NP

2007-2026 Integrated Resource Plan
for
The Empire District Electric Company

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

September 2007

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ES. Executive Summary

Demand-side management (DSM) programs consist of the planning, implementing, and monitoring activities of electric utilities that are designed to encourage consumers to modify their level and pattern of electricity usage. Prior to 2005, Empire's Experimental Low Income Program ("ELIP") and the Interruptible Service Rider were in effect. 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. Empire also participated in the Missouri Residential Market Assessment.

As a result of the stipulation and agreement in Case No. EO-2005-0263, Empire agreed to form 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

For the 20-year planning horizon of the IRP, additional DSM programs, and enhancements to those DSM programs for which implementation had begun, were identified and modeling parameters developed for each. These modeling parameters were used so that these DSM programs could be provided as resource options in the optimization modeling. The DSM resource options included:

- 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
- Air Conditioning Cycling Program

In Arkansas, Empire participated in a collaboration to develop energy efficiency rules. The Arkansas Public Service Commission approved the Rules for Conservation and Energy Efficiency Programs in Order 18 of Docket No. 06-004-R. Empire is a participant in two state-wide energy efficiency programs: the Arkansas Weatherization Program and the Energy Efficiency Arkansas Program. In addition, Empire has two DSM programs in its portfolio for Arkansas customers: the Central Air Conditioning Tune-Up Program and the C&I Prescriptive Rebate Program. The DSM programs are all labeled "Quick Start" and will be in effect from October 1, 2007 through December 31, 2009.

Empire believes that earning a return of and return on capital for DSM program investments increases the effectiveness of such programs and provides appropriate financial incentives for electric utilities. In addition, such a change could help achieve the energy efficiency and conservation objectives of many stakeholders.

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 2006 retail electric revenues were derived approximately 87.6% from Missouri customers, 6.1% from Kansas customers, 3.0% from Oklahoma customers and 3.3% from Arkansas customers. Empire supplies electric service at retail to 121 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 2007 system peak was 1,173 MW which occurred on August 15, 2007, when the temperature was 102°F, surpassing the 2006 peak of 1,159 MW. Empire's 2006 customer load was 5,040,275 MWh. Empire's electric operating revenues in 2006 were derived as follows: residential 41.7%, commercial 30.1%, industrial 16.9%, wholesale on-system 4.6%, wholesale off-system 3.2% and other 3.5%.

1.2 DSM Overview

Demand-side management (DSM) programs consist of the planning, implementing, and monitoring activities of electric utilities that are designed to encourage consumers to modify their level and pattern of electricity usage. The primary objective of most DSM programs historically has been to provide cost-effective energy and capacity resources to help defer the need for new sources of power, including generating facilities, power purchases, and transmission and distribution capacity additions. Some utilities also use DSM to enhance customer service. DSM refers only to energy and load-shape modifying activities undertaken in response to utility-administered programs. It does not refer to energy and load-shape changes arising from the normal operation of the marketplace or from government-mandated energy-efficiency standards.[1]

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

[1] *Electric Utility Demand-Side Management 1999*, Department of Energy, Energy Information Administration, www.eia.doe.gov/cneaf/electricity/dsm99/dsm_sum99.html.

Missouri Commercial Facility Energy Audit Program. Empire also participated in the Missouri Residential Market Assessment.

1.3 Regulatory Requirements

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 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. If a variance was requested or a clarification provided in Empire's July 23, 2007 filing, the notation "App for Variance" is shown for "Location in Report."

Table 1
Summary of Compliance with the Reporting Requirements for 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	App for Variance
22.050 (11) (B)	Results of end –use measures	App for Variance
22.050 (11) (C)	Info for programs passing probable environmental benefits test	App for Variance
22.050 (11) (D)	Document avoided cost estimates	Section 4.2
22.050 (11) (E)	Copies of completed studies	App for Variance, Appendix C
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 Section 4.4.
22.050 (11) (G)	DSM programs screened	Section 4.0
22.050 (11) (H)	Tabulation of DSM program data	Section 4.0
22.050 (11) (I)	Results of tests	Section 4.0 – Tables 50, 53, 57, 61, 65, 69, 73, 77, 80 and 83
22.050 (11) (J)	Process and impact evaluation plans	Section 3.0, Appendix C

1.4 Customer Programs Collaborative

On February 4, 2005, Empire filed an application with the Missouri Public Service Commission (MPSC) seeking approval of a regulatory plan that would in part sanction Empire's ownership participation in the Iatan 2 unit being developed by Kansas City Power & Light (KCP&L) (Case No. EO-2005-0263). As a result of the stipulation and agreement that resulted from that case, Empire agreed to form a Customer Programs Collaborative (CPC) with 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.

Empire agreed to meet with and provide updates to the CPC at least once every six months regarding:

- The status of program implementation including the amount of expenditures for each program and level of customer participation
- The status of program evaluations including evaluation consultants chosen, evaluation budgets, evaluation expenditures and copies of completed evaluations
- The status of new program selection and design efforts, including copies of program screening results.

The CPC's oversight is to include:

- 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

As per the stipulation, the CPC was formed and includes, in addition to Empire, representatives of:

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

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 will select 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 shown with stars. 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.

2.0 Pre-2006 DSM Programs

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.

2.1 Experimental Low Income Program (ELIP)

The Experimental Low Income Program (ELIP) 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. An evaluation of this program was completed in February 2006 and is provided electronically as part of Appendix C.

The evaluation showed that ELIP substantially succeeded in generating full, timely, and regular payments from low-income customers in efforts that decreased average arrearages. The evaluation recommended some increase in the credits provided to the eligible customers.[2] Case No. ER-2006-0315 directed several changes to the ELIP. Participation eligibility now extends beyond 24 months and $2,000 is earmarked annually for outreach. The monthly credit for the poorest families has been increased to $50, and the maximum qualifying household income has been increased to 125% of the federal poverty level. An experimental arrearage repayment incentive was added by allocating up to $30,000 of existing program funds. The CPC may make decisions in the future with regard to the ELIP; discussion has recently been initiated between Empire and the CPC about the funding level for ELIP in the future.

2.2 Interruptible Service Rider

The Interruptible Service Rider 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

[2] Fisher, Sheehan & Colton, "Experimental Low-Income Program (ELIP): Empire District Electric Company Final Program Evaluation (2006)," February 2006.

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

The objective of the Energy Star® Change a Light 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.

Pursuant to the Change a Light Campaign for 2005, consumers were offered a $2.00 instant rebate on the purchase of CFL bulbs. Empire provided $1.45 - $1.50 towards the rebate not to exceed $11,615 in total annually, and participating manufacturers contributed an additional $0.50 - $0.55 towards the rebate. Empire anticipated that its consumers would purchase slightly over 7,000 CFL bulbs for the 2005 campaign which was administered by the Midwest Energy Efficiency Alliance (MEEA). The campaign ended in December 2005. Retailers ordered 10,428 CFLs, including the total bulbs sold by participating Home Depot Stores. A total of 4,292 CFLs were documented as purchased by consumers within the service territory. Annual energy savings are estimated to total 219,321 kWh with lifetime energy savings of 1,535,248 kWh.

2.4 Residential Weatherization Program

The Residential Weatherization Program has a dual purpose of providing energy education and weatherization assistance, primarily for lower income customers. This program is being administered by the Ozark Area Community Action Corporation (approximately 47%), the Economic Security Corporation (approximately 51%), and the West Central Missouri Community Action Agency (approximately 2%). The funds are allocated to action agencies based on the number of Empire customers in the particular counties served by each agency and the number of low income households in those counties. The figures on the number of low income households were taken from the latest census information. The allocation employs the same formula used to disburse funds under weatherization programs of other utilities and is consistent with federal weatherization assistance program guidelines.

2.5 Missouri Commercial Facility Energy Audit Program

The Missouri Commercial Facility Energy Audit Program, since replaced with the C&I Rebate Program, aimed to increase commercial facility owners' awareness of energy-efficient measures. Specific customers were eligible for a rebate that paid for a portion of an energy audit that identified inefficient electrical equipment that could be replaced and energy-saving projects that could be implemented. The program was designed to

encourage the use of high-efficiency space and water heating equipment, central air conditioning, lighting, and other measures in commercial buildings.

The Missouri Commercial Facility Energy Audit Program was a voluntary program available only to commercial facilities located in Missouri that were receiving electric service from Empire. It was administered by Empire and provided rebates to a maximum of five customers that have energy audits performed on their commercial facilities by an approved energy audit firm. A rebate of up to $500 was available to offset up to 50% of the cost of an initial energy audit. If the initial energy audit identified a potential for energy savings, an additional rebate of up to $500 (up to 50% of the cost of the initial energy audit) was available to customers that had a follow-up detailed energy audit performed to identify specific energy-saving projects. If these energy-saving projects were implemented by the customer, an additional rebate of up to 33% of the cost of implementing the energy-saving projects was available. The total of all rebates to a participant in this program was a maximum of $5,000 and a participant was only allowed to participate in the program one time per facility. The total of all rebates to all participants was limited to a maximum of $25,000 annually.

2.6 HVAC Rebate Program

The CPC considered an appliance and heating, ventilation and air conditioning (HVAC) rebate program during 2005. The parties identified refrigerators, freezers, and air conditioners as the potential applicable ENERGY STAR® appliances. Because there did not appear to be sufficient funds for the refrigerator/freezer program and not enough time to implement the air conditioning program prior to the summer of 2005, the funds that would have been used for such a program were accrued and the collaborative group was to decide at a later meeting as to the appropriate application for such funds.

As a result of Empire's 2006 rate case (ER-2006-0315), the unused funds from the four programs established in Case No. ER-2004-0570 were moved to the CPC regulatory asset account 182318. These funds will be utilized in the current portfolio of DSM programs.

2.7 Other DSM Efforts

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 have been received. The Company plans to utilize this market assessment as part of the process used to select future DSM programs for its residential customers.

2.8 Rates

Empire currently has three tariffs in place to support its DSM efforts: Optional Time of Use Adjustment Rider OTOU, Special Transmission Service Contract: Praxair Schedule

SC-P, and Interruptible Service Rider IR. Rider OTOU is a rate schedule available to several classes of customers as shown on Table 2. The OTOU tariff allows a customer charge adjustment for on-peak, shoulder, and off-peak periods for each of the summer and winter seasons. No customers are currently participating in this tariff.

Table 2[3]
Optional Time of Use Adjustment Rider

Service Class	Rate Schedule	Cap on Number of Customers
Residential Service	RG	50
Commercial Service	CB	50
Small Heating Service	SH	50
General Power Service	GP	5
Total Electric Building	TEB	5
Large Power Service	LP	3

[3] Optional Time of Use Adjustment Rider OTOU, P.S.C. Mo. No., 5, Section 4, Sheet Nos. 18-19, issued November 3, 1995, Effective Date November 15, 1995.

3.0 Analysis of Current DSM Portfolio

In consultation with the CPC, Empire hired Applied Energy Group (AEG) in December 2005 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 implement are documented in this section.

3.1 DSM Program Criteria

DSM programs were evaluated with the following program criteria:

- Best Practices – DSM program designs follow current industry best practices.
- Coverage – The programs provide services to all classes of customers at all income levels.
- Goals – Participation goals are reasonable, based upon Empire's service territory and other utility experience.
- Budgets – Budgets include sufficient funds to properly manage, administer and market the programs.
- Cost Effectiveness – Each program has undergone benefit/cost screening consistent with the California Standard Practice Manual. Five different perspectives have been analyzed (Total Resource Cost, Societal, Participant, Ratepayer Impact Measure (RIM) and Utility Cost).[4]

3.2 Benefit/Cost Software

The software used to perform the benefit/cost screening has been adapted from the Minnesota Department of Commerce's "BenCost" software 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 specific input is provided.
  - 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

[4] Appendix A contains a description of each of these tests.

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 ($/kWh). This value may also be included in the Commodity Cost calculations and should not be duplicated.
- Environmental Damage Factor – the estimated value placed on avoiding environmental externalities such as emissions and other environmentally harmful effects of power generation ($/kWh).
- Escalation Rate – economic inflation rate used for utility rates, costs, and so forth. (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 savings measures. This value is used to determine net present value of costs and benefits in the Participant Test.
- Utility Discount Rate – the utility's cost of capital expressed as a percentage. This is representative of alternate utility investments, similar to the Participant Discount Rate. This value is used to determine net present value of costs and benefits in the Utility Cost Test and Revenue Requirements 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.
- General Input Data Year – the year from which the source data are taken. In order to properly discount future costs of money, it is important to know from which year the input data are derived.
- Project Analysis Year – the first year of project analysis, representative of a mature program (year, e.g., 2007). For the evaluation of planned programs, this represents the first year of program operations. Economic factors in the model are escalated appropriately to reflect the differences from data collection to program implementation.

- Project/Measure Specific Inputs – The following inputs 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 AEG using data provided by Empire on project target markets and customer energy usage characteristics and other utility programs.
  - 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, evaluation, and so forth 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 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 (e.g., 15 years maximum) 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.
- 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 costs are allocated across all the other programs and are reflected in each program'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. This has been achieved by using the third year of each program budget for each of the benefit/cost tests.

- Evaluation – Program evaluation is budgeted to occur in Year 3 of the five-year implementation cycle. In order to better reflect these costs in the benefit/cost analysis, the evaluation costs have been spread out over three years; thus only one-third of the evaluation cost is reflected in the benefit/cost analysis.

- Program Write-ups – Each program write-up contains the following sections:
  - Peak Demand and Energy Consumption – This is an estimate of the kW and kWh savings that can be expected to occur given the assumptions for each particular program.
  - Estimate of Program Cost Effectiveness – Each program undergoes benefit/cost screening. Five different perspectives have been analyzed (Total Resource Cost, Societal, Participant, Ratepayer Impact Measure (RIM) and Utility Cost).

Appendix A contains a description of each of these tests.
- Participation – The participation targets reflect the appliance saturations in Empire's service territory as well as replacement cycles and estimated penetrations for energy efficiency measures.
- Program Budgets – Each program budget contains categories for program delivery, project management, marketing, incentives and evaluation. Some of the programs also contain start-up costs that are reflected in Year 1.

3.3 Programs Selected

Programs selected for implementation included no load building programs. They are:

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

3.3.1 Low Income Efficiency Program

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 works 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 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 150% 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 results of the analysis for the low income efficiency program demonstrate the effect on annual peak demand and energy consumption (Table 3), the cost effectiveness using five standard benefit/cost ratios (Table 4), the estimated level of participation (Table 5), and provide a program budget (Table 6).

Table 3
Low Income Efficiency Program - Effect on Peak Demand and Energy Consumption

Year	Demand (kW)	Energy (kWh)
1	38	170,375
2-5 (per year)	38	170,375

Table 4
Low Income Efficiency Program – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
0.38	0.43	Infinity	0.19	0.32

At the time of the analysis, the two CAP agencies that serve almost all of Empire's service territory are using Empire funds to service about five (5) homes per month. This rate of activity has been used to estimate an annual participation rate.

Table 5
Low Income Efficiency Program – Projected Participation Levels

Years	Participation
1	125
2-5 (per year)	125

The budget assumes an average incentive of $1,200 and a CAP administrative charge of 15%. Project management is set at 10% of program delivery. The $1,200 per home average incentive level is escalated by $50 per year. Note that all the measures are installed at no cost to the participant. However, since this is a direct install program which pays money directly to the CAP agency, no funds are listed under customer incentive.

Table 6
Low Income Efficiency Program – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$172,500	$17,250	$5,000	$0		$194,750
2	$179,700	$17,970	$5,000	$0		$202,670
3	$186,900	$18,690	$5,000	$0	$21,059	$231,649
4	$194,100	$19,410	$5,000	$0		$218,510
5	$201,300	$20,130	$5,000	$0		$226,430

Evaluation

The budget assumes the evaluation in Year 3 will require 10% of that year's total project cost. CAP agencies will be required to provide a list of the measures for each home served that Empire's funds were used for. 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 could be conducted at the beginning of the third year of implementation.

3.3.2 Low Income New Home

Program Description

The Low Income New Home Program is a partnership between Empire and non-profit organizations, including Habitat for Humanity and local government community 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.

The results of the analysis for the low income new home program demonstrate the effect on annual peak demand and energy consumption (Table 7), the cost effectiveness using five standard benefit/cost ratios (Table 8), the estimated level of participation (Table 9), and provide a program budget (Table 10).

Table 7
Low Income New Home - Effect on Peak Demand and Energy Consumption

Year	Demand (kW)	Energy (kWh)
1	7.20	12,680
2-5 (per year)	7.20	12,680

Table 8
Low Income New Home – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
0.66	0.73	3.61	0.30	0.55

Table 9
Low Income New Home – Projected Participation Levels

Years	Participation
1	10
2-5 (per year)	10

The customer incentive budget is based upon 100% of the homes receiving refrigerator and lighting incentives, 25% of the homes receiving high efficiency air conditioners, and 25% receiving high efficiency heat pumps. While this program should be an "easy sell", it has lacked traction in other utility service territories. This may be due to lack of marketing. The budget therefore contains a relatively significant amount of funds for marketing, especially in Year 1.

Table 10
Low Income Efficiency Program – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$0	$2,500	$5,000	$5,000		$12,500
2	$0	$2,500	$2,500	$5,000		$10,000
3	$0	$3,000	$2,500	$5,000	$1,050	$11,550
4	$0	$3,000	$2,500	$5,000		$10,500
5	$0	$3,000	$2,500	$5,000		$10,500

Evaluation

The budget assumes that the project evaluation in Year 3 will require 10% of that year's total project cost. A process evaluation could be conducted at the beginning of the third year of implementation.

3.3.3 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 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 will be rolled out at a future date.

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. [5] 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

Empire will try to leverage its funds by "piggybacking" with similar programs in Missouri or neighboring states.

The results of the analysis for the home performance with ENERGY STAR® demonstrate the effect on annual peak demand and energy savings (Table 11), the cost effectiveness using five standard benefit/cost ratios (Table 12), the estimated level of participation (Table 13), and provide a program budget (Table 14).

[5] 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.

Year 1 for the Home Performance with ENERGY STAR® is start up. While this program should result in measurable energy savings, it has not been deployed in any utility service territory long enough to conduct an impact evaluation. An average of a 10% overall reduction in energy (kWh) use has been assumed for this analysis.

Table 11
Home Performance with ENERGY STAR® - Effect on Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
1	0	0
2	125	180,000
3-5 (per year)	208	300,000

Table 12
Home Performance with ENERGY STAR® – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.02	1.11	1.73	0.61	4.28

As the focus of Year 1 is start up and training auditors, no participation is expected.

Table 13
Home Performance with ENERGY STAR® – Projected Participation Levels

Years	Participation
1	0
2	150
3-5 (per year)	250

Table 14
Home Performance with ENERGY STAR® – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$40,000	$10,000	$0	$0		$50,000
2	$20,000	$10,500	$15,000	$0		$45,500
3	$20,000	$11,000	$15,000	$0	$4,600	$50,600
4	$20,000	$11,500	$15,000	$0		$46,500
5	$20,000	$12,000	$15,000	$0		$47,000

Evaluation

The budget assumes that the project evaluation in Year 3 will require 10% of that year's total project cost. Empire will track whole-house evaluations that are performed by

certified contractors in its service territory. Evaluation performed by ENERGY STAR® or other utilities with the same program can be monitored and used to estimate the benefits from this program. First Energy in Ohio is going to spend up to $4 million on this type of program over a three-year period. The New York State Energy Research and Development Authority (NYSERDA) and the Long Island Power Authority (LIPA) in New York State will also be spending over $5 million on a similar program. As part of these programs, extensive impact evaluations will be performed. Empire would be best served by waiting for research of this nature to be conducted and using the results as a starting point for estimating the savings for its program. A process evaluation looking at best practices could be conducted at the beginning of the third year of implementation.

3.3.4 ENERGY STAR® Change a Light

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 CFLs use up to 75 percent 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 come in a wide variety of shapes and sizes.

The program is offered in conjunction with the EPA and DOE national "ENERGY STAR® Change a Light, Change the World" campaign. Currently, in Missouri, the Midwest Energy Efficiency Alliance (MEEA) and the Missouri Department of Natural Resources are helping to administer this program.

Empire partners with MEEA to offer this program in its service territory. The cost effectiveness analysis assumes that each CFL has an average cost of $4.00 and that Empire will provide a $2.00 rebate resulting in a net cost to the customer of $2.00 per CFL. MEEA deployed a similar program in the Fall of 2005. Based on this experience, MEEA suggested a goal for 2006 of 10,000 CFL rebates. The energy savings shown for these 10,000 CFLs includes an assumption that 33% of the rebated CFLs will result in spillover. Actual results showed a revised goal of 11,191 CFLs with Empire customers purchasing 9,861 CFLs. The estimated annual energy savings is 503,897 kWh with lifetime energy savings of 3,527,280 kWh.

The results of the analysis for the ENERGY STAR® Change a Light program demonstrate the effect on annual peak demand and energy savings (Table 15), the cost effectiveness using five standard benefit/cost ratios (Table 16), the estimated level of participation (Table 17), and provide a program budget (Table 18).

Table 15
ENERGY STAR® Change a Light- Effect on Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
1	335.00	737,000
2-5 (per year)	335.00	737,000

While it is hoped that customers will replace the CFLs when they burn out without an additional incentive, the cost effectiveness analysis only assumes savings for the life of the CFL. The impacts assume a 50% free rider rate (i.e., one half of the CFLs would have been purchased anyway).

Table 16
ENERGY STAR® Change a Light– Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.97	2.24	7.60	0.40	2.63

Each customer is assumed to purchase 2 CFLs.

Table 17
ENERGY STAR® Change a Light – Projected Participation Levels

Years	Participation (CFLs)	Participation (Customers)
1	10,000	5,000
2-5 (per year)	10,000	5,000

Table 18
ENERGY STAR® Change a Light – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$5,000	$5,000	$10,000	$20,000		$40,000
2	$5,500	$5,500	$10,500	$20,000		$41,500
3	$6,000	$6,000	$11,000	$20,000	$4,300	$47,300
4	$6,500	$6,500	$11,500	$20,000		$44,500
5	$7,000	$7,000	$12,000	$20,000		$46,000

Evaluation

The budget assumes that the project evaluation in Year 3 will require 10% of that year's total project cost. Empire can rely upon evaluations conducted by the MEEA, EPA and ENERGY STAR®. A process evaluation could be conducted at the beginning of the third year of implementation.

3.3.5 Residential High Efficiency CAC Program

Program Description

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
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

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 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.

The results of the analysis for the residential high efficiency CAC program demonstrate the effect on annual peak demand and energy savings (Table 19), the cost effectiveness using five standard benefit/cost ratios (Table 20), the estimated level of participation (Table 21), and provide a program budget (Table 22).

Table 19
Residential High Efficiency CAC Program - Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
1	431.60	659,880
2	539.50	824,850
3-5 (per year)	647.40	989,820

Table 20
Residential High Efficiency CAC Program – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.12	1.22	2.46	0.47	1.46

Table 21
Residential High Efficiency CAC Program – Projected Participation Levels

Years	Participation
1	520
2	650
3-5 (per year)	780

The average incentive is assumed to be $400. Program delivery costs include rebate processing and contractor training courses in Manual J calculations and System Charging and Airflow.

Table 22
Residential High Efficiency CAC Program – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$0	$40,000	$20,000	$208,000		$268,000
2	$0	$42,500	$20,000	$260,000		$322,500
3	$0	$45,000	$20,000	$312,000	$37,700	$414,700
4	$0	$47,500	$20,000	$312,000		$379,500
5	$0	$50,000	$20,000	$312,000		$382,000

Evaluation

The budget assumes that the project evaluation in Year 3 will require 10% of that year's total project cost. The evaluation should include a sample of 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 could be conducted at the beginning of the third year of implementation.

3.3.6 ENERGY STAR® Homes

Program Description

ENERGY STAR® Homes 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. This program will be rolled out at a future date.

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.

The results of the analysis for the ENERGY STAR® Homes program demonstrate the annual peak demand and energy savings (Table 23), the cost effectiveness using five standard benefit/cost ratios (Table 24), the estimated level of participation (Table 25), and provide a program budget (Table 26).

Table 23
ENERGY STAR® Homes Program - Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
1	0	0
2	203.39	568,326
3-5 (per year)	304.16	849,882

Table 24
ENERGY STAR® Homes Program – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.07	1.20	2.88	0.39	1.33

The first year of the program will involve start-up activities, and recruitment and training of builders and certified home energy raters.

Table 25
ENERGY STAR® Homes Program – Projected Participation Levels

Years	Participation
1	0
2	218
3-5 (per year)	326

The average incentive is assumed to be $800 per home. Program delivery includes building awareness among all the stakeholders, and training for builders and home energy raters.

Table 26
ENERGY STAR® Homes Program – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$40,000	$20,000	$20,000	$0		$80,000
2	$30,000	$22,000	$20,000	$174,400		$246,400
3	$30,000	$24,000	$20,000	$260,800	$33,480	$368,280
4	$30,000	$26,000	$20,000	$260,800		$336,800
5	$30,000	$28,000	$20,000	$260,800		$338,800

Evaluation

The budget assumes that the project evaluation in Year 3 will require 10% of that year's total project cost. Evaluation will include random on-site inspections and engineering analysis. This program is being implemented by utilities (some very large) throughout the country. Many of them will be conducting impact evaluations and this research can be used as a starting point for the Empire's program. A process evaluation looking at best practices could be conducted at the beginning of the third year of implementation.

3.3.7 C&I Rebate Program

Program Description

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[6]).

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 avoided cost criteria provide a cap on incentives for projects that are relatively expensive for the amount of kW and kWh saved. Table 27 illustrates what the rebate would be for a "typical" project. Table 28 illustrates what it would be for a project that had marginal demand and energy savings.

Table 27
Typical Custom Project Used for Benefit/Cost Analysis

Item	Value
Cost per kWh, retail rate	$0.0693
Incremental cost	$3,500
kWh savings	10,600
Demand savings	3.50
Annual cost savings	$734
Rebate at 50% cost	$1,750
Rebate at 2 yr payback	$2,031
Rebate at 50% avoided costs	$2,468

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

Table 28
Marginal Custom Project (high cost and low energy savings)

Item	Value
Cost per kWh, retail rate	$0.0693
Incremental cost	$3,500
kWh savings	6,132
Demand savings	2.00
Annual cost savings	$425
Rebate at 50% cost	$1,750
Rebate at 2 yr payback	$2,650
Rebate at 50% avoided costs	$1,421

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 $20,000 in incentives for any program year.

The results of the analysis for the C&I Rebate program demonstrate the annual peak demand and energy savings (Table 29), the cost effectiveness using five standard benefit/cost ratios (Table 30), the estimated level of participation (Table 31), and provide a program budget (Table 32).

Table 29
C&I Rebate Program - Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
1	285	872,340
2	346	1,061,980
3-5 (per year)	408	1,251,619

Table 30
C&I Rebate Program – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.13	1.26	3.32	0.42	1.31

It is assumed that there will be 30 small audits and 10 large audits per year.

Table 31
C&I Rebate Program – Projected Participation Levels

Years	Rebate Participation	Audit Participation
1	75	40
2	100	40
3-5 (per year)	125	40

The average audit incentive is assumed to be $350.

Table 32
C&I Rebate Program – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$65,000	$25,000	$25,000	$164,000		$279,000
2	$75,000	$28,000	$27,000	$214,000		$344,000
3	$85,000	$31,000	$31,000	$264,000	$41,100	$452,100
4	$85,000	$32,500	$31,000	$264,000		$412,500
5	$85,000	$34,000	$31,000	$264,000		$414,000

Evaluation

The budget assumes that the project evaluation in Year 3 will require 10% of that year's total project cost. By design, the custom rebate program is self-evaluating. Impacts can be based upon the detailed engineering analysis that is used to determine the rebate levels. A process evaluation could be conducted at the beginning of the third year of implementation.

3.3.8 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 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 results of the analysis for the Building Operator Certification program demonstrate the annual peak demand and energy savings (Table 33), the cost effectiveness using five standard benefit/cost ratios (Table 34), the estimated level of participation (Table 35), and provide a program budget (Table 36).

Table 33
Building Operator Certification Program – Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
1	50.00	125,000
2-5 (per year)	50.00	125,000

Table 34
Building Operator Certification Program – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.18	1.31	5.14	0.45	1.51

Table 35
Building Operator Certification Program – Projected Participation Levels

Years	Participation
1	20
2-5 (per year)	20

Table 36
Building Operator Certification Program – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$20,000	$5,000	$7,500	$0		$32,500
2	$20,000	$5,500	$7,500	$0		$33,000
3	$20,000	$6,000	$7,500	$0	$3,350	$36,850
4	$20,000	$6,500	$7,500	$0		$34,000
5	$20,000	$7,000	$7,500	$0		$34,500

Evaluation

The budget assumes that the project evaluation in Year 3 will require 10% of that year's total project cost. Empire will keep track of each customer who 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.

3.3.9 C&I Peak Load Reduction Program

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. The mechanism to provide this capability already exists under the Interruptible Service Rider IR which has been effective since April 14, 1999. Under this tariff, 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.

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. 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 40 cents per kW per hour of requested load curtailment. The minimum credit will not be less than $1.60 per kW for each day that service is curtailed.

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.

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

In reviewing experience during the 1999 summer, which was the last time Empire required customers to interrupt due to capacity concerns; 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.

While this program has the potential to provide significant benefits, it is not going to be needed for at least the next five years (which is the planning period for this portfolio). This is because Empire currently has a surplus of capacity and does not expect to need to interrupt customers over the next five years. Therefore, no participation or demand reductions are assumed for this program, benefit/cost tests were not performed, and no program budget was prepared.

The rate tariff necessary to implement this program already exists. Therefore there is no cost associated with the program since it is not expected to be needed over the next five years. As the company's capacity situation changes, the program may become necessary, at which time a budget can be developed.

Evaluation

If the program is not activated, there is no need for an evaluation.

3.3.10 General Project Management and Marketing

Program Description

In order to deploy a multi sector demand response portfolio, it will be 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 person would also be responsible for reporting to and meeting with the Collaborative. This is not a full time commitment, however, which is reflected in the budget levels shown under project management.

It will also be necessary to develop general marketing materials and infrastructure. At a minimum, Empire will need to add significant content to its website, develop brochures, 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, and so forth). The budget for these activities is shown under marketing. It is important to have this general marketing support if the individual program participant goals are to be met.

The first year of the marketing budget reflects start-up costs.

Table 37
General Project Management and Marketing – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Total
1	$0	$50,000	$50,000	$0	$100,000
2	$0	$55,000	$25,000	$0	$80,000
3	$0	$60,000	$27,500	$0	$87,500
4	$0	$65,000	$30,000	$0	$95,000
5	$0	$70,000	$32,500	$0	$102,500

3.4 Total Portfolio Summary

The analysis of all of the above DSM programs in the portfolio demonstrate the annual peak demand and energy savings (Table 38), the cost effectiveness using five standard benefit/cost ratios (Table 39), cost effectiveness results excluding the low income programs (Table 40), the estimated level of participation (Table 41), and provide a program budget (Table 42). Savings, benefit/cost tests, and participation totals do not include the Peak Load Reduction Program which is not expected to be activated over this five-year period. None of these DSM programs are load building programs.

Table 38
Total Portfolio Summary - Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
1	1,146	2,577,275
2	1,643	3,680,211
3-5 (per year)	1,997	4,436,376

Table 39
Total Portfolio Summary – Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.11	1.23	2.82	0.46	1.44

Table 40
Total Portfolio Summary Excluding Low Income Programs– Estimate of Program Cost Effectiveness

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.21	1.34	2.80	0.48	1.67

Participation totals reflect 5,000 customers in the Change a Light Program, not 10,000 CFL rebates.

Table 41
Total Portfolio Summary – Projected Participation Levels

Years	Participation
1	5,790
2	6,313
3-5 (per year)	6,676

Table 42
Total Portfolio Summary – Program Budget

Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Total
1	$342,500	$174,750	$142,500	$397,000		$1,056,750
2	$330,200	$189,470	$132,500	$673,400		$1,325,570
3	$347,900	$204,690	$139,500	$861,800	$146,639	$1,700,529
4	$355,600	$217,910	$142,500	$861,800		$1,577,810
5	$363,300	$231,130	$145,500	$861,800		$1,601,730

3.5 Implementation

Low Income Efficiency Program. This program provides help for qualifying lower income customers to manage their energy use and bills through weatherization of their residences and replacement of existing appliances with or installation of high efficiency appliances. Empire provides supplemental funds to Community Action Partnership (CAP) agencies, organizations working with low income residents, that already provide weatherization services to lower income customers. This program was implemented in the Fall of 2006.

Low Income – New Home Program. This program consists of a partnership between Empire and non-profit organizations including Habitat for Humanity and local government community development organizations that aims to achieve energy-efficient affordable new housing for the low-income community. Incentives are available for high efficiency central air conditioning, heat pumps, Energy Star® refrigerators, Energy Star® lighting fixtures, and increased energy efficiency to the building shell. This program was implemented in the Spring of 2007.

Home Performance with Energy Star® Program. This program will provide training to private-sector contractors and service professionals to encourage them to consider replacing HVAC systems, adding insulation, and installing new windows. An implementation date has not yet been established due to the program's need to find utility partners to make this program successful. It will be rolled out at a future date.

Energy Star® Change a Light. This program encourages customers to replace light bulbs in their homes with Energy Star® light bulbs. Empire's funds will be contributed annually to the MEEA which will continue to promote this program for point of purchase rebates for CFLs. This program was implemented in the Fall of 2006. The program may change in its scope and approach in 2008.

Residential High Efficiency CAC Program. This program encourages residential customers to purchase and install energy efficient central air conditioning and heat pumps (seasonal energy efficiency ratio (SEER) of 15.0 and higher) by providing financial incentives to offset the equipment's initial cost. The program will also provide training in Manual J calculations and system charging and airflow for HVAC contractors. This program was implemented in the Spring of 2007.

Energy Star® Homes. This program will require that homes be constructed to a standard at least 30 percent more efficient than the 1993 National Model Energy Code as codified through the use of Energy Star® Builder Option Packages. Technical services and financial incentives are offered to builders and marketing of homes' benefits to buyers are also offered. An implementation date has not yet been established due to the program's need to find utility partners to make this program successful. It will be rolled out at a future date.

C&I Custom Rebate. This program provides 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 was implemented in the Spring of 2007.

Building Operator Certification Program. Empire will offer this program to train facility operators in efficient building operations and management. This program will be for customers that employ full-time building operators. Empire is currently in discussions with the Missouri Department of Natural Resources to implement this program later in 2007.

C&I Peak Load Reduction. This program provides a mechanism whereby businesses agree to voluntarily remove demand from Empire's system upon receiving a request to do so from Empire. The mechanism for this capability already exists under the Interruptible Service Rider IR which has been effective since April 14, 1999. To be eligible, customers must have a minimum of 50 kW available for interruption. Credits are provided based on the size of the load curtailment. Although this program has the potential to provide significant benefits, Empire does not expect to have to ask business customers to interrupt load for the next five years, the period of analysis for the existing DSM portfolio and thus expects no capacity or energy savings from this program.

For purposes of this IRP, the demand and energy reductions anticipated from this suite of DSM programs have been modeled as a reduction in annual peak demand and a reduction in annual energy for each year of the forecast period as shown on Table 43. In other words, these programs are all assumed to be implemented and achieved at the levels determined from the analysis.

Table 43
****Highly Confidential in its Entirety****
Forecast Peak Demand and Annual Energy Reductions due to DSM

3.6 Marketing, Dissemination, and Communication Plan

The marketing and communication plan for 2005-2007 developed by Empire is provided in Appendix B. Strategies were developed for the Low Income Weatherization Program, Low-Income Assistance Program, Energy Star® Change a Light, Low Income – New Home, High Efficiency CAC, as well as general information on energy efficiency and summer savings tips. The poster developed for the weatherization program, the bill insert for the CAC program, and the brochure for Low Income – New Homes are provided electronically as part of Appendix C.

Empire has not yet determined the details of the market research to be conducted pursuant to the requirements of this rule. Empire contacted AEG to obtain AEG's recommendation on what market research should be conducted. AEG recommends an Appliance Saturation Survey followed by a Commercial End-Use Inventory. Empire has discussed this approach with the CPC, of which the Missouri Department of Natural Resources is a member, and will keep the CPC informed of progress in this area.

3.7 Rates

The CPC and Empire have discussed the tariffs required to support the implementation of the DSM programs approved by the CPC on May 2, 2006. Revised tariffs have been put in place for each of Low Income Efficiency, Energy Star® Change a Light, and C&I Custom Rebate. New tariffs have been filed for Low Income – New Home and High

Efficiency CAC. New tariffs need to be filed for Home Performance with Energy Star®, Energy Star® Homes, and Building Operator Certification. The CPC and Empire have documented the timeframe and process for implementing the programs as well as the tariff filings necessary to put in place the entire suite of DSM programs.[7]

3.8 Evaluation

As part of the Stipulation and Agreement of Case No. EO-2005-0263, Empire agreed to have a consultant in place to perform post-implementation evaluations within six months of the end of the second year of the DSM programs implemented as part of the CPC. Such evaluation was specified to cover both process evaluation and cost effectiveness evaluation. Empire plans to hire an evaluation consultant within the next twelve months to perform the evaluation of the existing DSM programs including process and impact evaluation as appropriate to each individual program.

[7] "The Empire District Electric Company Initial Implementation & Development Requirements of the CPC Approved DSM and Energy Efficiency Programs," undated.

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 (AEP) using avoided costs developed by Global Energy Decisions (GED). Those DSM programs that passed the screening were made available for consideration in the Capacity Expansion Module of GED. Three levels of avoided costs were specified with two levels of pollution mitigation that are more stringent than the base case assumptions and that were judged to have a possibility of being imposed at some point in the future. Higher avoided costs result from the imposition of higher levels of pollution mitigation. In the base case, regulation of CO_2 started in 2012. For the medium and high CO_2 scenarios, regulation began in 2009. Table 44 shows the projected CO_2 taxes ($/ton) for all three scenarios.

Table 44
Carbon Dioxide Tax Assumptions

	Base CO_2 Scenario	Medium CO_2 Scenario	High CO_2 Scenario
2009		16.15	32.31
2010		17.66	35.32
2011		19.23	38.47
2012	2.30	20.87	41.75
2013	3.50	23.18	46.36
2014	4.80	24.98	49.95
2015	6.10	27.47	54.95
2016	7.50	30.08	60.16
2017	9.00	32.80	65.60
2018	10.50	33.62	67.24
2019	12.10	34.46	68.93
2020	13.80	35.32	70.65
2021	15.50	36.21	72.41
2022	17.40	37.11	74.23
2023	19.30	38.04	76.08
2024	21.30	38.99	77.98
2025	23.40	39.97	79.93
2026	24.00	40.97	81.93

Source: GED

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

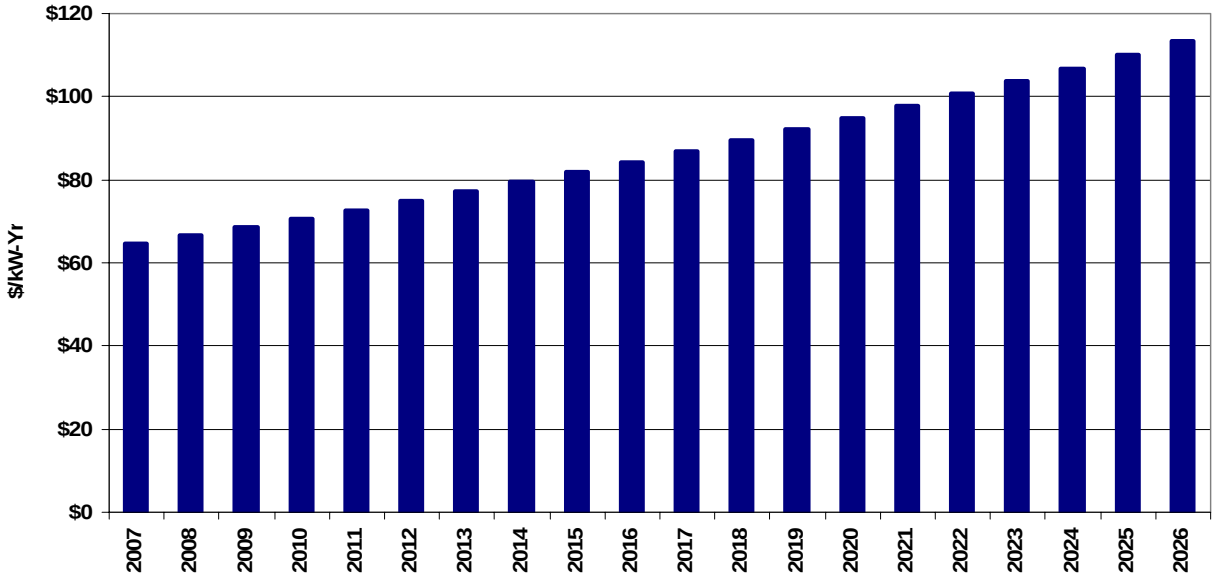
The calculated avoided costs provide an estimate of the cost savings that could be obtained by substituting DSM resources for existing and new supply-side resources. A large range of avoided costs could be calculated depending on the size of the DSM resource being considered. To minimize the problem 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. Since Empire's resource additions consist largely of participation in larger, jointly-owned new power plants, the decrement size of 10 MW was used.

4.2.2 Avoided Cost – Capacity Costs

Because Empire has made commitments to participate in Iatan 2, Plum Point, and the Meridian Way Wind Farm **_____ _____** no new additional capacity will be needed until **____**. The avoided capacity costs thus would be zero through **____**. 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 three of the cases are shown on Figure 1. The avoided energy costs for the base case and the two higher pollutant mitigation cases are shown on Figures 2-4. Tables 45-47 present the avoided cost values from the figures.

Figure 1
Avoided Capacity Costs – All Cases



Source: GED

Figure 2
Avoided Energy Costs – Base Case
****Highly Confidential in its Entirety****

Source: GED

Figure 3
Avoided Energy Costs – Medium Pollutant Case
****Highly Confidential in its Entirety****

Source: GED

Figure 4
Avoided Energy Costs – High Pollutant Case
****Highly Confidential in its Entirety****

Source: Global Energy

Table 45
Direct Running Costs ($/MWh) – Base Environmental Cost Assumptions
****Highly Confidential in its Entirety****

Table 46
Direct Running Costs ($/MWh) – Medium Environmental Cost Assumptions
****Highly Confidential in its Entirety****

Table 47
Direct Running Costs ($/MWh) – High Environmental Cost Assumptions
****Highly Confidential in its Entirety****

4.3 Demand Response Programs

Two demand response programs, Air Conditioning Cycling and C&I Peak Load Reduction were added to the DSM portfolio for the IRP, as there would be adequate time given the twenty-year planning horizon to plan for and implement these programs.

4.4 Program Specifications

With the exception of the demand response programs, the DSM programs considered in the IRP are the same as those implemented in the five-year plan by Empire and described previously in this report in Section 3.0. Only new or different data are presented for these programs in this section of the report. None of the DSM programs examined are load building programs and 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. The programs examined with their identified market segments are:

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

4.4.1 Low Income Efficiency

The number of low income customers that can be treated under this program is limited by the CAP agencies that provide the services and cannot be assumed to change due to increases in avoided costs or retail rates. Historically, as energy costs have increased, CAP agencies have not increased their staff or the number of customers that they treat. Costs are slightly higher for the mid and high scenarios reflecting an overall higher general project management budget.

The assumptions common to the Low Income Efficiency Program in each of the base, mid and high scenarios are shown in Table 48. There are no direct participant costs for this program. The varying project management and resulting total costs are reflected for all three scenarios in Table 49.

Table 48
Low Income Efficiency Program – Common Assumptions for Base, Mid and High Scenarios

Year	Program Delivery	Project Manage-ment	Marketing	Customer Incentive	Evaluation	# of Participants	Demand (kW)	Energy (kWh)
2008	$172,500	$17,250	$5,000	$0		125	38	170,375
2009	$179,700	$17,970	$5,000	$0		125	38	170,375
2010	$186,900	$18,690	$5,000	$0	$21,059	125	38	170,375
2011	$194,100	$19,410	$5,000	$0		125	38	170,375
2012	$201,300	$20,130	$5,000	$0		125	38	170,375
2013	$207,339	$20,734	$5,150	$0	$23,165	125	38	170,375
2014	$213,559	$21,356	$5,305	$0		125	38	170,375
2015	$219,966	$21,997	$5,464	$0		125	38	170,375
2016	$226,565	$22,656	$5,628	$0	$25,481	125	38	170,375
2017	$233,362	$23,336	$5,796	$0		125	38	170,375
2018	$240,363	$24,036	$5,970	$0		125	38	170,375
2019	$247,574	$24,757	$6,149	$0	$28,030	125	38	170,375
2020	$255,001	$25,500	$6,334	$0		125	38	170,375
2021	$262,651	$26,265	$6,524	$0		125	38	170,375
2022	$270,530	$27,053	$6,720	$0	$30,832	125	38	170,375
2023	$278,646	$27,865	$6,921	$0		125	38	170,375
2024	$287,006	$28,701	$7,129	$0		125	38	170,375
2025	$295,616	$29,562	$7,343	$0	$33,916	125	38	170,375
2026	$304,484	$30,448	$7,563	$0		125	38	170,375
2027	$313,619	$31,362	$7,790	$0		125	38	170,375

Table 49
Low Income Efficiency Program – Varying Assumptions Between Scenarios

	Base Scenario		Mid Scenario		High Scenario	
Year	Project Mgt. Allocation	Total Cost	Project Mgt. Allocation	Total Cost	Project Mgt. Allocation	Total Cost
2008	$9,000	$203,750	$9,900	$204,650	$10,800	$205,550
2009	$7,200	$209,870	$7,875	$210,545	$8,550	$211,220
2010	$7,875	$239,524	$8,550	$240,199	$9,225	$240,874
2011	$8,550	$227,060	$9,225	$227,735	$9,900	$228,410
2012	$9,225	$235,655	$9,900	$236,330	$10,575	$237,005
2013	$9,900	$266,288	$10,575	$266,963	$11,250	$267,638
2014	$10,575	$250,795	$11,250	$251,470	$11,925	$252,145
2015	$11,250	$258,676	$11,925	$259,351	$12,600	$260,026
2016	$11,925	$292,255	$12,600	$292,930	$13,275	$293,605
2017	$12,600	$275,094	$13,275	$275,769	$13,950	$276,444
2018	$13,275	$283,644	$13,950	$284,319	$14,625	$284,994
2019	$13,950	$320,460	$14,625	$321,135	$15,300	$321,810
2020	$14,625	$301,460	$15,300	$302,135	$15,975	$302,810
2021	$15,300	$310,740	$15,975	$311,415	$16,650	$312,090
2022	$15,975	$351,110	$16,650	$351,785	$17,325	$352,460
2023	$16,680	$330,112	$17,354	$330,786	$18,027	$331,459
2024	$17,416	$340,252	$18,087	$340,923	$18,758	$341,594
2025	$18,184	$384,621	$18,851	$385,288	$19,519	$385,956
2026	$18,986	$361,481	$19,648	$362,143	$20,310	$362,805
2027	$19,824	$372,595	$20,478	$373,249	$21,133	$373,904

The estimates of program effectiveness over the 20-year planning horizon are shown in Table 50.

Table 50
Low Income Efficiency Program – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
0.60	0.65	Infinity	0.31	0.51

The load shapes used in the modeling for Low Income Efficiency and Low Income New Homes for January and July are shown in Figures 5 and 6, respectively. A load shape was developed for each month, to reflect the differing weather conditions.

Figure 5

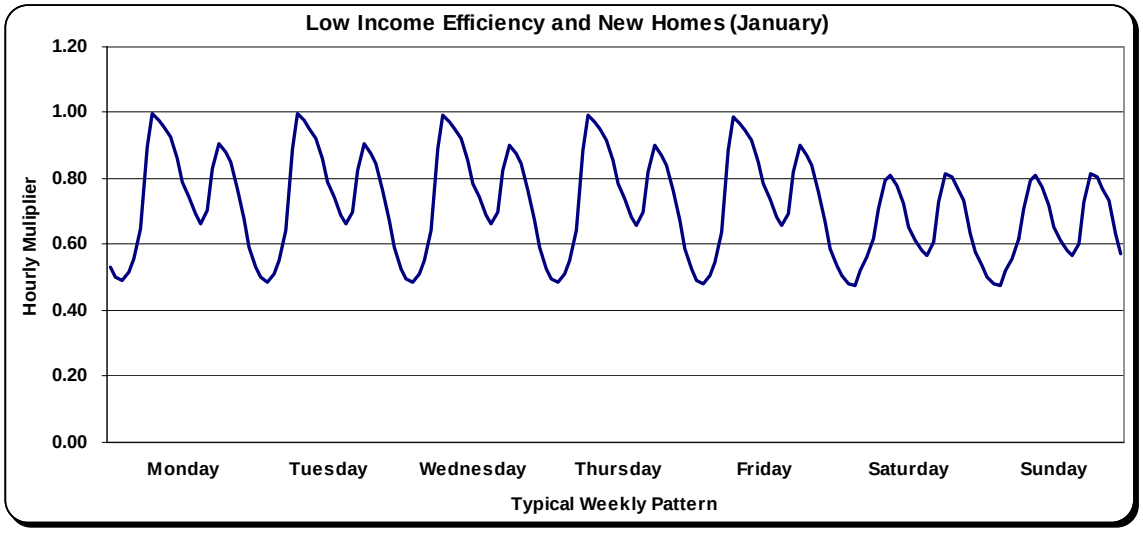
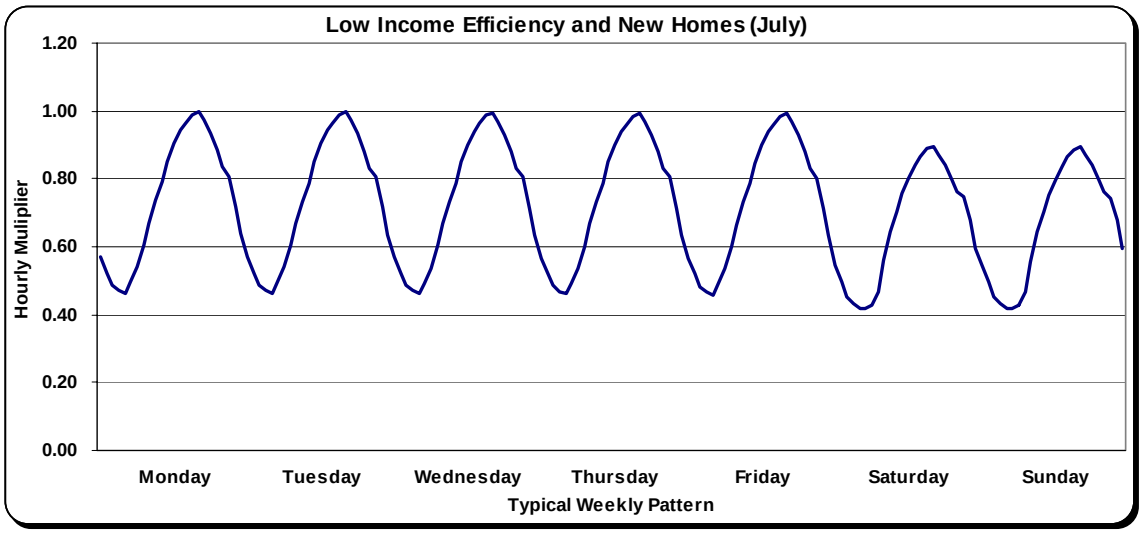


Figure 6



4.4.2 Low Income New Homes

The number of low income homes that are constructed in Empire's service territory cannot be assumed to change as the result of higher avoided costs and higher retail rates, thus the assumptions underlying the mid and high scenarios have not changed from the base case. The base scenario already assumes a participation rate consistent with active marketing. Costs are slightly higher for the mid and high scenarios reflecting an overall higher general project management budget.

The assumptions common to the Low Income Efficiency Program in each of the base, mid and high scenarios are shown in Table 51. Direct participant costs are $500 per participant. The utility incentive is also $500 per participant. The varying project management and resulting total costs are reflected for all three scenarios in Table 52.

Table 51
Low Income New Homes – Common Assumptions for Base, Mid and High Scenarios

Year	Program Delivery	Project Manage-ment	Marketing	Customer Incentive	Evaluation	# of Participants	Demand (kW)	Energy (kWh)
2008	$0	$2,500	$5,000	$0		10	7.2	12,680
2009	$0	$2,500	$5,000	$0		10	7.2	12,680
2010	$0	$3,000	$5,000	$0	$1,050	10	7.2	12,680
2011	$0	$3,000	$5,000	$0		10	7.2	12,680
2012	$0	$3,000	$5,000	$0		10	7.2	12,680
2013	$0	$3,090	$5,150	$0	$1,155	10	7.2	12,680
2014	$0	$3,183	$5,305	$0		10	7.2	12,680
2015	$0	$3,278	$5,464	$0		10	7.2	12,680
2016	$0	$3,377	$5,628	$0	$1,271	10	7.2	12,680
2017	$0	$3,478	$5,796	$0		10	7.2	12,680
2018	$0	$3,582	$5,970	$0		10	7.2	12,680
2019	$0	$3,690	$6,149	$0	$1,398	10	7.2	12,680
2020	$0	$3,800	$6,334	$0		10	7.2	12,680
2021	$0	$3,914	$6,524	$0		10	7.2	12,680
2022	$0	$4,032	$6,720	$0	$1,537	10	7.2	12,680
2023	$0	$4,153	$6,921	$0		10	7.2	12,680
2024	$0	$4,277	$7,129	$0		10	7.2	12,680
2025	$0	$4,406	$7,343	$0	$1,691	10	7.2	12,680
2026	$0	$4,538	$7,563	$0		10	7.2	12,680
2027	$0	$4,674	$7,790	$0		10	7.2	12,680

Table 52
Low Income New Homes – Varying Assumptions Between Scenarios

	Base Scenario		Mid Scenario		High Scenario	
Year	Project Mgt. Allocation	Total Cost	Project Mgt. Allocation	Total Cost	Project Mgt. Allocation	Total Cost
2008	$1,000	$13,500	$1,000	$13,600	$1,200	$13,700
2009	$800	$10,800	$875	$10,875	$950	$10,950
2010	$875	$12,425	$950	$12,500	$1,025	$12,575
2011	$950	$11,450	$1,025	$11,525	$1,100	$11,600
2012	$1,025	$11,525	$1,100	$11,600	$1,175	$11,675
2013	$1,100	$13,070	$1,175	$13,145	$1,250	$13,220
2014	$1,175	$12,314	$1,250	$12,389	$1,325	$12,464
2015	$1,250	$12,724	$1,325	$12,799	$1,400	$12,874
2016	$1,325	$14,413	$1,400	$14,488	$1,475	$14,563
2017	$1,400	$13,572	$1,475	$13,647	$1,550	$13,722
2018	$1,475	$14,013	$1,550	$14,088	$1,625	$14,163
2019	$1,550	$15,861	$1,625	$15,936	$1,700	$16,011
2020	$1,625	$14,926	$1,700	$15,001	$1,775	$15,076
2021	$1,700	$15,400	$1,775	$15,475	$1,850	$15,550
2022	$1,775	$17,423	$1,850	$17,498	$1,925	$17,573
2023	$1,853	$16,388	$1,928	$16,463	$2,003	$16,537
2024	$1,935	$16,906	$2,010	$16,980	$2,084	$17,055
2025	$2,020	$19,131	$2,095	$19,205	$2,169	$19,279
2026	$2,110	$17,992	$2,183	$18,065	$2,257	$18,139
2027	$2,203	$18,561	$2,275	$18,634	$2,348	$18,707

The estimates of program effectiveness over the 20-year planning horizon are shown in Table 53.

Table 53
Low Income New Homes – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.18	1.26	4.08	0.49	0.96

The load shapes for Low Income New Homes were combined with Low Income Efficiency, and are shown on Figures 5 and 6.

4.4.3 Home Performance with ENERGY STAR®

Higher participation rates are anticipated in the mid and high scenario over that expected for the base scenario. Higher retail rates will encourage more customers to participate in this program. Costs and participation rates for each scenario are provided on Tables 54,

55, and 56. Direct participant costs are estimated at $900 per participant. No utility incentive is provided. Table 57 provides the estimates of program effectiveness for each of the IRP scenarios. The load shapes used for the Home Performance with ENERGY STAR® in the IRP modeling are shown in Figures 7 and 8.

Table 57
Home Performance with ENERGY STAR® – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit-Cost Test Results					
IRP Scenarios	Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
Base	1.35	1.43	1.59	0.88	4.79
Mid	1.37	1.44	1.42	0.98	5.59
High	1.35	1.41	1.31	1.04	6.33

Figure 7

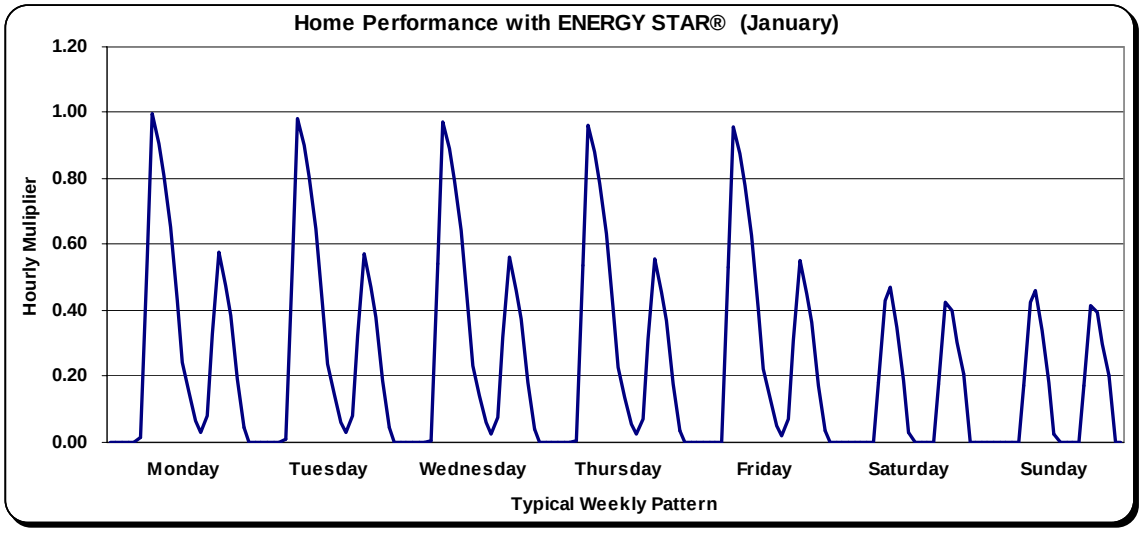


Table 54

Home Performance with ENERGY STAR® - Base Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$40,000	$10,000	$0	$0		$5,000	$55,000	-	-	-
2009	$20,000	$10,500	$15,000	$0		$4,000	$49,500	150	125	180,000
2010	$20,000	$11,000	$15,000	$0	$4,600	$4,375	$54,975	250	208	300,000
2011	$20,000	$11,500	$15,000	$0		$4,750	$51,250	250	208	300,000
2012	$20,000	$12,000	$15,000	$0		$5,125	$52,125	250	208	300,000
2013	$20,600	$12,360	$15,450	$0	$5,060	$5,500	$58,970	250	208	300,000
2014	$21,218	$12,731	$15,914	$0		$5,875	$55,737	250	208	300,000
2015	$21,855	$13,113	$16,391	$0		$6,250	$57,608	250	208	300,000
2016	$22,510	$13,506	$16,883	$0	$5,566	$6,625	$65,090	250	208	300,000
2017	$23,185	$13,911	$17,389	$0		$7,000	$61,486	250	208	300,000
2018	$23,881	$14,329	$17,911	$0		$7,375	$63,495	250	208	300,000
2019	$24,597	$14,758	$18,448	$0	$6,123	$7,750	$71,677	250	208	300,000
2020	$25,335	$15,201	$19,002	$0		$8,125	$67,663	250	208	300,000
2021	$26,095	$15,657	$19,572	$0		$8,500	$69,824	250	208	300,000
2022	$26,878	$16,127	$20,159	$0	$6,735	$8,875	$78,774	250	208	300,000
2023	$27,685	$16,611	$20,764	$0		$9,267	$74,326	250	208	300,000
2024	$28,515	$17,109	$21,386	$0		$9,675	$76,686	250	208	300,000
2025	$29,371	$17,622	$22,028	$0	$7,408	$10,102	$86,532	250	208	300,000
2026	$30,252	$18,151	$22,689	$0		$10,548	$81,640	250	208	300,000
2027	$31,159	$18,696	$23,370	$0		$11,013	$84,238	250	208	300,000

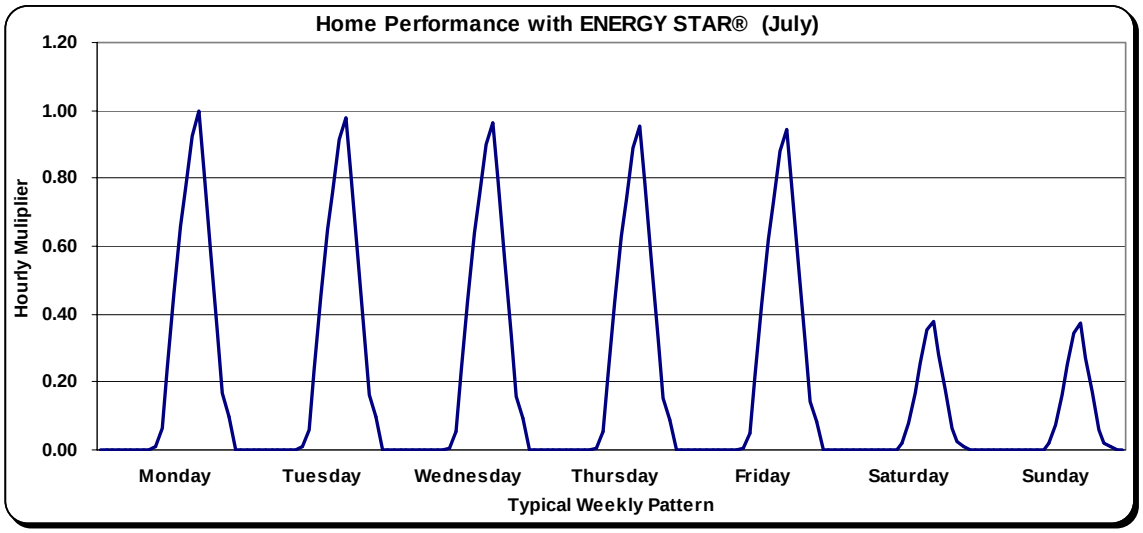
Table 55

Home Performance with ENERGY STAR®– Mid Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$40,000	$10,000	$0	$0		$5,500	$55,500	-	-	-
2009	$20,000	$10,500	$15,000	$0		$4,375	$49,875	150	125	180,000
2010	$23,400	$12,870	$17,550	$0	$5,382	$5,119	$64,321	292	242	350,400
2011	$23,400	$13,455	$17,550	$0		$5,558	$59,963	292	242	350,400
2012	$23,400	$14,040	$17,550	$0		$5,996	$60,986	292	242	350,400
2013	$24,102	$14,461	$18,077	$0	$5,920	$6,435	$68,995	292	242	350,400
2014	$24,825	$14,895	$18,619	$0		$6,874	$65,213	292	242	350,400
2015	$25,570	$15,342	$19,177	$0		$7,313	$67,402	292	242	350,400
2016	$26,337	$15,802	$19,753	$0	$6,512	$7,751	$76,155	292	242	350,400
2017	$27,127	$16,276	$20,345	$0		$8,190	$71,938	292	242	350,400
2018	$27,941	$16,764	$20,956	$0		$8,629	$74,290	292	242	350,400
2019	$28,779	$17,267	$21,584	$0	$7,163	$9,068	$83,862	292	242	350,400
2020	$29,642	$17,785	$22,232	$0		$9,506	$79,166	292	242	350,400
2021	$30,532	$18,319	$22,899	$0		$9,945	$81,694	292	242	350,400
2022	$31,448	$18,869	$23,586	$0	$7,880	$10,384	$92,165	292	242	350,400
2023	$32,391	$19,435	$24,293	$0		$10,842	$86,961	292	242	350,400
2024	$33,363	$20,018	$25,022	$0		$11,320	$89,723	292	242	350,400
2025	$34,364	$20,618	$25,773	$0	$8,668	$11,820	$101,242	292	242	350,400
2026	$35,395	$21,237	$26,546	$0		$12,341	$95,518	292	242	350,400
2027	$36,456	$21,874	$27,342	$0		$12,886	$98,558	292	242	350,400

Table 56

Home Performance with ENERGY STAR®– High Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$40,000	$10,000	$0	$0		$5,000	$55,000	-	-	-
2009	$20,000	$10,500	$15,000	$0		$4,000	$49,500	150	125	180,000
2010	$23,400	$12,870	$17,550	$0	$5,382	$5,119	$64,321	292	242	350,400
2011	$27,378	$15,742	$20,534	$0		$6,502	$70,156	340	282	408,000
2012	$27,378	$16,427	$20,534	$0		$7,016	$71,354	340	282	408,000
2013	$28,199	$16,920	$21,150	$0	$6,927	$7,529	$80,724	340	282	408,000
2014	$29,045	$17,427	$21,784	$0		$8,042	$76,299	340	282	408,000
2015	$29,917	$17,950	$22,438	$0		$8,556	$78,860	340	282	408,000
2016	$30,814	$18,489	$23,111	$0	$7,619	$9,069	$89,102	340	282	408,000
2017	$31,739	$19,043	$23,804	$0		$9,582	$84,168	340	282	408,000
2018	$32,691	$19,614	$24,518	$0		$10,096	$86,919	340	282	408,000
2019	$33,671	$20,203	$25,254	$0	$8,381	$10,609	$98,118	340	282	408,000
2020	$34,682	$20,809	$26,011	$0		$11,122	$92,624	340	282	408,000
2021	$35,722	$21,433	$26,792	$0		$11,636	$95,583	340	282	408,000
2022	$36,794	$22,076	$27,595	$0	$9,219	$12,149	$107,834	340	282	408,000
2023	$37,898	$22,739	$28,423	$0		$12,685	$101,744	340	282	408,000
2024	$39,034	$23,421	$29,276	$0		$13,245	$104,976	340	282	408,000
2025	$40,206	$24,123	$30,154	$0	$10,141	$13,829	$118,453	340	282	408,000
2026	$41,412	$24,847	$31,059	$0		$14,439	$111,756	340	282	408,000
2027	$42,654	$25,592	$31,991	$0		$15,076	$115,313	340	282	408,000

Figure 8



4.4.4 ENERGY STAR® Change a Light

Participation rates in the ENERGY STAR® Change a Light program have been increased in the mid and high scenarios from the base scenario. Higher retail rates will encourage more customers to participate in this program. Average kWh per CFL saved was reduced in each scenario to account for more bulbs being used in areas with less hours use. Costs and participation rates for each scenario are provided on Tables 58, 59, and 60. Direct participant costs are estimated at $4 per participant. Utility incentives are $2 per participant. Table 61 provides the estimates of program effectiveness for each of the IRP scenarios.

Table 61
ENERGY STAR® Change a Light – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit-Cost Test Results					
IRP Scenarios	Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
Base	3.07	3.35	8.81	0.60	3.81
Mid	3.46	3.71	8.33	0.71	4.30
High	3.67	3.90	8.07	0.78	4.53

Table 58

ENERGY STAR® Change A Light– Base Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$5,000	$5,000	$10,000	$20,000		$5,000	$45,000	10,000	335	737,000
2009	$5,500	$5,500	$10,500	$20,000		$4,000	$45,500	10,000	335	737,000
2010	$6,000	$6,000	$11,000	$20,000	$4,300	$4,375	$51,675	10,000	335	737,000
2011	$6,500	$6,500	$11,500	$20,000		$4,750	$49,250	10,000	335	737,000
2012	$7,000	$7,000	$12,000	$20,000		$5,125	$51,125	10,000	335	737,000
2013	$7,500	$7,500	$12,500	$20,600	$4,730	$5,500	$58,330	10,000	335	737,000
2014	$8,000	$8,000	$13,000	$21,218		$5,875	$56,093	10,000	335	737,000
2015	$8,500	$8,500	$13,500	$21,855		$6,250	$58,605	10,000	335	737,000
2016	$9,000	$9,000	$14,000	$22,510	$5,203	$6,625	$66,338	10,000	335	737,000
2017	$9,500	$9,500	$14,500	$23,185		$7,000	$63,685	10,000	335	737,000
2018	$10,000	$10,000	$15,000	$23,881		$7,375	$66,256	10,000	335	737,000
2019	$10,500	$10,500	$15,500	$24,597	$5,723	$7,750	$74,571	10,000	335	737,000
2020	$11,000	$11,000	$16,000	$25,335		$8,125	$71,460	10,000	335	737,000
2021	$11,500	$11,500	$16,500	$26,095		$8,500	$74,095	10,000	335	737,000
2022	$12,000	$12,000	$17,000	$26,878	$6,296	$8,875	$83,049	10,000	335	737,000
2023	$12,500	$12,500	$17,500	$27,685		$9,267	$79,451	10,000	335	737,000
2024	$13,000	$13,000	$18,000	$28,515		$9,675	$82,191	10,000	335	737,000
2025	$13,500	$13,500	$18,500	$29,371	$6,925	$10,102	$91,898	10,000	335	737,000
2026	$14,000	$14,000	$19,000	$30,252		$10,548	$87,800	10,000	335	737,000
2027	$14,500	$14,500	$19,500	$31,159		$11,013	$90,673	10,000	335	737,000

Table 59

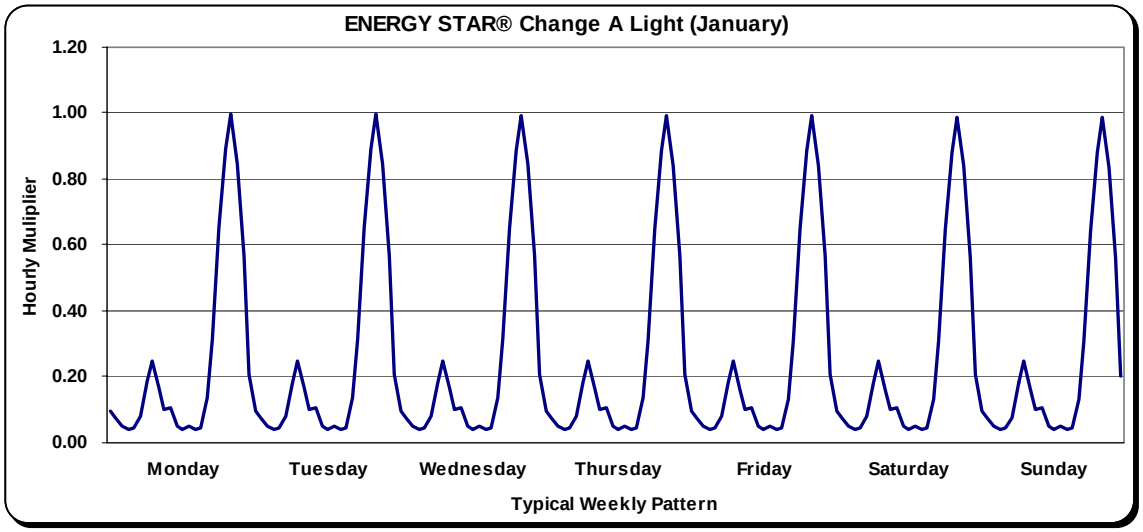
ENERGY STAR® Change A Light– Mid Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$5,750	$5,750	$11,500	$23,000		$5,750	$51,750	11,500	347	762,795
2009	$6,325	$6,325	$12,075	$23,000		$4,600	$52,325	11,500	347	762,795
2010	$6,900	$6,900	$12,650	$23,000	$4,945	$5,031	$59,426	11,500	347	762,795
2011	$7,475	$7,475	$13,225	$23,000		$5,463	$56,638	11,500	347	762,795
2012	$8,050	$8,050	$13,800	$23,000		$5,894	$58,794	11,500	347	762,795
2013	$8,625	$8,625	$14,375	$23,690	$5,440	$6,325	$67,080	11,500	347	762,795
2014	$9,200	$9,200	$14,950	$24,401		$6,756	$64,507	11,500	347	762,795
2015	$9,775	$9,775	$15,525	$25,133		$7,188	$67,395	11,500	347	762,795
2016	$10,350	$10,350	$16,100	$25,887	$5,983	$7,619	$76,289	11,500	347	762,795
2017	$10,925	$10,925	$16,675	$26,663		$8,050	$73,238	11,500	347	762,795
2018	$11,500	$11,500	$17,250	$27,463		$8,481	$76,194	11,500	347	762,795
2019	$12,075	$12,075	$17,825	$28,287	$6,582	$8,913	$85,756	11,500	347	762,795
2020	$12,650	$12,650	$18,400	$29,136		$9,344	$82,179	11,500	347	762,795
2021	$13,225	$13,225	$18,975	$30,010		$9,775	$85,210	11,500	347	762,795
2022	$13,800	$13,800	$19,550	$30,910	$7,240	$10,206	$95,506	11,500	347	762,795
2023	$14,300	$14,300	$20,050	$31,837		$10,657	$91,144	11,500	347	762,795
2024	$14,800	$14,800	$20,550	$32,793		$11,127	$94,069	11,500	347	762,795
2025	$15,300	$15,300	$21,050	$33,776	$7,964	$11,618	$105,008	11,500	347	762,795
2026	$15,800	$15,800	$21,550	$34,790		$12,130	$100,070	11,500	347	762,795
2027	$16,300	$16,300	$22,050	$35,833		$12,665	$103,148	11,500	347	762,795

Table 60

ENERGY STAR® Change A Light– High Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$5,750	$5,750	$11,500	$23,000		$5,750	$51,750	11,500	347	762,795
2009	$7,274	$7,274	$13,886	$26,450		$5,290	$60,174	13,000	392	776,061
2010	$7,935	$7,935	$14,548	$26,450	$5,687	$5,786	$68,340	13,000	392	776,061
2011	$8,596	$8,596	$15,209	$26,450		$6,282	$65,133	13,000	392	776,061
2012	$9,258	$9,258	$15,870	$26,450		$6,778	$67,613	13,000	392	776,061
2013	$9,919	$9,919	$16,531	$27,244	$6,255	$7,274	$77,141	13,000	392	776,061
2014	$10,580	$10,580	$17,193	$28,061		$7,770	$74,183	13,000	392	776,061
2015	$11,241	$11,241	$17,854	$28,903		$8,266	$77,505	13,000	392	776,061
2016	$11,903	$11,903	$18,515	$29,770	$6,881	$8,762	$87,732	13,000	392	776,061
2017	$12,564	$12,564	$19,176	$30,663		$9,258	$84,224	13,000	392	776,061
2018	$13,225	$13,225	$19,838	$31,583		$9,753	$87,624	13,000	392	776,061
2019	$13,886	$13,886	$20,499	$32,530	$7,569	$10,249	$98,620	13,000	392	776,061
2020	$14,548	$14,548	$21,160	$33,506		$10,745	$94,506	13,000	392	776,061
2021	$15,209	$15,209	$21,821	$34,511		$11,241	$97,991	13,000	392	776,061
2022	$15,870	$15,870	$22,483	$35,547	$8,326	$11,737	$109,832	13,000	392	776,061
2023	$16,370	$16,370	$22,983	$36,613		$12,255	$104,590	13,000	392	776,061
2024	$16,870	$16,870	$23,483	$37,711		$12,796	$107,730	13,000	392	776,061
2025	$17,370	$17,370	$23,983	$38,843	$9,159	$13,360	$120,084	13,000	392	776,061
2026	$17,870	$17,870	$24,483	$40,008		$13,950	$114,180	13,000	392	776,061
2027	$18,370	$18,370	$24,983	$41,208		$14,565	$117,496	13,000	392	776,061

The load shape used for the ENERGY STAR® Change a Light in the IRP modeling is shown in Figure 9.

Figure 9



4.4.5 Residential High Efficiency CAC Program

Participation rates in the Residential High Efficiency CAC Program have been increased for the mid and high scenarios. Higher retail rates will encourage more customers to participate in this program. Costs and participation rates for each scenario are provided on Tables 62, 63, and 64. Direct participant costs are estimated at $695 per participant. The utility incentive is $400 per participant. Table 65 provides the estimates of program effectiveness for each of the IRP scenarios.

Table 65
Residential High Efficiency CAC Program – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit-Cost Test Results					
IRP Scenarios	Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
Base	1.90	2.01	2.79	0.72	2.28
Mid	2.18	2.29	2.89	0.81	2.63
High	2.41	2.52	3.01	0.86	2.93

Table 62

Residential High Efficiency CAC Program – Base Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$0	$40,000	$20,000	$208,000		$20,000	$288,000	520	432	659,880
2009	$0	$42,500	$20,000	$260,000		$16,000	$338,500	650	540	824,850
2010	$0	$45,000	$20,000	$312,000	$37,700	$17,500	$432,200	780	647	989,820
2011	$0	$47,500	$20,000	$312,000		$19,000	$398,500	780	647	989,820
2012	$0	$50,000	$20,000	$312,000		$20,500	$402,500	780	647	989,820
2013	$0	$51,500	$20,600	$321,360	$41,470	$22,000	$456,930	780	647	989,820
2014	$0	$53,045	$21,218	$331,001		$23,500	$428,764	780	647	989,820
2015	$0	$54,636	$21,855	$340,931		$25,000	$442,422	780	647	989,820
2016	$0	$56,275	$22,510	$351,159	$45,617	$26,500	$502,061	780	647	989,820
2017	$0	$57,964	$23,185	$361,694		$28,000	$470,843	780	647	989,820
2018	$0	$59,703	$23,881	$372,544		$29,500	$485,628	780	647	989,820
2019	$0	$61,494	$24,597	$383,721	$50,179	$31,000	$550,991	780	647	989,820
2020	$0	$63,339	$25,335	$395,232		$32,500	$516,406	780	647	989,820
2021	$0	$65,239	$26,095	$407,089		$34,000	$532,423	780	647	989,820
2022	$0	$67,196	$26,878	$419,302	$55,197	$35,500	$604,073	780	647	989,820
2023	$0	$69,212	$27,685	$431,881		$37,066	$565,844	780	647	989,820
2024	$0	$71,288	$28,515	$444,837		$38,701	$583,342	780	647	989,820
2025	$0	$73,427	$29,371	$458,183	$60,716	$40,409	$662,105	780	647	989,820
2026	$0	$75,629	$30,252	$471,928		$42,192	$620,001	780	647	989,820
2027	$0	$77,898	$31,159	$486,086		$44,053	$639,197	780	647	989,820

Table 63

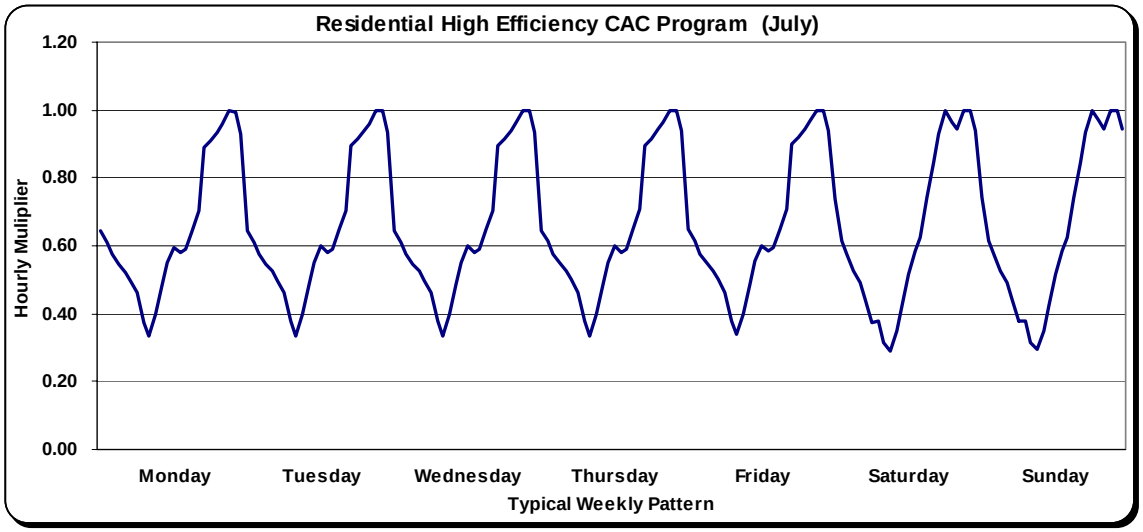
Residential High Efficiency CAC Program – Mid Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$0	$40,000	$20,000	$208,000		$22,000	$290,000	520	432	659,880
2009	$0	$42,500	$20,000	$260,000		$17,500	$340,000	650	540	824,850
2010	$0	$49,050	$21,800	$340,080	$41,093	$19,075	$471,098	850	706	1,078,650
2011	$0	$51,775	$21,800	$340,080		$20,710	$434,365	850	706	1,078,650
2012	$0	$54,500	$21,800	$340,080		$22,345	$438,725	850	706	1,078,650
2013	$0	$56,135	$22,454	$350,282	$45,202	$23,980	$498,054	850	706	1,078,650
2014	$0	$57,819	$23,128	$360,791		$25,615	$467,353	850	706	1,078,650
2015	$0	$59,554	$23,821	$371,615		$27,250	$482,240	850	706	1,078,650
2016	$0	$61,340	$24,536	$382,763	$49,723	$28,885	$547,247	850	706	1,078,650
2017	$0	$63,180	$25,272	$394,246		$30,520	$513,219	850	706	1,078,650
2018	$0	$65,076	$26,030	$406,073		$32,155	$529,334	850	706	1,078,650
2019	$0	$67,028	$26,811	$418,256	$54,695	$33,790	$600,580	850	706	1,078,650
2020	$0	$69,039	$27,616	$430,803		$35,425	$562,883	850	706	1,078,650
2021	$0	$71,110	$28,444	$443,727		$37,060	$580,341	850	706	1,078,650
2022	$0	$73,243	$29,297	$457,039	$60,164	$38,695	$658,439	850	706	1,078,650
2023	$0	$75,441	$30,176	$470,750		$40,402	$616,769	850	706	1,078,650
2024	$0	$77,704	$31,082	$484,873		$42,185	$635,843	850	706	1,078,650
2025	$0	$80,035	$32,014	$499,419	$66,181	$44,046	$721,694	850	706	1,078,650
2026	$0	$82,436	$32,974	$514,402		$45,989	$675,801	850	706	1,078,650
2027	$0	$84,909	$33,964	$529,834		$48,018	$696,724	850	706	1,078,650

Table 64

Residential High Efficiency CAC Program – High Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$0	$40,000	$20,000	$208,000		$24,000	$292,000	520	432	659,880
2009	$0	$45,000	$20,000	$312,000		$17,500	$394,500	780	647	989,820
2010	$0	$53,465	$23,762	$370,687	$44,791	$20,792	$513,497	927	769	1,175,729
2011	$0	$56,435	$23,762	$370,687		$22,574	$473,458	927	769	1,175,729
2012	$0	$59,405	$23,762	$370,687		$24,356	$478,210	927	769	1,175,729
2013	$0	$61,187	$24,475	$381,808	$49,271	$26,138	$542,879	927	769	1,175,729
2014	$0	$63,023	$25,209	$393,262		$27,920	$509,414	927	769	1,175,729
2015	$0	$64,913	$25,965	$405,060		$29,703	$525,641	927	769	1,175,729
2016	$0	$66,861	$26,744	$417,212	$54,198	$31,485	$596,499	927	769	1,175,729
2017	$0	$68,867	$27,547	$429,728		$33,267	$559,408	927	769	1,175,729
2018	$0	$70,933	$28,373	$442,620		$35,049	$576,975	927	769	1,175,729
2019	$0	$73,061	$29,224	$455,898	$59,617	$36,831	$654,632	927	769	1,175,729
2020	$0	$75,252	$30,101	$469,575		$38,613	$613,542	927	769	1,175,729
2021	$0	$77,510	$31,004	$483,663		$40,395	$632,572	927	769	1,175,729
2022	$0	$79,835	$31,934	$498,173	$65,579	$42,178	$717,699	927	769	1,175,729
2023	$0	$82,230	$32,892	$513,118		$44,038	$672,279	927	769	1,175,729
2024	$0	$84,697	$33,879	$528,511		$45,981	$693,069	927	769	1,175,729
2025	$0	$87,238	$34,895	$544,367	$72,137	$48,010	$786,647	927	769	1,175,729
2026	$0	$89,855	$35,942	$560,698		$50,128	$736,623	927	769	1,175,729
2027	$0	$92,551	$37,020	$577,519		$52,339	$759,429	927	769	1,175,729

The load shape used for the Residential High Efficiency CAC Program in the IRP modeling is shown in Figure 10.

Figure 10



4.4.6 ENERGY STAR® Homes

The participation rates in the ENERGY STAR® Homes program have been increased to reflect the mid and high scenarios. Higher retail rates will encourage more customers to participate in this program. Costs and participation rates for each scenario are provided on Tables 66, 67, and 68. Direct participant costs are estimated at $1,455 per participant. The utility incentive is $800 per participant. Table 69 provides the estimates of program effectiveness for each of the IRP scenarios.

Table 69
ENERGY STAR® Homes – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit-Cost Test Results					
IRP Scenarios	Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
Base	1.46	1.56	2.75	0.58	1.74
Mid	1.72	1.83	2.84	0.67	2.08
High	1.93	2.04	2.97	0.72	2.35

Table 66

ENERGY STAR® Homes – Base Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$40,000	$20,000	$20,000	$0		$20,000	$100,000	-	-	-
2009	$30,000	$22,000	$20,000	$174,400		$16,000	$262,400	218	203	568,326
2010	$30,000	$24,000	$20,000	$260,800	$33,480	$17,500	$385,780	326	304	849,882
2011	$30,000	$26,000	$20,000	$260,800		$19,000	$355,800	326	304	849,882
2012	$30,000	$28,000	$20,000	$260,800		$20,500	$359,300	326	304	849,882
2013	$30,900	$28,840	$20,600	$268,624	$36,828	$22,000	$407,792	326	304	849,882
2014	$31,827	$29,705	$21,218	$276,683		$23,500	$382,933	326	304	849,882
2015	$32,782	$30,596	$21,855	$284,983		$25,000	$395,216	326	304	849,882
2016	$33,765	$31,514	$22,510	$293,533	$40,511	$26,500	$448,333	326	304	849,882
2017	$34,778	$32,460	$23,185	$302,339		$28,000	$420,762	326	304	849,882
2018	$35,822	$33,433	$23,881	$311,409		$29,500	$434,045	326	304	849,882
2019	$36,896	$34,436	$24,597	$320,751	$44,562	$31,000	$492,243	326	304	849,882
2020	$38,003	$35,470	$25,335	$330,374		$32,500	$461,682	326	304	849,882
2021	$39,143	$36,534	$26,095	$340,285		$34,000	$476,057	326	304	849,882
2022	$40,317	$37,630	$26,878	$350,493	$49,018	$35,500	$539,837	326	304	849,882
2023	$41,527	$38,759	$27,685	$361,008		$37,066	$506,045	326	304	849,882
2024	$42,773	$39,921	$28,515	$371,838		$38,701	$521,749	326	304	849,882
2025	$44,056	$41,119	$29,371	$382,994	$53,920	$40,409	$591,868	326	304	849,882
2026	$45,378	$42,353	$30,252	$394,483		$42,192	$554,657	326	304	849,882
2027	$46,739	$43,623	$31,159	$406,318		$44,053	$571,892	326	304	849,882

Table 67

ENERGY STAR® Homes – Mid Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$40,000	$20,000	$20,000	$0		$22,000	$102,000	-	-	-
2009	$30,000	$22,000	$20,000	$174,400		$17,500	$263,900	218	203	568,326
2010	$33,000	$26,400	$22,000	$286,880	$36,828	$19,250	$424,358	360	336	938,520
2011	$33,000	$28,600	$22,000	$286,880		$20,900	$391,380	360	336	938,520
2012	$33,000	$30,800	$22,000	$286,880		$22,550	$395,230	360	336	938,520
2013	$33,990	$31,724	$22,660	$295,486	$40,511	$24,200	$448,571	360	336	938,520
2014	$35,010	$32,676	$23,340	$304,351		$25,850	$421,226	360	336	938,520
2015	$36,060	$33,656	$24,040	$313,482		$27,500	$434,737	360	336	938,520
2016	$37,142	$34,666	$24,761	$322,886	$44,562	$29,150	$493,167	360	336	938,520
2017	$38,256	$35,706	$25,504	$332,573		$30,800	$462,838	360	336	938,520
2018	$39,404	$36,777	$26,269	$342,550		$32,450	$477,449	360	336	938,520
2019	$40,586	$37,880	$27,057	$352,826	$49,018	$34,100	$541,467	360	336	938,520
2020	$41,803	$39,017	$27,869	$363,411		$35,750	$507,850	360	336	938,520
2021	$43,058	$40,187	$28,705	$374,313		$37,400	$523,663	360	336	938,520
2022	$44,349	$41,393	$29,566	$385,543	$53,920	$39,050	$593,821	360	336	938,520
2023	$45,680	$42,634	$30,453	$397,109		$40,773	$556,649	360	336	938,520
2024	$47,050	$43,913	$31,367	$409,022		$42,572	$573,924	360	336	938,520
2025	$48,462	$45,231	$32,308	$421,293	$59,312	$44,450	$651,055	360	336	938,520
2026	$49,915	$46,588	$33,277	$433,932		$46,411	$610,123	360	336	938,520
2027	$51,413	$47,985	$34,275	$446,950		$48,458	$629,082	360	336	938,520

Table 68

ENERGY STAR® Homes – High Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$40,000	$20,000	$20,000	$0		$24,000	$104,000	-	-	-
2009	$30,000	$22,000	$20,000	$174,400		$19,000	$265,400	218	203	568,326
2010	$34,650	$27,720	$23,100	$301,224	$38,669	$20,213	$445,576	378	353	985,446
2011	$34,650	$30,030	$23,100	$301,224		$21,945	$410,949	378	353	985,446
2012	$34,650	$32,340	$23,100	$301,224		$23,678	$414,992	378	353	985,446
2013	$35,690	$33,310	$23,793	$310,261	$42,536	$25,410	$471,000	378	353	985,446
2014	$36,760	$34,310	$24,507	$319,569		$27,143	$442,288	378	353	985,446
2015	$37,863	$35,339	$25,242	$329,156		$28,875	$456,474	378	353	985,446
2016	$38,999	$36,399	$25,999	$339,030	$46,790	$30,608	$517,825	378	353	985,446
2017	$40,169	$37,491	$26,779	$349,201		$32,340	$485,980	378	353	985,446
2018	$41,374	$38,616	$27,583	$359,677		$34,073	$501,322	378	353	985,446
2019	$42,615	$39,774	$28,410	$370,468	$51,469	$35,805	$568,541	378	353	985,446
2020	$43,894	$40,967	$29,262	$381,582		$37,538	$533,242	378	353	985,446
2021	$45,210	$42,196	$30,140	$393,029		$39,270	$549,846	378	353	985,446
2022	$46,567	$43,462	$31,044	$404,820	$56,616	$41,003	$623,512	378	353	985,446
2023	$47,964	$44,766	$31,976	$416,964		$42,811	$584,482	378	353	985,446
2024	$49,403	$46,109	$32,935	$429,473		$44,700	$602,620	378	353	985,446
2025	$50,885	$47,492	$33,923	$442,358	$62,277	$46,672	$683,607	378	353	985,446
2026	$52,411	$48,917	$34,941	$455,628		$48,731	$640,629	378	353	985,446
2027	$53,984	$50,385	$35,989	$469,297		$50,881	$660,536	378	353	985,446

The load shapes used for the ENERGY STAR® Homes in the IRP modeling are shown in Figures 11 and 12.

Figure 11

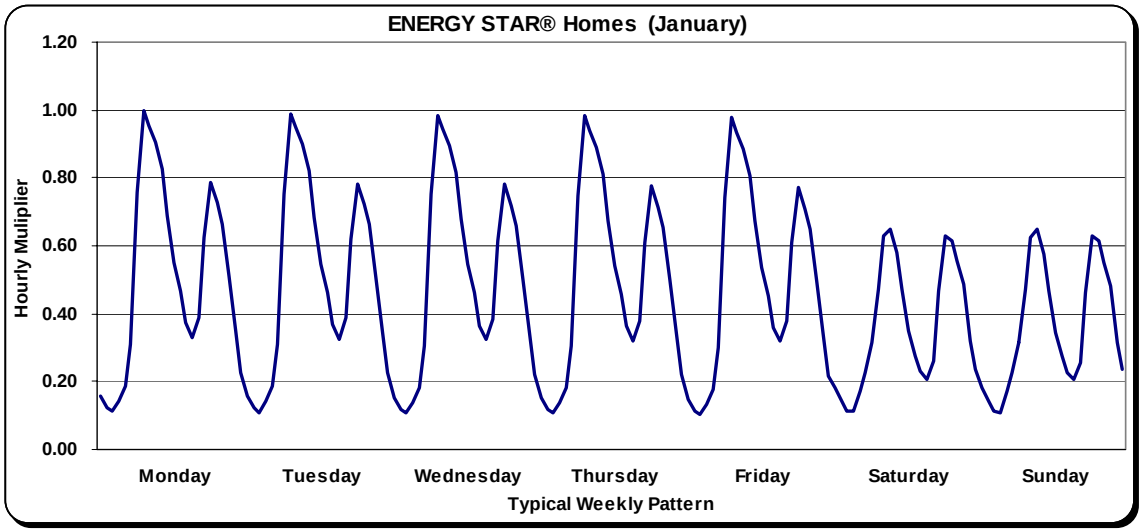
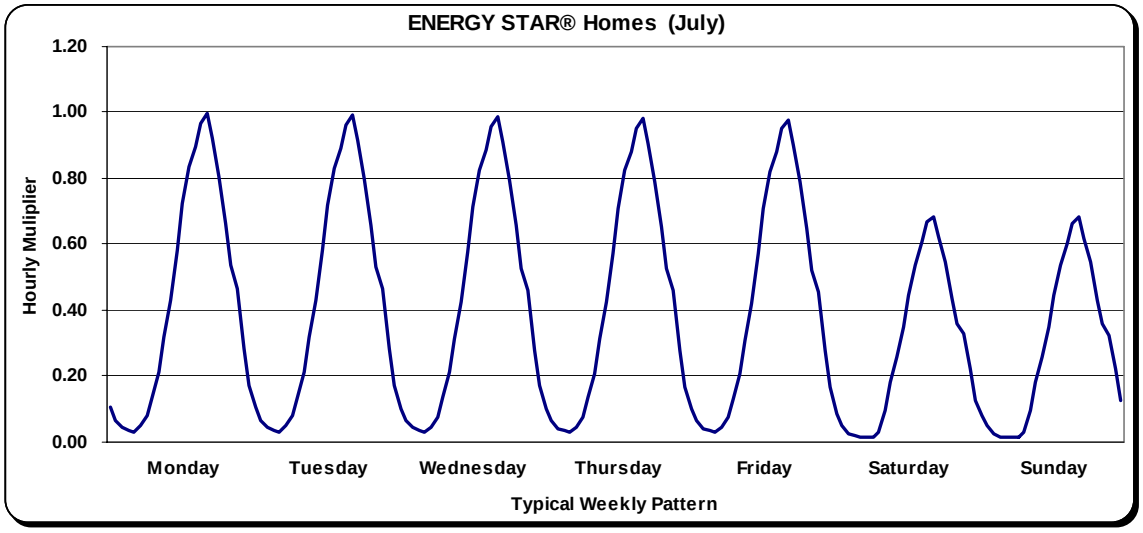


Figure 12



4.4.7 C&I Rebate

Participation rates have been increased in the C&I Rebate program to reflect the mid and high scenarios. Higher retail rates will encourage more customers to participate in this program. Costs and participation rates for each scenario are provided on Tables 70, 71, and 72. Direct costs are estimated at $2,800 per participant. The utility incentive is $1,600 per participant. Table 73 provides the estimates of program effectiveness for each of the IRP scenarios.

Table 70

C&I Rebate Program – Base Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$65,000	$25,000	$25,000	$164,000		$20,000	$299,000	115	285	872,340
2009	$75,000	$28,000	$27,000	$214,000		$16,000	$360,000	140	346	1,061,980
2010	$85,000	$31,000	$31,000	$264,000	$41,100	$17,500	$469,600	165	408	1,251,619
2011	$85,000	$32,500	$31,000	$264,000		$19,000	$431,500	165	408	1,251,619
2012	$85,000	$34,000	$31,000	$264,000		$20,500	$434,500	165	408	1,251,619
2013	$87,550	$35,020	$31,930	$271,920	$45,210	$22,000	$493,630	165	408	1,251,619
2014	$90,177	$36,071	$32,888	$280,078		$23,500	$462,713	165	408	1,251,619
2015	$92,882	$37,153	$33,875	$288,480		$25,000	$477,389	165	408	1,251,619
2016	$95,668	$38,267	$34,891	$297,134	$49,731	$26,500	$542,192	165	408	1,251,619
2017	$98,538	$39,415	$35,937	$306,048		$28,000	$507,939	165	408	1,251,619
2018	$101,494	$40,598	$37,016	$315,230		$29,500	$523,838	165	408	1,251,619
2019	$104,539	$41,816	$38,126	$324,687	$54,704	$31,000	$594,872	165	408	1,251,619
2020	$107,675	$43,070	$39,270	$334,427		$32,500	$556,943	165	408	1,251,619
2021	$110,906	$44,362	$40,448	$344,460		$34,000	$574,176	165	408	1,251,619
2022	$114,233	$45,693	$41,661	$354,794	$60,175	$35,500	$652,056	165	408	1,251,619
2023	$117,660	$47,064	$42,911	$365,438		$37,066	$610,139	165	408	1,251,619
2024	$121,190	$48,476	$44,199	$376,401		$38,701	$628,966	165	408	1,251,619
2025	$124,825	$49,930	$45,525	$387,693	$66,192	$40,409	$714,574	165	408	1,251,619
2026	$128,570	$51,428	$46,890	$399,324		$42,192	$668,404	165	408	1,251,619
2027	$132,427	$52,971	$48,297	$411,303		$44,053	$689,052	165	408	1,251,619

Table 71

C&I Rebate Program – Mid Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$65,000	$25,000	$25,000	$164,000		$22,000	$301,000	115	285	872,340
2009	$75,000	$28,000	$27,000	$214,000		$17,500	$361,500	140	346	1,061,980
2010	$99,450	$36,270	$36,270	$308,880	$48,087	$20,475	$549,432	193	477	1,464,015
2011	$99,450	$38,025	$36,270	$308,880	$0	$22,230	$504,855	193	477	1,464,015
2012	$99,450	$39,780	$36,270	$308,880	$0	$23,985	$508,365	193	477	1,464,015
2013	$102,434	$40,973	$37,358	$318,146	$52,896	$25,740	$577,547	193	477	1,464,015
2014	$105,507	$42,203	$38,479	$327,691	$0	$27,495	$541,374	193	477	1,464,015
2015	$108,672	$43,469	$39,633	$337,522	$0	$29,250	$558,545	193	477	1,464,015
2016	$111,932	$44,773	$40,822	$347,647	$58,185	$31,005	$634,364	193	477	1,464,015
2017	$115,290	$46,116	$42,047	$358,077	$0	$32,760	$594,289	193	477	1,464,015
2018	$118,749	$47,499	$43,308	$368,819	$0	$34,515	$612,890	193	477	1,464,015
2019	$122,311	$48,924	$44,608	$379,883	$64,004	$36,270	$696,000	193	477	1,464,015
2020	$125,980	$50,392	$45,946	$391,280	$0	$38,025	$651,623	193	477	1,464,015
2021	$129,760	$51,904	$47,324	$403,018	$0	$39,780	$671,786	193	477	1,464,015
2022	$133,652	$53,461	$48,744	$415,109	$70,404	$41,535	$762,905	193	477	1,464,015
2023	$137,662	$55,065	$50,206	$427,562		$43,367	$713,863	193	477	1,464,015
2024	$141,792	$56,717	$51,712	$440,389		$45,281	$735,891	193	477	1,464,015
2025	$146,046	$58,418	$53,264	$453,601	$77,445	$47,278	$836,051	193	477	1,464,015
2026	$150,427	$60,171	$54,862	$467,209		$49,364	$782,032	193	477	1,464,015
2027	$154,940	$61,976	$56,507	$481,225		$51,542	$806,190	193	477	1,464,015

Table 72

C&I Rebate Program – High Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$65,000	$25,000	$25,000	$164,000		$24,000	$303,000	115	285	872,340
2009	$85,000	$31,000	$31,000	$264,000		$19,000	$430,000	165	408	1,251,619
2010	$111,384	$40,622	$40,622	$345,946	$53,857	$22,932	$615,364	216	534	1,638,483
2011	$111,384	$42,588	$40,622	$345,946		$24,898	$565,438	216	534	1,638,483
2012	$111,384	$44,554	$40,622	$345,946		$26,863	$569,369	216	534	1,638,483
2013	$114,726	$45,890	$41,841	$356,324	$59,243	$28,829	$646,853	216	534	1,638,483
2014	$118,167	$47,267	$43,096	$367,014		$30,794	$606,339	216	534	1,638,483
2015	$121,712	$48,685	$44,389	$378,024		$32,760	$625,571	216	534	1,638,483
2016	$125,364	$50,145	$45,721	$389,365	$65,168	$34,726	$710,488	216	534	1,638,483
2017	$129,125	$51,650	$47,092	$401,046		$36,691	$665,604	216	534	1,638,483
2018	$132,998	$53,199	$48,505	$413,077		$38,657	$686,437	216	534	1,638,483
2019	$136,988	$54,795	$49,960	$425,469	$71,684	$40,622	$779,520	216	534	1,638,483
2020	$141,098	$56,439	$51,459	$438,234		$42,588	$729,818	216	534	1,638,483
2021	$145,331	$58,132	$53,003	$451,381		$44,554	$752,400	216	534	1,638,483
2022	$149,691	$59,876	$54,593	$464,922	$78,853	$46,519	$854,454	216	534	1,638,483
2023	$154,182	$61,673	$56,231	$478,870		$48,572	$799,526	216	534	1,638,483
2024	$158,807	$63,523	$57,918	$493,236		$50,714	$824,198	216	534	1,638,483
2025	$163,571	$65,428	$59,655	$508,033	$86,738	$52,952	$936,377	216	534	1,638,483
2026	$168,478	$67,391	$61,445	$523,274		$55,288	$875,876	216	534	1,638,483
2027	$173,533	$69,413	$63,288	$538,972		$57,727	$902,933	216	534	1,638,483

Table 73
C&I Rebate Program – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit-Cost Test Results					
IRP Scenarios	Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
Base	2.12	2.28	3.80	0.68	2,41
Mid	2.18	2.31	3.43	0.76	2.56
High	2.45	2.59	3.59	0.83	2.89

The load shapes used for the C&I Rebate Program in the IRP modeling are shown in Figures 13 and 14.

Figure 13

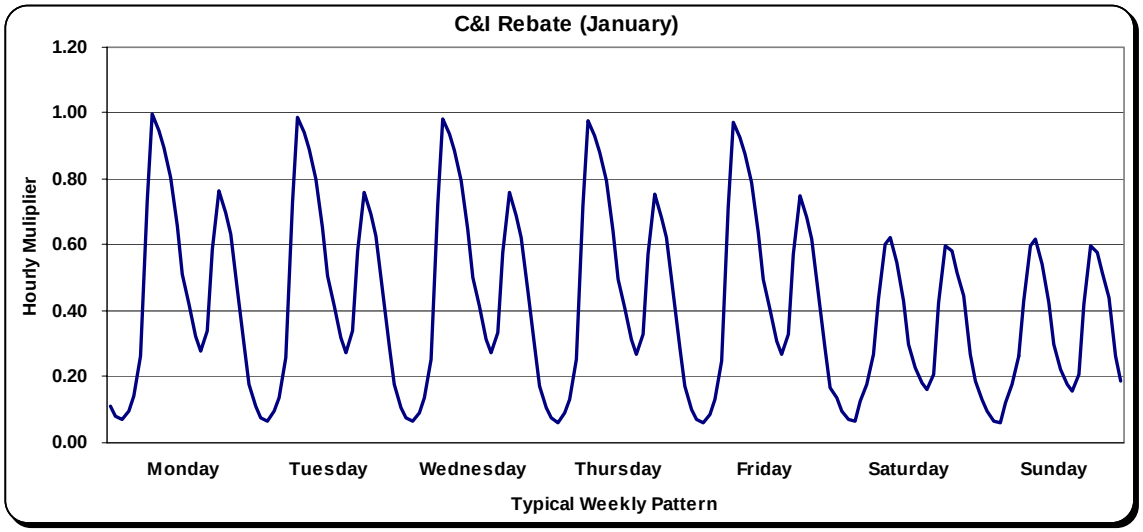
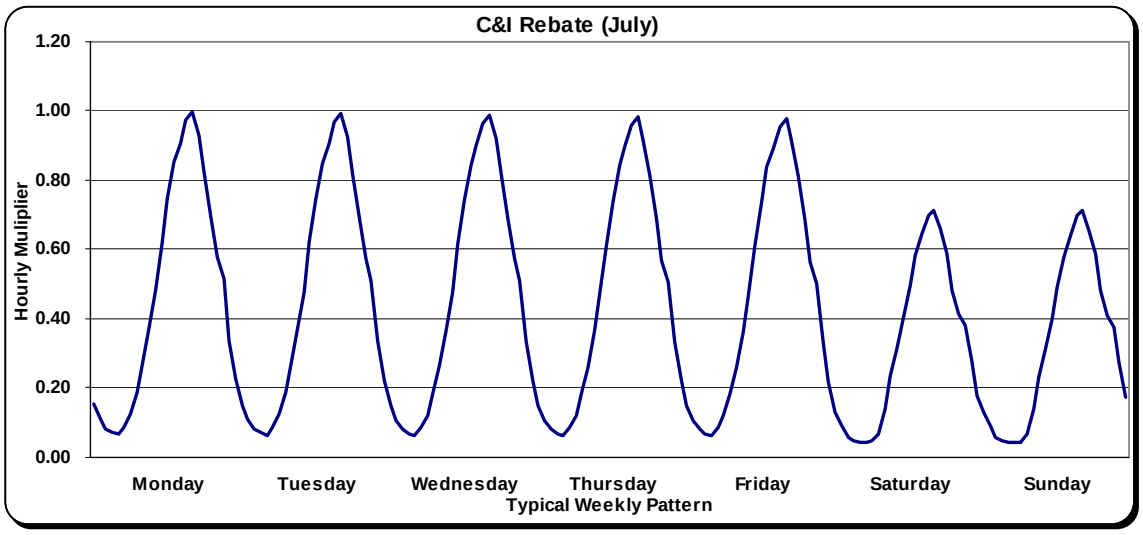


Figure 14



4.4.8 Building Operator Certification Program

Participation rates have been increased in the Building Operator Certification Program to reflect the mid and high scenarios. Higher retail rates will encourage more customers to participate in this program. Costs and participation rates for each scenario are provided on Tables 74, 75, and 76. The direct participant cost is $1,100 per participant. No utility incentive is provided. Table 77 provides the estimates of program effectiveness for each of the IRP scenarios.

Table 77
Building Operator Certification Program – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit-Cost Test Results					
IRP Scenarios	Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
Base	1.99	2.13	5.90	0.71	2,50
Mid	2.23	2.36	5.38	0.82	2.95
High	2.53	2.66	5.74	0.89	3.35

The load shapes used for the Builder Operator Certification Program in the IRP modeling are shown in Figures 15 and 16.

Figure 15

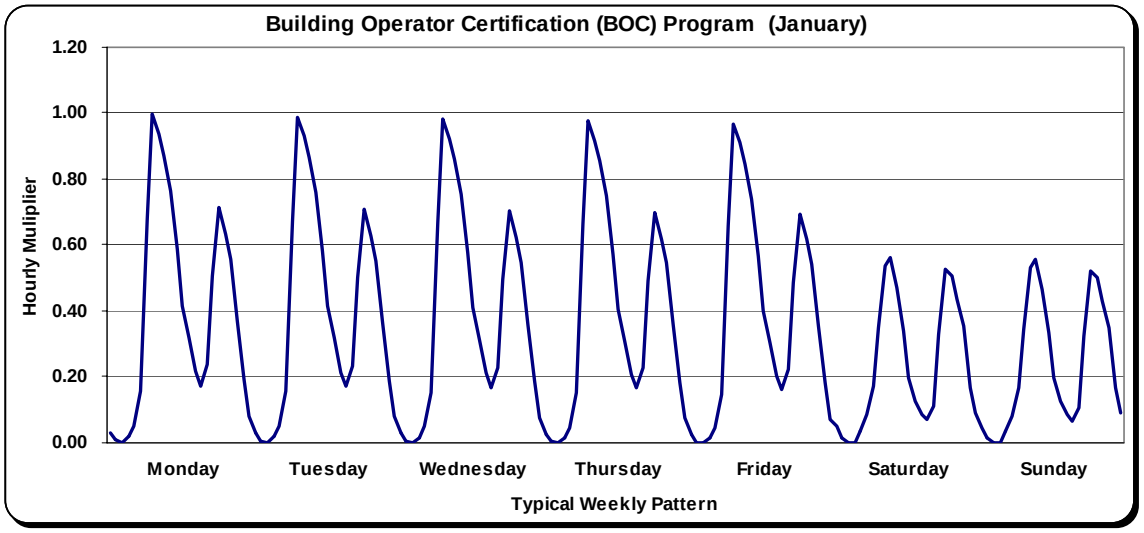


Table 74

Building Operator Certification (BOC) Program – Base Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$20,000	$5,000	$7,500	$0		$5,000	$37,500	20	50	125,000
2009	$20,000	$5,500	$7,500	$0		$4,000	$37,000	20	50	125,000
2010	$20,000	$6,000	$7,500	$0	$3,350	$4,375	$41,225	20	50	125,000
2011	$20,000	$6,500	$7,500	$0		$4,750	$38,750	20	50	125,000
2012	$20,000	$7,000	$7,500	$0		$5,125	$39,625	20	50	125,000
2013	$20,600	$7,210	$7,725	$0	$3,685	$5,500	$44,720	20	50	125,000
2014	$21,218	$7,426	$7,957	$0		$5,875	$42,476	20	50	125,000
2015	$21,855	$7,649	$8,195	$0		$6,250	$43,949	20	50	125,000
2016	$22,510	$7,879	$8,441	$0	$4,054	$6,625	$49,509	20	50	125,000
2017	$23,185	$8,115	$8,695	$0		$7,000	$46,995	20	50	125,000
2018	$23,881	$8,358	$8,955	$0		$7,375	$48,570	20	50	125,000
2019	$24,597	$8,609	$9,224	$0	$4,459	$7,750	$54,639	20	50	125,000
2020	$25,335	$8,867	$9,501	$0		$8,125	$51,829	20	50	125,000
2021	$26,095	$9,133	$9,786	$0		$8,500	$53,515	20	50	125,000
2022	$26,878	$9,407	$10,079	$0	$4,905	$8,875	$60,145	20	50	125,000
2023	$27,685	$9,690	$10,382	$0		$9,267	$57,023	20	50	125,000
2024	$28,515	$9,980	$10,693	$0		$9,675	$58,864	20	50	125,000
2025	$29,371	$10,280	$11,014	$0	$5,395	$10,102	$66,162	20	50	125,000
2026	$30,252	$10,588	$11,344	$0		$10,548	$62,732	20	50	125,000
2027	$31,159	$10,906	$11,685	$0		$11,013	$64,763	20	50	125,000

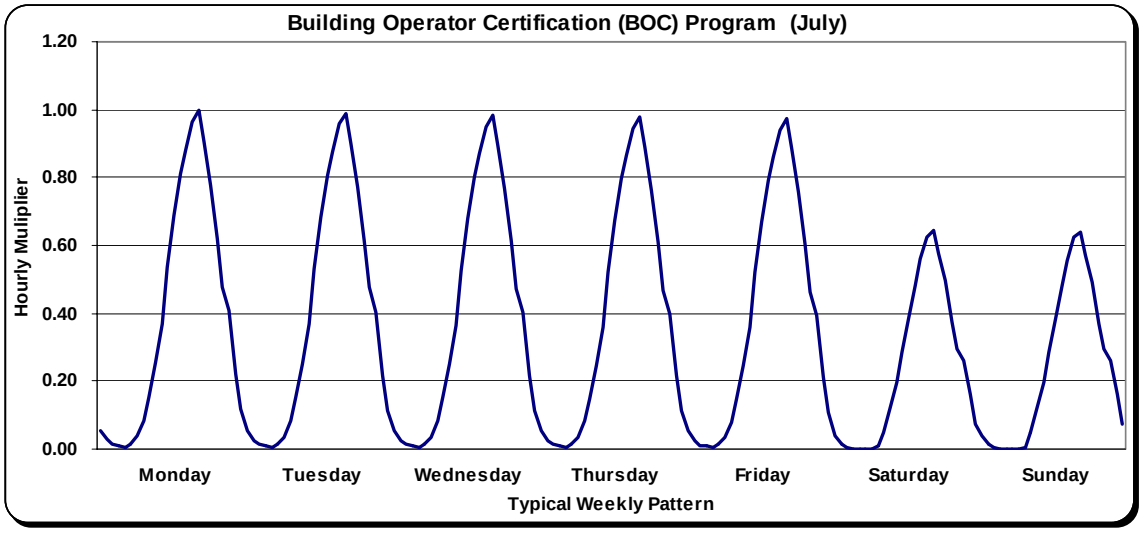
Table 75

Building Operator Certification (BOC) Program – Mid Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$20,000	$5,000	$7,500	$0		$5,500	$38,000	20	50	125,000
2009	$20,000	$5,500	$7,500	$0		$4,375	$37,375	20	50	125,000
2010	$23,400	$7,020	$8,775	$0	$3,920	$5,119	$48,233	23	58	143,750
2011	$23,400	$7,605	$8,775	$0	$0	$5,558	$45,338	23	58	143,750
2012	$23,400	$8,190	$8,775	$0	$0	$5,996	$46,361	23	58	143,750
2013	$24,102	$8,436	$9,038	$0	$4,311	$6,435	$52,322	23	58	143,750
2014	$24,825	$8,689	$9,309	$0	$0	$6,874	$49,697	23	58	143,750
2015	$25,570	$8,949	$9,589	$0	$0	$7,313	$51,420	23	58	143,750
2016	$26,337	$9,218	$9,876	$0	$4,743	$7,751	$57,925	23	58	143,750
2017	$27,127	$9,494	$10,173	$0	$0	$8,190	$54,984	23	58	143,750
2018	$27,941	$9,779	$10,478	$0	$0	$8,629	$56,827	23	58	143,750
2019	$28,779	$10,073	$10,792	$0	$5,217	$9,068	$63,928	23	58	143,750
2020	$29,642	$10,375	$11,116	$0	$0	$9,506	$60,639	23	58	143,750
2021	$30,532	$10,686	$11,449	$0	$0	$9,945	$62,612	23	58	143,750
2022	$31,448	$11,007	$11,793	$0	$5,739	$10,384	$70,369	23	58	143,750
2023	$32,391	$11,337	$12,147	$0		$10,842	$66,716	23	58	143,750
2024	$33,363	$11,677	$12,511	$0		$11,320	$68,871	23	58	143,750
2025	$34,364	$12,027	$12,886	$0	$6,312	$11,820	$77,409	23	58	143,750
2026	$35,395	$12,388	$13,273	$0		$12,341	$73,397	23	58	143,750
2027	$36,456	$12,760	$13,671	$0		$12,886	$75,773	23	58	143,750

Table 76

Building Operator Certification (BOC) Program – High Scenario										
Year	Program Delivery	Project Management	Marketing	Customer Incentive	Evaluation	Project Mang. Allocation	Total	Participants	Demand (kW)	Energy (kWh)
2008	$20,000	$5,000	$7,500	$0		$6,000	$38,500	20	50	125,000
2009	$20,000	$5,500	$7,500	$0		$4,750	$37,750	20	50	125,000
2010	$25,272	$7,582	$9,477	$0	$4,233	$5,528	$52,092	25	63	156,250
2011	$25,272	$8,213	$9,477	$0		$6,002	$48,965	25	63	156,250
2012	$25,272	$8,845	$9,477	$0		$6,476	$50,070	25	63	156,250
2013	$26,030	$9,111	$9,761	$0	$4,656	$6,950	$56,508	25	63	156,250
2014	$26,811	$9,384	$10,054	$0		$7,424	$53,673	25	63	156,250
2015	$27,615	$9,665	$10,356	$0		$7,898	$55,534	25	63	156,250
2016	$28,444	$9,955	$10,666	$0	$5,122	$8,371	$62,559	25	63	156,250
2017	$29,297	$10,254	$10,986	$0		$8,845	$59,383	25	63	156,250
2018	$30,176	$10,562	$11,316	$0		$9,319	$61,373	25	63	156,250
2019	$31,081	$10,878	$11,656	$0	$5,634	$9,793	$69,042	25	63	156,250
2020	$32,014	$11,205	$12,005	$0		$10,267	$65,491	25	63	156,250
2021	$32,974	$11,541	$12,365	$0		$10,741	$67,621	25	63	156,250
2022	$33,963	$11,887	$12,736	$0	$6,198	$11,214	$75,999	25	63	156,250
2023	$34,982	$12,244	$13,118	$0		$11,709	$72,054	25	63	156,250
2024	$36,032	$12,611	$13,512	$0		$12,226	$74,381	25	63	156,250
2025	$37,113	$12,989	$13,917	$0	$6,817	$12,765	$83,602	25	63	156,250
2026	$38,226	$13,379	$14,335	$0		$13,328	$79,268	25	63	156,250
2027	$39,373	$13,781	$14,765	$0		$13,916	$81,835	25	63	156,250

Figure 16



4.4.9 C&I Peak Load Reduction Program

Program Description

The C&I Peak Load Reduction Program examined for the 20-year planning horizon 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. **_____
_____
_____
_____
_____**

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 assumptions for this program do not change from the base to mid and high scenarios. The avoided demand cost does not change in the mid or high scenario, thus there is no economic reason to assume higher participation rates in this program. Costs are slightly higher for the mid and high scenarios reflecting an overall higher general project management budget.

The assumptions common to the C&I Load Reduction Program in each of the base, mid and high scenarios are shown in Table 78. There is no direct participant cost. The incentive per participant is $16,680. The varying project management and resulting total costs are reflected for all three scenarios in Table 79.

Table 78
C&I Load Reduction Program
Common Assumptions for Base, Mid and High Scenarios
****Highly Confidential in its Entirety****

Table 79
C&I Load Reduction Program – Varying Assumptions Between Scenarios
****Highly Confidential in its Entirety****

The estimates of program effectiveness over the 20-year planning horizon are shown in Table 80.

Table 80
C&I Load Reduction Program – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
15.82	15.87	8.58	2.29	2.50

4.4.10 Air Conditioning Cycling Program

Program Description

An Air Conditioning 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 established by the company. There are a number of 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 is similar from the different options, the ability to market, keep customers in the program, and verify the savings differ significantly.

This program is designed using a two-way thermostat control based system. The installed cost per point is assumed to be $500. This includes equipment, installation, marketing, a small one-time participant cash incentive and O&M. Savings are assumed to equal 1 kW per controlled central air conditioner (CAC). A 2.5% annual attrition rate is assumed as well. Installations are assumed to occur over the first five years of the program after which the program goes into a maintenance mode, with enough installations per year to offset attrition.

The assumptions for the Air Conditioning Cycling program have not been changed for the mid and high scenario. The avoided demand cost does not change in the mid and high scenarios, thus there is no economic reason to assume higher participation rates in this program. Costs are slightly higher for the mid and high scenarios reflecting an overall higher general project management budget.

The assumptions common to the Air Conditioning Cycling Program in each of the base, mid and high scenarios are shown in Table 81. The is no direct participant cost and no utility incentive. The varying project management and resulting total costs are reflected for all three scenarios in Table 82.

Table 81
Air Conditioning Cycling Program – Common Assumptions for Base, Mid and High Scenarios

Year	Program Delivery	Project Manage-ment	Marketing	Customer Incentive	Evaluation	# of Participants	Demand (kW)	Energy (kWh)
2008	$750,000	$0	$0	$0	$25,000	1,500	1,500	75,000
2009	$772,500	$0	$0	$0	$26,250	1,500	1,500	75,000
2010	$795,675	$0	$0	$0	$27,563	1,500	1,500	75,000
2011	$819,545	$0	$0	$0	$28,941	1,500	1,500	75,000
2012	$844,132	$0	$0	$0	$30,388	1,500	1,500	75,000
2013	$0	$232,500	$0	$0	$31,907			
2014	$0	$239,475	$0	$0	$33,502			
2015	$0	$246,659	$0	$0	$35,178			
2016	$0	$254,059	$0	$0	$36,936			
2017	$0	$261,681	$0	$0	$38,783			
2018	$0	$269,531	$0	$0	$40,722			
2019	$0	$277,617	$0	$0	$42,758			
2020	$0	$285,946	$0	$0	$44,896			
2021	$0	$294,524	$0	$0	$47,141			
2022	$0	$303,360	$0	$0	$49,498			
2023	$0	$312,461	$0	$0	$51,973			
2024	$0	$321,834	$0	$0	$54,572			
2025	$0	$331,489	$0	$0	$57,300			
2026	$0	$341,434	$0	$0	$60,165			
2027	$0	$351,677	$0	$0	$63,174			

Table 82
Air Conditioning Cycling Program – Varying Assumptions Between Scenarios

	Base Scenario		Mid Scenario		High Scenario	
Year	Project Mgt. Allocation	Total Cost	Project Mgt. Allocation	Total Cost	Project Mgt. Allocation	Total Cost
2008	$7,500	$782,500	$8,250	$783,250	$9,000	$784,000
2009	$6,000	$804,750	$6,563	$805,313	$7,125	$805,875
2010	$6,563	$829,800	$7,125	$830,363	$7,688	$830,925
2011	$7,125	$855,611	$7,688	$856,173	$8,250	$856,736
2012	$7,688	$882,207	$8,250	$882,769	$8,813	$883,332
2013	$8,250	$272,657	$8,813	$273,220	$9,375	$273,782
2014	$8,813	$281,790	$9,375	$282,352	$9,938	$282,915
2015	$9,375	$291,212	$9,938	$291,774	$10,500	$292,337
2016	$9,938	$300,933	$10,500	$301,495	$11,063	$302,058
2017	$10,500	$310,964	$11,063	$311,527	$11,625	$312,089
2018	$11,063	$321,316	$11,625	$321,879	$12,188	$322,441
2019	$11,625	$332,001	$12,188	$332,563	$12,750	$333,126
2020	$12,188	$343,030	$12,750	$343,592	$13,313	$344,155
2021	$12,750	$354,415	$13,313	$354,978	$13,875	$355,540
2022	$13,313	$366,171	$13,875	$366,733	$14,438	$367,296
2023	$13,900	$378,334	$14,461	$378,895	$15,023	$379,457
2024	$14,513	$390,919	$15,072	$391,479	$15,632	$392,038
2025	$15,153	$403,943	$15,709	$404,499	$16,266	$405,055
2026	$15,822	$417,421	$16,373	$417,973	$16,925	$418,525
2027	$16,520	$431,371	$17,065	$431,916	$17,611	$432,462

It should be noted that the peak demand savings are incremental and represent only those impacts associated with new installations. Energy savings assumes that the program is activated for 30 hours per summer season.

The estimates of program effectiveness over the 20-year planning horizon are shown in Table 83.

Table 83
Air Conditioning Cycling Program – Estimate of Program Cost Effectiveness – 20-year Planning Horizon

Benefit/Cost Test Results				
Total Resource Cost Test	Societal	Participant	Ratepayer Impact Measure (RIM)	Utility Cost
1.10	1.10	Infinity	0.94	1.00

While these participation levels are relatively aggressive, if Empire cannot recruit at least these many participants, the fixed cost components of the program become too expensive to justify the investment.

Program delivery assumes a flat $500 per install for a two-way system plus $25 per unit annually for ongoing O&M costs.

Evaluation

A two-way communications-based system will require analysis of runtime data to estimate impacts. Evaluations are done every year as long as the program is activated.

5.0 DSM Programs in Arkansas

The Arkansas Public Service Commission (APSC), through Docket No. 06-004-R, requested that all Arkansas utilities collaborate on proposed energy efficiency rules. Empire participated in this collaboration as well as the collaboration of two state-wide energy efficiency programs. The APSC approved the Rules for Conservation and Energy Efficiency Programs in Order 18 of the above mentioned docket. On August 16, 2007, the APSC held hearings on the ten dockets resulting from Docket No. 06-004-R, two of which were the state-wide programs and one of which was Empire's proposed portfolio. These programs are considered "Quick Start" and are to be in effect from October 1, 2007 through December 31, 2009. The APSC also authorized recovery of these costs through an Energy Efficiency Cost Recovery tariff.

The two state-wide programs are the Arkansas Weatherization Program and the Energy Efficiency Arkansas Program. The two DSM programs in Empire's portfolio are the Central Air Conditioning Tune-Up Program and the Commercial and Industrial (C&I) Prescriptive Rebate Program.

5.1 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 budget for this program for the twenty-seven months is $10,886.

5.2 Energy Efficiency Arkansas Program

Through the Energy Efficiency Arkansas 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)
- HVAC training and certification (residential and small commercial)
- Energy rater training and certification program (residential and small commercial)
- Information outreach 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 budget for this program for the twenty-seven months is $2,439.

5.3 Central Air Conditioning Tune-Up Program

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. The Central Air Conditioning Tune-Up Program encourages annual inspections and maintenance of air conditioning systems for residential and small commercial customers. The tune-up must be performed by a professional service technician and is based on a 12-point inspection with a rebate of $30.

The results of the analysis for the C&I Prescriptive Rebate Program demonstrate the estimated level of participation (Table 84), the effect on annual peak demand and energy savings (Table 85), the cost effectiveness using four standard benefit/cost ratios (Table 86), and provide a program budget (Table 87).

Table 84
Central Air Conditioning Tune-Up Program – Participation

Year	Participation
2007*	0
2008	300
2009	300
*Note: 2007 is a partial year (3 months from October through December). Since tune-ups are performed in the spring and early summer, no participation is expected in the 2007 fall period.	

Table 85
Central Air Conditioning Tune-Up Program – Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
2007	0	0
2008	63	96,600
2009	63	96,600

The peak demand and energy savings are based upon per ton Deemed Savings with an assumed size of 3.5 tons per system (based on an assumed mix of residential and small commercial systems). Weather zone 9 was used for the per ton savings.

Table 86
Central Air Conditioning Tune-Up Program – Estimate of Program Effectiveness

Total Resource Cost Test	Participant	Ratepayer Impact Measure (RIM)	Program Administrator Cost
1.13	2.62	0.53	1.60

The total budget for this quick start program is $36,000. Incentive budgets will be set by calendar year. Any 2008 dollars not spent will move into 2009. If all the incentive dollars are used in any calendar year, customers will be told that they may reapply in the following calendar year.

Table 87
Central Air Conditioning Tune-Up Program – Program Budget

Year	Program Delivery	Marketing	Customer Incentive	Evaluation	Total
2007	$0	$0	$0	$0	$0
2008	$4,500	$2,500	$9,000	$2,000	$18,000
2009	$4,500	$2,500	$9,000	$2,000	$18,000

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. Phone surveys will be conducted for a random sample of 10% of all participants to measure customer satisfaction and participation in the program.

5.4 C&I Prescriptive Rebate Program

Program Description

The C&I Prescriptive Rebate Program is similar to the prescriptive rebate portion of Empire's Missouri Commercial & Industrial Facility Rebate Program. The Arkansas program provides rebates to C&I customers that install, replace, or retrofit qualifying electric savings measures including lighting, motors, HVAC, and chillers. Rebates are prescriptive in nature and are based on a combination of the cost of high efficiency equipment and the anticipated savings (based on the Deemed Savings values).

The results of the analysis for the C&I Prescriptive Rebate Program demonstrate the estimated level of participation (Table 88), the effect on annual peak demand and energy savings (Table 89), the cost effectiveness using four standard benefit/cost ratios (Table 90), and provide a program budget (Table 91).

Table 88
C&I Prescriptive Rebate Program – Participation

Year	Participation
2007*	9
2008	36
2009	36
*Note: 2007 is a partial year (3 months from October through December)	

The peak demand and energy savings for the C&I Prescriptive Rebate Program shown in Table 89 are based upon an assumed mix of lighting, HVAC and motor measures using information from another utility's prescriptive rebate program.

Table 89
C&I Prescriptive Rebate Program – Peak Demand and Energy Savings

Year	Demand (kW)	Energy (kWh)
2007	8.8	26,813
2008	36.0	109,440
2009	36.0	109,440

Table 90
C&I Prescriptive Rebate Program – Estimate of Program Effectiveness

Total Resource Cost Test	Participant	Ratepayer Impact Measure (RIM)	Program Administrator Cost
1.37	3.32	0.46	1.88

The total budget for this quick start program is $63,000. Incentive budgets will be set by calendar year. Any 2007 dollars not spent will be moved into 2008. Any 2008 dollars not spent will move into 2009. If all the incentive dollars are used in any calendar year, customers will be told that they may reapply in the following calendar year.

Table 91
C&I Prescriptive Rebate Program – Program Budget

Year	Program Delivery	Marketing	Customer Incentive	Evaluation	Total
2007	$1,250	$500	$4,500	$750	$7,000
2008	$5,000	$2,000	$18,000	$3,000	$28,000
2009	$5,000	$2,000	$18,000	$3,000	$28,000

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 5% of all participants.

6.0 Cost Recovery for DSM

The reliance of conventional rate recovery methodologies on the amount of kWh sold to customers discourage electric utilities from pursuing energy efficiency and other DSM programs. A variety of methods have been developed and implemented in a number of jurisdictions around the country to both ensure the financial integrity of electric utilities and to encourage conservation and energy efficiency programs. These methods include revenue decoupling, surcharges, and shared savings as well as performance-based ratemaking.

Revenue decoupling unlinks, to some extent, a utility's cost recovery and profitability from sales volume and instead ensures cost recovery through a true-up or other mechanism. In April 2007, the New York State Public Service Commission determined that properly designed utility revenue decoupling mechanisms were needed to address discouragement of utility promotion and implementation of energy efficiency programs. The mechanisms will true-up forecast and actual delivery service revenues to reduce or eliminate the disincentives that exist through such traditional rate-making mechanisms as recovery of utility fixed delivery costs through volumetric (per kWh) rates and marginal consumption blocks. The true-ups are to include net lost revenues due to the achievement of more energy efficient use[8].

A surcharge, also known as a tariff rider charge, is used by utilities in the western U.S. including PacifiCorp, Avista, Idaho Power, and Puget Sound Energy[9]. The volumetric surcharge is collected via the application of a percentage to the customer bills. The percentage is established through the regulatory process and is typically in the range of 0.5 to 1.5 percent. The monies collected from the surcharge are used to underwrite DSM programs.

Shared savings programs are a form of revenue decoupling that break the linkage between profits and sales by rewarding a utility with a portion of the consumer surplus generated by the implementation of cost effective DSM. The utility has the opportunity through the design of the reward structure to increase profits by an amount greater than the cost of the lost sales. Typically the shared savings are 10-30% of the cost savings. In addition, all costs of implementing the DSM programs are recovered[10].

Performance-based ratemaking (PBR) is another mechanism to decrease the linkages between a utility's cost of service and its prices. The typical incentives that result from PBR can be categorized as sliding scale, price cap, and revenue cap. Under sliding scale regulation, prices are adjusted to keep a utility's rate of return within a pre-specified

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[8] "New Hampshire PUC to consider decoupling to boost energy efficiency," *SNL Energy Electric Utility Report*, June 25, 2007, p. 21. New York State Public Service Commission, "Case 03-E-0640 Revenue Decoupling Mechanism," www.dps.state.ny.us/Case_03-E-0640.htm.

[9] "New Funding Source: IPUC Approves 0.5 Percent Rate Surcharge for Idaho Power DSM," www.newsdata.com/enernet/conweb/conweb77.html. "2000/10/25 – UE-001457 – PacifiCorp, d/b/a Pacific Power & Light – Tariff Revision," Docket: UE-001457, Washington Utilities and Transportation Commission, from www.wutc.wa.gov/webdocs.nsf.

[10] "Demand-Side Management of Electricity," www.colby.edu/personal/t/thtieten/dsm-ne.html.

band. Price caps set a ceiling on the prices for utility services but may be indexed to increase with an appropriate rate of inflation, such as the consumer price index. Revenue caps are ceilings that are usually applied only to revenues from base rates. Some revenue caps are increased as the number of customers increase.[11]

[11] G.A. Comnes, A. Stoft, N. Greene, and L.J. Hill, *Performance-Based Ratemaking for Electric Utilities: Review of Plans and Analysis of Economic and Resource-Planning Issues*, Volume I, Lawrence Berkeley National Laboratory, LBL-37577, UC-1320, November 1995.

Abbreviations

AEG – Applied Energy Group
AEO – Arkansas Economic Development Commission-Energy Office
APSC – Arkansas Public Service Commission
BOC – Building Operator Certification
BPI – Building Performance Institute
C&I – Commercial and Industrial
CAC – Central air conditioning
CAP – Community Action Partnership
CB – Commercial Service
CEM – Certified Energy Manager
CFL – Compact fluorescent light bulbs
CPC – Customer Programs Collaborative
DOE – Department of Energy
DSM – Demand-side Management
EER – Energy Efficiency Ratio
ELIP – Experimental Low Income Program
EPA – Environmental Protection Agency
GED – Global Energy Decisions
GP – General Power Service
HID – High intensity discharge lighting
HSPF – Heating Season Performance Factor
HVAC – Heating, ventilation, and air conditioning
IR – Interruptible Service
IRP – Integrated Resource Plan or integrated resource planning
kW – kilowatt
kWh – kilowatthour
LIPA – Long Island Power Authority
LP – Large Power Service
MEEA – Midwest Energy Efficiency Alliance
MPSC – Missouri Public Service Commission
MW – Megawatt
MWh – Megawatthour
NEEC – Northwest Energy Efficiency Council
NYSERDA – New York State Energy Research and Development Authority
O&M – Operations and maintenance costs
OTOU – Optional Time of Use
PBR – Performance-Based Ratemaking
PE – Professional Engineer
RG – Residential General Service
RIM – Ratepayer Impact Measure
SEER – Seasonal energy efficiency ratio
SH – Small Heating Service
TEB – Total Electric Building Service

APPENDIX A Benefit/Cost Tests

Test Name	Benefit Components	Cost Components	Test Descriptions
Ratepayer Impact Test (RIM) other names include: Non-Participant Test	Avoided Energy (per kWh) Variable O&M (per kWh) Avoided Demand (per kW)	Lost Revenue (kWh * retail rate) Program costs (total program costs as shown in budgets)	A test which measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by a DSM program. The benefits for the RIM are the savings from avoided supply or other system costs. The costs for the RIM are the program costs incurred by the utility, the incentives paid to the participants, and decreased revenues for any period when load has been decreased
Utility Cost Test other names include: Revenue Requirements	Avoided Energy (per kWh) Variable O&M (per kWh) Avoided Demand (per kW)	Program costs (total program costs as shown in budgets)	A benefit-cost test which measures the net costs of a demand-side management program as a resource option based on the costs incurred by the utility (including incentive costs) and excluding any net costs incurred by the participant. The benefits for the Utility Cost Test are the avoided supply costs of energy and demand. The costs for the Utility Cost Test are the program costs incurred by the utility, the incentives paid to the customer, and any increased supply costs.
Societal Test other names include: Resource Cost Test with Externalities	Avoided Energy (per kWh) Variable O&M (per kWh) Avoided Demand (per kW) Avoided Environmental (per kWh)	Program costs (total program costs as shown in budgets) Incremental Measure Cost (out of pocket costs for participant)	A benefit-cost test which measures the net costs of a demand-side program as a resource option based on the total costs of the program, including both the participants' and the utility's costs. The benefits are avoided supply costs and beneficial externalities. The costs are the program costs (including equipment costs) paid by both the utility and the participants plus the increase in supply costs for any period in which load has been increased, and the costs of negative externalities.
Participant Test	Program Incentives Utility Bill Savings	Incremental Measure Cost (out of pocket costs for participant)	This benefit-cost test evaluates DSM programs from the perspective of the program's participants. The benefits include reductions in utility bills, incentives paid by the utility and any state, federal or local tax benefits received. The costs include all out-of-pocket expenses incurred as a result of participating in a program.

Appendix B

Energy Efficiency Programs Communications Timeline

Low-Income Weatherization

November 2, 2005
Low-Income weatherization kick-off news conference at site of customer receiving weatherization by Economic Security. Covered by all local TV stations and Joplin Globe.

Fall/winter 2005/06
Worked with Economic Security and Missouri Gas Energy to develop advertising.
- Posters that were placed in community locations
- Television and radio ads
- Introduced information about program on web site

Also worked with Ozark Area Community Action Corporation on east end.

Fall/winter 2006/07
Ads and posters used again

Low-Income Assistance Program

Winter 2005/06 and Winter 2006/07
Promoted Low-Income (ELIP) assistance for electric utility bills with news releases and interviews.

Included bill messages promoting program.

Winter 2006/07
Promoted Low-Income (ELIP) assistance for gas utility bills with news releases and interviews.

Included bill messages promoting program.

Change a Light

November 2005
Promoted Change a Light/Change the World with news release. Our tariff was not approved in time for announcement and promotion with other utilities.

October 2, 2006
Change a Light/Change the World news conference at Henkle's Ace Hardware. Alecia Ward, president and CEO, Midwest Energy Efficiency Alliance (MEEA), Chicago, Illinois, helped kickoff program. Covered by all local TV stations, Joplin Daily.com.

Feature story prepared for Joplin Daily.com regarding program, focused on Pearl Brother's True Value. Appeared September 30.

Bill message promoting program to Missouri residential customers.

Regional advertising carried our logo as well as other participating companies'. Offered community specific advertising to bulb distributors. No takers, not enough bulbs left.

Promoted program on front page of Web site.

Smart Energy Solutions

Spring 2007
Introduced tag as umbrella for all energy efficiency programs. Believe this can also be used with long-range plan as we move forward.

Created separate section on current Web site to promote programs. Separate tab on new Web page, designed to emphasize importance.

- Missouri residential electric programs:
  - Low Income Weatherization
  - Low income New Homes
  - Change a Light, Change the World
  - AC Rebate Program
- Missouri commercial/industrial electric program:
  - Rebate program
- Missouri residential gas program:
  - Low-Income Weatherization
- Missouri commercial gas program (coming soon):
  - Audit program

Low-Income New Homes

Summer 2007
Created brochure that was mailed to local housing authorities and Habitat of Humanity programs.

Top Tips for Summer Savings

Summer 2007
Radio, television, and print ads
Bill insert for residential electric customers

Missouri Residential High Efficiency AC Rebate program

Summer 2007
Bill inserts to Missouri residential customers in July
Will consider print ads if necessary