	$7,800	$78,000	$117,000
Residential High Efficiency Cooling	$81,250	$81,250	$130,000	$390,000
Refrigerator Pickup Program	$90,000	$90,000	$135,000	$360,000
Home Performance with ENERGY STAR®	$100,000	$150,000	$150,000	$200,000
Home Energy Comparison Reports	$97,500	$97,500	$110,000	$150,000
ENERGY STAR® Appliance - Refrigerator	$0	$0	$30,000	$135,000
ENERGY STAR® Appliance – Washing Machines	$0	$0	$16,250	$32,500
ENERGY STAR® Appliance - Dehumidifiers	$0	$0	$0	$16,250
Direct Load Control	$350,000	$700,000	$875,000	$1,375,000
Total C&I	**$361,500**	**$871,917**	**$959,167**	**$1,494,917**
Commercial Prescriptive Rebate Program	$126,500	$126,500	$189,750	$253,000
Commercial Custom Rebate Program	$154,000	$154,000	$154,000	$308,000
Large C&I Turnkey Energy-Efficiency Program	$0	$510,417	$510,417	$510,417
Small Business Direct Install	$0	$0	$0	$318,500
Building Operator Certification Program	$35,000	$35,000	$35,000	$35,000
Large C&I Voluntary Interruptible/Peak Load Reduction Program	$46,000	$46,000	$70,000	$70,000

Table 3-37
Total Portfolio Summary – First Year kWh Energy Savings

Program	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total All Programs	**4,684,827**	**7,436,483**	**11,798,795**	**19,134,775**
Total Residential	**3,489,848**	**3,623,424**	**7,622,409**	**13,173,008**
Low-Income Assistance	72,451	72,451	144,903	289,806
Residential High Efficiency Lighting	288,523	288,523	2,885,232	4,327,848
Residential High Efficiency Cooling	199,829	199,829	319,726	959,179
Refrigerator Pickup Program	441,868	441,868	662,802	1,767,472
Home Performance with ENERGY STAR®	203,035	304,552	304,552	406,070
Home Energy Comparison Reports	2,252,084	2,252,084	3,002,778	4,504,168
ENERGY STAR® Appliance - Refrigerator	0	0	94,037	423,167
ENERGY STAR® Appliance – Washing Machines	0	0	128,233	256,465
ENERGY STAR® Appliance - Dehumidifiers	0	0	0	158,688
Direct Load Control	32,058	64,116	80,145	80,145
Total C&I	**1,194,978**	**3,813,059**	**4,176,386**	**5,961,767**
Commercial Prescriptive Rebate Program	470,186	470,186	705,279	940,372
Commercial Custom Rebate Program	511,072	511,072	511,072	1,022,143
Large C&I Turnkey Energy-Efficiency Program	0	2,618,081	2,618,081	2,618,081
Small Business Direct Install	0	0	0	948,386
Building Operator Certification Program	181,663	181,663	181,663	272,494
Large C&I Voluntary Interruptible/Peak Load Reduction Program	32,508	32,058	160,291	160,291

Table 3-38
Total Portfolio Summary – First Year kW Demand Savings

Program	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total All Programs	**2,835**	**4,517**	**9,755**	**11,291**
Total Residential	**1,516**	**2,632**	**3,477**	**4,661**
Low-Income Assistance	21	21	41	83
Residential High Efficiency Lighting	8	8	75	113
Residential High Efficiency Cooling	230	230	368	1,103
Refrigerator Pickup Program	55	55	82	220
Home Performance with ENERGY STAR®	58	87	87	116
Home Energy Comparison Reports	59	59	78	117
ENERGY STAR® Appliance - Refrigerator	0	0	12	53
ENERGY STAR® Appliance – Washing Machines	0	0	16	33
ENERGY STAR® Appliance - Dehumidifiers	0	0	0	106
Direct Load Control	1,087	2,174	2,717	2,717
Total C&I	**1,319**	**1,884**	**6,278**	**6,631**
Commercial Prescriptive Rebate Program	92	92	139	185
Commercial Custom Rebate Program	100	100	100	201
Large C&I Turnkey Energy-Efficiency Program	0	565	565	565
Small Business Direct Install	0	0	0	186
Building Operator Certification Program	39	39	39	59
Large C&I Voluntary Interruptible/Peak Load Reduction Program	1,087	1,087	5,435	5,435

4.0 DSM Programs Evaluated Within the IRP

4.1 Evaluation Approach

DSM programs were evaluated over the 20-year planning horizon on an equal basis with supply-side options. Data required in the modeling include size of each DSM program by year, the monthly load shape for each program, and the costs associated with each program.

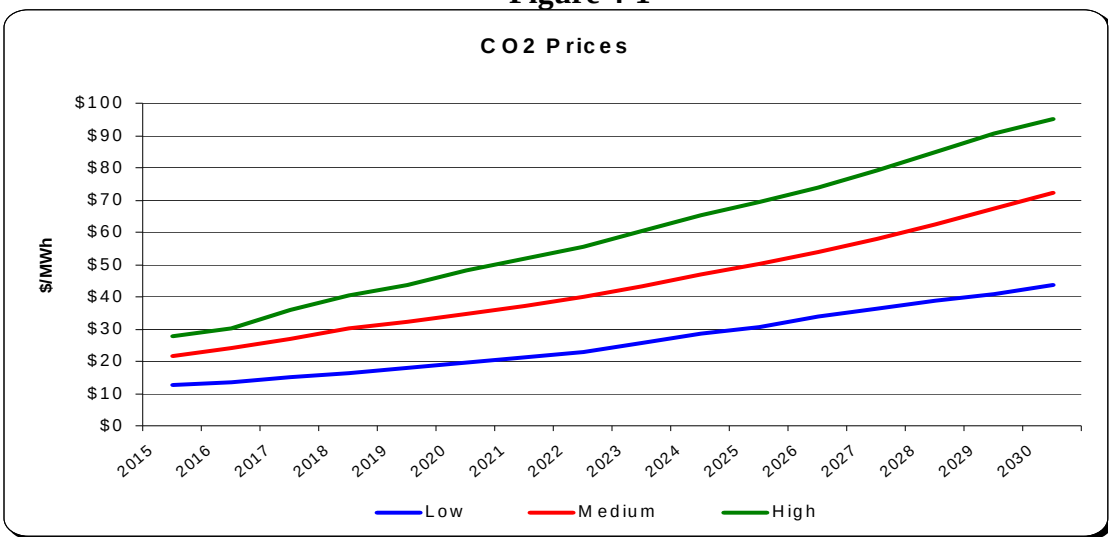
4.2 Avoided Costs Developed for DSM Screening

DSM programs to be considered in the IRP analysis are to be screened, per 4 CSR 240-22.050, using avoided costs developed specifically for this purpose. Screening of DSM programs was performed by Applied Energy Group (AEG) using avoided costs developed by Ventyx. Those DSM programs that passed the screening were made available for consideration in the Capacity Expansion Module of Ventyx. Four levels of energy avoided costs were determined using four levels of pollution mitigation: Scenario 1 – no CO_2 tax is implemented over the planning horizon, Scenario 2 – low CO_2 tax, Scenario 3 – base CO_2 tax, and Scenario 4 – high CO_2 tax. Higher avoided costs result from the imposition of higher levels of pollution mitigation. For all cases, regulation of CO_2 starts in 2015. Table 4-1 and Figure 4-1 show the projected CO_2 taxes ($/ton) for Scenarios 2, 3 and 4.

Table 4-1
Carbon Dioxide Tax Assumptions

	Base CO_2 Scenario – Scenario 3	Low CO_2 Scenario – Scenario 2	High CO_2 Scenario – Scenario 4
2015	21.48	12.55	27.77
2016	24.12	13.58	30.38
2017	27.04	15.05	35.81
2018	30.09	16.35	40.37
2019	32.21	18.07	43.57
2020	34.66	19.43	48.23
2021	37.22	21.23	51.74
2022	40.19	22.98	55.65
2023	43.23	25.72	60.39
2024	46.87	28.51	65.29
2025	50.18	30.81	69.23
2026	53.90	33.84	73.84
2027	58.00	36.35	79.20
2028	62.35	38.60	85.03
2029	67.18	40.63	90.44

Figure 4-1



As avoided costs increase, there are additional benefits to be gained through energy conservation and peak load reduction. Increased benefits are represented by higher benefit cost results. Higher retail rates result in higher bill savings for those customers who become motivated to conserve and participate in DSM programs. Measure costs and incentive levels were reviewed and changed as appropriate to reflect the increased avoided costs and retail rates.

Certain market limitations result in specific DSM programs for which achievable potential will not increase with increased avoided costs or higher retail rates. For example, a program that replaces a piece of equipment with a higher efficiency option at the end of its useful operating life is limited by the number of pieces of equipment that wear out each year.

4.2.1 Avoided Cost – Decrement Size

The calculated avoided costs provide an estimate of the cost savings that could be obtained by substituting DSM resources for existing and new supply-side resources. A large range of avoided costs could be calculated depending on the size of the DSM resource being considered. To minimize the problem associated with this range of size possibilities, the 4 CSR 240-22.050 specifies use of the "decrement" approach to compute avoided costs. Specifically, the Rule states "Avoided costs shall be calculated as the difference in costs associated with a specified decrement in load large enough to delay the on-line date of the new capacity additions by at least one (1) year."

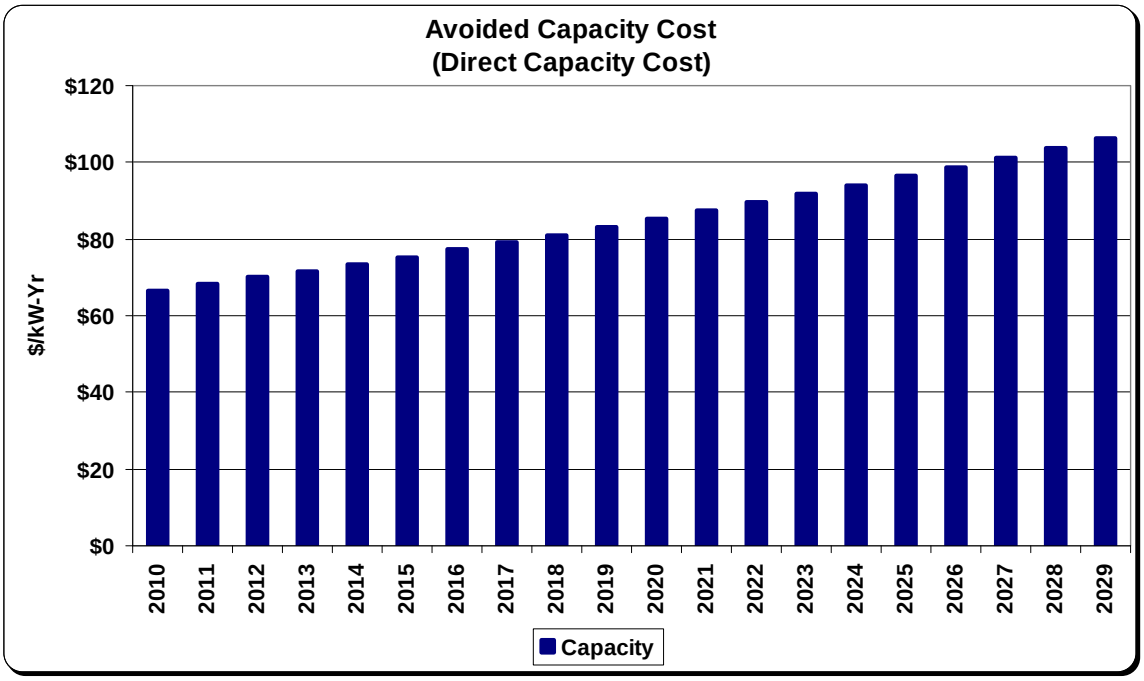
The decrement approach reduces the range of avoided costs for the various DSM programs into a single load decrement or load reduction size that is considered representative of all DSM programs. Clearly, all DSM programs cannot be represented by one uniform decrement size; but for screening purposes, a decrement approach is quite reasonable. DSM programs that pass the total resource costs screening tests were

considered in the integration phase of the modeling. A decrement size of 10 MW was used.

4.2.2 Avoided Cost – Capacity Costs

** ** However, since adding DSM capacity would allow Empire to make sales of energy into the market, a nonzero capacity market was considered in developing the avoided capacity and energy costs for use in the DSM screening. The avoided capacity costs for all four of the cases are shown on Figure 4-2. The avoided energy costs for a case without a carbon tax (Scenario 1) and three carbon tax scenarios are shown on Figures 4-3 through 4-6. Tables 4-2 through 4-5 present the average avoided cost values from the figures.

Figure 4-2
Avoided Capacity Costs – All Cases



Source: Ventyx

Figure 4-3
Avoided Energy Costs – No Carbon Tax (Scenario 1)
**** Highly Confidential in its entirety****

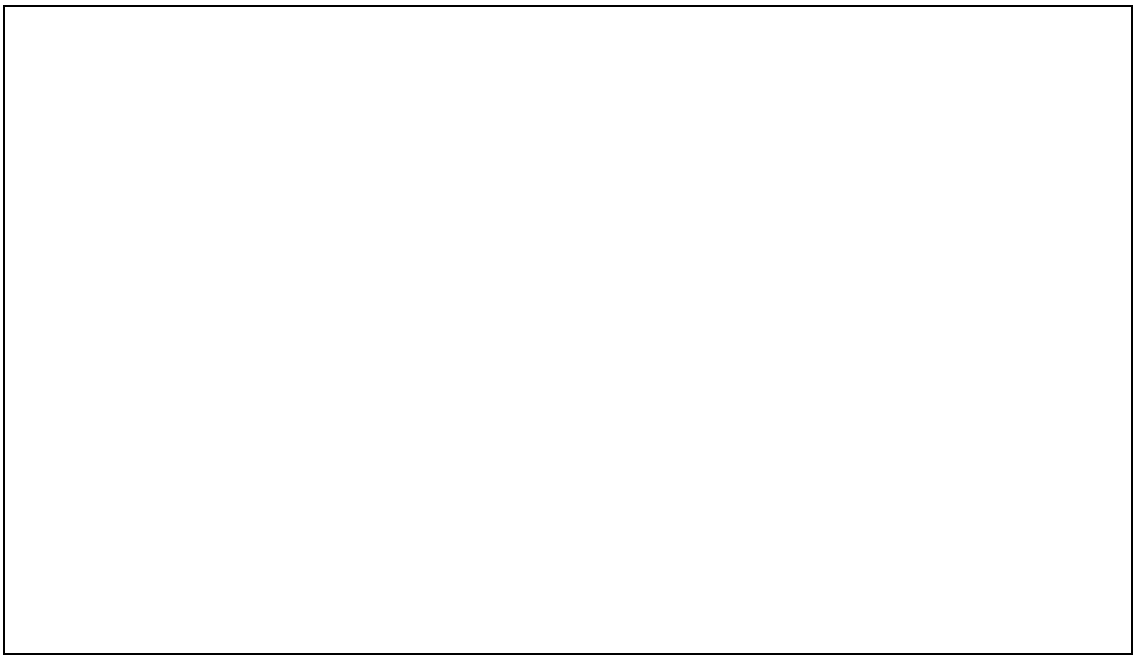
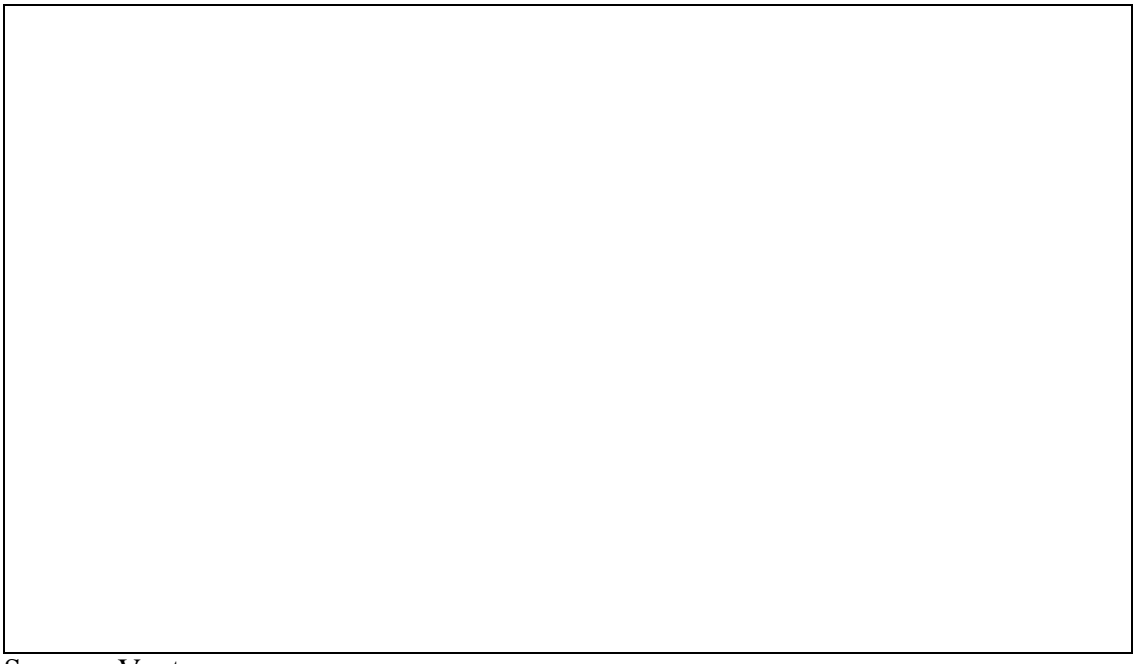
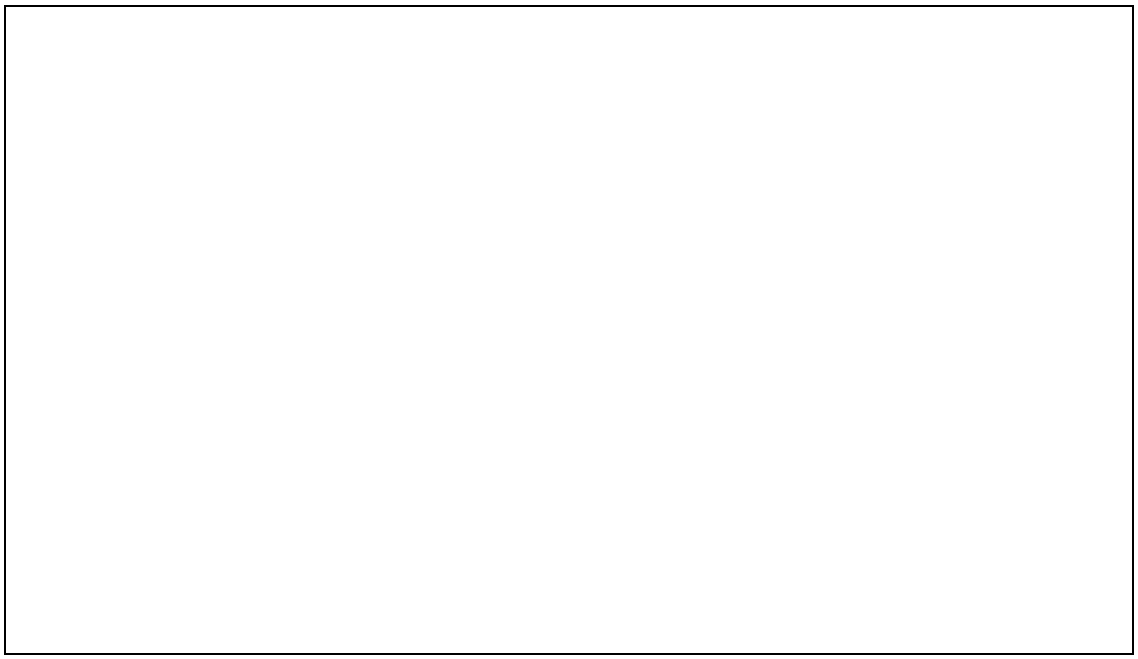


Figure 4-4
Avoided Energy Costs – Low Pollutant Case (Scenario 2)
**** Highly Confidential in its entirety****



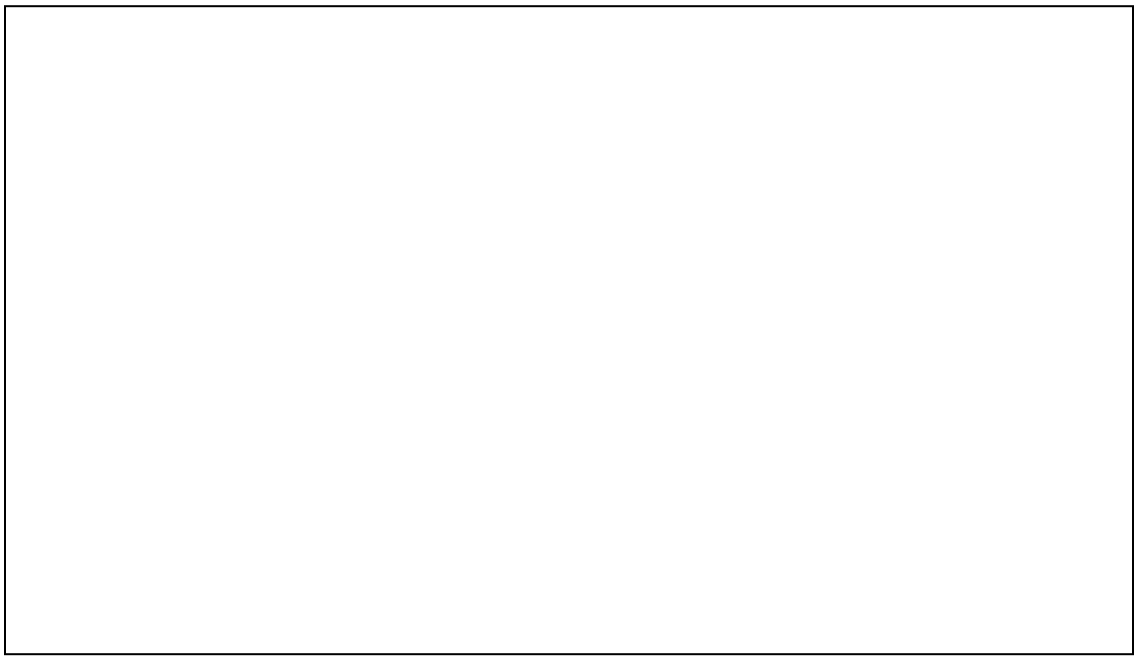
Source: Ventyx

Figure 4-5
Avoided Energy Costs – Medium Pollutant Case (Scenario 3)
**** Highly Confidential in its entirety****



Source: Ventyx

Figure 4-6
Avoided Energy Costs – High Pollutant Case (Scenario 4)
**** Highly Confidential in its entirety****



Source: Ventyx

Table 4-2
Average Direct Running Costs ($/MWh) – No Carbon Tax (Scenario 1)
**** Highly Confidential in its entirety****

Table 4-3
Average Direct Running Costs ($/MWh) – Low Pollutant Case (Scenario 2)
**** Highly Confidential in its entirety****

Table 4-4
Average Direct Running Costs ($/MWh) – Medium Pollutant Costs (Scenario 3)
**** Highly Confidential in its entirety****

Table 4-5
Average Direct Running Costs ($/MWh) – High Pollutant Costs (Scenario 4)
**** Highly Confidential in its entirety****

4.3 Demand Response Programs

Two demand response programs, Residential Direct Load Control and C&I Voluntary Interruptible/Peak Load Reduction are candidate demand-side resources for Empire's 2010 IRP.

4.4 Program Specifications

None of the candidate demand-side resources considered for the IRP are load building programs. The solar photovoltaic (PV) and wind renewable energy programs that were considered in the technical potential analysis did not pass the screening tests and thus are not included in the candidate demand-side resources considered in the IRP. None of the candidate demand-side resources reflect energy technologies that substitute for electricity at the point of use. The candidate demand-side resources examined, as previously identified in Section 3.0, include:

- **Residential**
  - Low-Income Assistance Program
  - Residential High Efficiency Lighting
  - Residential High Efficiency Cooling Program
  - Refrigerator Pickup Program
  - Home Performance with ENERGY STAR®
  - Home Energy Comparison Reports
  - ENERGY STAR® Appliance Rebates
    - Refrigerators
    - Washing Machines
    - Dehumidifier
  - Direct Load Control
- **Commercial and Industrial**
  - Commercial Prescriptive Rebate Program
  - Commercial Custom Rebate Program
  - Large C&I Turnkey Energy Efficiency Program
  - Small Business Direct Install
  - Building Owner Certification Program
  - Large C&I Voluntary Interruptible/Peak Load Reduction Program

This portion of the IRP report provides load shapes for each program reflecting the data used as input to the planning models as well as the costs, energy savings, and peak demand savings for each program for each environmental scenario. Although load shapes were developed for each month to reflect different weather conditions and thus different impacts of each DSM program, figures for each program are only provided for specific months of interest.

4.4.1 Low-Income Assistance Program

The parameters needed for computer modeling for Scenario 1 for the Low-Income Assistance Program are shown in Table 4-6. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for the Low-Income Assistance Program vary by year. Those values are reflected on Tables 4-7 through 4-9.

Table 4-6
Low-Income Assistance Program – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	50	$99,750	72,451	21

Table 4-7
Low-Income Assistance Program – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	50	$99,750	72,451	21
2012	51	$101,745	73,900	21
2013	52	$103,740	75,349	22
2014	53	$105,735	76,798	22
2015	54	$107,730	78,247	22
2016	55	$109,725	79,697	23
2017	56	$111,720	81,146	23
2018	57	$113,715	82,595	24
2019	58	$115,710	84,044	24
2020-2029	59	$117,705	85,493	24

Table 4-8
Low-Income Assistance Program – Scenario 3 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	100	$199,500	144,903	41
2012	103	$205,485	149,250	43
2013	106	$211,470	153,597	44
2014	109	$217,455	157,944	45
2015	112	$223,440	162,291	46
2016	115	$229,425	166,638	48
2017	118	$235,410	170,985	49
2018	121	$241,395	175,332	50
2019	124	$247,280	179,679	51
2020-2029	127	$253,365	184,027	53

Table 4-9
Low-Income Assistance Program – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	200	$399,000	289,806	83
2012	205	$408,975	297,051	85
2013	210	$418,950	304,296	87
2014	215	$428,925	311,541	89
2015	220	$438,900	318,786	91
2016	226	$450,870	327,480	94
2017	232	$462,840	336,174	96
2018	238	$474,810	344,869	98
2019	244	$486,780	353,563	101
2020-2029	250	$498,750	362,257	103

The load shapes used in the modeling for the Low-Income Assistance Program for January and July are shown in Figures 4-7 and 4-8, respectively.

Figure 4-7

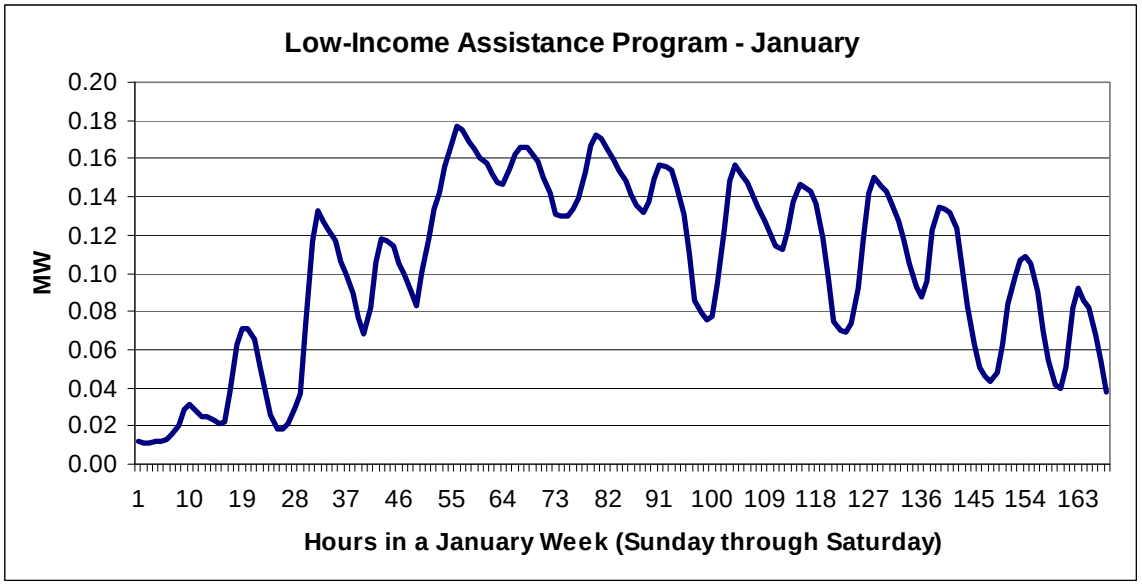
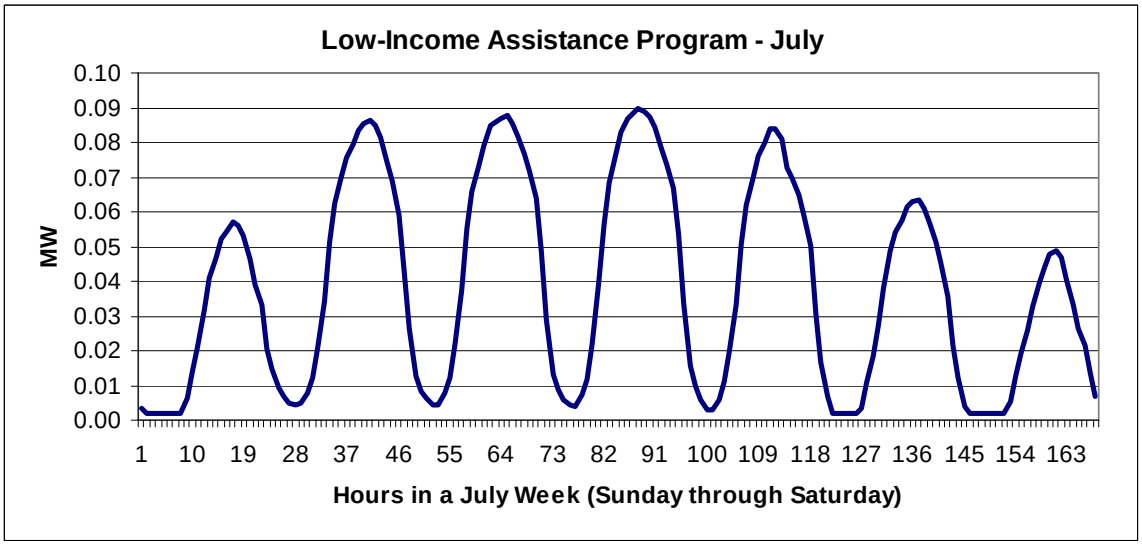


Figure 4-8



4.4.2 Residential High Efficiency Lighting

The parameters needed for computer modeling for each of the scenarios for Residential High Efficiency Lighting are shown on Tables 4-10 through 4-13.

Table 4-10
Residential High Efficiency Lighting – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	1,000	$7,800	288,523	8
2012	1,000	$7,800	288,523	8
2013	1,000	$7,800	288,523	8
2014	900	$7,020	259,671	7
2015	800	$6,240	230,819	6
2016	700	$5,460	201,966	5
2017	600	$4,680	173,114	5

Table 4-11
Residential High Efficiency Lighting – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	1,000	$7,800	288,523	8
2012	1,025	$7,995	295,736	8
2013	1,051	$8,198	303,238	8
2014	900	$7,020	259,671	7
2015	800	$6,240	230,819	6
2016	700	$5,460	201,966	5
2017	600	$4,680	173,114	5

Table 4-12
Residential High Efficiency Lighting – Scenario 3 Input Parameters

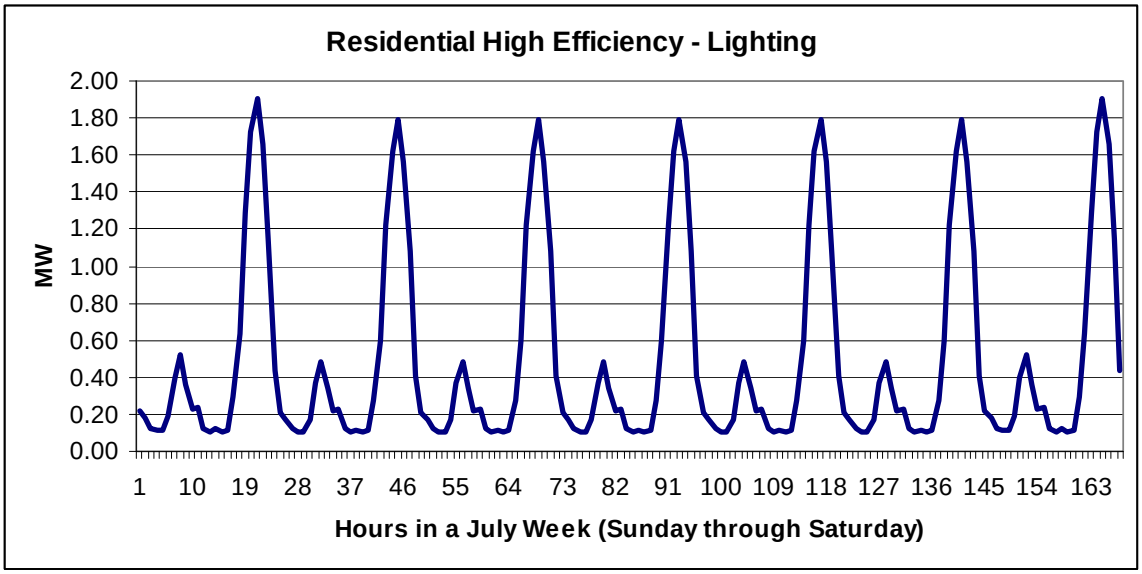
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	10,000	$78,000	2,885,232	75
2012	10,250	$79,950	2,957,363	77
2013	10,506	$81,947	3,031,225	79
2014	9,000	$70,200	2,596,709	68
2015	8,000	$62,400	2,308,186	60
2016	7,000	$54,600	2,019,662	53
2017	7,175	$55,965	2,070,154	54

Table 4-13
Residential High Efficiency Lighting – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	15,000	$117,000	4,327,848	113
2012	15,375	$119,925	4,436,044	116
2013	15,759	$122,920	4,546,837	118
2014	12,000	$93,600	3,462,278	90
2015	11,000	$85,800	3,173,755	83
2016	11,275	$87,945	3,253,099	85
2017	8,000	$62,400	2,308,186	60

The load shape used in the modeling for Residential High Efficiency Lighting for July is shown in Figure 4-9. The load shapes for all months are similar to the one shown in Figure 4-9.

Figure 4-9



4.4.3 Residential High Efficiency Cooling Program

The parameters needed for computer modeling for Scenario 1 for the Residential High Efficiency Cooling Program are shown in Table 4-14. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for the Residential High Efficiency Cooling Program vary by year. Those values are reflected on Tables 4-15 through 4-17.

Table 4-14
Residential High Efficiency Cooling Program – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	250	$81,250	199,829	230

Table 4-15
Residential High Efficiency Cooling Program – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	250	$81,250	199,829	230
2012	256	$83,200	204,625	235
2013	262	$85,150	209,421	241
2014	269	$87,425	215,016	247
2015	276	$89,700	220,611	254
2016	283	$91,975	226,206	260
2017	290	$94,250	231,802	267
2018	297	$96,525	237,397	273
2019	304	$98,800	242,992	279
2020-2029	312	$101,400	249,387	287

Table 4-16
Residential High Efficiency Cooling Program – Scenario 3 Input Parameters

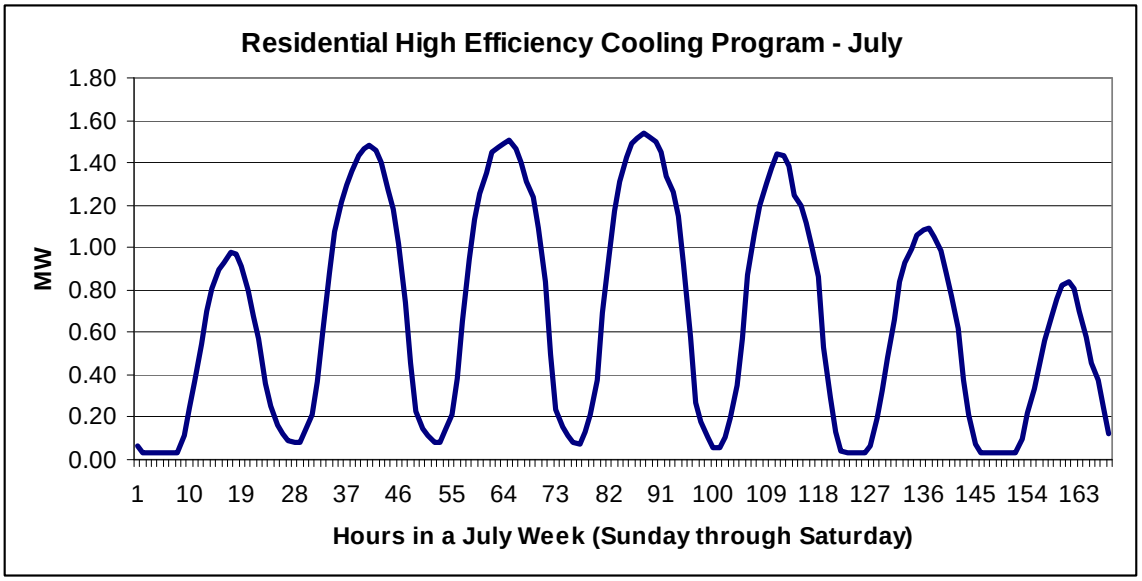
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	400	$130,000	319,726	368
2012	410	$133,250	327,720	377
2013	420	$136,500	335,713	386
2014	431	$140,075	344,505	396
2015	442	$143,650	353,298	406
2016	453	$147,225	362,090	416
2017	464	$150,800	370,883	426
2018	476	$154,700	380,474	437
2019	488	$158,600	309,066	448
2020-2029	500	$162,500	399,658	460

Table 4-17
Residential High Efficiency Cooling Program – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	1,200	$390,000	959,179	1,103
2012	1,230	$399,750	983,159	1,130
2013	1,261	$409,825	1,007,938	1,159
2014	1,293	$420,225	1,033,516	1,188
2015	1,325	$430,625	1,059,094	1,218
2016	1,358	$441,350	1,085,471	1,248
2017	1,392	$452,400	1,112,648	1,279
2018	1,427	$463,775	1,140,624	1,311
2019	1,463	$475,475	1,169,399	1,345
2020-2029	1,500	$487,500	1,198,974	1,379

The load shape used in the modeling for the Residential High Efficiency Cooling Program for July is shown in Figure 4-10. The program is not in effect except during the summer months.

Figure 4-10



4.4.4 Refrigerator Pickup Program

The parameters needed for computer modeling for Scenario 1 for the Refrigerator Pickup Program are shown in Table 4-18. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for the Refrigerator Pickup Program vary by year. Those values are reflected on Tables 4-19 through 4-21.

Table 4-18
Refrigerator Pickup Program – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	500	$90,000	441,868	55

Table 4-19
Refrigerator Pickup Program – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	500	$90,000	441,868	55
2012	513	$92,340	453,356	56
2013	526	$94,680	464,845	58
2014	539	$97,020	476,334	59
2015	552	$99,360	487,822	61
2016	566	$101,880	500,194	62
2017	580	$104,400	512,567	64
2018	595	$107,100	525,823	65
2019	610	$109,800	539,079	67
2020-2029	625	$112,500	552,335	69

Table 4-20
Refrigerator Pickup Program – Scenario 3 Input Parameters

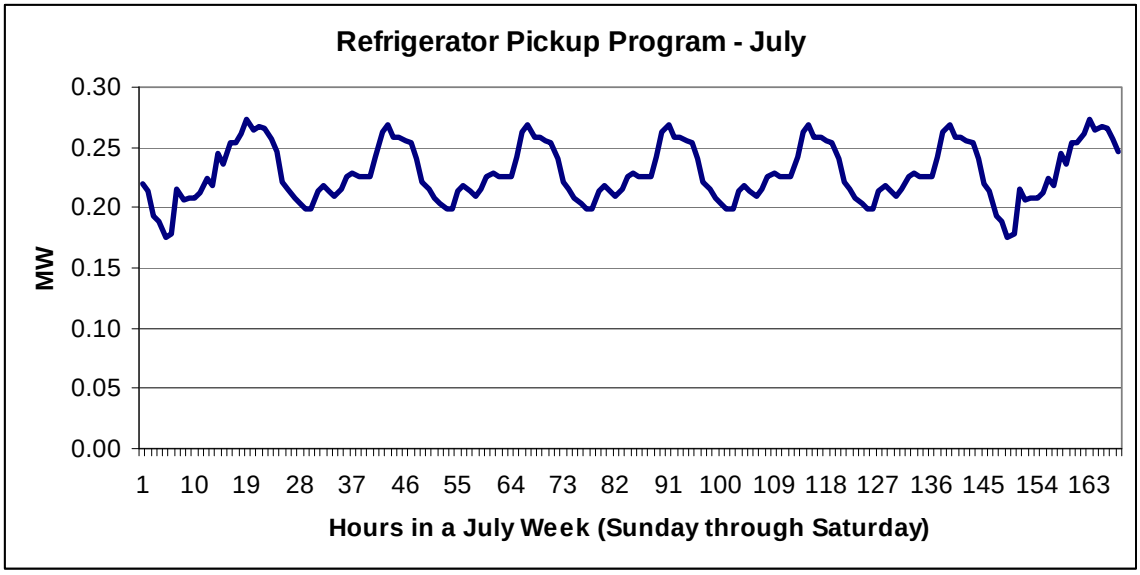
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	750	$135,000	662,802	82
2012	769	$138,420	679,593	84
2013	788	$141,840	696,384	87
2014	808	$145,440	714,059	89
2015	828	$149,040	731,733	91
2016	849	$152,820	750,292	93
2017	870	$156,600	768,850	96
2018	892	$160,560	788,292	98
2019	914	$164,520	807,735	100
2020-2029	937	$168,660	828,060	103

Table 4-21
Refrigerator Pickup Program – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	2,000	$360,000	1,767,472	220
2012	2,050	$369,000	1,811,658	225
2013	2,101	$378,180	1,856,729	231
2014	2,154	$387,720	1,903,567	237
2015	2,208	$397,440	1,951,289	243
2016	2,263	$407,340	1,999,894	249
2017	2,320	$417,600	2,050,267	255
2018	2,378	$428,040	2,101,524	261
2019	2,437	$438,660	2,153,664	268
2020-2029	2,498	$449,640	2,207,572	274

The load shape used in the modeling for the Refrigerator Pickup Program for July is shown in Figure 4-11. The load shapes for all months are similar to the one shown in Figure 4-11.

Figure 4-11



4.4.5 Home Performance with ENERGY STAR®

The parameters needed for computer modeling for Scenario 1 for Home Performance with ENERGY STAR® are shown in Table 4-22. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for Home Performance with ENERGY STAR® vary by year. Those values are reflected on Tables 4-23 through 4-25.

Table 4-22
Home Performance with ENERGY STAR® – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	100	$100,000	203,035	58

Table 4-23
Home Performance with ENERGY STAR® – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	150	$150,000	304,552	87
2012	154	$154,000	312,674	89
2013	158	$158,000	320,795	92
2014	162	$162,000	328,916	94
2015	166	$166,000	337,038	96
2016	170	$170,000	345,159	99
2017	174	$174,000	353,281	101
2018	178	$178,000	361,402	103
2019	182	$182,000	369,523	106
2020-2029	187	$187,000	379,675	108

Table 4-24
Home Performance with ENERGY STAR® – Scenario 3 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	150	$150,000	304,552	87
2012	154	$154,000	312,674	89
2013	158	$158,000	320,795	92
2014	162	$162,000	328,916	94
2015	166	$166,000	337,038	96
2016	170	$170,000	345,159	99
2017	174	$174,000	353,281	101
2018	178	$178,000	361,402	103
2019	182	$182,000	369,523	106
2020-2029	187	$187,000	379,675	108

Table 4-25
Home Performance with ENERGY STAR® – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	200	$200,000	406,070	116
2012	205	$205,000	416,221	119
2013	210	$210,000	426,373	122
2014	215	$215,000	436,525	125
2015	220	$220,000	446,677	128
2016	226	$226,000	458,859	131
2017	232	$232,000	471,041	135
2018	238	$238,000	483,223	138
2019	244	$244,000	495,405	141
2020-2029	250	$250,000	507,587	145

The load shapes used in the modeling for Home Performance with ENERGY STAR® for January and July are shown in Figures 4-12 and 4-13, respectively.

Figure 4-12

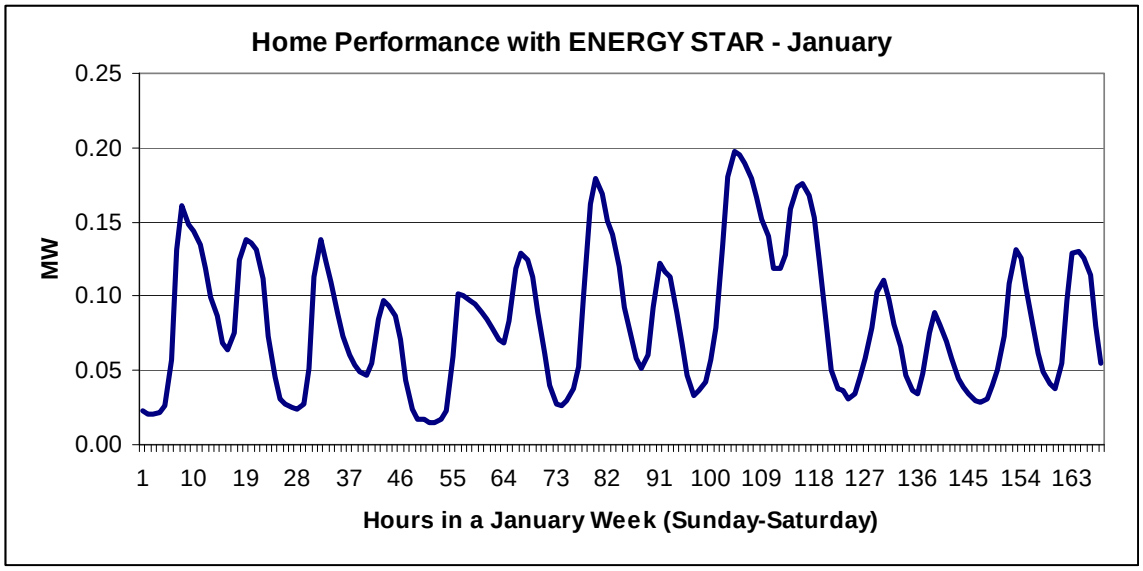
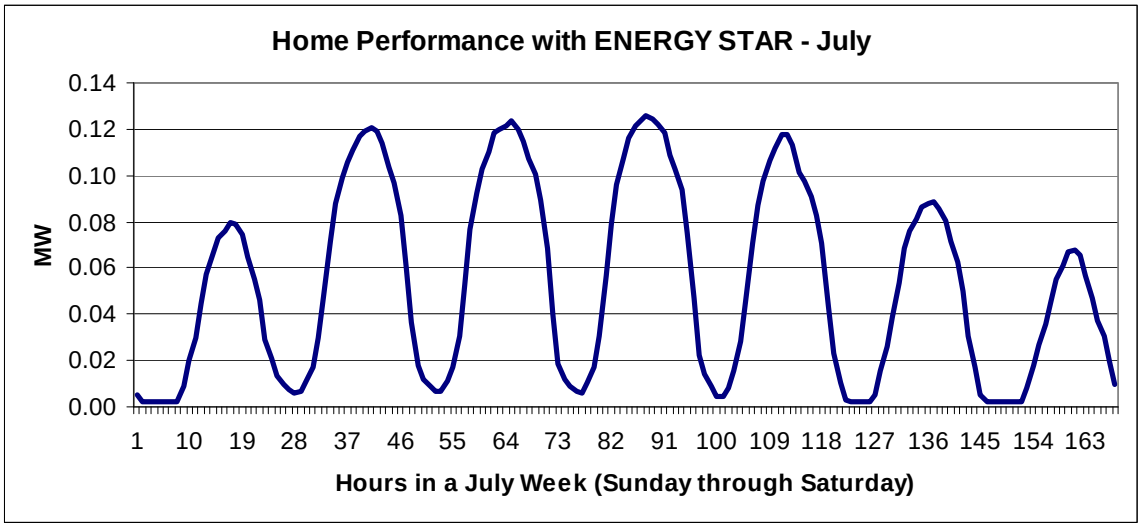


Figure 4-13



4.4.6 Home Energy Comparison Reports

The parameters needed for computer modeling for Scenario 1 for Home Energy Comparison Reports are shown in Table 4-26. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for Home Energy Comparison Reports vary by year. Those values are reflected on Tables 4-27 through 4-29.

Table 4-26
Home Energy Comparison Reports – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	7,500	$97,500	32,058	59

Table 4-27
Home Energy Comparison Reports – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	7,500	$97,500	2,252,084	59
2012	7,688	$99,944	2,308,536	60
2013	7,880	$102,440	2,366,189	62
2014	8,077	$105,001	2,425,344	63
2015	8,279	$107,627	2,486,000	65
2016	8,486	$110,318	2,548,158	66
2017	8,698	$113,074	2,611,817	68
2018	8,915	$115,895	2,676,977	70
2019	9,138	$118,794	2,743,939	71
2020-2029	9,366	$121,758	2,812,402	73

Table 4-28
Home Energy Comparison Reports – Scenario 3 Input Parameters

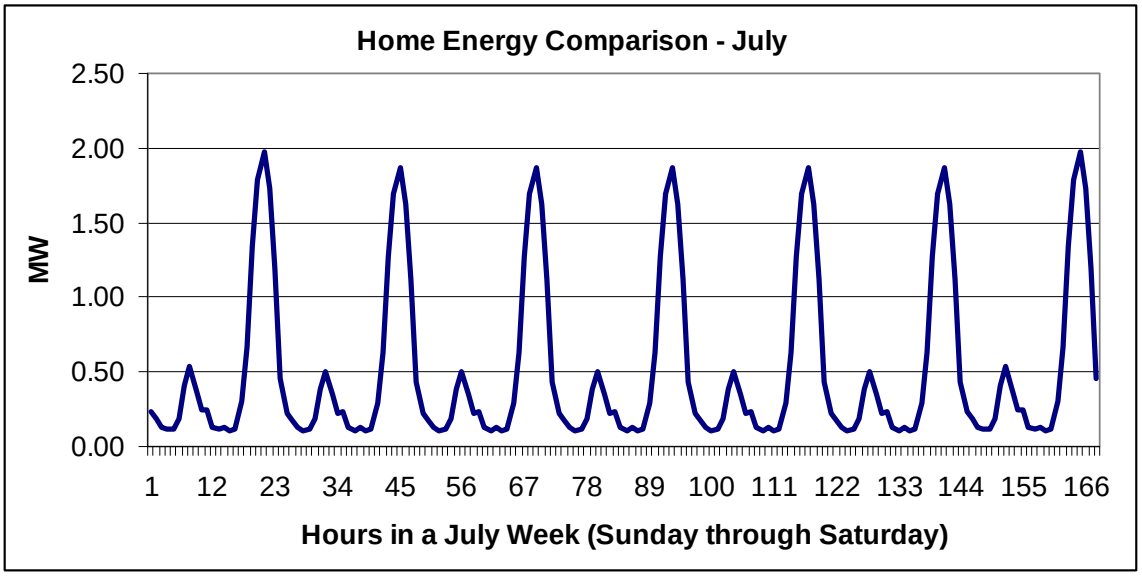
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	10,000	$110,000	3,002,778	78
2012	10,250	$112,750	3,077,848	80
2013	10,506	$115,566	3,154,719	82
2014	10,769	$118,459	3,233,692	84
2015	11,038	$121,418	3,314,467	86
2016	11,314	$124,454	3,397,343	88
2017	11,597	$127,567	3,482,322	91
2018	11,887	$130,757	3,569,403	93
2019	12,184	$134,024	3,658,585	95
2020-2029	12,489	$137,379	3,750,170	98

Table 4-29
Home Energy Comparison Reports – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	15,000	$150,000	4,504,168	117
2012	15,375	$153,750	4,616,772	120
2013	15,759	$157,590	4,732,078	123
2014	16,153	$161,530	4,850,388	126
2015	16,557	$165,570	4,971,700	129
2016	16,971	$169,710	5,096,015	133
2017	17,395	$173,950	5,223,333	136
2018	17,830	$178,300	5,353,954	139
2019	18,276	$182,760	5,487,878	143
2020-2029	18,733	$187,330	5,625,105	147

The load shape used in the modeling for the Home Energy Comparison Reports for July is shown in Figure 4-14. The load shapes for all months are similar to the one shown in Figure 4-14.

Figure 4-14



4.4.7 ENERGY STAR® Appliance Rebates

Modeling was performed independently for each ENERGY STAR® appliance for which rebates were examined: refrigerators, washing machines, and dehumidifiers.

4.4.7.1 Refrigerators

The ENERGY STAR® Appliance Rebates – Refrigerators program only becomes cost effective in Scenarios 3 and 4. The parameters need for computer modeling for these two scenarios are shown in Tables 4-30 and 4-31.

Table 4-30
ENERGY STAR® Appliance Rebates – Refrigerators – Scenario 3 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	1,000	$30,000	94,037	12
2012	1,025	$30,750	96,388	12
2013	1,051	$31,530	98,833	12
2014	1,077	$32,310	101,278	13
2015	1,104	$33,120	103,817	13
2016	1,132	$33,960	106,450	13
2017	1,160	$34,800	109,083	14
2018	1,189	$35,670	111,810	14
2019	1,219	$36,570	114,631	14
2020-2029	1,249	$37,470	117,452	15

Table 4-31
ENERGY STAR® Appliance Rebates – Refrigerators – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	4,500	$135,000	423,167	53
2012	4,613	$138,390	433,794	54
2013	4,728	$141,840	444,608	55
2014	4,846	$145,380	455,704	57
2015	4,967	$149,010	467,083	58
2016	5,091	$152,730	478,743	60
2017	5,218	$156,540	490,686	61
2018	5,348	$160,440	502,911	63
2019	5,482	$164,460	515,512	64
2020-2029	5,619	$168,570	528,395	66

The load shapes used in the modeling for ENERGY STAR® Appliance Rebates – Refrigerators for January and July are shown in Figures 4-15 and 4-16, respectively.

Figure 4-15

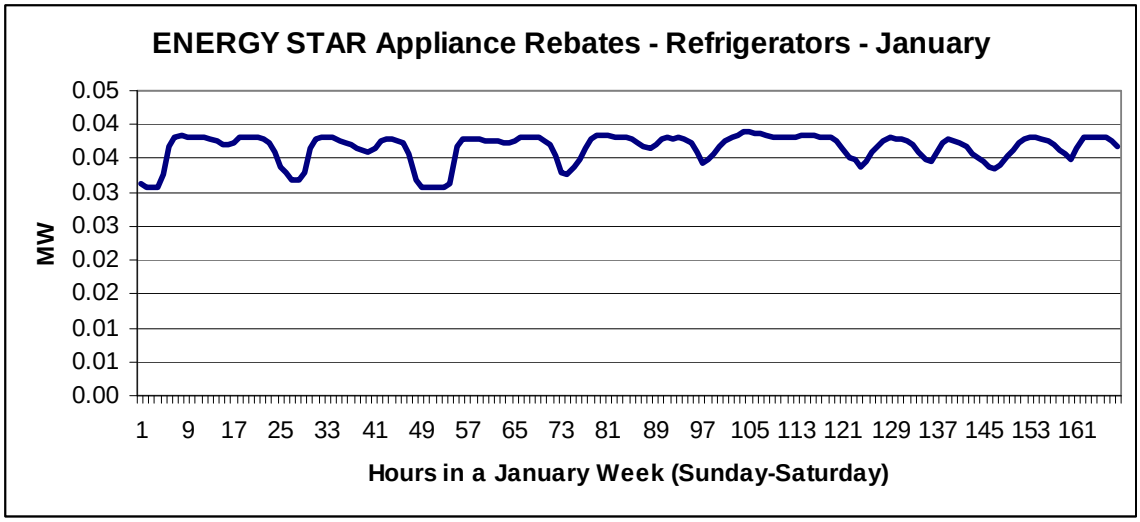
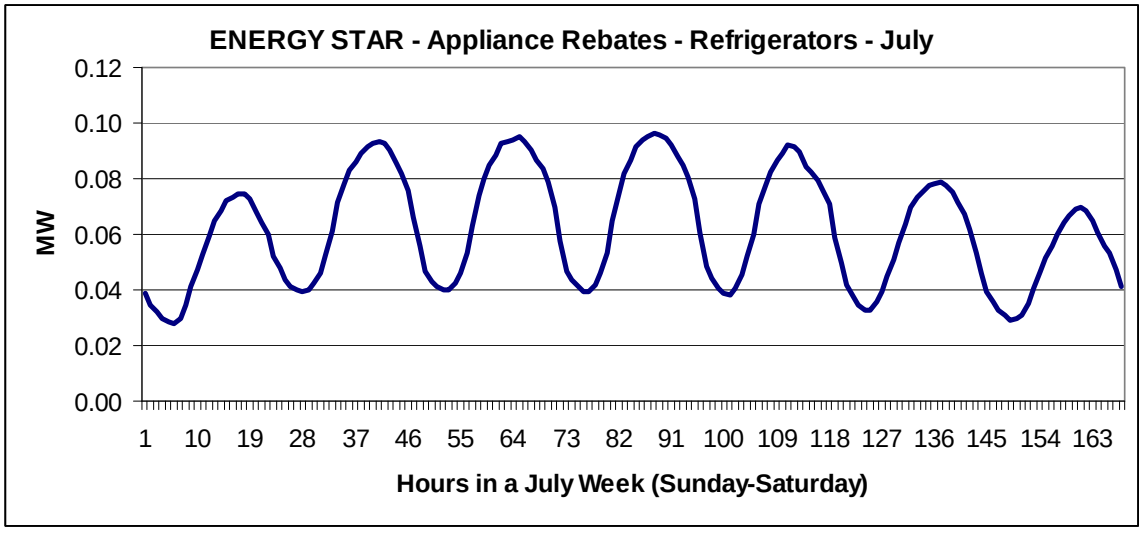


Figure 4-16



4.4.7.2 Washing Machines

The ENERGY STAR® Appliance Rebates – Washing Machines program only becomes cost effective in Scenarios 3 and 4. The parameters need for computer modeling for these two scenarios are shown in Tables 4-32 and 4-33.

Table 4-32
ENERGY STAR® Appliance Rebates – Washing Machines – Scenario 3 Input Parameters

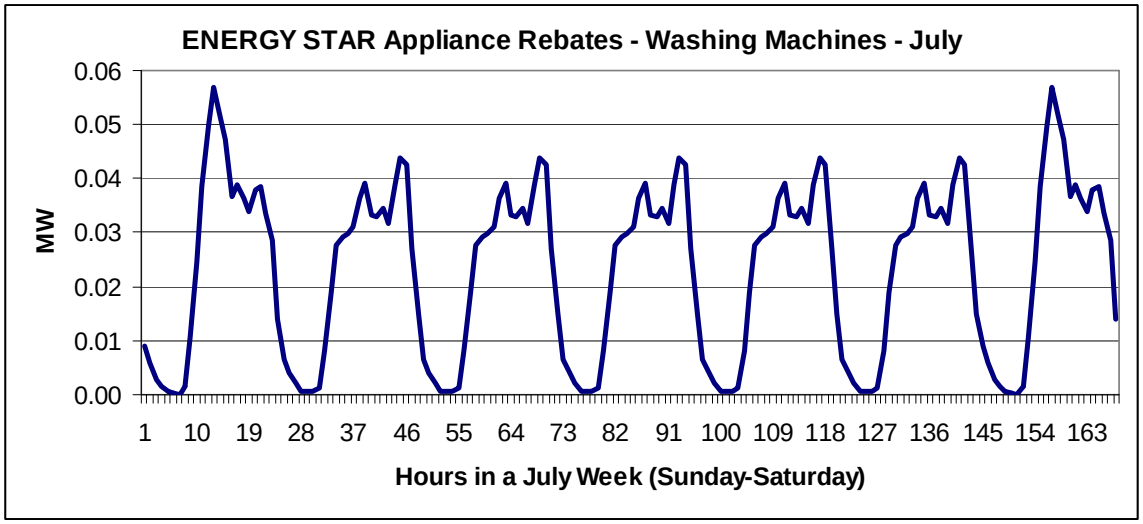
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	500	$16,250	128,233	16
2012	513	$16,673	131,567	17
2013	526	$17,095	134,901	17
2014	539	$17,518	138,235	18
2015	552	$17,940	141,569	18
2016	566	$18,395	145,159	19
2017	580	$18,850	148,750	19
2018	595	$19,338	152,597	20
2019	610	$19,825	156,444	20
2020-2029	625	$20,313	160,291	21

Table 4-33
ENERGY STAR® Appliance Rebates – Washing Machines – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	1,000	$32,500	256,465	33
2012	1,025	$33,313	262,877	34
2013	1,051	$34,158	269,545	35
2014	1,077	$35,003	276,213	35
2015	1,104	$35,880	283,137	36
2016	1,132	$36,790	290,318	37
2017	1,160	$37,700	297,499	38
2018	1,189	$38,643	304,937	39
2019	1,219	$39,618	312,631	40
2020-2029	1,249	$40,593	320,235	41

The load shape used in the modeling for the ENERGY STAR® Appliance Rebates – Washing Machines for July is shown in Figure 4-17. The load shapes for all months are similar to the one shown in Figure 4-17.

Figure 4-17



4.4.7.3 Dehumidifiers

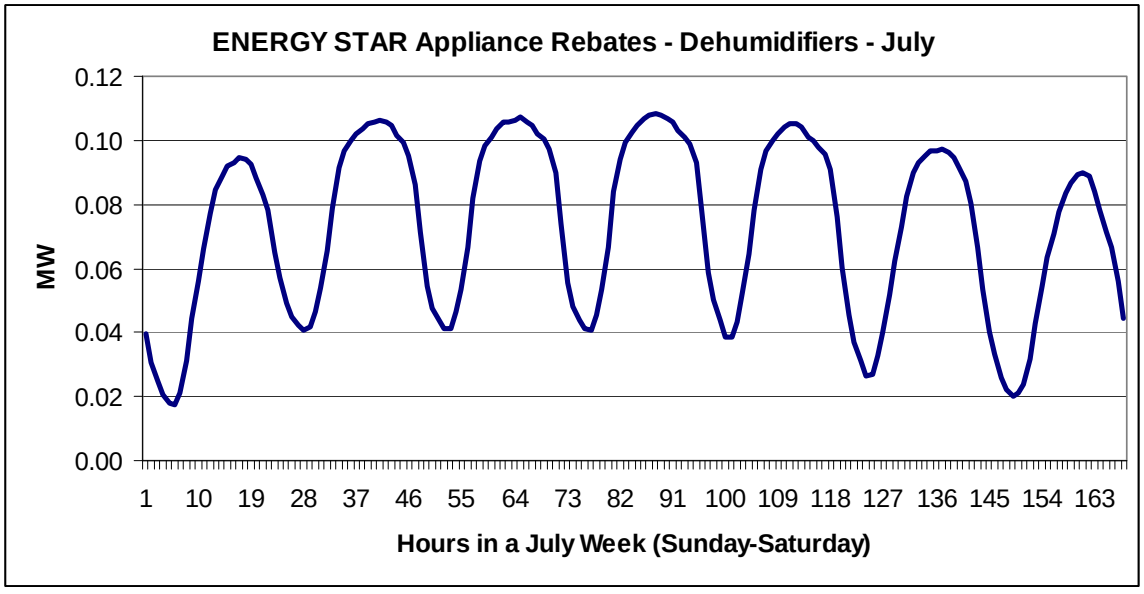
The ENERGY STAR® Appliance Rebates – Dehumidifiers program only becomes cost effective in Scenario 4. The parameters need for computer modeling for this scenario is shown in Table 4-34.

Table 4-34
ENERGY STAR® Appliance Rebates – Dehumidifiers – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	500	$16,250	158,688	106
2012	513	$16,673	162,814	109
2013	526	$17,095	166,940	112
2014	539	$17,518	171,065	115
2015	552	$17,940	175,191	117
2016	566	$18,395	179,635	120
2017	580	$18,850	184,078	123
2018	595	$19,338	188,838	127
2019	610	$19,825	193,599	130
2020-2029	625	$20,313	198,360	133

The load shape used in the modeling for the ENERGY STAR® Appliance Rebates – Dehumidifiers for July is shown in Figure 4-18. The load shapes for all months are similar to the one shown in Figure 4-18.

Figure 4-18



4.4.8 Direct Load Control

The parameters needed for computer modeling for Scenario 1 for Direct Load Control are shown in Table 4-35. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for Direct Load Control vary by year. Those values are reflected on Tables 4-36 through 4-38.

Table 4-35
Direct Load Control – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	1,000	$350,000	32,058	1,087

Table 4-36
Direct Load Control – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	2,000	$700,000	64,116	2,174
2012	2,050	$717,500	65,719	2,228
2013	2,101	$735,350	67,354	2,284
2014	2,154	$753,900	69,053	2,341
2015	2,208	$772,800	70,784	2,400
2016	2,263	$792,050	72,548	2,460
2017	2,320	$812,000	74,375	2,522
2018	2,378	$832,300	76,234	2,585
2019	2,437	$852,950	78,126	2,649
2020-2029	2,498	$874,300	80,081	2,715

Table 4-37
Direct Load Control – Scenario 3 Input Parameters

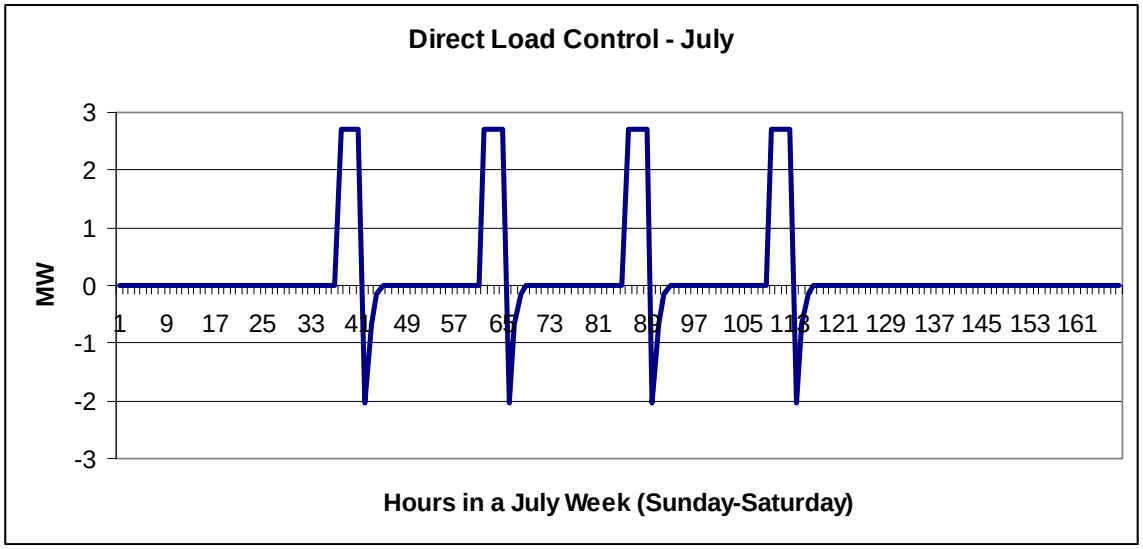
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	2,500	$875,000	80,145	2,717
2012	2,563	$897,050	82,165	2,786
2013	2,627	$919,450	84,217	2,855
2014	2,693	$942,550	86,333	2,927
2015	2,760	$966,000	88,480	3,000
2016	2,829	$990,150	90,692	3,075
2017	2,900	$1,015,000	92,969	3,152
2018	2,973	$1,040,550	95,309	3,232
2019	3,047	$1,066,450	97,681	3,312
2020-2029	3,123	$1,093,050	100,118	3,395

Table 4-38
Direct Load Control – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	2,500	$1,375,000	80,145	2,717
2012	2,563	$1,409,650	82,165	2,786
2013	2,627	$1,444,850	84,217	2,855
2014	2,693	$1,481,150	86,333	2,927
2015	2,760	$1,518,000	88,480	3,000
2016	2,829	$1,555,950	90,692	3,075
2017	2,900	$1,595,000	92,969	3,152
2018	2,973	$1,635,150	95,309	3,232
2019	3,047	$1,675,850	97,681	3,312
2020-2029	3,123	$1,717,650	100,118	3,395

The load shape used in the modeling for the Direct Load Control for July is shown in Figure 4-19. The load shapes for all months are similar to the one shown in Figure 4-19.

Figure 4-19



4.4.9 Commercial Prescriptive Rebate Program

The parameters needed for computer modeling for Scenario 1 for the Commercial Prescriptive Rebate Program are shown in Table 4-39. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for the Commercial Prescriptive Rebate Program vary by year. Those values are reflected on Tables 4-40 through 4-42.

Table 4-39
Commercial Prescriptive Rebate Program – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	40	$126,500	470,186	92

Table 4-40
Commercial Prescriptive Rebate Program – Scenario 2 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	40	$126,500	470,186	92
2012	41	$129,663	481,941	95
2013	42	$132,825	493,695	97
2014	43	$135,988	505,450	99
2015	44	$139,150	517,205	102
2016	45	$142,313	528,959	104
2017	46	$145,475	540,714	106
2018	47	$148,638	552,468	109
2019	48	$151,800	564,223	111
2020-2029	49	$154,963	575,978	113

Table 4-41
Commercial Prescriptive Rebate Program – Scenario 3 Input Parameters

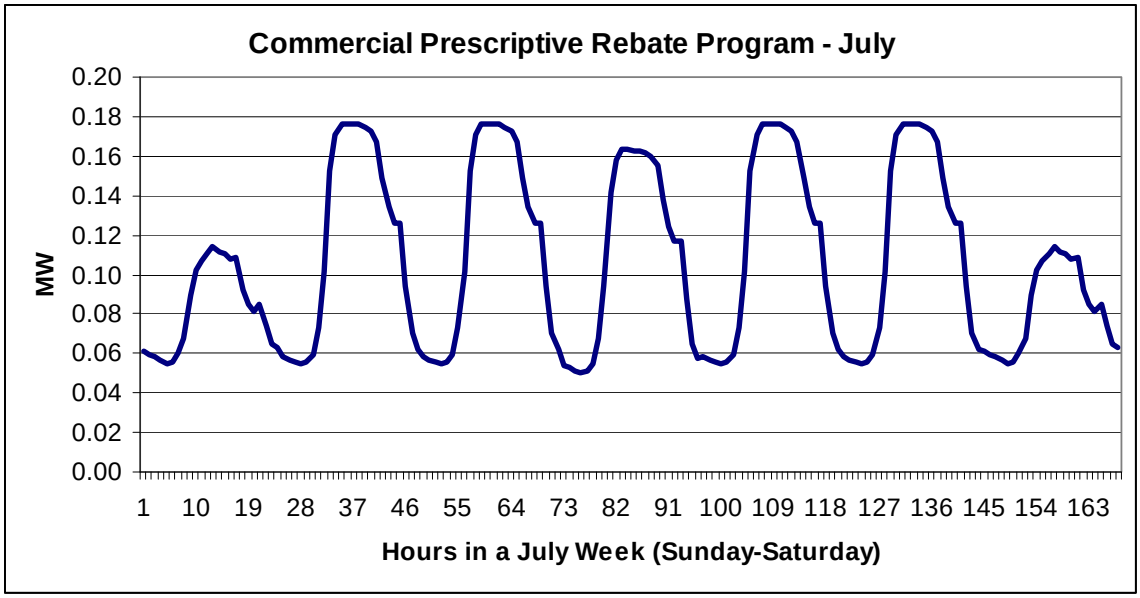
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	60	$189,750	705,279	139
2012	62	$196,075	728,788	143
2013	64	$202,400	752,297	148
2014	66	$208,725	775,807	152
2015	68	$215,050	799,316	157
2016	70	$221,375	822,825	162
2017	72	$227,700	846,335	166
2018	74	$234,025	869,844	171
2019	76	$240,350	893,353	175
2020-2029	78	$246,675	916,863	180

Table 4-42
Commercial Prescriptive Rebate Program – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	80	$253,000	940,372	185
2012	82	$259,325	963,881	189
2013	84	$265,650	987,390	194
2014	86	$271,975	1,010,900	199
2015	88	$278,300	1,034,409	203
2016	90	$284,625	1,057,918	208
2017	92	$290,950	1,081,428	212
2018	94	$297,275	1,104,937	217
2019	96	$303,600	1,128,446	222
2020-2029	98	$309,925	1,151,956	226

The load shape used in the modeling for the Commercial Prescriptive Rebate Program for July is shown in Figure 4-20. The load shapes for all months are similar to the one shown in Figure 4-20.

Figure 4-20



4.4.10 Commercial Custom Rebate Program

The parameters needed for computer modeling for Scenarios 1, 2 and 3 for the Commercial Custom Rebate Program are shown in Table 4-43. All of the parameters in each year of the modeling are the same as shown on this table. For Scenario 4, the parameters for the Commercial Custom Rebate Program vary by year. Those values are reflected on Tables 4-44.

Table 4-43
Commercial Custom Rebate Program – Scenarios 1, 2 and 3 Input Parameters

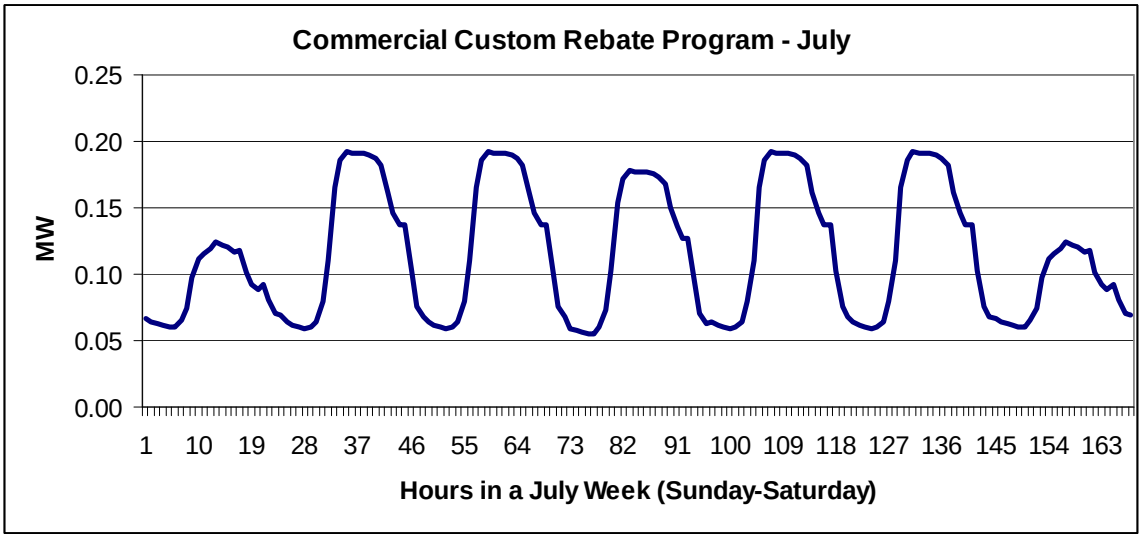
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	10	$154,000	511,072	100

Table 4-44
Commercial Custom Rebate Program – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	20	$308,000	1,022,143	201
2012	21	$323,400	1,073,251	211
2013	22	$338,800	1,124,358	221
2014	23	$354,200	1,175,465	231
2015	24	$369,600	1,226,572	241
2016	25	$385,000	1,277,679	251
2017	26	$400,400	1,328,786	261
2018	27	$415,800	1,379,894	271
2019	28	$431,200	1,431,001	281
2020-2029	29	$446,600	1,482,108	291

The load shape used in the modeling for the Commercial Custom Rebate Program for July is shown in Figure 4-21. The load shapes for all months are similar to the one shown in Figure 4-21.

Figure 4-21



4.4.11 Large C&I Turnkey Energy Efficiency Program

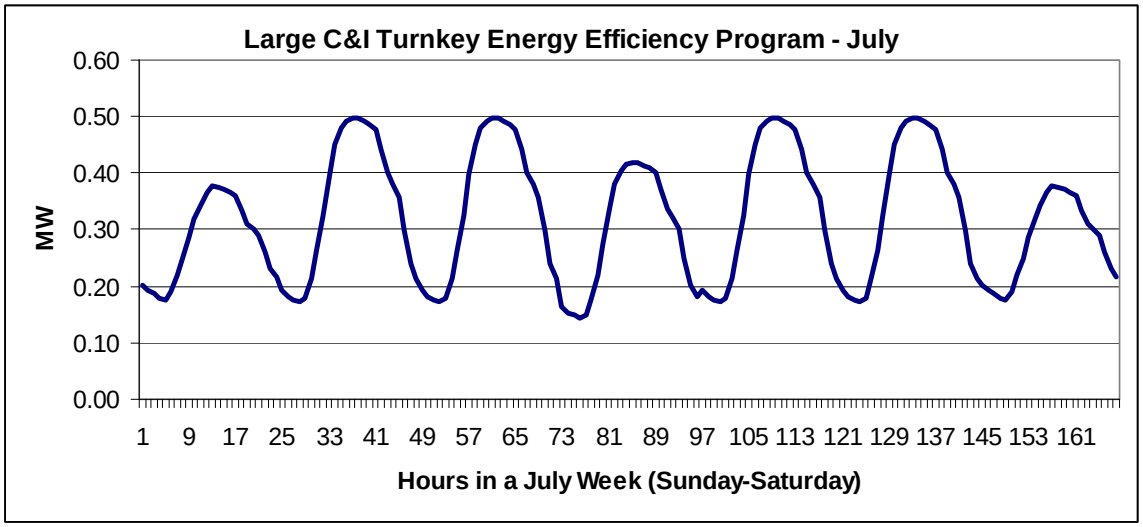
The Large C&I Turnkey Energy Efficiency Program is cost effective in Scenarios 2, 3 and 4. The parameters needed for computer modeling for each of these scenarios is the same in any year. Those values are reflected on Tables 4-45.

Table 4-45
Large C&I Turnkey Energy Efficiency Program – Scenario 2, 3 and 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	5	$510,417	2,618,081	565

The load shape used in the modeling for the Large C&I Turnkey Energy Efficiency Program for July is shown in Figure 4-22. The load shapes for all months are similar to the one shown in Figure 4-22.

Figure 4-22



4.4.12 Small Business Direct Install

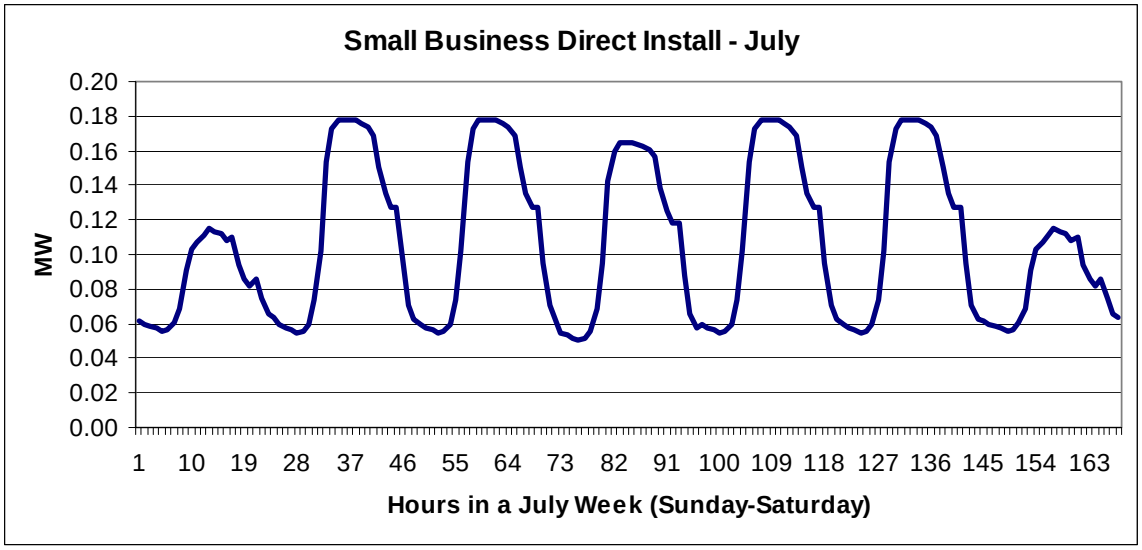
The Small Business Direct Install is only viable in Scenario 4. The parameters needed for computer modeling for Scenario 4 for Small Business Direct Install are shown in Table 4-46.

Table 4-46
Small Business Direct Install – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	125	$318,500	948,386	186
2012	128	$326,144	971,148	191
2013	131	$333,788	993,309	195
2014	134	$341,432	1,016,670	200
2015	137	$349,076	1,039,432	204
2016	140	$356,720	1,062,193	209
2017	144	$366,912	1,092,541	215
2018	148	$377,104	1,122,890	221
2019	152	$387,296	1,153,238	227
2020-2029	156	$397,488	1,183,586	233

The load shape used in the modeling for the Small Business Direct Install for July is shown in Figure 4-23. The load shapes for all months are similar to the one shown in Figure 4-23.

Figure 4-23



4.4.13 Building Operator Certification Program

The parameters needed for computer modeling for Scenario 1 for the BOC Program are shown in Table 4-47. All of the parameters in each year of the modeling are the same as shown on this table. For scenarios 2, 3, and 4, the parameters for the BOC Program vary by year. Those values are reflected on Tables 4-48 through 4-49.

Table 4-47
BOC Program – Scenario 1 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	20	$35,000	181,663	39

Table 4-48
BOC Program – Scenario 2 and 3 Input Parameters

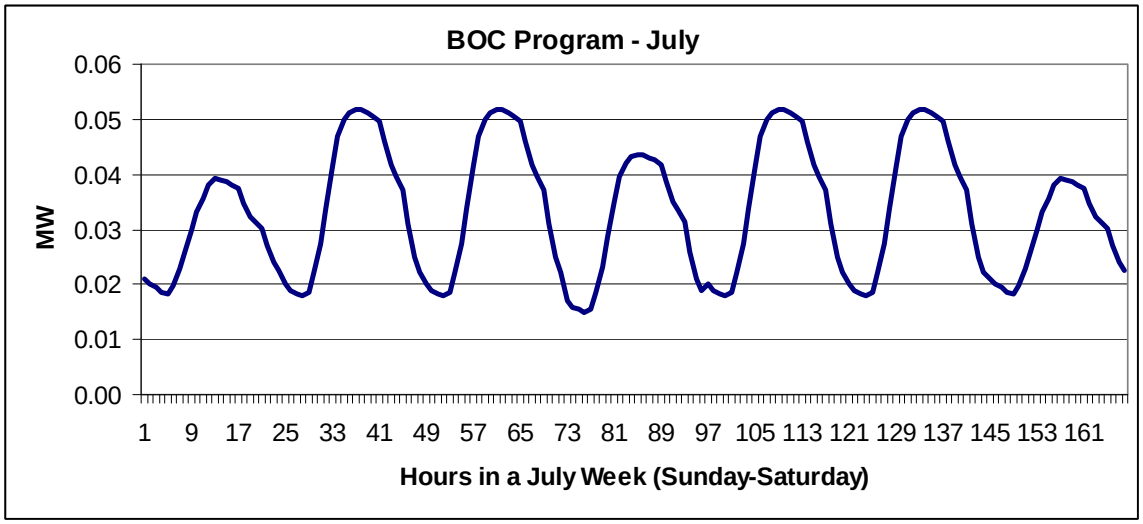
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	20	$35,000	181,663	39
2012	21	$36,750	190,746	41
2013	22	$38,500	199,829	43
2014	23	$40,250	208,912	45
2015	24	$42,000	217,995	47
2016	25	$43,750	227,078	49
2017	26	$45,500	236,162	51
2018	27	$47,250	245,245	53
2019	28	$49,000	254,328	55
2020-2029	29	$50,750	263,411	57

Table 4-49
BOC Program – Scenario 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
2011	30	$35,000	272,494	59
2012	31	$36,167	281,577	61
2013	32	$37,333	290,660	63
2014	33	$38,500	299,744	65
2015	34	$39,667	308,827	67
2016	35	$40,833	317,910	69
2017	36	$42,000	326,993	71
2018	37	$43,167	336,076	73
2019	38	$44,333	345,159	75
2020-2029	39	$45,500	354,242	76

The load shape used in the modeling for the BOC Program for July is shown in Figure 4-24. The load shapes for all months are similar to the one shown in Figure 4-24.

Figure 4-24



4.4.14 Large C&I Voluntary Interruptible/Peak Load Reduction Program

The parameters needed for computer modeling for Scenarios 1 and 2 for the Large C&I Voluntary Interruptible/Peak Load Reduction Program are shown in Table 4-50. All of the parameters in each year of the modeling are the same as shown on this table. Similarly, the input parameters for Scenarios 3 and 4 are shown on Table 4-51.

Table 4-50
Large C&I Voluntary Interruptible/Peak Load Reduction Program
– Scenarios 1 and 2 Input Parameters

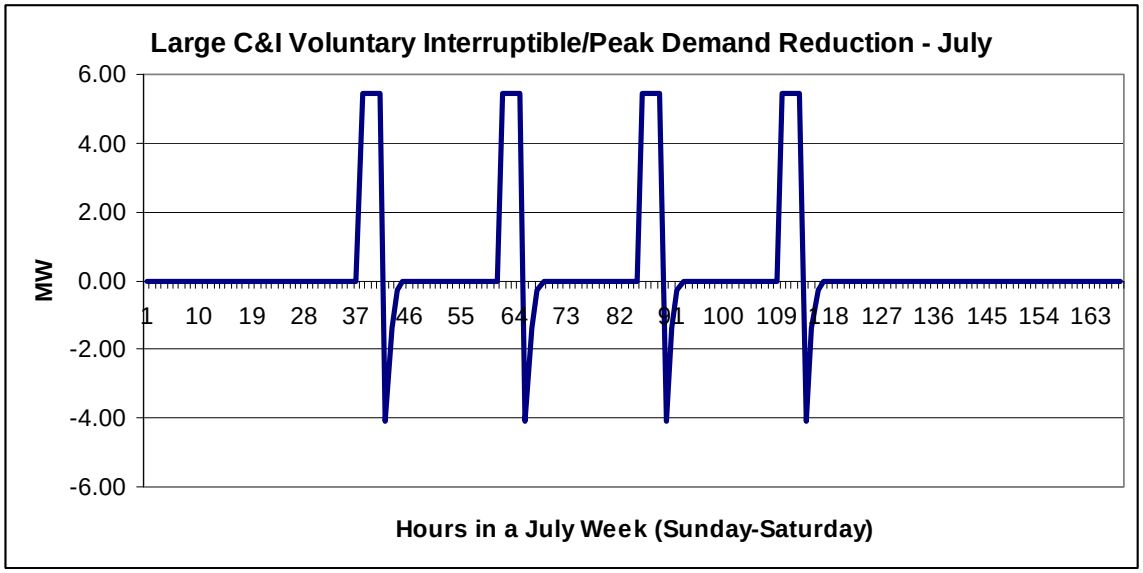
Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	5	$46,000	32,058	1,087

Table 4-51
Large C&I Voluntary Interruptible/Peak Load Reduction Program
– Scenarios 3 and 4 Input Parameters

Year	# of Participants	Program Costs	Energy Savings (kWh)	Demand Savings (kW)
All years	10	$70,000	160,291	5,435

The load shape used in the modeling for the Large C&I Voluntary Interruptible/Peak Load Reduction Program for July is shown in Figure 4-25. The load shapes for all months are similar to the one shown in Figure 4-25.

Figure 4-25


Large C&I Voluntary Interruptible/Peak Demand Reduction - July
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
MW
1 10 19 28 37 46 55 64 73 82 91 100 109 118 127 136 145 154 163
Hours in a July Week (Sunday-Saturday)

5.0 DSM Programs in Kansas

On January 29, 2010, Empire filed an Application with the Kansas Corporation Commission (KCC) for approval to implement its portfolio of energy efficiency and demand response programs for its Kansas customers. On June 3, 2010, a Joint Motion to Approve the Stipulation and Agreement was filed with the KCC with a requested effective date of July 1, 2010. The motion was approved and all programs were implemented July 1, 2010 as pilot programs – with three-year lives.

Empire's DSM programs in Kansas are designed to:

- offer programs across all customer classes and income levels
- follow current industry best practices and incorporate them in program design
- provide education to customers
- include challenging goals
- include sufficient budget
- demonstrate cost effectiveness

In the development of its DSM portfolio for its Kansas customers, Empire has striven to ensure compliance with KCC guidelines for evaluation, measurement and verification (EM&V). In compliance with KCC Order 422, each direct impact program has undergone benefit/cost screening consistent with the California Standard Practice Manual. All five perspectives – Total Resource Cost, Societal, Participant, Ratepayer Impact Measure (RIM), and Utility Cost – have been analyzed. Two benefit/cost analyses have been conducted for each program and for the portfolio as a whole. A discussion of the benefit/cost software and the associated input data are found in Appendix B.

The programs in the portfolio are:

- Low Income Efficiency Program
- Residential High Efficiency CAC Program
- C&I Rebate Program
- Building Operator Certification Program
- C&I Peak Load Reduction Program

The information for each program includes a program description, program framework/strategy, program budget, program beneficiaries – participation, estimate of program cost effectiveness, and program evaluation, measurement and verification (EM&V). Summary information for the total portfolio is also included.

5.1 Low Income Efficiency Program – Kansas

Program Description

Qualifying lower income customers can receive help in managing their energy use and bills through Empire's Low Income Weatherization and High Efficiency Program. The program will work directly with local CAP agencies that already provide weatherization services to low income customers through the DOE and other state agencies. Empire provides supplemental funds to the CAP agencies to cover the cost of weatherization measures. This program will be administered by the CAP agencies and follow the protocol under current federal and state guidelines.

Participants can be an Empire residential customer in a one to four-unit structure. Income and occupancy eligibility will follow the Federal Low Income Weatherization guidelines. CAP agencies are allowed to spend an average of $1,000 (escalated by $50 per year) of Empire funds to go along with their DOE funds. Empire funds will focus on measures that reduce electricity usage such as electric heat, air conditioning, refrigeration, lighting, insulation, air infiltration, and so forth. CAP agencies have discretion to use the funds as they wish for weatherization and heating equipment. The maximum per home will be $1,500 escalated by $50 per year.

Within the average of $1,000, they may also spend up to $200 towards the purchase of an ENERGY STAR® rated refrigerator and $100 towards the purchase of ENERGY STAR® rated compact fluorescent light bulbs (CFL) and lighting fixtures. The CAP agency must follow federal guidelines and ensure that the old refrigerator is removed and recycled in accordance with safe recycling practices. Proof of disabling the refrigerator from future use must be provided to use Empire's funding for an Energy Star refrigerator. Finally, in addition to being an Energy Star rated refrigerator, the new refrigerator must be of similar size and features to the old refrigerator. Energy Star lighting fixtures can be installed only where an existing inefficient lighting fixture currently exists or there were definite plans to install a new non-Energy Star lighting fixture. In the latter case, installing an Energy Star fixture would avoid the installation of new inefficient lighting fixtures.

While the CAPs have the primary responsibility to obtain leads for this program, Empire can supplement their efforts, as necessary, by targeting low income customers in arrears who would benefit from reduced utility bills or by referring any other potentially eligible customers who call requesting assistance because of their economic circumstances.

This program helps qualifying customers reduce their energy costs at no cost to the customer. CAP agencies offer a cost effective implementation capability, which allows most of the funds allocated to this program to go directly to the purchase and installation of energy efficiency measures.

With the stimulus funding currently being available to all CAP agencies and the timeline within which they are expected to spend their funding, Empire agreed with Staff to start the program in April 2011.

The expected peak demand and energy savings resulting from the Low Income Efficiency Program are shown on Table 5-1.

Table 5-1
Kansas Low Income Efficiency Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
2-3 (each year)	6	27,260

Program Framework/Strategy

Relationship to other programs: This program provides services to the low income customer at no cost to the participant. As no other program targets this population, this programs fills that niche and equalizes the opportunity to save energy for all customers.

Marketing Strategy: This program will be marketed in several ways:

- Company communications to customers, i.e., bill inserts, website, etc., will notify all customers of the availability of this program
- Empire will work with the CAP agencies and Low Income Home Energy Assistance Program (LIHEAP) agencies to inform them of this funding
- Empire will leverage opportunities for informing community organizations of this program.

Program Delivery: This program will be delivered through a CAP agency.

Partners: This program will partner with the CAP agency delivering the program.

Program Budget

Because there is no major activity associated with starting this program, no start-up budget is incorporated in the program estimates.

Program delivery costs have been separated from program administrative costs. Program delivery is the cost of implementing the program. For this program, the delivery budget includes a CAP administrative fee. A feature of this program is that all of the measures are installed at no cost to the participant. Since this is a direct install program which pays money directly to the CAP agency, no funds are listed under the customer incentive column. Instead, the weatherization costs are listed under program delivery. Although this program will start a year later than the other programs, the evaluation has been scheduled at the same time as the other programs to leverage the funding. The program budget for this DSM program is shown on Table 5-2.

Table 5-2
Kansas Low Income Efficiency Program – Program Budget

Years	Deliver	Mgmt/Admin	Marketing	Customer Incentive	Evaluation	Total
1						
2	$23,000	$2,300	$2,500	$0	$500	$28,300
3	$24,150	$2,415	$2,500	$0	$500	$29,565

Program Beneficiaries – Participation

Customers eligible to participate in this program are low income customers who qualify as low income under Federal and State guidelines for Low Income Weatherization Assistance. It is anticipated that 20 customers will participate annually in years 2 and 3 as shown on Table 5-3.

Other beneficiaries of this program are all ratepayers. While they do pay the cost of this program, it will hopefully reduce arrearages that will benefit all ratepayers.

Table 5-3
Kansas Low Income Efficiency Program – Participation

Years	Participation
2-3 (per year)	20

Estimate of Program Cost Effectiveness

The results for two scenario analyses conducted for this program are shown on Table 5-4.

Table 5-4
Kansas Low Income Efficiency Program – Estimate of Program Effectiveness

Scenario	TRC	Societal	Participant	RIM	Utility
3% Discount on Soc	0.47	0.84	n/a	0.25	0.47
7% Discount on Soc	0.47	0.65	n/a	0.25	0.47

Program Evaluation, Measurement and Verification (EM&V)

The total EM&V budget for the Low Income Weatherization Program is 6.76% of the Year 3 program cost. The total EM&V budget for all programs is less than 5% of the Year 3 budget for all programs. Empire proposes to analyze reduction in energy usage and perform a process evaluation in year 3, utilizing an external, disinterested third party.

5.2 Residential High Efficiency CAC Program – Kansas

Program Description

This program consists of three components – installation of new equipment, tune-up of existing equipment, and electronic programmable set-back thermostats. The three components working together represent a comprehensive high efficiency central cooling program.

Installation of New Equipment

The Residential High Efficiency CAC Program will encourage 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. Since heat pumps are traditionally more expenses than CACs, Empire is aware that providing the same incentive may bias the program toward CACs. However, for the sake of simplicity, and the minimal difference between the technologies in terms of benefit to the system, the same incentive has been offered for CACs and for heat pumps.

The programs 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 central cooling system market toward greater energy efficiency.

Incentives will be available for systems that meet the criteria shown in Table 5-5.

Table 5-5
Kansas Residential High Efficiency CAC Program – Qualifying Criteria and Incentives

Qualifying Critera	Incentive Amount
SEER 15 to 15.9	$400
SEER 16 to 16.9	$450
SEER 17 or higher	$500

Customers with more than one system can receive multiple incentives, up to three per location. The program is voluntary and available on a first-come, first-served basis. For the first eight (8) months of the program year, 65% of the available funds will be made available to residential customers. After the first eight months, all remaining funds will be equally available to residential customers, landlords of residential properties, and builders.

To qualify for an incentive, the customer must meet all of the eligibility conditions and complete an incentive application. The customer will be required to attach a copy of the sale receipt or paid invoice from a professional heating and cooling contractor indicating the date of purchase, dealer name and address, address of residence where the equipment is installed and account number. The application must be received within 60 days of

installation. The contractor will be required to submit a copy of the load calculation summary.

Tune Up of Existing Equipment

The second component of Empire's program is the central cooling system tune-up. A spring inspection and tune-up of a central air conditioning or heat pump system can improve its efficiency and increase its life span. Without regular cleaning and maintenance, an air conditioner can lose a portion of its original efficiency for each year of operation.

Empire will offer an incentive to encourage annual inspections and maintenance of air conditioning systems. Any residential customer can receive $50 towards a professional service inspection and tune-up. Customers with more than one system can receive multiple incentives, up to three per location. Only air conditioning systems of 5 tons or less are eligible. As the program progresses, only air conditioning systems that have not had a tune-up within the last three years will be eligible.

Electronic Programmable Set-back Thermostats

The third component of Empire's program is the availability of incentives for electronic programmable setback thermostats. Customers can quality for an additional $25 when a programmable setback thermostat is installed at the same time the new cooling system is installed or the tune-up is performed. The thermostat must be purchased from and installed by the same cooling contractor and be on the same invoice as the cooling system or tune-up.

The peak demand and energy savings associated with the Residential High Efficiency CAC program are shown on Table 5-6.

Table 5-6
Kansas Residential High Efficiency CAC Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
1-3 (per year)	20	48,054

Program Framework/Strategy

Relationship to other programs: This program provides for all aspects of high efficiency cooling for all residential customers. In addition to reducing energy use throughout the summer, this energy efficiency program also contributes greatly to residential demand reduction, second only to a residential demand response program. This program rounds out the residential offerings in Empire's portfolio.

Marketing Strategy: Empire will utilize various mediums, such as direct mail, bill inserts, and its website, to notify both customers and HVAC dealers of the availability of these incentives.

Program Delivery: The 'delivery' component of this program is the fulfillment of rebates for qualifying measures. For a program of this size, this function will most likely be completed internally, rather than by a third-party fulfillment house.

Partners: The trade allies will be Empire's partners in implementing this program, in that they will most influence the buyer's decision to purchase and install any of these measures.

Program Budget

Because there is no major activity associated with starting this program, no start-up budget has been submitted. It is assumed that 80% of participants replacing their cooling systems or receiving a tune-up will also install a qualifying setback thermostat. The program delivery cost is for rebate processing. The program budget by category is shown on Table 5-7.

Table 5-7
Kansas Residential High Efficiency CAC Program – Program Budget

Years	Delivery	Mgmt/Admin	Marketing	Customer Incentive	Evaluation	Total
1	$525	$595	$3,500	$11,900	$300	$16,820
2	$551	$625	$3,500	$11,900	$300	$16,876
3	$579	$656	$3,500	$11,900	$300	$16,935

Program Beneficiaries – Participation

All residential customers with central cooling systems are eligible to participate in this program. Thirty-five customers are expected to participate in the program annually as shown in Table 5-8.

Table 5-8
Kansas Residential High Efficiency CAC Program – Participation

Years	Participation
1-3 (per year)	35

Other beneficiaries include all ratepayers (while they do pay for the cost of this program, the benefits that accrue include a reduced need for future power plants and peaking units). In addition, trade allies who sell and install high efficiency cooling systems and thermostats and perform tune-ups will also benefit from this program, thereby contributing to the economic health of the community.

Estimate of Program Effectiveness

The results for two scenario analyses conducted for this program are shown on Table 5-9.

Table 5-9
Kansas Residential High Efficiency CAC Program – Estimate of Program Effectiveness

Scenario	TRC	Societal	Participant	RIM	Utility
3% Discount on Soc	1.09	2.00	2.28	0.50	1.99
7% Discount on Soc	1.09	1.47	2.28	0.50	1.99

Program Evaluation, Measurement and Verification (EM&V)

The total EM&V budget for the Residential High Efficiency CAC program is 8.86% of the Year 3 program cost. The total EM&V budget for all programs is less than 5% of the Year 3 budget for all programs. Empire proposes to analyze reduction in energy usage and perform a process evaluation in year 3, utilizing an external, disinterested third party.

5.3 C&I Rebate Program – Kansas

Program Description

The C&I Rebate program will provide rebates to commercial and industrial (C&I) customers that install, replace or retrofit qualifying electric savings measures including HVAC systems, motors, lighting, pumps, and so forth. This program is designed as an end-use incentive program. Empire will encourage audits so that customers can prioritize actions and be aware of all the energy improvement opportunities available to them. Empire will also encourage the customer to make as many improvements as possible, or to develop a plan to eventually implement other energy efficiency improvements. However, Empire will not require an audit, nor will it require customers to implement measures on a descriptive order.

As part of this program, Empire will offer rebates to customers for a portion of the cost of an energy audit. In order to receive the rebate, the customer must implement at least one of the audit recommendations that qualify for a rebate. The energy audit rebate will be set at 50% of the audit cost up to $300 for customers with facilities less than 25,000 square feet and up to $500 for customers with facilities over 25,000 square feet. Energy audits must be performed by a certified (CEM, licensed PE or equivalent) commercial energy auditor. Customers may choose their own auditor or Empire can recommend one. Customers with multiple buildings will be eligible for multiple audit rebates. Chain accounts will be limited to two audits per program year.

A limited number of prescriptive rebates for lighting (e.g., fluorescent fixtures and controls, HID fixtures and controls), cooling (e.g., unitary A/C and split systems) and motors will be available. Usually the small commercial customers (defined as customers

with peak billed demands under 40 kW[16]) are the primary participants in this part of the program.

All C&I customers, including those that utilize the prescriptive rebates, will be eligible for custom rebates. The custom rebates will be individually determined and analyzed to ensure that they pass the Total Resource Cost Test (defined as a test result of 1.0 or higher) and have a payback greater than two (2) years. Empire will use the approved discount rate for this analysis. Custom rebates will require pre-approval.

A customer is eligible for both custom and prescriptive rebates provided the rebates are for different measures. One customer may submit multiple rebate applications for different measures. Each individual measure will be evaluated on its own merits. Similar measures that are proposed in different facilities or buildings will be evaluated separately. However, no customer, including those with multiple facilities or buildings, may receive more than $5,000 in incentives for any program year.

Custom rebates are calculated as the lesser of the following:

- A buydown to a two-year payback
- 50% of the incremental cost
- 50% of lifecycle avoided demand and energy costs

The avoided cost criteria provide a cap on incentives for projects that are relatively expensive for the amount of kW and kWh saved.

The peak demand and energy savings for the C&I Rebate Program are shown in Table 5-10.

Table 5-10
Kansas C&I Rebate Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
1-3 (per year)	85	261,667

Program Framework/Strategy

Relationship to other programs: This program provides opportunities to save energy to all commercial and industrial customers for all end uses. Within this portfolio, this is the program that assists C&I customers implement energy efficiency measures.

Marketing Strategy: Empire will utilize various mediums, such as direct mail, bill inserts, key account representatives and its website, to notify both customers and HVAC dealers of the availability of these incentives.

[16] Rates codes CB (Commercial Service) and SH (Small Heating Service).

Program Delivery: The delivery component of the prescriptive portion of this program is the eligibility of verification, calculation, approval and fulfillment of rebates for qualifying measures. The delivery component of the custom rebate portion of the program will include technical assistance, eligibility verification, calculation of the rebate, and fulfillment of the rebate. Startup costs are development of a website dedicated to this program for access by interested parties.

Partners: The trade allies will be Empire's partners in implementing this program, in that they will most influence the buyer's decision to purchase and install any of these measures. Empire's third-party provider will also be a partner in that they make available technical expertise as needed by customers.

Program Budget

Because there is no major activity associated with starting this program, no start-up budget has been submitted. Website cost includes maintenance costs and therefore have been moved from a start-up cost to a delivery cost. The average customer incentive is assumed to be $1,189. The program budget for the C&I Rebate Program is shown in Table 5-11.

Table 5-11
Kansas C&I Rebate Program – Program Budget

Years	Delivery	Mgmt/Admin	Marketing	Customer Incentive	Evaluation	Total
1	$9,625	$3,925	$5,000	$39,250	$500	$58,300
2	$10,106	$4,121	$5,000	$39,250	$500	$58,977
3	$10,612	$4.327	$5,000	$39,250	$500	$59,689

Program Beneficiaries – Participation

All commercial and industrial customers are eligible to participate in this program. As shown on Table 5-12, it is anticipated that 33 customers will participate annually for the next 3 years.

Other beneficiaries of this program are trade allies who sell and install qualifying high efficiency equipment.

Table 5-12
Kansas C&I Rebate Program – Participation

Years	Participation
1-3 (per year)	33

Estimate of Program Effectiveness

The results for two scenario analyses conducted for this program are shown on Table 5-13.

Table 5-13
Kansas C&I Rebate Program – Estimate of Program Effectiveness

Scenario	TRC	Societal	Participant	RIM	Utility
3% Discount on Soc	1.47	2.56	3.58	0.46	2.44
7% Discount on Soc	1.47	1.99	3.58	0.46	2.44

Program Evaluation, Measurement and Verification (EM&V)

The total EM&V budget for the C&I Rebate program is 4.2% of the Year 3 program cost. The total EM&V budget for all programs is less than 5% of the Year 3 budget for all programs. Impacts can be based upon the detailed engineering analysis that is used to determine the rebate levels. A process evaluation will be conducted.

5.4 Building Operator Certification Program – Kansas

Program Description

The Building Operator Certification (BOC) Program is a professional development program in the energy and resource efficient operations of buildings. The training program covers building operation and maintenance for building operators, managers and consultants. It offers an in-depth look at the best ways to manage a facility, from the latest technologies to trade tips. Participants can improve job skills, access tools to more efficiently run facilities and achieve measurable energy savings. With over 5,000 BOC graduates nationwide, this rapidly growing training program provides an expansive network of peers and a highly regarded credential. BOC training includes nearly 80 hours of classroom and project work in building systems operation and maintenance. Each course in the series is completed in a one-day training session, except BOC 103-HVAC Systems and Controls, which is a two-day course. To become certified, participants must pass an exam at the end of each day of training and complete assigned projects.

There are two levels of certification: Level I - Building System Maintenance and Level II - Equipment Troubleshooting and Maintenance. Level I classes run for a total of 8 days whereas Level II classes run for 7. Development support for BOC was originally provided by the Northwest Energy Efficiency Alliance (NEEA), a non-profit group of electric utilities, state governments, public interest groups, and industry representatives committed to promoting affordable, energy-efficient products and services. Today, the Northwest Energy Efficiency Council (NEEC) is leading efforts to make BOC a nationally recognized standard.

Empire will be cooperating with Westar Energy and offering Westar's BOC classes to Empire's customers. Empire will share in sponsoring the training classes, including rental of property if any, refreshments, meals, and handouts. Empire will also contribute toward the annual license fee and Westar's internal administrative costs. In addition, Empire will offer scholarships at approximately 50% of the total registration fee. Empire will target this training support towards customers with facilities that employ full-time building operators. Attendees must operate and maintain a building served by Empire on an electric retail rate to quality for the scholarship. All commercial and industrial customers are eligible to participate. The annual budget assumes a total of 3 attendees will quality for the scholarship.

Estimated Peak Demand and Energy Savings

Based on the Evaluation of the BOC program, Empire is estimating an annual O&M savings of 0.40 kWh per square foot[17]. For purposes of benefit cost analysis, Empire has used an estimated average of 50,000 square feet per participant. The peak demand and energy savings for the BOC Program are shown in Table 5-14.

Table 5-14
Kansas BOC Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
1-3 (per year)	0	60,000

Program Framework/Strategy

Relationship to other programs: This program will encourage any attendee's company to implement an energy efficiency measure that qualifies for a C&I Rebate. Consequently, this program can also serve as a referral to the C&I Rebate program.

Marketing Strategy: Empire will coordinate marketing efforts with Westar Energy. Empire will also utilize various mediums, such as direct mail, bill inserts, key account representatives and its website to notify C&I customers of the availability of the training and scholarships.

Program Delivery: The training sessions will be implemented by the Midwest Energy Efficiency Alliance (MEEA) on behalf of the utilities.

Partners: MEEA and Westar Energy will be Empire's partners for this program.

Program Budget

Because there is no major activity associated with starting this program, no start-up budget has been submitted. Delivery assumes a cost of $2,000 per participant to sponsor the training and pay for a portion of licensing and Westar's administrative costs. This has

[17] The evaluation is titled "Long Term Monitoring and Tracking Report on 2007 Activities", Summit Blue, May 28, 2008 to the Northwest Energy Efficiency Alliance.

been escalated by $25 per year. Scholarships are assumed to be $600 for the next two years. For the third year, Empire assumes a scholarship cost of $650 per attendee. The program budget for the C&I Rebate Program is shown in Table 5-15.

Table 5-15
Kansas BOC Program – Program Budget

Years	Delivery	Mgmt/Admin	Marketing	Scholarship	Evaluation	Total
1	$6,000	$600	$500	$1,800	$50	$8,950
2	$6,025	$603	$500	$1,800	$50	$8,978
3	$6,050	$605	$500	$1,950	$50	$9,155

Program Beneficiaries – Participation

All commercial and industrial customers who have facilities in Empire's service territory who employ full-time building operators are eligible to participate in this program. As shown on Table 5-16, it is anticipated that 3 customers will participate annually for the next 3 years.

Other beneficiaries of this program are the building owners who send their employees to the training sessions.

Table 5-16
Kansas BOC Program – Participation

Years	Participation
1-3 (per year)	3

Estimate of Program Effectiveness

The results for two scenario analyses conducted for this program are shown on Table 5-17.

Table 5-17
Kansas BOC Program – Estimate of Program Effectiveness

Scenario	TRC	Societal	Participant	RIM	Utility
3% Discount on Soc	2.42	4.44	17.37	0.38	2.78
7% Discount on Soc	2.42	3.45	17.37	0.38	2.78

Program Evaluation, Measurement and Verification (EM&V)

The total EM&V budget for the BOC program is 2.7% of the Year 3 program cost. The total EM&V budget for all programs is less than 5% of the Year 3 budget for all programs. A process evaluation will be completed in Year 3, if not sooner.

5.5 C&I Peak Load Reduction Program – Kansas

Program Description

The C&I Peak Load Reduction Program is a partnership between businesses and Empire to assure that electric demand can be met on certain days during the summer and winter when customer demand for electricity might exceed the available supply. It is a voluntary demand response program designed to reduce peak demand at the request of the company. It will be available to all Commercial or Industrial customers being served under the Total Electric Building (TEB), General Power Service (GP) or Transmission Service (PT) rates. Customers under those rates who volunteer to participate in this program must have a minimum monthly billing demand of 200 kW and an anticipated minimum load curtailment capability of 200 kW.

Customers who participate will be required to enter in to a contract for a term of one, three, or five years with an automatic renewal for the same term of the contract unless notification is given by either the customer or the company at least 30 days prior to the expiration of the contract. Availability of this rider is also subject to the economic and technical feasibility of the installation of required Company equipment. The total MW contracted for under this program will not exceed 5 MW.

The contract year will be June 1 through May 31. Curtailments will typically occur during, but not necessarily limited to, the hours of 12:00 noon through 10:00 pm, Monday through Friday. The maximum number of curtailment events will be 10 per curtailment year and each event will last no less than two but no more than eight consecutive hours. Unless there is a system reliability event that needs to be addressed, there will not be more than one event per day. Customers will be provided with a curtailment notice of at least four hours prior to the start of an event. Curtailments may be called for either operational or economic reasons.

Compensation: For each curtailment year, a customer shall receive a payment or bill credit based upon the contract term. The Monthly Program Participation Payment per kW of Interruptible Demand (ID) shall be as shown in Table 5-18.

Table 5-18
Monthly Payments for C&I Peak Load Reduction Program – Kansas

Contract Term	$/kW of ID per Month
One year	$0.51
Three years	$1.27

In addition to the payments shown in Table 6-18, customers will receive additional compensation equal to $0.30/kW of ID for each hour of actual curtailment during the curtailment year.

Customers will be responsible for monitoring their load to comply with the terms of the contract. Penalties are assessed for failure to curtail. If a customer fails to reduce per the

terms of the contract during three or more curtailment events during a contract year, the customer shall be ineligible to participate for a period of two years from the date of the third failure.

Estimated Peak Demand and Energy Savings

This is a demand response program targeting a reduction in kW during a specific time frame. Little or no energy (kWh) is saved on a permanent basis. Therefore, energy savings are not applicable and not estimated. The peak demand and energy savings for the C&I Peak Load Reduction Program are shown in Table 5-19.

Table 5-19
Kansas C&I Peak Load Reduction Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
1	1,000	n/a
2-3 (per year)	1,500	n/a

Program Framework/Strategy

Relationship to other programs: This program is a specific demand response program. As such, it will allow qualifying C&I customers to reduce demand when requested by Empire to ensure adequate capacity to meet all customer needs.

Marketing Strategy: Empire will also utilize various mediums, such as direct mail, bill inserts, key account representatives and its website to notify customers of the availability of this program.

Program Delivery: The 'delivery' component of this program is getting the customer set up in the program parameters once they agree to participate. This includes setting up and testing dispatching, notification, verification, and so forth. Program delivery will be accomplished internally.

Partners: The participating customers will be Empire's partners in this program.

Program Budget

Because there is no major activity associated with starting this program, no start-up budget has been submitted. Delivery costs are costs associated with setting up the customer for participation, ensuring dispatch and notification processes are in place and working, and any equipment needed to verify curtailment is installed. The program budget for the C&I Peak Load Reduction Program is shown in Table 5-20.

Table 5-20
Kansas C&I Peak Load Reduction Program – Program Budget

Years	Delivery	Mgmt/Admin	Marketing	Customer Incentive	Evaluation	Total
1	$5,000	$5,000	$2,000	$13,375	$200	$25,575
2	$5,000	$5,250	$2,000	$20,063	$200	$32,513
3	$5,000	$5,513	$2,000	$20,063	$200	$33,776

Program Beneficiaries – Participation

All commercial and industrial customers who qualify to participate with their capability of curtailing load are eligible to participate in this program. As shown on Table 5-21, it is anticipated that one customer will participate in Year 1 and four will participate annually for the following four years.

Other beneficiaries of this program are all ratepayers who will benefit from Empire's ability to meet demand through curtailment on peak days and postpone the need for the procurement of new capacity to meet load serving obligations.

Table 5-21
Kansas C&I Peak Load Reduction Program – Participation

Years	Participation
1	1
2-3 (per year)	3

Estimate of Program Effectiveness

The results for two scenario analyses conducted for this program are shown on Table 5-22.

Table 5-22
Kansas C&I Peak Load Reduction Program – Estimate of Program Effectiveness

Scenario	TRC	Societal	Participant	RIM	Utility
3% Discount on Soc	6.17	6.17	n/a	2.39	2.39
7% Discount on Soc	6.17	6.17	n/a	2.39	2.39

Program Evaluation, Measurement and Verification (EM&V)

By design, a C&I peak load reduction program is self-verifying as the company tracks the customer's usage during a curtailment and ensures that the load was reduced to the contracted level. Measurement and verification of curtailments serve as an impact evaluation for this program. Process evaluations will be performed to determine if improvements can be made in how this program is designed, delivered, and administered.

The total EM&V budget for the C&I Peak Load Reduction program is 3.05% of the Year 3 program cost. The total EM&V budget for all programs is less than 5% of the Year 3 budget for all programs.

5.6 General Project Management and Marketing – Kansas

In order to deploy a multi-sector DSM portfolio, it is necessary to have an experienced manager-level resource available to provide oversight and guidance to the individual program managers (regardless of whether they are internal Empire staff or contracted labor). This is not a full-time commitment, as reflected in the budget levels shown under project management.

It will also be necessary to maintain and improve general marketing materials and infrastructure. Once approved, Empire will need to add content on these programs to its website. Empire will continue to assess potential improvements and implement them as appropriate to keep the information current and keep the site refreshed. Empire will also develop brochures and other collateral materials, train and possibly add resources to its customer service operation and undertake various "no cost" initiatives with print, radio and television media (news releases, news conferences, etc.). The budget for these activities is shown under general portfolio marketing. It is important to have this general marketing support if the individual program goals are to be met.

The general project management and marketing budget is shown in Table 5-23.

Table 5-23
Kansas General Project Management and Marketing Budget

Years	Delivery	Mgmt/Admin	Marketing	Customer Incentive	Evaluation	Total
1		$12,500	$7,500	$0		$20,000
2		$13,125	$7,875	$0		$21,000
3		$13,781	$8,269	$0		$22,050

5.7 Total Portfolio Summary – Kansas

Tables 5-24 through 5-31 show estimated peak demand and energy savings, estimates of program cost effectiveness, program participation and program budgets for the entire DSM portfolio in Kansas.

Table 5-24
Kansas Portfolio Summary – Estimated Peak Demand and Energy Savings – Year 1

Year 1 Without Low Income Weatherization	Demand (kW)	Energy (kWh)
Without C&I Peak Load Reduction	105	369,721
With C&I Peak Load Reduction	1,105	369.721

Table 5-25
Kansas Portfolio Summary – Estimated Peak Demand and Energy Savings – Years 2-3

Years 2-3 (per year) Without Low Income Weatherization	Demand (kW)	Energy (kWh)
Without C&I Peak Load Reduction	111	396,981
With C&I Peak Load Reduction	1,611	396,981

Table 5-26
Kansas Portfolio Summary – Estimate of Program Effectiveness – Without C&I Peak Load Reduction

Scenario	TRC	Societal	Participant	RIM	Utility
3% Discount on Soc	1.11	1.95	3.89	0.41	1.55
7% Discount on Soc	1.11	1.51	3.89	0.41	1.55

Table 5-27
Kansas Portfolio Summary – Estimate of Program Effectiveness – With C&I Peak Load Reduction

Scenario	TRC	Societal	Participant	RIM	Utility
3% Discount on Soc	4.02	6.14	4.08	1.48	4.84
7% Discount on Soc	4.02	4.77	4.08	1.48	4.84

Table 5-28
Kansas Portfolio Summary – Participation – Year 1

Year 1 – Without Low Income Weatherization	Participation
Without C&I Peak Load Reduction	71
With C&I Peak Load Reduction	72

Table 5-29
Kansas Portfolio Summary – Participation – Years 2-3

Years 2-3 (per year) – Without Low Income Weatherization	Participation
Without C&I Peak Load Reduction	91
With C&I Peak Load Reduction	92

Table 5-30
Kansas Portfolio Summary – Budget – Without C&I Peak Load Reduction Program

Years	Delivery	Mgmt/Admin	Marketing	Customer Incentive	Evaluation	Total
1	$16,150	$17,620	$16,500	$52,950	$850	$104,070
2	$39,682	$20,774	$19,375	$52,950	$1,350	$134,131
3	$41,391	$21,784	$19,769	$53,100	$1,350	$137,394

Table 5-31
Kansas Portfolio Summary – Budget – With C&I Peak Load Reduction Program

Years	Delivery	Mgmt/Admin	Marketing	Customer Incentive	Evaluation	Total
1	$21,150	$22,620	$18,500	$66,325	$1,050	$129,645
2	$44,682	$26,024	$21,375	$73,013	$1,550	$166,644
3	$46,391	$27,297	$21,769	$73,163	$1,550	$170,140

5.8 Other DSM Efforts – Kansas

Efficiency Kansas is a low-cost loan program to help home owners and small business owners make energy efficiency improvements to their homes and businesses. The KCC State Energy Office established Efficiency Kansas using $34 million in federal funds authorized by the American Recovery and Reinvestment Act of 2009 (the stimulus package). A residential customer can get a loan of up to $20,000 for home improvements. A small business can get a loan of up to $30,000 for business improvements that must use residential-sized heating and cooling systems.

Customers are required to get an energy audit to determine what cost effective improvements can be made. A requirement is that the projected energy (and dollar) savings must be enough to cover the cost of the improvements over the maximum 15-year life of the loan. Customers are required to use a Kansas qualified energy auditor who performs the audit and provides a customized plan for increasing the energy efficiency of the home or business. Participating lenders or utilities provide the low-cost financing to enable the customer to implement the auditor's energy-efficiency recommendations.

6.0 DSM Programs in Oklahoma

Empire's slate of four DSM programs in Oklahoma is designed to help customers improve their energy efficiency, reduced their peak demand, and save money. This portfolio of programs resulted from an energy efficiency potential study undertaken for Empire's Oklahoma customers. Together, they provide incentives that cover the major end uses for all customer classes. In addition, the programs strike a balance between energy efficiency and demand response programs, and do not promote fuel switching. All of these programs have been successfully deployed in many other electric utility service territories throughout the U.S. The four programs are:

- Low Income Weatherization Program
- Air Conditioning Tune-Up and Replacement Program
- C&I Prescriptive Rebate Program
- C&I Interruptible Rider Program

The objectives for each program are outlined in the paragraphs below. Specific information as to how the programs are implemented is provided in the discussion on each program.

Low Income Weatherization Program: Low income customers most often live in leaky homes with little insulation. This results in high bills for those least able to afford it. Quite often, they are renters and have no incentive to make costly improvements to a property they do not own. At the same time, the landlords have no motivation to make improvements to property for which they do not pay the energy bills. Both landlords and renters, as well as low income customers in general, are hard to reach and need assistance in removing obstacles to energy efficiency. Low income weatherization provides free weatherization services utilizing the protocol used by the Federal Government Weatherization Assistance Program. Consequently, it removes obstacles to participation for these hard to reach customer groups. The program is available only to the retrofit market and not to new construction.

Air Conditioning Tune-Up and Replacement Program: This program promotes annual tune-ups or the replacement of central cooling systems for existing residential and small commercial customers. Incentives will be provided to cover approximately 50% of either the expected cost of the tune up or the incremental cost of the high efficiency system. A longer term goal of this program is also 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 efficiency. This program is only available to the retrofit market and not to new construction. Heat pump rebates are only available to electric heating customers.

C&I Prescriptive Rebate Program: This program promotes the replacement of electric consuming equipment with the highest energy efficiency option commercially available for all commercial and industrial customers. Incentives will be provided to cover the

majority of the incremental cost between baseline efficiency and high efficiency. This program is available only to the retrofit market and not to new construction.

C&I Interruptible Rider: The purpose of this effort is to reduce customer load and thus demand during peak periods upon request of the company. This Rider will be available to any commercial or industrial customer receiving service under qualifying service rates with a minimum monthly billing demand of 200 kW and an anticipated minimum load curtailment capacity of 200 kW. A longer term goal of this program is to delay the need for the construction of new power plants.

6.1 Low Income Weatherization Program – Oklahoma

The Low Income Weatherization project will offer weatherization services to low income customers in Empire's Oklahoma service territory. The components of this project are administered by the CAP agencies and follow the protocol under current federal and state guidelines. The project provides significant energy savings to Empire's low income customers. Participants must be an Empire residential customer, qualify as "low income" under current Low Income Weatherization Assistance Program criteria (have a household income at or below 200 percent of federal poverty guidelines) and have not participated in the DOE program since 1993. Both renters and homeowners are eligible to participate. Renters must have approval of their landlords and follow the protocols of Low Income Weatherization Assistance for rental property.

This project helps low income customers reduce their energy costs at no cost to the customer. CAP agencies offer a cost effective implementation capability, which allows most of the funds allocated for this project to go directly to the purchase and installation of energy efficiency measures.

Funding for this program can be used for building envelope weatherization, refrigerators, and lighting. Incentives will be capped at $1,000 for weatherization, including air sealing, per residence. An administrative fee of 15% or $150 per weatherization job completed is also available for the CAP agency performing the work.

Empire will work with the CAP agencies to find qualifying low income customers to participate in this project. The project will be promoted via bill inserts and the Company's website, as well as through the CAPs' various communication mediums with the low income community.

In addition to participating in this program, low income customers are eligible to participate in the A/C Tune-Up or Replacement Program, provided the same measures are not paid for with Empire funding in both programs. The program will be implemented from January 2010 though December 2012.

Participation

Empire expects that 10 customers will participate in each program year as shown in Table 6-1.

Table 6-1
Oklahoma Low Income Weatherization Program - Participation

Years	Participation
2010	10
2011	10
2012	10

Peak Demand and Energy Savings

The peak demand and energy savings expected from this program are shown in Table 6-2. These values are based upon Deemed Savings.

Table 6-2
Oklahoma Low Income Weatherization Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
2010	4.4	17,020
2011	4.4	17,020
2012	4.4	17,020

Estimate of Program Cost Effectiveness

The benefit cost ratios derived for this program are shown in Table 6-3.

Table 6-3
Oklahoma Low Income Weatherization Program – Program Cost Effectiveness

Total Resource Cost Test	Participant	RIM	Program Administrator Cost
1.31	n/a	0.37	0.79

Program Budget

Weatherization budgets are set by calendar year. If all of the dollars are used in any calendar year, customers will be told that they may reapply in the following calendar year. Any dollars not spent in a particular year will be moved into the next year within the three-year program period. The program budget for this program is shown in Table 6-4.

Table 6-4
Oklahoma Low Income Weatherization Program – Program Budget

Years	Program Delivery	Marketing	Weatherization	Evaluation	Total.
2010	$3,000	$2,500	$11,500	$3,000	$20,000
2011	$3,000	$2,500	$11,500	$3,000	$20,000
2012	$3,000	$2,500	$11,500	$3,000	$20,000

Evaluation

Impacts will be based on Deemed Savings for weather zone 9 for installed measures. Due to the small size of the program, surveys will be conducted for all participants to measure customer satisfaction with participation in the program.

6.2 Air Conditioning Tune-Up and Replacement Program – Oklahoma

Tune Up

A spring inspection and tune-up of a central air conditioning or heat pump system can improve its efficiency and increase its life span. Without regular cleaning and maintenance, an air conditioner can lose up to 5% of its original efficiency for each year of operation.

Empire will offer an incentive to encourage annual inspections and maintenance of air conditioning systems for residential and small commercial customers (small commercial is defined as rate class CB – less than 40 kW). Any customer in this group can receive $50 towards a professional service inspection and tune-up. Customers with more than one system can receive multiple incentives up to three per location.

To qualify for an incentive, the customer must meet all of the eligibility conditions and complete an incentive application. Only air conditioning systems of 5 tons or less that have not participated in Empire's Tune-Up program within the last three years are eligible. To receive the incentive, a tune-up must be performed by a professional service technician and include an inspection with pre-specified items. In no case will Empire pay more than 100% of the actual cost of the inspection and tune-up.

Replacement

Some systems are so old and inefficient that a replacement is the best alternative for the customer. Empire will provide incentives to customers who purchase and install a new high efficiency central cooling system that meets the following criteria:

Central Air Conditioner
- SEER greater than or equal to 15
- EER greater than or equal to 12.5

Air Source Heat Pump
SEER greater than or equal to 15
HSPF greater than or equal to 8.5

The incentive will be $400 per qualifying unit. Customers with more than one system can receive multiple incentives up to three per location. Only electric heating customers can qualify for heat pumps incentives. Customers can also qualify for an additional $25 when a programmable setback thermostat is installed at the same time as the new cooling system. The thermostat must be purchased from and installed by the same cooling contractor and be on the same invoice as the cooling system.

To qualify for an incentive, the customer must meet all of the eligibility conditions and complete an incentive application. The contractor will be required to submit verification of a load calculation based on Manual J for each installation.

Empire will utilize direct mail and its website to notify both customers and HVAC dealers of the availability of these incentives. The program will be implemented from January 2010 though December 2012.

Participation

Empire expects that 27 customers will participate in each program year as shown in Table 6-5.

Table 6-5
Oklahoma CAC Tune-Up and Replacement Program - Participation

Years	Participation
2010	27
2011	27
2012	27

Peak Demand and Energy Savings

The peak demand and energy savings shown on Table 6-6 are based upon per ton Deemed Savings with an assumed size of 3.5 tons per system (this assumes a mix of residential and small commercial systems). Weather zone 9 was used for the per ton savings.

Table 6-6
Oklahoma CAC Tune-Up and Replacement Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
2010	8.3	28,964
2011	8.3	28,964
2012	8.3	28,964

Estimate of Program Cost Effectiveness

The cost benefit analysis results for the CAC Tune-Up and Replacement Program are shown on Table 6-7.

Table 6-7
Oklahoma CAC Tune-Up and Replacement Program – Program Cost Effectiveness

Total Resource Cost Test	Participant	RIM	Program Administrator Cost
1.26	3.73	0.47	1.27

Program Budget

Incentive budgets are set by calendar year. If all of the incentive dollars are used in any calendar year, customers who applications have been received will be put on hold and will be first to receive the incentive when the next year's funding becomes available. Empire will notify such customers regarding the status of their rebate applications. For those customers who have not submitted their applications, but who have purchased and installed qualifying equipment, Empire will note their account information and they will be told that they may apply in the following calendar year. Any dollars not spent in a particular year will be moved into the next year within the three-year program period. The program budget for the CAC Tune-Up and Replacement Program is shown on Table 6-8.

Table 6-8
Oklahoma CAC Tune-Up and Replacement Program – Program Budget

Years	Program Delivery	Marketing	Customer Incentive	Evaluation	Total.
2010	$3,000	$3,000	$5,850	$2,000	$13,850
2011	$3,000	$3,000	$5,850	$2,000	$13,850
2012	$3,000	$3,000	$5,850	$2,000	$13,850

Evaluation

Impacts will be based on a per ton Deemed Savings for weather zone 9. Actual unit size data will be collected for all participants and used to estimate impacts. Surveys will be conducted for all participants to measure customer satisfaction with participation in the program.

6.3 C&I Prescriptive Rebate Program – Oklahoma

Program Description

The C&I Rebate Program will provide rebates to commercial and industrial (C&I) customers that install, replace or retrofit qualifying electric savings measures including HVAC systems, motors, variable frequency drives, chillers and lighting.

All rebates will be prescriptive in nature. Rebates are based upon a combination of the cost of the high efficiency equipment and the anticipated savings (based on the Deemed Savings values). Tables 6-9 through 6-13 contain a list of the measures and the corresponding rebates that will be offered under this program.

Table 6-9
Oklahoma C&I Prescriptive Rebate Program – Lighting Measures and Rebates

Measure	Rebate
High Performance T8 Fixtures	
High Performance T8 (or "Super T8") lighting is an option that can be used to retrofit T12 or standard T8 lighting in existing facilities, or can be used instead of standard T8 lighting in new facilities. High Performance T8 fixtures must meet specifications set by the Consortium for Energy Efficiency (CEE) including, but not limited to, the following:	
2-lamp fixtures	$20 per fixture
3-lamp fixtures	$30 per fixture
High Performance T8 Lamps and Ballasts	
This High Performance T8 Lamps and Ballasts rebate is only available for the replacement of existing T12 systems. Both lamps and ballasts must be replaced to be eligible. High Performance T8 lamps and ballasts must meet specifications set by the CEE including, but not limited to, the following:	
High performance T8 lamps	$2 per lamp
High performance T8 ballasts	$10 per ballast
Lighting Power Density	
For common building types where the above prescriptive lighting options do not apply, a prescriptive rebate may be available based on Lighting Power Density. The overall lighting power must be reduced by at least 25% below the requirements of the local energy code or ASHRAE Std. 90.1	
	$1 per watt per square foot
High Intensity Fluorescent Fixtures	
High Intensity Fluorescent lighting is designed to replace high intensity discharge (HID) fixtures in high bay and other applications such as gymnasiums, warehouses, and parking lots.	
	$50 per fixture
Pulse Start Metal Halide Fixtures	
For HID applications, rebates are available for lamp and ballast replacements in typical 400 watt high bay applications. The lamp must be rated as pulse start with a pulse start ballast. Lamp wattage must be either 320 or 360 watts as a replacement for 400 watt metal halide or high pressure sodium.	
	$50 per fixture
Lighting Controls	
Rebates are available for occupancy sensors, either switch replacements or remote/ceiling mounted that use ultrasonic or passive infrared technology. Dual technology sensors are also eligible. Rebates for switch replacement sensors are limited to small rooms less than 250 square feet.	
Switch Replacement Sensor	$20 per sensor
Ceiling/Remote Mounted Sensor	$50 per sensor

Table 6-10
Oklahoma C&I Prescriptive Rebate Program – Motors Measures and Rebates

Motor Size, Horsepower	NEMA Nominal Full Load Efficiency		Incentive per Motor
	Open Drip Proof (ODP)	Totally Enclosed Fan Cooled (TEFC)	
1	85.5%	85.5%	$50
1.5	86.5%	86.5%	$50
2	86.5%	86.5%	$60
3	89.5%	89.5%	$60
5	89.5%	89.5%	$60
7.5	91.0%	91.7%	$90
10	91.7%	91.7%	$100
15	93.0%	92.4%	$115
20	93.0%	93.0%	$125
25	93.6%	93.6%	$130
30	94.12%	94.12%	$150
40	94.53%	94.53%	$180
50	94.97%	94.97%	$220
60	95.13%	95.13%	$260
75	95.17%	95.17%	$300
100	95.50%	95.50%	$400
125	95.78%	95.78%	$600
150	95.97%	95.97%	$700
200	96.13%	96.13%	$700

Efficiency and Incentive Levels: Motors meeting or exceeding the NEMA Nominal Efficiencies are eligible for incentives.
Motor Run Hours: Motors must operate a minimum of 2000 hours per year to be eligible for incentives.
Motors must be new, three phase, induction motors, NEMA design A & B, 1-200 HP, Open Drip Proof (ODP) or Totally Enclosed Fan Cooled (TEFC) any speed (RPM).

Table 6-11
Oklahoma C&I Prescriptive Rebate Program – Air Conditioning Measures and Rebates
Unitary Air Conditioners and Split System Air Conditioners – Efficiency and Incentive Levels

Equipment Size	Equipment Size, Btuh	Minimum Efficiency (SEER/EER)	Incentive per Unit ($/ton)
Single Phase Air Conditioning Equipment			
<5.4	<65,000	14.0 SEER	$92
Three Phase Air Conditioning Equipment			
<5.4	<65,000	13.0 SEER	$92
≥ 5.4 to < 11.25	≥ 65,000 to < 135,000	11.0 SEER	$73
≥ 11.25 to <20	≥ 135,000 to < 240,000	10.8 EER	$79
≥ 20 to 30	≥ 240,000 to 360,000	10.0 EER	$79
General Eligibility Requirements for Air Conditioning Systems: Incentives may be applied to packaged unitary air conditioning equipment and split system air conditioning equipment for use in commercial facilities. Compressor or condenser replacements or window units are not eligible for incentives. Efficiency and Incentive Levels for Air Conditioning Systems: Equipment meeting or exceeding the efficiency levels are eligible for the incentives listed.			

Table 6-12
Oklahoma C&I Prescriptive Rebate Program – Chillers Measures and Rebates

Equipment	Minimum Efficiency	Base Unit Incentive per ton	Additional Incentive
Air Cooled Chiller with condenser ≥ 30 and ≤ 300	10 EER and IPLV 12 EER	$20	$5/ton for each 0.1 EER point above minimum criteria
Water Cooled Chiller≥ 30 and < 150	.72 kW/ton and IPLV .62 kW/ton	$12	$8/ton for each .01 kW/ton below minimum criteria
Water Cooled Chiller≥ 150 and < 300	.63 kW/ton and IPLV .51 kW/ton	$12	$2/ton for each .01 kW/ton below minimum criteria
Water Cooled Chiller with condenser ≥ 300 and ≤ 1000	.56 kW/ton and IPLV .51 kW/ton	$5	$4/ton for each .01 kW/ton below minimum criteria

Table 6-13
Oklahoma C&I Prescriptive Rebate Program – Variable Frequency Drives
Measures and Rebates

VFD Controlled Hp	Incentive
5	$800
7.5	$950
10	$1,050
15	$1,150
20	$1,250
25	$1,350

Any application for a C&I rebate must be pre-approved prior to the installation of a measure.

Rebates will be limited to no more than $2,500 per customer through the first six months of each program year. After the initial six-month period, rebate limits will be increased to $5,000. The program will be implemented from January 2010 through December 2012.

Participation

Empire expects that 13 customers will participate in each program year as shown in Table 6-14.

Table 6-14
Oklahoma C&I Prescriptive Rebate Program - Participation

Years	Participation
2010	13
2011	13
2012	13

Peak Demand and Energy Savings

The peak demand and energy savings shown on Table 6-15 are based upon an assumed mix of lighting, HVAC and motor measures.

Table 6-15
Oklahoma C&I Prescriptive Rebate Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
2010	13.0	39,520
2011	13.0	39,520
2012	13.0	39,520

Estimate of Program Cost Effectiveness

The benefit cost ratios derived for this program are shown in Table 6-16.

Table 6-16
Oklahoma C&I Prescriptive Rebate Program – Program Cost Effectiveness

Total Resource Cost Test	Participant	RIM	Program Administrator Cost
1.25	3.28	0.45	0.92

Program Budget

Incentive budgets are set by calendar year. If all of the incentive dollars are used in any calendar year, customers whose applications have been received will be put on hold and will be first to receive the incentive when next year's funding becomes available. Empire will notify these customers of the status of their rebate applications. Any dollars not spent in a particular year will be moved into the next year within the three-year program period. The program budget for this program is shown in Table 6-17.

Table 6-17
Oklahoma C&I Prescriptive Rebate Program – Program Budget

Years	Program Delivery	Marketing	Customer Incentive	Evaluation	Total.
2010	$5,000	$3,500	$19,500	$3,000	$31,000
2011	$5,000	$3,500	$19,500	$3,000	$31,000
2012	$5,000	$3,500	$19,500	$3,000	$31,000

Evaluation

Impacts will be based on engineering analysis formulas from Deemed Savings. All inputs that are required for the engineering analysis will be collected for all projects. On-site inspection will be conducted for a random sample of all participants.

7.4 C&I Interruptible Rider Program – Oklahoma

Program Description

The C&I Interruptible Rider is a voluntary demand response program designed to reduce peak demand at the request of the Company. It will be available to all commercial or industrial customers being served under the Total Electric Building (TEB), General Power Commercial/Industrial Service (GP), or Large Industrial Service (PT) rates. Customers under those rates who volunteer to participate in this program must have a minimum monthly billing demand of 200 kW and an anticipated minimum load curtailment capability of 200 kW.

Customers who participate will be required to enter into a contract for a term of one, three, or five years with an automatic renewal for the same term of the contract unless notification is given by either the customer or the Company at least 30 days prior to expiration of the contract. Availability of this rider is also subject to the economic and

technical feasibility of the installation of required Company equipment. The total MW contracted for under this program will not exceed 6 MW.

The contract year will be June 1 through May 31. Curtailments will typically occur during, but not necessarily be limited to, the hours of 12:00 noon through 10:00 pm, Monday through Friday. The maximum number of curtailment events will be ten per curtailment year and each event will last no less than two but no more than eight consecutive hours. Unless there is a system reliability event that needs to be addressed, there will not be more than one event per day. Participating customers will be provided with a curtailment notice of at least four hours prior to the start of an event. Curtailments may be called for either operational or economic reasons.

Compensation: For each curtailment year, a participating customer shall receive a payment or bill credit based upon the contract term. The Monthly Program Participation Payment per kW of Interruptible Demand (ID) will be as shown on Table 6-18.

Table 6-18
Monthly Payments for C&I Interruptible Rider Program – Oklahoma

Contract Term	$/kW of ID per Month
One year	$0.51
Three years	$1.27
Five years	$2.02

In addition to the payments shown in Table 6-18, participating customers will receive additional compensation equal to $0.30/kW of ID for each hour of actual curtailment during the curtailment year.

Customers will be responsible for monitoring their load to comply with the terms of the contract. Penalties are assessed for failure to curtail. If a customer fails to reduce per the terms of the contract during three or more curtailment events during a contract year, the customer shall be ineligible to participate for a period of two years from the date of the third failure.

This program shall continue until the Rider is cancelled or rescinded.

Participation

Empire expects that 2 customers will participate in each program year as shown in Table 6-19.

Table 6-19
Oklahoma C&I Interruptible Rider Program - Participation

Years	Participation
2010	2
2011	2
2012	2

Peak Demand and Energy Savings

This is a demand response program targeting a reduction in kW during a specific time frame. Little or no energy (kWh) is saved on a permanent basis. Therefore, energy savings is not applicable, and as shown on Table 6-20, not estimated.

Table 6-20
Oklahoma C&I Interruptible Rider Program – Peak Demand and Energy Savings

Years	Demand (kW)	Energy (kWh)
2010	3,000	n/a
2011	3,000	n/a
2012	3,000	n/a

Estimate of Program Cost Effectiveness

The cost effectiveness analysis was performed from a 1-year ramp up program perspective, which would be indicative of a worst case scenario and a 5-year mature program perspective which would be more indicative of a best case scenario. The benefit cost ratios derived for this program are shown in Table 6-21.

Table 6-21
Oklahoma C&I Interruptible Rider Program – Program Cost Effectiveness

Scenario	Total Resource Cost Test	Participant	RIM	Program Administrator Cost
1-year ramp up	7.51	7.31	2.20	2.41
5-year mature	11.81	16.13	1.74	1.82

Program Budget

The program budget for this program is shown in Table 6-22.

Table 6-22
Oklahoma C&I Interruptible Rider Program – Program Budget

Years	Program Delivery	Marketing	Customer Incentive	Evaluation	Total.
2010	$4,000	$1,000	$40,125	$2,000	$47,125
2011	$4,000	$1,000	$40,125	$2,000	$47,125
2012	$4,000	$1,000	$40,125	$2,000	$47,125

Evaluation

Measurement and verification of curtailments serve as an impact evaluation for this program. Process evaluations will be performed to determine if improvements can be made in how the program is designed, delivered and administered.

6.5 Total Portfolio – Oklahoma

A summary of the portfolio, its participants, demand and energy savings, and budgets are shown in Tables 6-23 through 6-25. Only one year of the three-year program effort are reflected on these tables. The estimated results are the same for each of the three years. Empire has estimated the cost effectiveness from a portfolio perspective.

Table 6-23
Oklahoma Portfolio Summary – Participation, Peak Demand and Energy Savings

Program	Participation	Demand Savings (kW)	Energy Savings (kWh)
Low Income Weatherization	10	4.4	17,020
CAC Tune-Up and Replacement	27	8.3	28,964
C&I Prescriptive Rebate	13	13.0	39,520
C&I Interruptible Rider	2	3,000	n/a
Total	52	3,025.7	85,504

Table 6-24
Oklahoma Portfolio Summary - Budget

Category	Program Delivery	Marketing	Customer Incentive	Evaluation	Total
Low Income Weatherization	$3,000	$2,500	$11,500	$3,000	$20,000
CAC Tune-Up and Replacement	$3,000	$3,000	$5,850	$2,000	$13,850
C&I Prescriptive Rebate	$5,000	$3,500	$19,500	$3,000	$31,000
C&I Interruptible Rider	$4,000	$1,000	$40,125	$2,000	$47,125
Total	$15,000	$10,000	$76,975	$10,000	$111,975

Table 6-25
Oklahoma Portfolio Summary – Estimate of Cost Effectiveness

Scenario	Total Resource Cost Test	Participant	RIM	Program Administrator Cost
Portfolio without Interruptible	1.47	4.81	0.48	1.07

7.0 DSM Programs in Arkansas

Empire offers two DSM programs that are offered statewide in Arkansas – Energy Efficiency Arkansas and Arkansas Weatherization Program. These are "Quick Start" programs as categorized under the general list of initial program categories as defined in the Energy Efficiency Rules Docket No. 06-004-R Order 18. In addition, since October 2007, Empire has offered its Arkansas customers the opportunity to participate in the C&I Prescriptive Rebate program and the Air Conditioning Tune-Up program. In July 2009, Empire proposed adding the Air Conditioning Replacement Rebate and the Programmable Setback Thermostat to the Rebate program. These additions plus the C&I Interruptible Program were approved for implementation beginning January 2010.

Air Conditioning Tune-Up and Replacement Program: To promote annual tune-ups or the replacement of central cooling systems for residential and small commercial customers. Incentives will be provided to cover approximately 50% of the expected cost of the tune up or the incremental cost of the high efficiency system. A longer term goal of this program is also 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 efficiency. The replacement incentive is a new addition to the program for this plan. Its objective is to encourage installation of higher efficiency equipment at the time of replacement.

C&I Prescriptive Rebate Program: To promote the replacement of electric consuming equipment with the highest energy efficiency option commercially available for all commercial and industrial customers. Incentives will be provided to cover the majority of the incremental cost between baseline efficiency and high efficiency.

The C&I Interruptible Rider: To reduce customer load and thus demand during peak periods upon request of the Company. This Rider would be available to any commercial or industrial customer receiving service under qualifying service rates with a minimum monthly billing demand of 200 kW and an anticipated minimum load curtailment capability of 200 kW. A longer term goal of this program is to delay the need for additional peaking plants or high cost purchases of peak power on the open market.

7.1 Arkansas Weatherization Program

The Arkansas Weatherization Program focuses on severely energy-inefficient homes. Criteria were developed to determine which homes were severely energy-inefficient. The criteria include attic insulation less than or equal to R-12, wall and floor insulation equal to R-0, single pane windows with no storm windows attached, heating system less than 70% efficient, cooling system with SEER of 8 or less, and air infiltration problems. A significant number of measures are approved for use in this program ranging from insulation to appliance tune-up or replacement.

This program will be administered by a network consisting of the Department of Health and Human Services Office of Community Services, Community Action Agencies/Service Providers with support and coordination from Arkansas Community Action Agencies Association. No benefit/cost evaluation was conducted. Utility funding is determined by the percentage of the utility's customers of the state-wide electric total. Empire's annual budget for this program is $4,838.

7.2 Energy Efficiency Arkansas Program

Through the Energy Efficiency Arkansas (EEA) Program, education and training is provided that is administered by the Arkansas Economic Development Commission-Energy Office (AEO). The program strives to promote the efficient use of electricity and natural gas. It has the following elements:

- Educational outreach and promotion – no cost – low cost measures (residential)
- Media to include creation and placement of television, radio, and print ads plus maintaining EEA website
- HVAC training and certification (residential and small commercial)
- Energy rater training and Certified Energy Manager certification program
- Information outreach and training in large commercial and industry sectors

Utility funding is determined by the allocation of the budget for each program based on the percentage of utility customers to the total customers state-wide. This program does include the electric cooperatives in Arkansas. Empire's 2010 budget for this program is $2,398.

7.3 Central Air Conditioning Tune-Up and Replacement Program – Arkansas

Program Description

A spring inspection and tune-up of a central air conditioning or heat pump system can improve its efficiency and increase its life span. Without regular cleaning and maintenance, an air conditioner can lose up to 5% of its original efficiency for each year of operation.

Empire will offer an incentive to encourage annual inspections and maintenance of air conditioning systems for residential and small commercial customers (small commercial is defined as rate class CB - less than 40 kW). Any customer in this group can receive $50 towards a professional service inspection and tune-up. Customers with more than one system can receive multiple incentives up to three per location.

To qualify for an incentive, the customer must meet all of the eligibility conditions and complete an incentive application. Only air conditioning systems of five tons or less that have not had a tune-up within the last three years are eligible.

To receive the incentive, a tune-up must be performed by a professional service technician and include the following 12-point inspection:

- Check and clean condensing unit coils
- Check wiring and connections
- Check coolant level
- Check system operating pressures and temperatures against manufacturer's specification
- Check condensate pump and drain line
- Check thermostat
- Inspect air filter and replace if necessary
- Check compressor contacts
- Check belts and drives
- Clean and adjust controls
- Lubricate moving parts and clean indoor fan
- Check voltage

In no case will Empire pay more than 100% of the actual cost of the inspection and tune-up.

Replacement

Some systems are so old and inefficient that a replacement is the best alternative for the customer. Empire will provide incentives to customers who purchase and install a new high efficiency central cooling system that meets the following criteria:

Central Air Conditioner
SEER greater than or equal to 15
EER greater than or equal to 12.5

Air Source Heat Pump
SEER greater than or equal to 15
HSPF greater than or equal to 8.5

The incentive will be $400 per qualifying unit. Customers with more than one system can receive multiple incentives up to three per location. Customers can also qualify for an additional $25 when a programmable setback thermostat is installed at the same time as the new cooling system. The thermostat must be purchased from and installed by the same cooling contractor and be on the same invoice as the cooling system.

To qualify for an incentive, the customer must meet all of the eligibility conditions and complete an incentive application. The contractor will be required to submit verification of a load calculation based on Manual J for each installation.

Empire will utilize direct mail and its website to notify both customers and HVAC dealers of the availability of these incentives. The program will be implemented from January 2010 though December 2012.

The expected level of participation in the CAC Tune-Up and Replacement Program is shown on Table 7-1.

Table 7-1
Arkansas CAC Tune-Up and Replacement Program – Participation

Year	Participation
2010	27
2011	27
2012	27

The peak demand and energy savings shown in Table 7-2 are based upon per ton Deemed Savings with an assumed size of 3.5 tons per system (this assumes a mix of residential and small commercial systems). Weather zone 9 was used for the per ton savings.

Table 7-2
Arkansas CAC Tune-Up and Replacement Program – Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
2010	8.3	24,332
2011	8.3	24,332
2012	8.3	24,332

The estimates of program effectiveness are shown on Table 7-3.

Table 7-3
Arkansas CAC Tune-Up and Replacement Program – Estimate of Program Effectiveness

Total Resource Cost Test	Participant	Ratepayer Impact Measure (RIM)	Program Administrator Cost
1.03	3.23	0.43	1.07

Incentive budgets are set by calendar year. If all the incentive dollars are used in any calendar year, customers whose applications have been received will be put on hold and will be first to receive the incentive when the next year's funding becomes available. Customers will be notified as to the status of their rebate application. Any dollars not spent in a particular year will be moved into the next year within the three-year program period. The program budget is shown in Table 7-4.

Table 7-4
Arkansas CAC Tune-Up and Replacement Program – Program Budget

Year	Program Delivery	Marketing	Customer Incentive	Evaluation	Total
2010	$3,000	$3,000	$5,850	$2,000	$13,850
2011	$3,000	$3,000	$5,850	$2,000	$13,850
2012	$3,000	$3,000	$5,850	$2,000	$13,850

Evaluation

Impacts will be based on per ton Deemed Savings for weather zone 9. Actual unit size data will be collected for all participants and used to estimate impacts. Due to the small number of participants, surveys will be conducted for all participants to measure customer satisfaction with participation in the program.

7.4 C&I Prescriptive Rebate Program – Arkansas

Program Description

The C&I Prescriptive Rebate Program will provide rebates to C&I customers that install, replace, or retrofit qualifying electric savings measures including HVAC systems, motors, chillers, variable frequency drives and lighting.

All rebates will be prescriptive in nature. Rebates are based upon a combination of the cost of high efficiency equipment and the anticipated savings (based on the Deemed Savings values). Tables 7-5 through 7-9 contain a list of the measures and the corresponding rebates that will be offered under this program.

Table 7-5
Arkansas C&I Prescriptive Rebate Program – Lighting Measures and Rebates

Measure	Rebate
High Performance T8 Fixtures	
High Performance T8 (or "Super T8") lighting is an option that can be used to retrofit T12 or standard T8 lighting in existing facilities, or can be used instead of standard T8 lighting in new facilities. High Performance T8 fixtures must meet specifications set by the Consortium for Energy Efficiency (CEE) including, but not limited to, the following:	
2-lamp fixtures	$20 per fixture
3-lamp fixtures	$30 per fixture
High Performance T8 Lamps and Ballasts	
This High Performance T8 Lamps and Ballasts rebate is only available for the replacement of existing T12 systems. Both lamps and ballasts must be replaced to be eligible. High Performance T8 lamps and ballasts must meet specifications set by the CEE including, but not limited to, the following:	
High performance T8 lamps	$2 per lamp
High performance T8 ballasts	$10 per ballast
Lighting Power Density	
For common building types where the above prescriptive lighting options do not apply, a prescriptive rebate may be available based on Lighting Power Density. The overall lighting power must be reduced by at least 25% below the requirements of the local energy code or ASHRAE Std. 90.1	
	$1 per watt per square foot
High Intensity Fluorescent Fixtures	
High Intensity Fluorescent lighting is designed to replace high intensity discharge (HID) fixtures in high bay and other applications such as gymnasiums, warehouses, and parking lots.	
	$50 per fixture
Pulse Start Metal Halide Fixtures	
For HID applications, rebates are available for lamp and ballast replacements in typical 400 watt high bay applications. The lamp must be rated as pulse start with a pulse start ballast. Lamp wattage must be either 320 or 360 watts as a replacement for 400 watt metal halide or high pressure sodium.	
	$50 per fixture
Lighting Controls	
Rebates are available for occupancy sensors, either switch replacements or remote/ceiling mounted that use ultrasonic or passive infrared technology. Dual technology sensors are also eligible. Rebates for switch replacement sensors are limited to small rooms less than 250 square feet.	
Switch Replacement Sensor	$20 per sensor
Ceiling/Remote Mounted Sensor	$50 per sensor

Table 7-6
Arkansas C&I Prescriptive Rebate Program – Motors Measures and Rebates

Motor Size, Horsepower	NEMA Nominal Full Load Efficiency		Incentive per Motor
	Open Drip Proof (ODP)	Totally Enclosed Fan Cooled (TEFC)	
1	85.5%	85.5%	$50
1.5	86.5%	86.5%	$50
2	86.5%	86.5%	$60
3	89.5%	89.5%	$60
5	89.5%	89.5%	$60
7.5	91.0%	91.7%	$90
10	91.7%	91.7%	$100
15	93.0%	92.4%	$115
20	93.0%	93.0%	$125
25	93.6%	93.6%	$130
30	94.12%	94.12%	$150
40	94.53%	94.53%	$180
50	94.97%	94.97%	$220
60	95.13%	95.13%	$260
75	95.17%	95.17%	$300
100	95.50%	95.50%	$400
125	95.78%	95.78%	$600
150	95.97%	95.97%	$700
200	96.13%	96.13%	$700
Efficiency and Incentive Levels: Motors meeting or exceeding the NEMA Nominal Efficiencies are eligible for incentives. Motor Run Hours: Motors must operate a minimum of 2000 hours per year to be eligible for incentives. Motors must be new, three phase, induction motors, NEMA design A & B, 1-25 HP, Open Drip Proof (ODP) or Totally Enclosed Fan Cooled (TEFC) any speed (RPM).			

Table 7-7
Arkansas C&I Prescriptive Rebate Program – Air Conditioning Measures and Rebates
Unitary Air Conditioners and Split System Air Conditioners – Efficiency and Incentive Levels

Equipment Size	Equipment Size, Btuh	Minimum Efficiency (SEER/EER)	Incentive per Unit ($/ton)
Single Phase Air Conditioning Equipment			
<5.4	<65,000	14.0 SEER	$92
Three Phase Air Conditioning Equipment			
<5.4	<65,000	13.0 SEER	$92
≥ 5.4 to < 11.25	≥ 65,000 to < 135,000	11.0 SEER	$73
≥ 11.25 to <20	≥ 135,000 to < 240,000	10.8 EER	$79
≥ 20 to 30	≥ 240,000 to 360,000	10.0 EER	$79
General Eligibility Requirements for Air Conditioning Systems: Incentives may be applied to packaged unitary air conditioning equipment and split system air conditioning equipment for use in commercial facilities. Compressor or condenser replacements or window units are not eligible for incentives. Efficiency and Incentive Levels for Air Conditioning Systems: Equipment meeting or exceeding the efficiency levels are eligible for the incentives listed.			

Table 7-8
Arkansas C&I Prescriptive Rebate Program – Chillers Measures and Rebates

Equipment	Minimum Efficiency	Base Unit Incentive per ton	Additional Incentive
Air Cooled Chiller with condenser ≥ 30 and ≤ 300	10 EER and IPLV 12 EER	$20	$5/ton for each 0.1 EER point above minimum criteria
Water Cooled Chiller≥ 30 and < 150	.72 kW/ton and IPLV .62 kW/ton	$12	$8/ton for each .01 kW/ton below minimum criteria
Water Cooled Chiller≥ 150 and < 300	.63 kW/ton and IPLV .51 kW/ton	$12	$2/ton for each .01 kW/ton below minimum criteria
Water Cooled Chiller with condenser ≥ 300 and ≤ 1000	.56 kW/ton and IPLV .51 kW/ton	$5	$4/ton for each .01 kW/ton below minimum criteria

Table 7-9
Arkansas C&I Prescriptive Rebate Program – Variable Frequency Drives Measures and Rebates

VFD Controlled Hp	Incentive
5	$800
7.5	$950
10	$1,050
15	$1,150
20	$1,250
25	$1,350

Any application for a C&I rebate must be pre-approved prior to the installation of a measure.

Rebates will be limited to no more than $2,500 per customer through the first six months of each program year. After the initial six-month period, rebate limits will be increased to $5,000. The program will be implemented from January 2010 through December 2012.

The expected level of participation in the C&I Prescriptive Rebate Program is shown on Table 7-10.

Table 7-10
Arkansas C&I Prescriptive Rebate Program – Participation

Year	Participation
2010	20
2011	20
2012	20

The peak demand and energy savings for the C&I Prescriptive Rebate Program shown in Table 7-11 are based upon an assumed mix of lighting, HVAC and motor measures.

Table 7-11
Arkansas C&I Prescriptive Rebate Program – Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
2010	20.0	60,800
2011	20.0	60,800
2012	20.0	60,800

The estimates of program cost effectiveness are shown on Table 7-12.

Table 7-12
Arkansas C&I Prescriptive Rebate Program – Estimate of Program Effectiveness

Total Resource Cost Test	Participant	Ratepayer Impact Measure (RIM)	Program Administrator Cost
1.31	3.28	0.44	1.00

Incentive budgets are set by calendar year. If all the incentive dollars are used in any calendar year, customers whose applications have been received will be put on hold and will be first to receive the incentive when the next year's funding becomes available. The customers will be notified of the status of their rebate application. Any dollars not spent in a particular year will be moved into the next year within the three-year program period. The program budget is shown in Table 7-13.

Table 7-13
Arkansas C&I Prescriptive Rebate Program – Program Budget

Year	Program Delivery	Marketing	Customer Incentive	Evaluation	Total
2007	$5,000	$3,500	$30,000	$3,000	$41,500
2008	$5,000	$3,500	$30,000	$3,000	$41,500
2009	$5,000	$3,500	$30,000	$3,000	$41,500

Evaluation

Impacts will be based on engineering analysis formulas from Deemed Savings. All inputs that are required for the engineering analysis will be collected for all projects. On-site inspection will be conducted for a random sample of all participants.

7.5 C&I Interruptible Rider – Arkansas

Program Description

The C&I Interruptible Rider under consideration in Arkansas is a voluntary demand response program designed to reduce peak demand at the request of the company. It will be available to all Commercial or Industrial customers being served under the General Power Service (GP) or Large Industrial Service (PT) rates. Customers under those rates who volunteer to participate in this program must have a minimum monthly billing demand of 200 kW and an anticipated minimum load curtailment capability of 200 kW.

Customers who participate would be required to enter into a contract for a term of one, three, or five years with an automatic renewal for the same term of the contract unless notification is given by either the customer or the Company at least 30 days prior to expiration of the contract. Availability of this rider is also subject to the economic and technical feasibility of the installation of required Company equipment. The total capacity contracted for under this program will not exceed 3 MW.

The contract year under the program would be June 1 through May 31. Curtailments will typically occur during, but not necessarily be limited to, the hours of 12:00 noon through 10:00 pm, Monday through Friday. The maximum number of curtailment events will be ten per curtailment year. Each event will last no less than two but no more than eight consecutive hours. Unless there is a system reliability event that needs to be addressed, there will not be more than one event per day. Customers will be provided with a curtailment notice of at least four hours prior to the start of an event. Curtailments may be called for either operational or economic reasons.

To determine demands, the following definitions will be used:

Customer Peak Demand (CPD) shall be either the customer's historical actual maximum measured kW demand during a peak period or an amount determined based on the specific circumstances involving a Customer's actual or expected operations and agreed upon between the Company and the Customer.

The Maximum Firm Demand (MFD) shall be the maximum level of demand that the Customer can place on the system during a curtailment event and will be at least 200 kW lower than the customer's CPD. The difference between the two will be the Interruptible Demand (ID), expressed in kW and shall be the demand upon which credits under this Rider are available to the customer. All IDs must be at least 200 kW. The Company may also use a test curtailment for verification of the customer's ability to curtail to the MFD or to establish the MFD.

Compensation: For each curtailment year, a customer shall receive a payment or bill credit based upon the contract term. The Monthly Program Participation Payment per kW of ID is as shown in Table 7-14:

Table 7-14
Monthly Payments for C&I Interruptible Rider – Arkansas

Contract Term	$/kW of ID per Month
One year	$0.51
Three years	$1.27
Five years	$2.02

In addition to the payments mentioned above, participating customers would receive additional compensation equal to $.30 per kW of ID for each hour of actual curtailment during the curtailment year.

The customer will be responsible for monitoring their load to comply with the terms of the contract. A penalty shall be assessed if the customer fails to curtail the full amount of the ID or to keep its demand at or below the MFD for any reason. If this failure occurs, the ID and MFD in the contract shall be adjusted and the customer will refund all credits or payments previously received under the current contract in an amount equal to the change in ID multiplied by 150% of the contract demand rate for the remaining months of the contract period. If a customer fails to reduce load to its MFD during three or more

curtailment events during a contract year, the customer shall be ineligible to participate for a period of two years from the date of the third failure.

The expected level of participation in the C&I Interruptible Rider is shown on Table 7-15.

Table 7-15
Arkansas C&I Interruptible Rider – Participation

Year	Participation
2010	2
2011	2
2012	2

This is a demand response program targeting a reduction in kW during a specific time frame. Little or no energy (kWh) is saved on a permanent basis. Therefore, energy savings is not applicable and has not been estimated in Table 7-16.

Table 7-16
Arkansas C&I Interruptible Rider – Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
2010	3,000	n/a
2011	3,000	n/a
2012	3,000	n/a

The cost effectiveness analysis, shown in Table 7-17, was performed from a one-year ramp up perspective, which would be indicative of a worst case scenario and a five-year mature program perspective which would be more indicative of a base case scenario.

Table 7-17
Arkansas C&I Interruptible Rider – Estimate of Program Effectiveness

Scenario	Total Resource Cost Test	Participant	Ratepayer Impact Measure (RIM)	Program Administrator Cost
1-year ramp up	7.55	7.74	2.05	2.24
5-year mature	11.81	16.02	1.73	1.81

The program budget is shown in Table 7-18.

Table 7-18
Arkansas C&I Interruptible Rider – Program Budget

Year	Program Delivery	Marketing	Customer Incentive	Evaluation	Total
Year 1	$4,000	$1,000	$40,125	$2,000	$47,125
Year 2	$4,000	$1,000	$40,125	$2,000	$47,125
Year 3	$4,000	$1,000	$40,125	$2,000	$47,125

Evaluation

Measurement and verification of curtailments serve as an impact evaluation for this program. Process evaluations will be performed to determine if improvements can be made in how this program is designed, delivered and administered.

7.6 Total Portfolio – Arkansas

A summary of the portfolio, its participants, demand and energy savings, and budgets are shown in Tables 7-19 through 7-21. Only one year of the three-year program effort are reflected on these tables. The estimated results are the same for each of the three years. Empire has estimated the cost effectiveness from a portfolio perspective.

Table 7-19
Arkansas Portfolio Summary – Participation, Peak Demand and Energy Savings

Program	Participation	Demand Savings (kW)	Energy Savings (kWh)
CAC Tune-Up and Replacement	27	8.3	24,332
C&I Prescriptive Rebate	20	20.0	60,800
C&I Interruptible Rider	2	3,000	n/a
Total	49	3,028	85,132

Table 7-20
Arkansas Portfolio Summary - Budget

Category	Program Delivery	Marketing	Customer Incentive	Evaluation	Total
CAC Tune-Up and Replacement	$3,000	$3,000	$5,850	$2,000	$13,850
C&I Prescriptive Rebate	$5,000	$3,500	$30,000	$3,000	$41,500
C&I Interruptible Rider (A)	$4,000	$1,000	$40,125	$2,000	$47,125
Subtotal	$12,000	$7,500	$75,925	$7,000	$102,475
Statewide Low Income Weatherization					$4,838
Statewide Education					$1,091
Total					$108,404
(A) Implementation delayed until next general rate case.					

Table 7-21
Arkansas Portfolio Summary – Estimate of Cost Effectiveness

Scenario	Total Resource Cost Test	Participant	RIM	Program Administrator Cost
Portfolio without Interruptible	1.32	3.33	0.46	1.07

Abbreviations

A/C or AC – Air conditioning
ACCA – Air Conditioning Contractors of America
AEG – Applied Energy Group
AEO – Arkansas Economic Development Commission – Energy Office
AHU – Air Handling Unit
APSC – Arkansas Public Service Commission
ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BOC – Building Operator Certification
BPI – Building Performance Institute
Btu – British thermal unit
Btuh – Btu's per hour
C&I – Commercial and Industrial
CAC – Central air conditioning
CAP – Community Action Partnership
CBECS – Commercial Buildings Energy Consumption Survey
CEE – Consortium for Energy Efficiency
CEM – Certified Energy Manager
CFL – Compact fluorescent light bulbs
CHP – Combined heat and power
CMH – Ceramic Metal Hallide (lighting)
CPC – Customer Programs Collaborative
CPD – Customer Peak Demand
DCV – Demand Control Ventilation
DEER – Database for Energy Efficient Resources
DHW – Domestic Hot Water
DOE – Department of Energy
DSM – Demand-side Management
ECM – Energy Conservation Measure
EDF – Environmental Damage Factor
EEA – Energy Efficiency Arkansas
EEM – Energy Efficiency Measure
EER – Energy Efficiency Ratio
ELIP – Experimental Low Income Program
EM&V – Evaluation Measurement and Verification
EPA – Environmental Protection Agency
GED – Global Energy Decisions
GP – General Power Commercial/Industrial Service rate class
HID – High intensity discharge lighting
HIF – High Intensity Fluorescent lighting
Hp – Horsepower
HPS – High Pressure Sodium (lighting)
HPT – High Performance T8
HSPF – Heating Season Performance Factor

HVAC – Heating, ventilation, and air conditioning
ID – Interruptible Demand
IPLV – Integrated Part-Load Value
IR – Interruptible Service rate class
IRP – Integrated Resource Plan or integrated resource planning
KCC – Kansas Corporation Commission
kW – kilowatt
kWh – kilowatthour
LED – Light Emitting Diode (lighting)
LIHEAP – Low Income Home Energy Assistance Program
LIPA – Long Island Power Authority
LP – Large Power rate class
MDNR – Missouri Department of Natural Resources
MEEA – Midwest Energy Efficiency Alliance
MFD – Maximum Firm Demand
MH – Metal Hallide (lighting)
MPSC – Missouri Public Service Commission
MV – Mercury Vapor (lighting)
MW – Megawatt
MWh – Megawatthour
NEEA – Northwest Energy Efficiency Alliance
NEEC – Northwest Energy Efficiency Council
NEMA – National Electrical Manufacturers Association
NYSERDA – New York State Energy Research and Development Authority
O&M – Operations and maintenance costs
ODP – Open Drip Proof (motor)
OTOU – Optional Time of Use
PBR – Performance-Based Ratemaking
PE – Professional Engineer
PSMH – Pulse-Start Metal Hallide
PTAC – Packaged Terminal Air Conditioner
RIM – Ratepayer Impact Measure
RTU – Remote Terminal Unit
SC – Small Cooling Rate Class
SH – Small Heating Rate Class
SEER – Seasonal energy efficiency ratio
TEB – Total Electric Building rate class
TEFC – Totally Enclosed Fan Cooled (motor)
VFD – Variable frequency drive

Appendix A
All DSM Measures Evaluated in the Technical Potential Analysis by Sector

RESIDENTIAL	Air-Source Heat Pump Replacement with 15 SEER (Space Cooling (SC) Only)
RESIDENTIAL	Air-Source Heat Pump Replacement with 8.2 HSPF (Space Heating (SH) Only)
RESIDENTIAL	Air-Source Heat Pump Replacement with 15 SEER (Annual Savings)
RESIDENTIAL	Air-Source to Ground-source Heat Pump Replacement (SC Only)
RESIDENTIAL	Air-Source to Ground-source Heat Pump Replacement (SH Only)
RESIDENTIAL	Air-Source to Ground-Source Heat Pump Replacement (Annual Savings)
RESIDENTIAL	Ceiling Insulation Installation (SC Only)
RESIDENTIAL	Ceiling Insulation Installation (SH Only)
RESIDENTIAL	Ceiling Insulation Installation (Annual Savings)
RESIDENTIAL	Central A/C Replacement to 15 SEER
RESIDENTIAL	Central A/C Tune-up
RESIDENTIAL	CFL Installation
RESIDENTIAL	Duct Efficiency Improvement (SC Only)
RESIDENTIAL	Duct Efficiency Improvement (SH Only)
RESIDENTIAL	Duct Efficiency Improvement (Annual Savings)
RESIDENTIAL	ENERGY STAR Clothes Washer Replacement (Appliance Only Savings)
RESIDENTIAL	ENERGY STAR Clothes Washer Replacement (Electric Clothes Dryer Energy Savings)
RESIDENTIAL	ENERGY STAR Clothes Washer Replacement (Electric Water Heat Savings)
RESIDENTIAL	ENERGY STAR Clothes Washer Replacement (Average Annual Savings)
RESIDENTIAL	ENERGY STAR Color TVs
RESIDENTIAL	ENERGY STAR Dehumidifier Replacement
RESIDENTIAL	ENERGY STAR Dishwasher Replacement (Appliance Savings Only)
RESIDENTIAL	ENERGY STAR Dishwasher Replacement (Electric Water Heat Savings)
RESIDENTIAL	ENERGY STAR Dishwasher Replacement (Average Annual Savings)
RESIDENTIAL	ENERGY STAR Freezer Replacement
RESIDENTIAL	ENERGY STAR Personal Computers
RESIDENTIAL	ENERGY STAR Refrigerator Replacement
RESIDENTIAL	ENERGY STAR Window Installation (SC Only)
RESIDENTIAL	ENERGY STAR Window Installation (SH Only)
RESIDENTIAL	ENERGY STAR Window Installation (Annual Savings)
RESIDENTIAL	Faucet Aerator Retrofit
RESIDENTIAL	Floor Insulation Installation (SC Only)
RESIDENTIAL	Floor Insulation Installation (SH Only)
RESIDENTIAL	Floor Insulation Installation (Annual Savings)
RESIDENTIAL	Freezer Early Retirement
RESIDENTIAL	Infiltration Reduction (Caulking & Weatherstripping) - SH Only
RESIDENTIAL	Infiltration Reduction (Caulking & Weatherstripping)- SC Only
RESIDENTIAL	Infiltration Reduction (Annual Savings)
RESIDENTIAL	Low-flow Showerhead Retrofit
RESIDENTIAL	Programmable Thermostat Installation (SC Only)
RESIDENTIAL	Programmable Thermostat Installation (SH Only)
RESIDENTIAL	Programmable Thermostat (Annual Savings)
RESIDENTIAL	Refrigerator Early Retirement
RESIDENTIAL	Room A/C Replacement
RESIDENTIAL	Storm Window Installation (SC Only)
RESIDENTIAL	Storm Window Installation (SH Only)
RESIDENTIAL	Storm Window Installation (Annual Savings)
RESIDENTIAL	Tankless Installation from Storage Water Heater
RESIDENTIAL	Wall Insulation (SC Only)

RESIDENTIAL Wall Insulation (SH Only)
RESIDENTIAL Wall Insulation (Annual Savings)
RESIDENTIAL Water Heater Blanket Installation
RESIDENTIAL Water Heater Pipe Wrap Installation
RESIDENTIAL High Efficiency Water Heater Replacement

RESIDENTIAL Renewable Energy : Photovoltaic [PV]; Wind

COMMERCIAL Interior Lighting; Fluorescent; T12; ---> HPT8 retrofit
COMMERCIAL Interior Lighting; Fluorescent; T8; ---> standard T8 to HPT8
COMMERCIAL Interior Lighting; Fluorescent; T5; ---> none
COMMERCIAL Interior Lighting; HID; Metal Halide [MH]; ---> replace with PSMH
COMMERCIAL Interior Lighting; HID; Metal Halide [MH]; ---> replace with HIF
COMMERCIAL Interior Lighting; HID; Mercury Vapor [MV]; ---> replace with PSMH
COMMERCIAL Interior Lighting; HID; Mercury Vapor [MV]; ---> replace with HIF
COMMERCIAL Interior Lighting; HID; High Pressure Sodium [HPS]; ---> replace with PSMH
COMMERCIAL Interior Lighting; HID; High Pressure Sodium [HPS]; ---> replace with HIF
COMMERCIAL Interior Lighting; Other; Incandescent; ---> replace with CFL
COMMERCIAL Interior Lighting; Other; Incandescent; ---> replace with CMH
COMMERCIAL Interior Lighting; Other; Compact Fluorescent [CFL]; ---> none
COMMERCIAL Interior Lighting; Other; LED; ---> none
COMMERCIAL Interior Lighting; Controls; daylighting, fluorescent; ---> implement daylight harvesting for fluorescent
COMMERCIAL Interior Lighting; Controls; daylighting, HID; ---> implement daylight harvesting for HID
COMMERCIAL Interior Lighting; Controls; occupancy, fluorescent; ---> install occupancy sensors for fluorescent
COMMERCIAL Interior Lighting; Controls; occupancy, HID; ---> install occupancy sensors for HID
COMMERCIAL Exterior Lighting; Fluorescent; all; ---> high efficiency fluorescent replacement
COMMERCIAL Exterior Lighting; HID; all; ---> replace with PSMH
COMMERCIAL Exterior Lighting; HID; ; ---> replace with LED
COMMERCIAL Exterior Lighting; Other; Incandescent; ---> replace with PSMH
COMMERCIAL Exterior Lighting; Other; CFL; ---> replace with LED
COMMERCIAL Exterior Lighting; All; controls; ---> photecell and astronomic clock
COMMERCIAL Space Cooling; AHU; n/a; --->
COMMERCIAL Space Cooling; RTU; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; PTAC; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; Split; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; Other; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; All; controls; ---> economizers; setback; DCV, etc.
COMMERCIAL Ventilation; Motors; fractional; ---> ECM
COMMERCIAL Ventilation; Motors; >= 1 HP; ---> Premium Motors
COMMERCIAL Ventilation; Variable Frequency Drives [VFD]; VFD for fans; ---> add VFD
COMMERCIAL Ventilation; Variable Frequency Drives [VFD]; VFD for pumps, cooling; ---> add VFD
COMMERCIAL Ventilation; Variable Frequency Drives [VFD]; VFD for pumps, heating; ---> add VFD
COMMERCIAL Space Heating; electric; resistance; ---> replace with heat pump
COMMERCIAL Space Heating; electric; heat pump; ---> replace with high efficiency
COMMERCIAL Space Heating; electric; heat pump; ---> replace with geothermal heat pump
COMMERCIAL Water Heating; DHW; ; ---> replace with high efficiency storage DHW
COMMERCIAL Water Heating; DHW; ; ---> replace with tankless DHW
COMMERCIAL Cooking ; ; ; --->
COMMERCIAL Refrigeration; ; ; --->
COMMERCIAL Kitchen Equipment; ; ; --->
COMMERCIAL Office Equipment; ; ; --->
COMMERCIAL Other; Miscellaneous; ; --->

COMMERCIAL Other; Compressed Air; ; --->
COMMERCIAL Other; Existing Building Commissioning; ; --->

INDUSTRIAL Boiler & CHP
INDUSTRIAL Process Heating
INDUSTRIAL Process Cooling & Refrigeration
INDUSTRIAL Machine Drives
INDUSTRIAL Electro-Chemical Processes
INDUSTRIAL Facility HVAC
INDUSTRIAL Facility HVAC : cooling, high efficiency AC
INDUSTRIAL Facility HVAC : ventilation, premium motors
INDUSTRIAL Facility HVAC : ventilation, variable speed drives
INDUSTRIAL Facility Lighting
INDUSTRIAL Facility Lighting : fluorescent, T12 retrofit
INDUSTRIAL Facility Lighting : fluorescent, high intensity T5HO
INDUSTRIAL Facility Lighting : HID, pulse start metal halide
INDUSTRIAL Facility Lighting : controls, occupancy sensors
INDUSTRIAL Other & Misc
RESIDENTIAL Air-Source Heat Pump Replacement with 15 SEER (SC Only)
RESIDENTIAL Air-Source Heat Pump Replacement with 8.2 HSPF (SH Only)
RESIDENTIAL Air-Source Heat Pump Replacement with 15 SEER (Annual Savings)
RESIDENTIAL Air-Source to Ground-source Heat Pump Replacement (SC Only)
RESIDENTIAL Air-Source to Ground-source Heat Pump Replacement (SH Only)
RESIDENTIAL Air-Source to Ground-Source Heat Pump Replacement (Annual Savings)
RESIDENTIAL Ceiling Insulation Installation (SC Only)
RESIDENTIAL Ceiling Insulation Installation (SH Only)
RESIDENTIAL Ceiling Insulation Installation (Annual Savings)
RESIDENTIAL Central A/C Replacement to 15 SEER
RESIDENTIAL Central A/C Tune-up
RESIDENTIAL CFL Installation
RESIDENTIAL Duct Efficiency Improvement (SC Only)
RESIDENTIAL Duct Efficiency Improvement (SH Only)
RESIDENTIAL Duct Efficiency Improvement (Annual Savings)
RESIDENTIAL ENERGY STAR Clothes Washer Replacement (Appliance Only Savings)
RESIDENTIAL ENERGY STAR Clothes Washer Replacement (Electric Clothes Dryer Energy Savings)
RESIDENTIAL ENERGY STAR Clothes Washer Replacement (Electric Water Heat Savings)
RESIDENTIAL ENERGY STAR Clothes Washer Replacement (Average Annual Savings)
RESIDENTIAL ENERGY STAR Color TVs
RESIDENTIAL ENERGY STAR Dehumidifier Replacement
RESIDENTIAL ENERGY STAR Dishwasher Replacement (Appliance Savings Only)
RESIDENTIAL ENERGY STAR Dishwasher Replacement (Electric Water Heat Savings)
RESIDENTIAL ENERGY STAR Dishwasher Replacement (Average Annual Savings)
RESIDENTIAL ENERGY STAR Freezer Replacement
RESIDENTIAL ENERGY STAR Personal Computers
RESIDENTIAL ENERGY STAR Refrigerator Replacement
RESIDENTIAL ENERGY STAR Window Installation (SC Only)
RESIDENTIAL ENERGY STAR Window Installation (SH Only)
RESIDENTIAL ENERGY STAR Window Installation (Annual Savings)
RESIDENTIAL Faucet Aerator Retrofit
RESIDENTIAL Floor Insulation Installation (SC Only)
RESIDENTIAL Floor Insulation Installation (SH Only)
RESIDENTIAL Floor Insulation Installation (Annual Savings)

RESIDENTIAL Freezer Early Retirement
RESIDENTIAL Infiltration Reduction (Caulking & Weatherstripping) - SH Only
RESIDENTIAL Infiltration Reduction (Caulking & Weatherstripping)- SC Only
RESIDENTIAL Infiltration Reduction (Annual Savings)
RESIDENTIAL Low-flow Showerhead Retrofit
RESIDENTIAL Programmable Thermostat Installation (SC Only)
RESIDENTIAL Programmable Thermostat Installation (SH Only)
RESIDENTIAL Programmable Thermostat (Annual Savings)
RESIDENTIAL Refrigerator Early Retirement
RESIDENTIAL Room A/C Replacement
RESIDENTIAL Storm Window Installation (SC Only)
RESIDENTIAL Storm Window Installation (SH Only)
RESIDENTIAL Storm Window Installation (Annual Savings)
RESIDENTIAL Tankless Installation from Storage Water Heater
RESIDENTIAL Wall Insulation (SC Only)
RESIDENTIAL Wall Insulation (SH Only)
RESIDENTIAL Wall Insulation (Annual Savings)
RESIDENTIAL Water Heater Blanket Installation
RESIDENTIAL Water Heater Pipe Wrap Installation
RESIDENTIAL High Efficiency Water Heater Replacement

RESIDENTIAL Renewable Energy : Photovoltaics [PV]

COMMERCIAL Interior Lighting; Fluorescent; T12; ---> HPT8 retrofit
COMMERCIAL Interior Lighting; Fluorescent; T8; ---> standard T8 to HPT8
COMMERCIAL Interior Lighting; Fluorescent; T5; ---> none
COMMERCIAL Interior Lighting; HID; Metal Halide [MH]; ---> replace with PSMH
COMMERCIAL Interior Lighting; HID; Metal Halide [MH]; ---> replace with HIF
COMMERCIAL Interior Lighting; HID; Mercury Vapor [MV]; ---> replace with PSMH
COMMERCIAL Interior Lighting; HID; Mercury Vapor [MV]; ---> replace with HIF
COMMERCIAL Interior Lighting; HID; High Pressure Sodium [HPS]; ---> replace with PSMH
COMMERCIAL Interior Lighting; HID; High Pressure Sodium [HPS]; ---> replace with HIF
COMMERCIAL Interior Lighting; Other; Incandescent; ---> replace with CFL
COMMERCIAL Interior Lighting; Other; Incandescent; ---> replace with CMH
COMMERCIAL Interior Lighting; Other; Compact Fluorescent [CFL]; ---> none
COMMERCIAL Interior Lighting; Other; LED; ---> none
COMMERCIAL Interior Lighting; Controls; daylighting, fluorescent; ---> implement daylight harvesting for fluorescent
COMMERCIAL Interior Lighting; Controls; daylighting, HID; ---> implement daylight harvesting for HID
COMMERCIAL Interior Lighting; Controls; occupancy, fluorescent; ---> install occupancy sensors for fluorescent
COMMERCIAL Interior Lighting; Controls; occupancy, HID; ---> install occupancy sensors for HID
COMMERCIAL Exterior Lighting; Fluorescent; all; ---> high efficiency fluorescent replacement
COMMERCIAL Exterior Lighting; HID; all; ---> replace with PSMH
COMMERCIAL Exterior Lighting; HID; ; ---> replace with LED
COMMERCIAL Exterior Lighting; Other; Incandescent; ---> replace with PSMH
COMMERCIAL Exterior Lighting; Other; CFL; ---> replace with LED
COMMERCIAL Exterior Lighting; All; controls; ---> photocell and astronomic clock
COMMERCIAL Space Cooling; AHU; n/a; --->
COMMERCIAL Space Cooling; RTU; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; PTAC; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; Split; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; Other; ; ---> replace with high efficiency
COMMERCIAL Space Cooling; All; controls; ---> economizers; setback; DCV, etc.

COMMERCIAL Ventilation; Motors; fractional; ---> ECM
COMMERCIAL Ventilation; Motors; >= 1 HP; ---> Premium Motors
COMMERCIAL Ventilation; Variable Frequency Drives [VFD]; VFD for fans; ---> add VFD
COMMERCIAL Ventilation; Variable Frequency Drives [VFD]; VFD for pumps, cooling; ---> add VFD
COMMERCIAL Ventilation; Variable Frequency Drives [VFD]; VFD for pumps, heating; ---> add VFD
COMMERCIAL Space Heating; electric; resistance; ---> replace with heat pump
COMMERCIAL Space Heating; electric; heat pump; ---> replace with high efficiency
COMMERCIAL Space Heating; electric; heat pump; ---> replace with geothermal heat pump
COMMERCIAL Water Heating; DHW; ; ---> replace with high efficiency storage DHW
COMMERCIAL Water Heating; DHW; ; ---> replace with tankless DHW
COMMERCIAL Cooking ; ; ; --->
COMMERCIAL Refrigeration; ; ; --->
COMMERCIAL Kitchen Equipment; ; ; --->
COMMERCIAL Office Equipment; ; ; --->
COMMERCIAL Other; Miscellaneous; ; --->
COMMERCIAL Other; Compressed Air; ; --->
COMMERCIAL Other; Existing Building Commissioning; ; --->

INDUSTRIAL Boiler & CHP
INDUSTRIAL Process Heating
INDUSTRIAL Process Cooling & Refrigeration
INDUSTRIAL Machine Drives
INDUSTRIAL Electro-Chemical Processes
INDUSTRIAL Facility HVAC
INDUSTRIAL Facility HVAC : cooling, high efficiency AC
INDUSTRIAL Facility HVAC : ventilation, premium motors
INDUSTRIAL Facility HVAC : ventilation, variable speed drives
INDUSTRIAL Facility Lighting
INDUSTRIAL Facility Lighting : fluorescent, T12 retrofit
INDUSTRIAL Facility Lighting : fluorescent, high intensity T5HO
INDUSTRIAL Facility Lighting : HID, pulse start metal halide
INDUSTRIAL Facility Lighting : controls, occupancy sensors
INDUSTRIAL Other & Miscellaneous

Appendix B – Benefit/Cost Software and Input Data (KANSAS)

BENEFIT COST SOFTWARE

The "BenCost" software used to perform the benefit/cost screening has been adapted from the Minnesota Office of Energy Security (formerly Department of Commerce) and is consistent with the California Standard Practice Manual. The input data required for the model include the following:

- General Inputs – Applied to all energy conservation measures/programs, these data describe the utility avoided costs, economic evaluation conditions [e.g., discount rates], and customer rates. A description of each of the specific inputs is identified below.

    - Retail Rate – the average cost of energy saved [$/kWh] by the customer, including demand and energy charges. The customer may be defined as residential or commercial/industrial if different rate structures exist. This rate is used to calculate the value of a particular measure/program from the customer's perspective and can be used to calculate simple payback.

    - Commodity Cost – the utility's avoided cost of energy [$/kWh]. This represents the amount of money that would be saved by avoiding the generation, transmission, and distribution of one less unit of energy

    - Demand Cost – avoided capacity charge for electric demand [$/kW]. The utility cost savings achieved by avoiding the delivery of one less unit of demand [kW]. This may represent avoided generation and/or purchased power depending on the specific utility generation assets and planned delivery of power.

    - Variable O&M – the estimated utility cost savings achieved in operations and maintenance by the avoidance in demand or energy, expressed as savings per unit of energy saved [$/kWh]. This value may also be included in the Commodity Cost calculations and should not be duplicated.

    - Environmental Damage Factor (EDF) – the estimated value placed on avoiding environmental externalities such as emissions and other environmentally harmful effects of power generation [$/kWh]. In compliance with KCC guidelines, only the CO_2 EDF has been included in the analysis. The EDF was calculated using the avoided costs per ton as specified [$15 per ton] and a value of 0.746 tons per mwh from avoided generation. This is based on fuel and purchased power forecasts in the year 2013 for Empire in Missouri.

- Escalation Rate – economic inflation rate used for utility rates, costs, etc. [percent]. This escalation rate is applied to current values to estimate the value of the same costs in future dollars. The rate is applied to each of the costs identified above.

- Participant Discount Rate – the economic inflation rate applied to participant cash flows [percent]. This represents the customer's cost of money for which alternative investments may be made instead of the investment in energy saving measures. This value is used to determine net present value of costs and benefits in the Participant Test. 10% was used for the current analysis.

- Utility Discount Rate – the utility's cost of capital expressed as a percentage. This is representative of alternate utility investments, similar to Participant Discount Rate. This value is used to determine net present value of costs and benefits in the Utility Cost Test and Ratepayer Impact Measure Test. Empire's weighted average cost of capital was used for the current analysis. This discount rate was also applied to the Total Resource Cost test.

- Societal Discount Rate – similar to the other discount rates, this value represents the overall societal cost of money [percent] and is used in discounting the societal effects of savings. This value is used to determine net present value of costs and benefits in the Societal Test. For this Kansas filing, two different discount rates, 7% and 3%, were used for comparison purposes.

- General Input Data Year – the year from which the source data is taken. In order to properly discount future costs of money, it is important to know from which year the input data is derived.

- Project Analysis Year – the first year of project analysis, representative of a mature program [year, e.g., 2013]. Economic factors in the model are escalated appropriately to reflect the differences from data collection to program implementation.

- Project/Measure Specific Inputs – The following is a list of the inputs that are applied to an individual project/measure. These vary depending on program type, measure description, and nature of the energy savings. These data were developed by Applied Energy Group (AEG) using data provided by Empire on project target markets and customer energy usage characteristics and other utility programs. Wherever possible, Arkansas Deemed Savings were used.

    - Utility Project Costs – the overall annual costs for the utility to implement the program under evaluation [annual $]. This includes the utility cost for incentives, administration, delivery, marketing and evaluation. Utility

incentives must be provided separately as these costs are handled differently from other utility costs in certain benefit cost tests.

- Direct Participant Cost – the incremental cost of each energy savings measure [$ per measure] before utility incentives. This represents what the customer would have to pay to achieve the benefits of the specified energy efficient measure. This is a one-time cost.

- Other Participant Cost – if there are other costs such as increased annual maintenance these may be defined here [annual $]. It is assumed that these are recurring costs over the life of the measure.

- Other Energy Savings – if there are other energy savings [non-electric] such as fuel savings, these may be defined here [annual $]. It is assumed that these are recurring savings over the life of the measure.

- Project Life – the estimated lifetime that a project/measure will yield energy savings [years]. Measure life should be consistent with equipment life but in some instances the utility may choose to limit the savings to a predetermined life [for analysis purposes].

- Demand Savings – the amount of demand reduction that the particular measure will yield [kW]. This represents the rated reduction on power.

- Coincident Factor – a factor applied to Demand Savings to determine the value of demand reduction that will be achieved during the hour of the utility peak [in percent].

- kWh/participant Savings – the energy savings component of a particular measure [annual kWh]. This is defined as the savings achieved for each measure. Empire has utilized a Net to Gross savings per participant wherever possible based on end use, program, and the available data from DEER. For this filing, a 2% attrition rate has also been applied to the savings.

- Number of Participants – the participation goal for a particular program.

- Incentive per Participant – the value of the utility incentive for each particular measure included in program. This value multiplied by the Number of Participants will yield the total utility incentive.

- General Project Management and Marketing – Management and marketing costs which are specific to a program are included in that program's budget. Management and marketing costs that are for the entire portfolio are in General Project Management and Marketing budget and are reflected in the portfolio's cost effectiveness test results.

- Steady State vs. Start-Up – The benefit/cost analysis is a life cycle analysis. Thus, it is important to reflect steady state implementation costs and not one-time start-up costs. In this case, there are no start-up costs included in Empire's portfolio budget.

- Evaluation –For purposes of benefit cost analysis, the evaluation budget has been spread out over five years even though the actual evaluation will occur around Year Three of the program cycle.