ORIGINAL NEW APPLICATION

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| IN THE MATTER OF THE APPLICATION OF TUCSON ELECTRIC POWER COMPANY FOR APPROVAL OF ITS 2011-2012 ENERGY EFFICIENCY IMPLEMENTATION PLAN. | DOCKET NO. E-01933A-11-_____ |

**APPLICATION FOR APPROVAL OF:**

**(1) ENERGY EFFICIENCY IMPLEMENTATION PLAN;**

**(2) DEMAND-SIDE MANAGEMENT SURCHARGE; AND**

**(3) AUTHORIZED REVENUE REQUIREMENT TRUE-UP MECHANISM**

**(Expedited Review and Approval Requested by June 1, 2011)**

Tucson Electric Power Company ("TEP" or "Company"), through undersigned counsel, and in accordance with Arizona Administrative Code R14-2-2405 and the Arizona Corporation Commission's Policy Statement of Regarding Utility Disincentive to Energy Efficiency and Decoupled Rate Structures (the "Commission's Policy Statement") hereby submits for Arizona Corporation Commission ("Commission") approval of its:

(i) Energy Efficiency Implementation Plan for 2011-2012 ("EE Plan");

(ii) Proposed Demand-Side Management ("DSM") Surcharge ("DSMS"); and

(iii) Authorized Revenue Requirement True-Up Mechanism ("ARRT").

Arizona Corporation Commission
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In support hereof, TEP states as follows:

## I. INTRODUCTION.

Throughout the proceedings that resulted in the Energy Efficiency ("EE") Rules, and the related Commission's Policy Statement, the issue of synchronizing a lost revenue recovery mechanism with the implementation of the rules was deliberated. There was consistent consensus that (i) appropriately devised EE is in the public interest; and (ii) the standards set in the EE Rules could only be achieved if rates were decoupled or an alternative lost revenue mechanism was in place.

Nevertheless, the EE Rules were finalized without a provision for lost revenue recovery. Likewise, the Commission's Policy Statement recommended deferral of the implementation of a lost revenue recovery mechanism to future rate cases.

TEP submits this application for approval of its EE Plan jointly with a lost revenue mechanism, the ARRT. In order to avoid confiscation of TEP's authorized revenues, the EE Plan and ARRT should be implemented at the same time. The Commission's Policy Statement recommendation that a lost revenue recovery mechanism be considered (and, presumably, ordered) in a future rate case will not avoid or resolve the confiscation problem for TEP as it is precluded from filing a rate case until July 1, 2012.[1] For these reasons, the Commission should simultaneously implement the EE Plan and ARRT or waive the EE requirements for TEP until such time as the ARRT (or other adequate remedy) is in place.

## II. THE EE PLAN.

The EE Plan is designated to comply with the requirements of the electric Energy Efficiency Standard ("EE Standard") in conjunction with the ARRT. As part of the EE Plan, TEP has included: (i) a description of how the Company intends to meet the EE Standard target for 2011 of 1.25% and the cumulative EE Standard target for 2012 of 3%, as well as an estimate of the annual kilowatt hour ("kWh") and kilowatt ("kW") savings projected for each program through 2012; (ii) a description of existing and proposed DSM programs, their estimated total cost and cost per kWh

[1] Commission Decision No. 70628 (December 1, 2008)

reduction, and how those programs comply with the requirements of the EE Standard; (iii) a tariff filing that complies with A.A.C. R14-2-2406(A); and (iv) a request to modify and reset the existing Demand Side Management Surcharge ("DSMS") for implementation through 2012 in order to ensure just and reasonable rates.

TEP estimates that the EE Plan will require a budget of approximately $85.7 million. At this time, it is anticipated that the DSMS required to implement the EE Plan will be approximately $0.005675/kWh, based on forecasted retail sales for the same 19 months. The average impact to a residential customer will be $4.99 per month.[2] Key provisions of the EE Plan are summarized as follows:

**A. Implementation of the proposed EE Plan, DSM Surcharge and ARRT should be effective as of June 1, 2011.**

A.A.C R14-2-2405(A) requires TEP to file its initial EE Plan within 30 days of the effective date of the EE Standard. A.A.C. R14-2-2405(A) also requires that subsequent plans be filed on June 1 of each odd year, making TEP's next EE Plan due June 1, 2013. The EE Plan is a 2 year implementation plan. TEP believes that an initial 2 year plan provides an appropriate time frame for the Commission to evaluate the impact of the EE Standard and its results.

TEP also requests that the DSMS be implemented by June 1, 2011 so that the Company can continue its effective implementation of the EE Standard. This expedited review and implementation of the DSMS will ensure no gaps in implementation or program delivery between the previously approved DSM Plan and the newly filed EE Plan.

**B. Conforming existing reporting requirements in light of the reporting requirements contained in the EE Standard.**

Pursuant to A.A.C. R14-2-2409(D), TEP requests that the reporting requirements in the EE Standard be found to be in compliance with the Company's existing reporting requirements in Decision No. 70628 (December 1, 2008). Currently, TEP is required to file its DSM surcharge on April 1st and its semi-annual DSM reports on March 1st and September 1st of each year. The

[2] The Company's proposed DSMS is explained more fully in the EE Plan attached hereto, and incorporated herein.

reporting requirements contained in R14-2-2409 require that certain DSM reports be filed annually on March 1st and September 1st respectively. In order to avoid confusion or duplicative filings, TEP requests that the reporting requirements set forth in A.A.C. R14-2-2409 be used and that the Commission find that the use of such reporting requirements by TEP is in compliance with Decision No. 70628.

**C. New DSM programs.**

TEP is proposing the following new Residential, Commercial, Behavioral and Support DSM Programs: Multi-Family, Appliance Recycling, Schools Program, Combined Heat and Power Pilot, Retro-Commissioning, Bid-for-Efficiency, Behavioral Comprehensive (including K-12 Education, Direct Canvassing, Compact Fluorescent ("CFL") Bulb give-away, and Community Education), Residential Financing, and Codes and Support.[3]

**D. Enhancements to existing DSM programs.**

The EE Plan incorporates enhancements through modifications to the following existing DSM programs: Efficient Products (formerly CFL Buy-Down), C&I Comprehensive (formerly Non-Residential Existing Facilities), Small Business, and Commercial New Construction. TEP is also proposing to modify its existing Low-Income Weatherization Program by modifying customer eligibility requirements to match the current Low-Income Home Energy Assistance Program ("LIHEAP") standard of Federal Poverty Level. The modifications to these programs are set forth in the attached EE Plan.

The EE Plan contemplates that the following existing programs will continue with no modifications: Residential New Construction, Shade Tree, Direct Load Control Pilot, Home Energy Reports (sub-section), Existing Homes and Audit Direct Install, C & I Direct Load Control, and Education and Outreach.

**E. The proposed DSMS.**

TEP is seeking approval of the proposed DSMS to recover three elements: (i) DSM

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[3] The new DSM programs are set forth in detail in the attached hereto, and incorporated herein.

program costs; (ii) DSM performance incentives; and (iii) the ARTT.[4] Specifically, the DSMS will collect $51.14 million in DSM program costs; $16.4 million in pre-tax DSM performance incentives; and $18.2 million in ARRT.

**F. Procedural and Administrative Modifications.**

In order to sustain participation in EE programs, the EE Plan contemplates flexibility for the Company to shift approved funds between programs, and modify budget line items, where cost-effective. This type of flexibility has proven to be valuable in the implementation plans of the Renewable Energy Standard. TEP is requesting that the following language be adopted in order approving the EE Plan:

> Accordingly, TEP will be allowed to shift up to 25% of approved funds from Residential to Commercial or from Commercial to Residential programs as deemed necessary based on program activity, and TEP will be allowed the option of increasing, up to 25%, the total Energy Efficiency budget where cost-effective to continue participation until approval of the next regularly scheduled Energy Efficiency Implementation plan.

## III. THE ARRT.

The issue of synchronizing a revenue recovery mechanism with the implementation of the EE Rules is critical and should be resolved in this proceeding. The Commission's Policy Statement accurately states "[t]he Commission believes it is critical that utility disincentives to demand side management programs and energy efficiency be addressed. As stakeholders recognized, it is unlikely that the EES can be met without addressing financing disincentive and impacts to utilities' revenues and earnings." Commission's Policy Statement at page 27.

As previously stated, however, both the EE Rules and the Commission's Policy Statement were finalized without providing a mechanism for lost revenue recovery. Instead, the Commission has stated that a company may seek redress for lost revenues due to the implementation of the EE Standard in the company's next rate case. While the Commission's recommendation on how a company can address the disincentives of EE may work for some companies, this recommendation

[4] The ARRT is discussed herein and is detailed in Exhibit 4 attached hereto, and incorporated herein. .

does not provide an equitable solution for those companies, like TEP, that are in a rate freeze.[5]

In TEP's case, this inequity can be rectified through the ARRT. TEP's ARRT is a straightforward mechanism which has been described in numerous Energy Efficiency workshops and decoupling discussions over the past two years. The ARRT recovers the revenue requirement associated with the incremental energy efficiency kWh savings from the EE Standard starting in 2011 by multiplying these savings by the applicable approved non-fuel variable rates from TEP's last rate case. TEP is proposing this mechanism only remain in effect until approval of a revenue decoupling, or similar mechanism, in its next rate case.

Successful implementation of cost-effective EE programs, and the resultant reduced sales volume, will ultimately result in a utility being unable to recover its authorized revenue requirement. For TEP, this is caused, in part, by its Commission-approved rate design in which variable energy-based (per kWh) charges are used to collect non-fuel fixed utility costs. Thus, the mandatory nature of complying with the EE Rules, without the concurrent ability to request for the recovery of the costs of those rules, will result in elimination of a portion of TEP's authorized revenue requirement, which was deemed just and reasonable in Decision No. 70628.

In order to avoid this confiscation of TEP's authorized revenues, the EE Plan and ARRT should be implemented at the same time. In the alternative, the Commission should waive the EE requirements for TEP until such time as the ARRT (or other adequate remedy) is in place.

## IV. CONCLUSION.

The EE Plan and the ARRT are designed to comply with the Commission's EE Rules and to provide a framework for future compliance. The Company's approach set forth herein is prudent as it seeks to comply with the EE Rules in a way that benefits TEP customers and maintains its financial integrity. Accordingly, for all the forgoing reasons, TEP respectfully requests that the Commission issue an order in this case:

[5] In TEP's case, rates are frozen until July 1, 2012 (Decision No. 70628). A decoupling or other mechanism could not be implemented until July 2013 at the earliest, leaving the Company with no recovery of lost revenues for the first 5% of the EE Standard.

1. Approving the EE Plan;
2. Finding that compliance with the reporting requirements set forth in A.A.C. R14-2-2409 should be used and are in compliance with the requirements of Decision No. 70628 (December 1, 2008);
3. Approving the DSMS;
4. Approving the ARRT;
5. Approving the proposed performance incentives;
6. Setting the effective date of the EE Plan, ARRT and DSMS as of June 1, 2011;
7. In the alternative, if the Commission does not approve the ARRT, then granting TEP a waiver of the EE Rules until such time as the ARRT (or other adequate remedy) is in place; and
8. For and such other relief as the Commission deems appropriate and in the public interest at this time.

RESPECTFULLY SUBMITTED this 31st day of January 2011.

Tucson Electric Power Company

By _____

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Original and 13 copies of the foregoing filed this 31st day of January 2011 with:

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By Mary Appolito

# TUCSON ELECTRIC POWER COMPANY
# 2011-2012
# ELECTRIC ENERGY EFFICIENCY IMPLEMENTATION PLAN

## JANUARY 31, 2011

# Table of Contents

# I. Executive Summary

Tucson Electric Power Company ("TEP" or "Company") is pleased to present its 2011-2012 Energy Efficiency Implementation Plan ("EE Plan") for Arizona Corporation Commission ("Commission") approval, in compliance with Arizona Administrative Code R14-2-2405. As part of its EE Plan, TEP has included a description of how the Company intends to meet the 2011 Electric Energy Efficiency Standard ("EE Standard" or "EEES") of 1.25% and the cumulative 2012 EE Standard of 3%, as well as an estimate of the annual kilowatt hour ("kWh") and kilowatt ("kW") savings projected for each program through 2012.

TEP's EE Plan also contains a description of existing and proposed Demand-Side Management ("DSM") programs, their estimated total cost and cost per kWh reduction, and how those programs contribute to the Company's 2011-2012 EE savings goals. TEP has included a tariff filing that complies with A.A.C. R14-2-2406(A) and a request to modify and reset the existing adjustment mechanism for implementation through 2012 in order to ensure just and reasonable rates.

TEP estimates a 2011-2012 EE Plan Budget total of approximately $85.7 million. Additional details and the elements of the Company's proposed Demand-Side Management Surcharge ("DSMS") for June 1, 2011 through December 31, 2012 can be found in the attached Exhibit 3. At this time, it is anticipated that the incremental increase in the DSMS required to implement the 2011-2012 EE Plan will be approximately $0.005675/kWh based on forecasted retail sales for the same 19 months.[1] The average impact to a residential customer will be $4.99 per month. Budget details as well as a summary of portfolio savings, net benefits, and benefit-cost results appear in Table 1-1.

**Table 1-1. Summary Costs and Savings**

| Program Year | Total Program Budget | Annual Savings (MWh) | Lifetime Savings (MWh) | Peak Demand Savings (MW) | Total Net Benefits | Portfolio Societal Cost Test |
|---|---|---|---|---|---|---|
| 2011 | $23,612,678 | 155,325 | 1,831,174 | 47.32 | $58,605,017 | 2.7 |
| 2012 | $27,486,097 | 180,603 | 2,533,363 | 73.74 | $74,743,247 | 2.9 |
| Total | $51,098,774 | 335,928 | 4,364,537 | 121.07 | $133,348,264 | 2.8 |

As part of TEP's EE Plan, the Company is seeking approval of the following new Residential, Commercial, Behavioral and Support Programs: Multi-Family, Appliance Recycling, Schools Program, Combined Heat and Power Pilot, Retro-Commissioning, Bid-for-Efficiency, Behavioral Comprehensive (including K-12 education, direct canvassing, compact fluorescent bulb give away, and community education), Residential Financing, and Codes and Support. The full details of each program, including each program's budget, can be found in the attached appendices.

TEP is also seeking enhancements through the addition of new measures to the following existing DSM programs (full details and budgets appear in the attached appendices): Efficient Products (formerly CFL Buy-Down), Commercial and Industrial ("C&I") Comprehensive (formerly Non-Residential Existing Facilities), Small Business, and Commercial New Construction. TEP is also proposing to modify its existing Low-Income Weatherization Program by modifying customer eligibility requirements to match the current Low-Income Home Energy Assistance Program ("LIHEAP") standard of Federal Poverty Level.

[1] TEP's existing DSMS of $0.001249 will remain in effect through May 31, 2011.

TEP plans to continue administering the following existing programs with no modifications: Residential New Construction, Shade Tree, Direct Load Control Pilot, Home Energy Reports (sub-section), Existing Homes and Audit Direct Install, C&I Direct Load Control, and Education and Outreach. TEP's proposed portfolio of new and expanded programs is projected to meet the 2011 goal of 1.25% of previous year retail sales and the 2012 cumulative goal of 3%. Program planning also accounts for delays in program approval and start-up.

In addition to programmatic changes, TEP is seeking approval of its proposed DSM Surcharge to recover three elements: (i) DSM program costs; (ii) after tax DSM performance incentives; and (iii) Authorized Revenue Requirement True-up ("ARRT"). Specifically, TEP is requesting approval to collect $51.1 million in DSM program costs for 2011-2012, a $16.4 million pre-tax DSM performance incentive for 2011-2012, and $18.2 million in ARRT for 2011-2012. TEP is also seeking approval to shift approved EE Plan funds between programs, and to moderately increase the budgets outlined in the 2011-2012 EE Plan where it would be cost-effective to do so.

As explained in the attached EE Plan and appendices, TEP's 2011-2012 EE Plan contains new programs, enhancements to existing programs, and continued implementation of already successful programs. TEP respectfully requests approval of these programs and their budgets, as well as implementation of the ARRT. TEP believes these measures are prudent and necessary to the successful implementation of the EEE Standard and are in the public interest.

# II. Introduction

The following EE Plan presents a detailed overview of the proposed electric energy efficiency programs targeted at the residential, commercial and industrial ("C&I") sectors, as well as their associated implementation costs, savings, and benefit-cost results. The EE Plan presents detailed information on the approach, energy efficiency measures, and proposed incentive levels.

TEP, with input from other parties such as the Southwest Energy Efficiency Project ("SWEEP"), has designed a comprehensive portfolio of programs to deliver electric energy and demand savings to meet annual DSM energy savings goals outlined in the Electric Energy Efficiency Standard. These programs include incentives, direct-install and buy down approaches for energy efficient products and services, educational and marketing approaches to raise awareness and modify behaviors, and partnerships with trade allies to apply as much leverage as possible to augment the rate-payer dollars invested.

For context and reference, service territory graphics are included below. Figure 2-1 shows TEP service territory in the context of all Unisource Energy Corporation territories and Figure 2-2 shows greater detail of TEP service territory.

**Figure 2-1. Unisource Energy Service Territory**

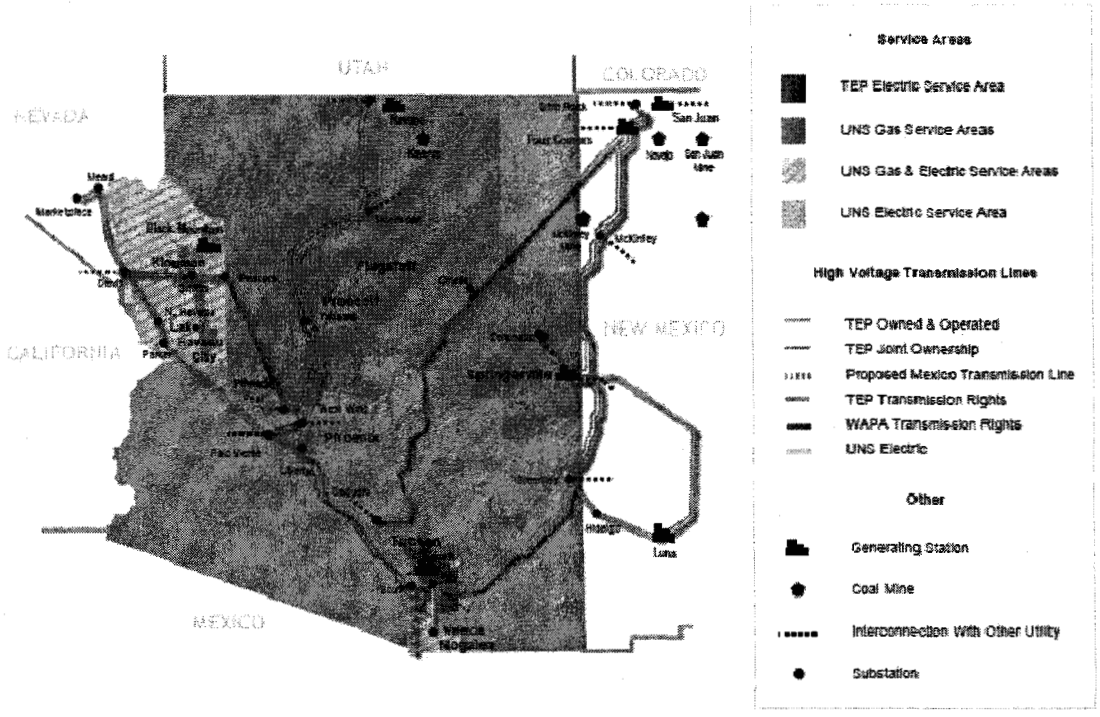
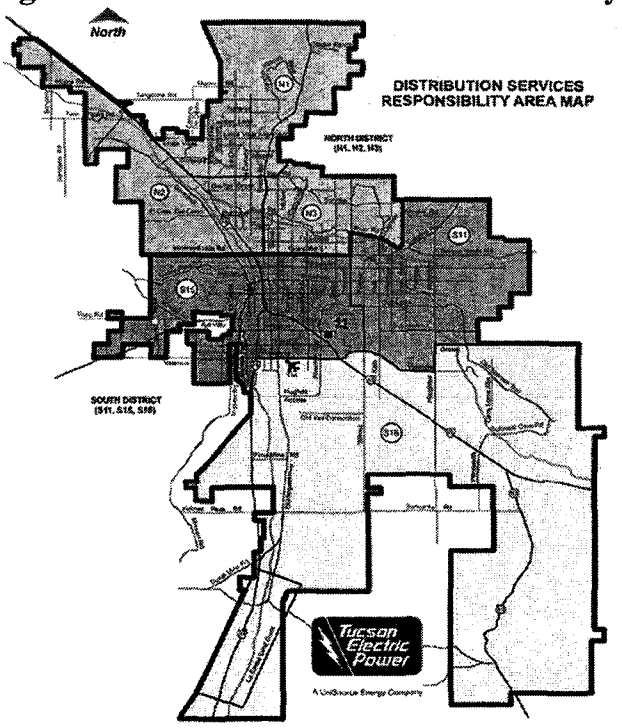


**Figure 2-2. Tucson Electric Service Territory**




## A. Implementation Plan, Goals, and Objectives

TEP's high-level efficiency-related goals and objectives for the 2011-2012 EEES are as follows:

- Implement only cost-effective energy efficiency programs.
- Design and implement a diverse group of programs that provide opportunities for participation for all customers.
- Achieve a 2011 energy savings goal equal to 1.25% of 2010 retail sales and a 2012 energy savings goal equal to 1.75% of 2011 retail sales to achieve the cumulative 3% EE goal.
- When feasible, maximize opportunities for program coordination with other efficiency programs (e.g., Southwest Gas Corporation, Arizona Public Service Corporation) to yield maximum benefits.
- Maximize program savings at a minimum cost by striving to achieve comprehensive cost-effective savings opportunities.
- Provide TEP customers and contractors with web access to detailed information on all efficiency programs (residential and business) for electricity savings opportunities at www.tep.com.
- Expand the energy efficiency infrastructure in the state by increasing the number of available qualified contractors through training and certification in specific fields.
- Use trained and qualified trade allies such as electricians, HVAC contractors, builders, architects and engineers to transform the market for efficient technologies.
- Inform and educate customers to modify behaviors that enable them to use energy more efficiently.

## B. Planning Process

TEP's portfolio of programs incorporates elements of the most successful energy efficiency programs across North America into program plans designed for the Tucson market and TEP customers in particular. A substantial amount of information including evaluations, program plans and potential studies were used to develop specific programs for TEP. TEP also used a benchmarking process to review the most successful energy efficiency programs from across the country, with a focus on successful Southwest programs to help shape the portfolio.

## C. Portfolio Risk Management

As of December 2010, the Arizona economy remains in the midst of recovering from a severe economic recession. In this economic environment, TEP's ability to convince residential and business customers to voluntarily take on additional debt for the installation of cost-effective measures, even with very short pay-back periods, will likely be challenging. TEP recognizes this challenge and has developed a portfolio of programs that provide opportunities for participation at multiple levels. By proposing a multi-faceted and broad portfolio of programs, TEP will attempt to capitalize on those sectors of the market willing to invest in energy efficiency regardless of the challenging economic landscape. In balance, this will allow us to meet aggressive regulatory efficiency goals.

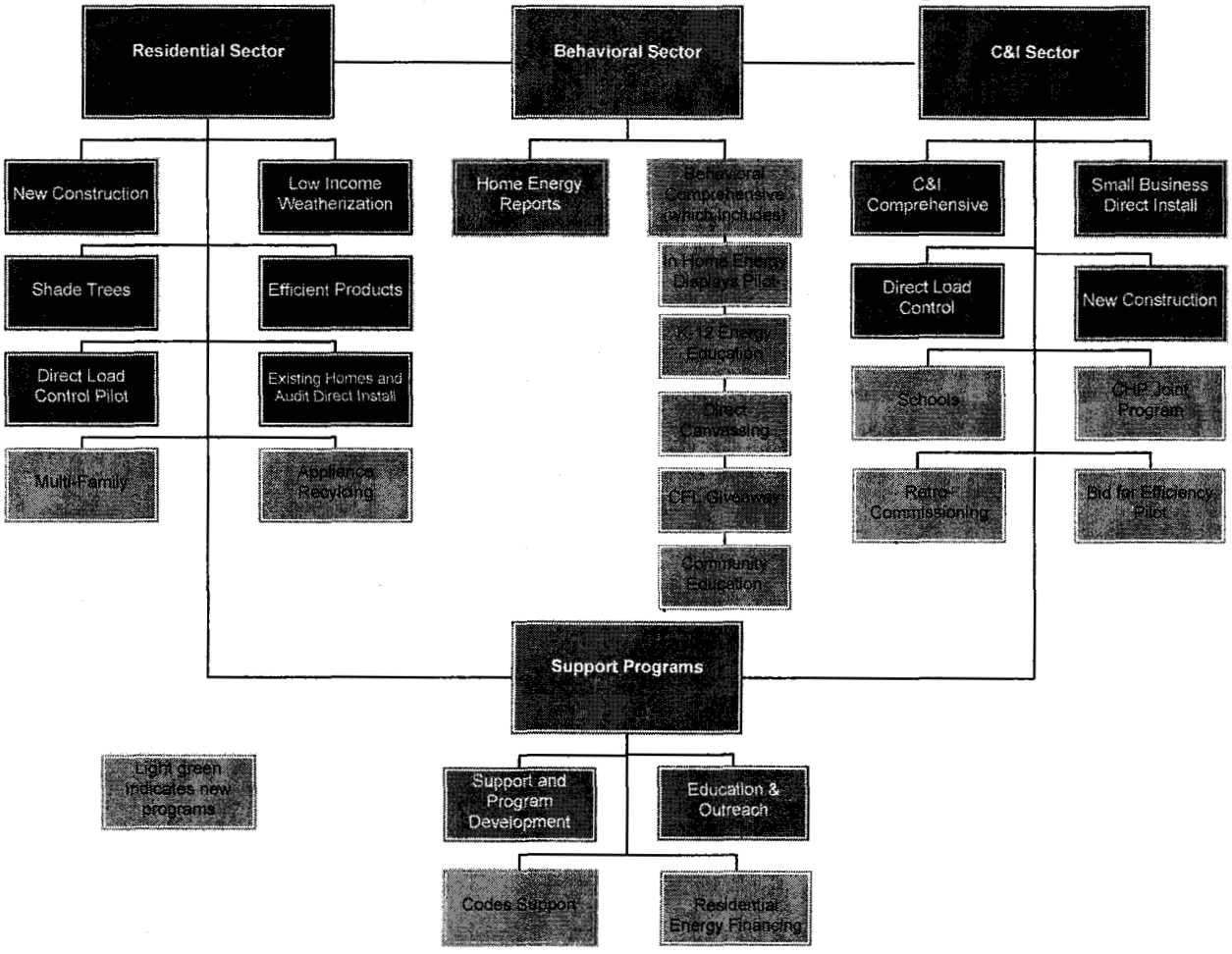
TEP used the following strategies to minimize the risks and produce the lowest cost associated with its portfolio of energy efficiency programs:

- Implementing primarily "tried and true" programs that have been successfully applied by other utilities in the Southwest and across the country.
- Implementing programs through a combination of third-party contractors and TEP staff. TEP designs programs on the most cost-effective basis utilizing implementation contractors where they provide the lowest cost per kWh and likewise utilizing TEP staff when appropriate.

## III. Program Portfolio Overview

As demonstrated in Figure 3-1, TEP's portfolio of programs can be divided into residential, commercial, behavioral, and support sectors with administrative functions providing support across all program areas. Detailed information on existing program design, measure savings, costs and other technical details are available in Section V through Section X and detailed information for all new programs are included in the appendices.

**Figure 3-1. Tucson Electric Power Portfolio of Programs**



## A. Savings, Budgets, and Benefit-Cost Results Overview

While this plan presents a two-year portfolio of investment consistent with the requirements of the Energy Efficiency Standard, TEP will continue to monitor projected program funding and program participation. As such, we expect there may be some slight adjustments in the forecasted investment levels. Additionally, incentive levels and other program elements will be reviewed and modified on an annual basis to reflect changes in market conditions or implementation processes in order to maximize cost-effective savings. Such modifications will be reported in the annual reports submitted to the Commission.

As detailed in Tables 3-1 through 3-4, TEP has developed this plan with the intent of meeting statutory electric savings goals as a percent of prior year sales as outlined in Energy Efficiency Standard Section R14-2-2404. For 2011, TEP's budget forecast is $23.6 million increasing to $27.5 million in 2012.

**Table 3-1. Summary Costs and Savings**

| Program Year | Total Program Budget | Annual Savings (MWh) | Lifetime Savings (MWh) | Peak Demand Savings (MW) | Total Net Benefits | Portfolio Societal Cost Test |
|---|---|---|---|---|---|---|
| 2011 | $23,612,678 | 155,325 | 1,831,174 | 47.32 | $58,605,017 | 2.7 |
| 2012 | $27,486,097 | 180,603 | 2,533,363 | 73.74 | $74,743,247 | 2.9 |
| Total | $51,098,774 | 335,928 | 4,364,537 | 121.07 | $133,348,264 | 2.8 |

As noted in Table 3-2, the 2011 Energy Efficiency Standard target is 1.25% savings as a percent of sales of the previous calendar year; for 2012 this increases to 1.75%. TEP's proposed portfolio of new and expanded programs is projected to meet the 2011 and 2012 goals. TEP believes it is prudent to factor project fall-out and delay in approval to achieve the EEES goals. This approach will show the Company overachieving the EEES, but as inevitabilities take place, the Company expects to meet the EE Standard for both 2011 and 2012.

**Table 3-2. Planned Savings and EE Standard Target**

| | 2011 | 2012 |
|---|---|---|
| Annual MWh Savings Goal as % of Sa | 1.25% | 1.75% |
| MWh Savings Goal | 116,133 | 163,367 |
| Planned MWh Savings | 155,325 | 180,603 |
| Planned MWh Savings as % of Sales | 1.67% | 1.93% |
| Percent of Savings Goal Achieved | 134% | 111% |

Note: MWh Savings include line loss reductions created from energy reductions which are not included in the Authorized Revenue Requirement True-up.

Table 3-3 provides cost and savings details per program over 2011 and 2012 period combined. Given that the current behavior programs all benefit residential customers, the break down in spending between residential and commercial is even and in line with revenues.

## Table 3-3. 2011-2012 Costs and Savings by Program

| | | Annual Savings (MWh) | Peak Demand Savings (MW) | Total Program Cost | Percent of Annual Savings (MWh) | Percent of Peak Demand Savings (MW) | Percent of Total Portfolio Cost |
|---|---|---|---|---|---|---|---|
| Residential | Efficient Products | 99,122 | 11.56 | $4,358,106 | 30% | 10% | 9% |
| | Appliance Recycling | 14,459 | 1.74 | $1,716,258 | 4% | 1% | 3% |
| | Res. New Construction | 7,088 | 3.90 | $5,165,772 | 2% | 3% | 10% |
| | Existing Homes and Audit Direct Insta | 6,371 | 3.94 | $6,153,682 | 2% | 3% | 12% |
| | Shade Tree | 1,956 | 0.31 | $644,737 | 1% | 0% | 1% |
| | Low Income Weatherization | 431 | 0.22 | $1,227,641 | 0% | 0% | 2% |
| | Multi-Family | 1,193 | 0.06 | $169,738 | 0% | 0% | 0% |
| | Residential Direct Load Control - Pilot | - | 2.56 | $969,966 | 0% | 2% | 2% |
| | Subtotal | 130,619 | 24.29 | $20,405,901 | 39% | 20% | 40% |
| Commercial | C&I Comprehensive Program | 59,199 | 11.32 | $8,079,990 | 18% | 9% | 16% |
| | Commercial Direct Load Control | 27,950 | 66.30 | $5,489,805 | 8% | 55% | 11% |
| | Small Business Direct Install | 43,993 | 11.19 | $7,616,648 | 13% | 9% | 15% |
| | Commercial New Construction | 4,011 | 0.54 | $808,788 | 1% | 0% | 2% |
| | Bid for Efficiency - Pilot | 3,978 | 0.36 | $797,353 | 1% | 0% | 2% |
| | Retro-Commissioning | 1,105 | 0.10 | $175,520 | 0% | 0% | 0% |
| | Schools Facilities | 697 | 0.08 | $157,941 | 0% | 0% | 0% |
| | CHP Joint Program - Pilot | 15,912 | 1.99 | $150,756 | 5% | 2% | 0% |
| | Subtotal | 156,844 | 91.88 | $23,276,802 | 47% | 76% | 46% |
| Behavio r | Home Energy Reports | 26,934 | 2.46 | $1,074,496 | 8% | 2% | 2% |
| | Behavioral Comprehensive Program | 21,532 | 2.43 | $2,239,568 | 6% | 2% | 4% |
| | Subtotal | 48,466 | 4.89 | $3,314,064 | 14% | 4% | 6% |
| Support Programs | Education and Outreach | - | - | $768,641 | 0% | 0% | 2% |
| | Residential Energy Financing | - | - | $1,573,908 | 0% | 0% | 3% |
| | Codes Support | - | - | $124,825 | 0% | 0% | 0% |
| | Program Development, Analysis and Reporting Softw are | - | - | $1,634,633 | 0% | 0% | 3% |
| | Subtotal | - | - | $4,102,008 | 0% | 0% | 8% |
| Total | Total | 335,928 | 121.07 | $51,098,774 | 100% | 100% | 100% |

Table 3-4 provides program level detail of budgetary break downs as well as program and portfolio level cost effectiveness results.

**Table 3-4. 2011 and 2012 Program Budgets, Net Benefits, and Cost Effectiveness**

| | | 2011-2012 Total | | |
|---|---|---|---|---|
| | | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
| Residential | Efficient Products | $4,358,106 | $24,903,753 | 4.8 |
| | Appliance Recycling | $1,716,258 | $2,475,348 | 1.9 |
| | Res. New Construction | $5,165,772 | $8,131,101 | 1.7 |
| | Existing Homes and Audit Direct Insta | $6,153,682 | $1,207,322 | 1.1 |
| | Shade Tree | $644,737 | $839,078 | 1.5 |
| | Low Income Weatherization | $1,227,641 | $175,013 | 1.2 |
| | Multi-Family | $169,738 | $260,777 | 2.5 |
| | Residential Direct Load Control - Pilot | $969,966 | $675,098 | 1.7 |
| | Subtotal | $20,405,901 | $38,667,489 | 2.2 |
| Commercial | C&I Comprehensive Program | $8,079,990 | $35,204,278 | 3.4 |
| | Commercial Direct Load Control | $5,489,805 | $18,486,223 | 8.1 |
| | Small Business Direct Install | $7,616,648 | $16,827,820 | 2.5 |
| | Commercial New Construction | $808,788 | $3,624,068 | 5.6 |
| | Bid for Efficiency - Pilot | $797,353 | $1,295,514 | 2.3 |
| | Retro-Commissioning | $175,520 | $419,165 | 3.0 |
| | Schools Facilities | $157,941 | $341,881 | 3.2 |
| | CHP Joint Program - Pilot | $150,756 | $15,438,653 | 8.0 |
| | Subtotal | $23,276,802 | $91,637,603 | 3.8 |
| Behavior | Home Energy Reports | $1,074,496 | $34,880 | 1.0 |
| | Behavioral Comprehensive Program | $2,239,568 | $4,642,925 | 3.0 |
| | Subtotal | $3,314,064 | $4,677,805 | 2.4 |
| Support Programs | Education and Outreach* | $768,641 | $0 | N/A |
| | Residential Energy Financing* | $1,573,908 | $0 | N/A |
| | Codes Support* | $124,825 | $0 | N/A |
| | Program Development, Analysis and Reporting Software | $1,634,633 | -$1,634,633 | N/A |
| | Subtotal | $4,102,008 | -$1,634,633 | N/A |
| Total | Total | $51,098,774 | $133,348,264 | 2.8 |

## B. 2011 Portfolio Results

This section presents a detailed review of the 2011 projected savings and costs. As noted in the Table 3-5, the savings goal for 2011 is 1.25% and the proposed portfolio is 1.67% as a percent of sales, meeting the required savings goals. As noted above, prudent program planning must account for delays in program approval and fall-out of projects, but as inevitabilities occur, TEP expects to meet the EEES for 2011.

**Table 3-5. 2011 Savings Goal**

| | 2010 Electricity Sales (MWh) | Percent Savings | Program Savings (MWh) |
|---|---|---|---|
| **Target** | 9,290,665 | 1.25% | 116,133 |
| **2011 Savings Forecast** | | 1.67% | 155,325 |
| **Difference** | | 0.42% | 39,192 |
| **Percent of Target Reached** | | | 134% |

Table 3-6 presents a detailed review of 2011 portfolio savings, costs, and detail in terms of program level costs per first year and lifetime energy and demand savings.

**Table 3-6. 2011 Annual and Lifetime Portfolio Savings and Costs**

| | | 2011 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Annual Energy Savings at Generator (MWh) | Coincident Demand Savings at Generator (MW) | Total Program Budget | Program Cost per Lifetime kWh Saved ($/kWh) | Program Cost per First Year kWh Saved ($/kWh) | Program Cost per kW Saved ($/kW) | Percent of MWh Savings by Program | Percent of Budget by Program |
| Residential | Efficient Products | 50,948 | 5.95 | $1,926,611 | $0.006 | $0.04 | $324 | 33% | 8% |
| | Appliance Recycling | 7,229 | 0.87 | $856,725 | $0.020 | $0.12 | $983 | 5% | 4% |
| | Res. New Construction | 3,339 | 1.83 | $2,445,125 | $0.024 | $0.73 | $1,336 | 2% | 10% |
| | Existing Homes and Audit Direct Instal | 2,562 | 1.56 | $2,577,643 | $0.072 | $1.01 | $1,652 | 2% | 11% |
| | Shade Tree | 978 | 0.16 | $319,155 | $0.016 | $0.33 | $2,034 | 1% | 1% |
| | Low Income Weatherization | 215 | 0.11 | $611,190 | $0.142 | $2.84 | $5,675 | 0% | 3% |
| | Multi-Family | 0 | 0.00 | $0 | $0.000 | $0.00 | N/A | 0% | 0% |
| | Residential Direct Load Control - Pilot | 0 | 1.28 | $785,150 | $0.000 | $0.00 | $613 | 0% | 3% |
| | Subtotal | 65,272 | 11.76 | $9,521,598 | $0.019 | $0.15 | $810 | 42% | 40% |
| Commercial | C&I Comprehensive Program | 26,568 | 5.12 | $3,794,134 | $0.01 | $0.14 | $741 | 17% | 16% |
| | Commercial Direct Load Control | 11,613 | 22.10 | $2,737,846 | $0.01 | $0.24 | $124 | 7% | 12% |
| | Small Business Direct Install | 19,579 | 4.82 | $3,547,437 | $0.02 | $0.18 | $736 | 13% | 15% |
| | Commercial New Construction | 2,006 | 0.27 | $402,469 | $0.01 | $0.20 | $1,478 | 1% | 2% |
| | Bid for Efficiency - Pilot | 1,547 | 0.14 | $294,261 | $0.02 | $0.19 | $2,083 | 1% | 1% |
| | Retro-Commissioning | 0 | 0.00 | $0 | $0.00 | $0.00 | N/A | 0% | 0% |
| | Schools Facilities | 0 | 0.00 | $0 | $0.00 | $0.00 | N/A | 0% | 0% |
| | CHP Joint Program - Pilot | 7,956 | 0.99 | $74,800 | $0.00 | $0.01 | $75 | 5% | 0% |
| | Subtotal | 69,269 | 33.44 | $10,850,947 | $0.009 | $0.16 | $324 | 45% | 46% |
| Behavior | Home Energy Reports | 10,359 | 0.95 | $400,706 | $0.04 | $0.04 | $424 | 7% | 2% |
| | Behavioral Comprehensive Program | 10,425 | 1.17 | $819,289 | $0.01 | $0.08 | $698 | 7% | 3% |
| | Subtotal | 20,784 | 2.12 | $1,219,996 | $0.017 | $0.06 | $575 | 13% | 5% |
| Support Programs | Education and Outreach | 0 | 0.00 | $383,917 | N/A | N/A | N/A | 0% | 2% |
| | Residential Energy Financing | 0 | 0.00 | $781,646 | N/A | N/A | N/A | 0% | 3% |
| | Codes Support | 0 | 0.00 | $49,335 | N/A | N/A | N/A | 0% | 0% |
| | Program Development, Analysis and Reporting Software | 0 | 0.00 | $805,238 | N/A | N/A | N/A | 0% | 3% |
| | Subtotal | 0 | 0.00 | $2,020,136 | N/A | N/A | N/A | 0% | 9% |
| Total | Total | 155,325 | 47.32 | $23,612,678 | $0.013 | $0.15 | $499 | 100% | 100% |

Table 3-7 presents 2011 portfolio costs, by program, segmented by the amount projected to be spent on incentives, program delivery, program marketing, utility program administration, evaluation costs and program development, analysis and reporting software.

**Table 3-7. 2011 Summary Portfolio Implementation Costs**

| | | 2011 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
| Residential | Efficient Products | $1,155,000 | $413,013 | $235,202 | $49,296 | $74,100 | $1,926,611 | $12,595,412 | 5.9 |
| | Appliance Recycling | $189,000 | $560,713 | $59,977 | $14,085 | $32,951 | $856,725 | $1,239,078 | 1.9 |
| | Res. New Construction | $1,176,000 | $771,497 | $389,499 | $14,085 | $94,043 | $2,445,125 | $3,798,641 | 1.7 |
| | Existing Homes and Audit Direct Instal | $1,541,200 | $622,697 | $324,585 | $14,085 | $75,077 | $2,577,643 | $357,658 | 1.1 |
| | Shade Tree | $200,000 | $78,853 | $13,943 | $14,085 | $12,275 | $319,155 | $422,753 | 1.6 |
| | Low Income Weatherization | $525,000 | $48,568 | $5,736 | $14,085 | $17,802 | $611,190 | $90,137 | 1.2 |
| | Multi-Family | $0 | $0 | $0 | $0 | $0 | $0 | $0 | N/A |
| | Residential Direct Load Control - Pilot | $0 | $655,000 | $98,250 | $12,750 | $19,150 | $785,150 | $17,382 | 1.0 |
| | Subtotal | $4,786,200 | $3,150,340 | $1,127,191 | $132,469 | $325,398 | $9,521,598 | $18,521,061 | 2.2 |
| Commercial | C&I Comprehensive Program | $2,165,375 | $1,125,568 | $329,094 | $28,169 | $145,928 | $3,794,134 | $15,153,775 | 3.2 |
| | Commercial Direct Load Control | $1,452,000 | $1,225,283 | $0 | $10,563 | $50,000 | $2,737,846 | $5,738,163 | 5.5 |
| | Small Business Direct Install | $2,298,982 | $654,855 | $443,076 | $14,085 | $136,440 | $3,547,437 | $7,449,330 | 2.5 |
| | Commercial New Construction | $279,310 | $59,695 | $33,900 | $14,085 | $15,480 | $402,469 | $1,813,959 | 5.6 |
| | Bid for Efficiency - Pilot | $210,000 | $34,160 | $31,741 | $7,042 | $11,318 | $294,261 | $519,632 | 2.4 |
| | Retro-Commissioning | $0 | $0 | $0 | $0 | $0 | $0 | $0 | N/A |
| | Schools Facilities | $0 | $0 | $0 | $0 | $0 | $0 | $0 | N/A |
| | CHP Joint Program - Pilot | $0 | $68,000 | $6,800 | $0 | $0 | $74,800 | $7,719,904 | 8.0 |
| | Subtotal | $6,405,666 | $3,167,560 | $844,611 | $73,944 | $359,165 | $10,850,947 | $38,394,764 | 3.5 |
| Behavior | Home Energy Reports | $247,500 | $85,913 | $16,671 | $35,211 | $15,412 | $400,706 | -$19,100 | 1.0 |
| | Behavioral Comprehensive Program | $422,900 | $300,794 | $50,000 | $14,085 | $31,511 | $819,289 | $2,513,531 | 3.9 |
| | Subtotal | $670,400 | $386,706 | $66,671 | $49,296 | $46,923 | $1,219,996 | $2,494,431 | 2.9 |
| Support Programs | Education and Outreach* | $0 | $350,000 | $16,530 | $9,859 | $7,528 | $383,917 | $0 | N/A |
| | Residential Energy Financing* | $332,889 | $366,135 | $57,496 | $14,085 | $11,042 | $781,646 | $0 | N/A |
| | Codes Support* | $0 | $41,250 | $6,188 | $0 | $1,898 | $49,335 | $0 | N/A |
| | Program Development, Analysis and Reporting Software | $0 | $805,238 | $0 | $0 | $0 | $805,238 | -$805,238 | N/A |
| | Subtotal | $332,889 | $1,562,623 | $80,214 | $23,944 | $20,467 | $2,020,136 | -$805,238 | N/A |
| Total | Total | $12,195,155 | $8,267,230 | $2,118,686 | $279,652 | $751,954 | $23,612,678 | $58,605,017 | 2.7 |
| | Percent of Cost by Category | 52% | 35% | 9% | 1% | 3% | 100% | | |

* Lifetime Net Benefits are adjusted to $0. Benefits are likely to equal costs; however at this time they are not quantified

Table 3-8 on the following page presents a detailed explanation of activities represented in each budget category including incentives; program delivery; program marketing; utility program administration; evaluation; and program development, analysis and reporting software.

**Table 3-8. Budget Item Definitions**

| | |
|---|---|
| **Incentives** | **Costs for approved customer incentives including but not limited to:**<br>• Direct customer incentives;<br>• Agency payments for low-income weatherization program<br>• Agency payments for shade trees; and<br>• Contractor payments for direct-install programs. |
| **Program Delivery** | **Costs associated with implementing approved programs including but not limited to:**<br>• Implementation contractor labor, travel and expenses;<br>• Testing equipment and IC Contractor database modifications;<br>• Energy efficiency education and technical assistance;<br>• Engineering analysis to support custom incentives;<br>• Development and distribution of technical consumer educational materials;<br>• Field inspections and testing;<br>• Data entry and validation;<br>• Sales, oversight and management of programs and budgets;<br>• Training, technical assistance and problem resolution;<br>• Travel and expenses; and<br>• Administration, review and recommended modifications. |
| **Program Marketing** | **Direct program marketing costs related to marketing programs and increasing DSM consumer awareness as opposed to general consumer education including but not be limited to:**<br>• Agency and internal costs to develop materials;<br>• Production costs for radio, television, or internet ads;<br>• Internal labor costs to develop materials and marketing plan; and<br>• Costs for ad placement and reproduction and mailing. |
| **Utility Program Administration** | **Internal costs for management and reporting, including but not limited to:**<br>• Tracking program activity;<br>• Developing ACC DSM and compliance reports;<br>• Preparing data requests;<br>• Avoided costs evaluation;<br>• Request for proposal ("RFP") and contractor selection;<br>• Contractor and contract management; and<br>• Financial monitoring and compliance. |
| **Evaluation** | **Costs for Measurement, Evaluation, and Research by an independent contractor including but not limited to:**<br>• Identification of baseline efficiency levels and the market potential;<br>• Process and impact evaluations;<br>• Verification of installed energy efficient measures;<br>• Validation of reported energy savings; and<br>• Research into new and emerging technologies. |
| **Program Development, Analysis and Reporting Software** | **Costs for program design, development and resources necessary to meet reporting requirements of the EE Standard:**<br>• Measure and program research and benefit-cost analysis;<br>• Codes and Standards research and analysis;<br>• Education and training on new technologies;<br>• Incremental cost studies;<br>• Program design, development and analysis;<br>• Software for tracking and reporting to remain in compliance with EEES |

## C. 2012 Portfolio Results

This section presents a detailed review of the 2012 projected savings and costs. TEP's proposed portfolio of new and expanded programs is projected to meet the 2012 cumulative EE goal of 3% with 111% of required savings. As noted earlier, TEP expects to meet the 2012 EE goal and has accounted here for the inevitabilities associated with new program implementation.

**Table 3-9. 2012 Savings Goal**

| | 2011 Electricity Sales (MWh) | Percent Savings | Program Savings (MWh) |
|---|---|---|---|
| Target | 9,335,237 | 1.75% | 163,367 |
| 2012 Savings Forecast | | 1.93% | 180,603 |
| Difference | | 0.18% | 17,237 |
| Percent of Target Reached | | | 111% |

Table 3-10 presents a detailed review of 2012 portfolio savings, costs, and detail in terms of program level costs per first year and lifetime energy and demand savings.

**Table 3-10. 2012 Annual and Lifetime Portfolio Savings and Costs**

| | | 2012 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Annual Energy Savings at Generator (MWh) | Coincident Demand Savings at Generator (MW) | Total Program Budget | Program Cost per Lifetime kWh Saved ($/kWh) | Program Cost per First Year kWh Saved ($/kWh) | Program Cost per kW Saved ($/kW) | Percent of MWh Savings by Program | Percent of Budget by Program |
| Residential | Efficient Products | 48,173 | 5.62 | $2,431,495 | $0.008 | $0.05 | $433 | 27% | 9% |
| | Appliance Recycling | 7,229 | 0.87 | $859,533 | $0.020 | $0.12 | $986 | 4% | 3% |
| | Res. New Construction | 3,749 | 2.07 | $2,720,648 | $0.024 | $0.73 | $1,317 | 2% | 10% |
| | Existing Homes and Audit Direct Install | 3,808 | 2.38 | $3,576,038 | $0.066 | $0.94 | $1,503 | 2% | 13% |
| | Shade Tree | 978 | 0.16 | $325,582 | $0.017 | $0.33 | $2,075 | 1% | 1% |
| | Low Income Weatherization | 215 | 0.11 | $616,451 | $0.143 | $2.86 | $5,724 | 0% | 2% |
| | Multi-Family | 1,193 | 0.06 | $169,738 | $0.021 | $0.14 | $2,845 | 1% | 1% |
| | Residential Direct Load Control - Pilot | 0 | 1.28 | $184,816 | $0.000 | $0.00 | $144 | 0% | 1% |
| | Subtotal | 65,346 | 12.54 | $10,884,303 | $0.020 | $0.17 | $868 | 36% | 40% |
| Commercial | C&I Comprehensive Program | 32,631 | 6.20 | $4,285,856 | $0.01 | $0.13 | $692 | 18% | 16% |
| | Commercial Direct Load Control | 16,337 | 44.20 | $2,751,959 | $0.00 | $0.17 | $62 | 9% | 10% |
| | Small Business Direct Install | 24,414 | 6.37 | $4,069,211 | $0.02 | $0.17 | $639 | 14% | 15% |
| | Commercial New Construction | 2,006 | 0.27 | $406,319 | $0.01 | $0.20 | $1,492 | 1% | 1% |
| | Bid for Efficiency - Pilot | 2,431 | 0.22 | $503,092 | $0.02 | $0.21 | $2,266 | 1% | 2% |
| | Retro-Commissioning | 1,105 | 0.10 | $175,520 | $0.02 | $0.16 | $1,739 | 1% | 1% |
| | Schools Facilities | 697 | 0.08 | $157,941 | $0.02 | $0.23 | $1,867 | 0% | 1% |
| | CHP Joint Program - Pilot | 7,956 | 0.99 | $75,956 | $0.00 | $0.01 | $76 | 4% | 0% |
| | Subtotal | 87,575 | 58.44 | $12,425,855 | $0.007 | $0.14 | $213 | 48% | 45% |
| Behavior | Home Energy Reports | 16,575 | 1.51 | $673,790 | $0.04 | $0.04 | $445 | 9% | 2% |
| | Behavioral Comprehensive Program | 11,107 | 1.25 | $1,420,279 | $0.02 | $0.13 | $1,133 | 6% | 5% |
| | Subtotal | 27,682 | 2.77 | $2,094,069 | $0.025 | $0.08 | $757 | 15% | 8% |
| Support Programs | Education and Outreach | 0 | 0.00 | $384,724 | N/A | N/A | N/A | 0% | 1% |
| | Residential Energy Financing | 0 | 0.00 | $792,262 | N/A | N/A | N/A | 0% | 3% |
| | Codes Support | 0 | 0.00 | $75,490 | N/A | N/A | N/A | 0% | 0% |
| | Program Development, Analysis and Reporting Software | 0 | 0.00 | $829,395 | N/A | N/A | N/A | 0% | 3% |
| | Subtotal | 0 | 0.00 | $2,081,871 | N/A | N/A | N/A | 0% | 8% |
| Total | Total | 180,603 | 73.74 | $27,486,097 | $0.011 | $0.15 | $373 | 100% | 100% |

Table 3-11 presents 2012 portfolio costs, by program, segmented by the amount projected to be spent on incentives, program delivery, program marketing, utility program administration, and evaluation costs. Please refer to Table 3-8 for an explanation of activities included in each cost category.

**Table 3-11. 2012 Summary Portfolio Implementation Costs**

| | | 2012 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
| Residential | Efficient Products | $1,571,232 | $417,639 | $298,331 | $50,775 | $93,519 | $2,431,495 | $12,308,341 | 4.1 |
| | Appliance Recycling | $189,000 | $562,822 | $60,146 | $14,507 | $33,059 | $859,533 | $1,236,270 | 1.9 |
| | Res. New Construction | $1,329,600 | $838,317 | $433,583 | $14,507 | $104,640 | $2,720,648 | $4,332,460 | 1.7 |
| | Existing Homes and Audit Direct Instal | $2,308,180 | $698,233 | $450,962 | $14,507 | $104,156 | $3,576,038 | $849,664 | 1.2 |
| | Shade Tree | $200,000 | $84,336 | $14,217 | $14,507 | $12,522 | $325,582 | $416,325 | 1.5 |
| | Low Income Weatherization | $525,000 | $53,207 | $5,782 | $14,507 | $17,955 | $616,451 | $84,875 | 1.2 |
| | Multi-Family | $40,950 | $94,234 | $13,518 | $14,507 | $6,528 | $169,738 | $260,777 | 2.5 |
| | Residential Direct Load Control - Pilot | $40,000 | $105,370 | $21,806 | $13,133 | $4,508 | $184,816 | $657,716 | 5.5 |
| | Subtotal | $6,203,962 | $2,854,158 | $1,298,345 | $150,950 | $376,888 | $10,884,303 | $20,146,429 | 2.1 |
| Commercial | C&I Comprehensive Program | $2,557,394 | $1,162,607 | $372,000 | $29,014 | $164,841 | $4,285,856 | $20,050,503 | 3.5 |
| | Commercial Direct Load Control | $1,452,000 | $1,259,079 | $0 | $10,880 | $30,000 | $2,751,959 | $12,748,060 | 10.8 |
| | Small Business Direct Install | $2,713,450 | $676,286 | $508,460 | $14,507 | $156,508 | $4,069,211 | $9,378,490 | 2.6 |
| | Commercial New Construction | $279,310 | $62,676 | $34,199 | $14,507 | $15,628 | $406,319 | $1,810,109 | 5.6 |
| | Bid for Efficiency - Pilot | $330,000 | $85,253 | $53,983 | $14,507 | $19,350 | $503,092 | $775,882 | 2.3 |
| | Retro-Commissioning | $110,000 | $24,141 | $20,121 | $14,507 | $6,751 | $175,520 | $419,165 | 3.0 |
| | Schools Facilities | $78,158 | $52,287 | $6,914 | $14,507 | $6,075 | $157,941 | $341,881 | 3.2 |
| | CHP Joint Program - Pilot | $0 | $53,133 | $5,313 | $17,510 | $0 | $75,956 | $7,718,749 | 7.9 |
| | Subtotal | $7,520,312 | $3,375,461 | $1,000,990 | $129,940 | $399,152 | $12,425,855 | $53,242,839 | 4.0 |
| Behavior | Home Energy Reports | $513,200 | $69,283 | $29,124 | $36,268 | $25,915 | $673,790 | $53,980 | 1.1 |
| | Behavioral Comprehensive Program | $602,380 | $698,765 | $50,000 | $14,507 | $54,626 | $1,420,279 | $2,129,394 | 2.5 |
| | Subtotal | $1,115,580 | $768,048 | $79,124 | $50,775 | $80,541 | $2,094,069 | $2,183,375 | 2.0 |
| Support Programs | Education and Outreach* | $0 | $350,000 | $17,026 | $10,155 | $7,544 | $384,724 | $0 | N/A |
| | Residential Energy Financing* | $332,889 | $375,415 | $58,259 | $14,507 | $11,192 | $792,262 | $0 | N/A |
| | Codes Support* | $0 | $56,180 | $8,427 | $7,979 | $2,903 | $75,490 | $0 | N/A |
| | Program Development, Analysis and Reporting Software | $0 | $829,395 | $0 | $0 | $0 | $829,395 | -$829,395 | N/A |
| | Subtotal | $332,889 | $1,610,990 | $83,712 | $32,641 | $21,639 | $2,081,871 | -$829,395 | N/A |
| Total | Total | $15,172,743 | $8,608,659 | $2,462,171 | $364,305 | $878,220 | $27,486,097 | $74,743,247 | 2.9 |
| | Percent of Cost by Category | 55% | 31% | 9% | 1% | 3% | 100% | | |

* Lifetime Net Benefits are adjusted to $0. Benefits are likely to equal costs; however at this time they are not quantified

## D. Review of Different Benefit-Cost Tests and Results

As required in the Cost Effectiveness section of the EE Standard (R14-2-2412), TEP must ensure that the incremental benefits to society of the overall DSM portfolio exceed the incremental costs to society using the Societal Cost Test. For a full description of inputs to conduct a Societal Cost Test ("SCT") please refer to the "Benefit/Cost Analysis of DSM Programs – A Guide for Arizona Investor Owned Utilities" included in Exhibit 1. This paper was developed in cooperation with Arizona Public Service Corporation ("APS") and a collaborative group of stakeholders in 2010 and presented to Commission Staff as the utility requested methodology for application of the SCT. For the analysis of program benefits, a software program we call *NAVdesign* was developed by Navigant Consulting, Inc. for use by TEP. *NAVdesign* applies avoided cost savings generated by each measure or program across the entire portfolio. Measure and program level benefit-cost details are available in the appendices.

### Program Development

Program development involves selecting the technologies to include in each program as well as estimating participation levels and program costs. Though the DSM portfolio must be cost-effective, there are a number of perspectives on cost effectiveness. Some of these alternative perspectives are described below.

## Types of Benefit-Cost Tests

As detailed in Table 3-12, there are five major benefit-cost tests commonly utilized in the energy efficiency industry, each of which addresses different perspectives. The Arizona EEES established that the societal cost test should be used as the key perspective for judging the cost-effectiveness of the energy efficiency measures and programs. Regardless of which perspective is used, benefit-cost ratios greater than or equal to 1.0 are considered beneficial. While various perspectives are often referred to as tests, the following list of criteria demonstrates that decisions on program development go beyond a pass/fail test.

**Table 3-12. Comparative Benefit-Cost Tests**

| | SOCIETAL TEST | TOTAL RESOURCE COST TEST | UTILITY RESOURCE COST TEST | PARTICIPANT COST TEST | RATE IMPACT MEASURE TEST |
|---|---|---|---|---|---|
| **BENEFITS** | | | | | |
| Reduction in Customer's Utility Bill | | | | X | |
| Incentive Paid by Utility/Program Administrator | | | | X | |
| Any Tax Credit Received | | X | | X | |
| Avoided Supply Costs | X | X | X | | X |
| Avoided Participant Costs | X | X | | X | |
| Participant Payment to Utility (if any) | | | X | | X |
| External Benefits | X | | | | |
| **COSTS** | | | | | |
| Utility Admin Costs | X | X | X | | X |
| Participant Costs | X | X | | X | |
| Incentive Costs | | | X | | |
| External Costs | X | | | | |
| Lost Revenues | | | | | X |

Although TEP is only required to analyze its programs using the SCT, the Company evaluated the cost-effectiveness of its measures, programs, and overall portfolio based on all of the following standard tests.

## Utility Resource Cost Test

The Utility Resource Cost Test ("UCT"), also referred to as the Program Administrator Test("PAT"), measures the net benefits of a DSM program as a resource option based on the costs and benefits incurred by the utility (including incentive costs) and excluding any net costs incurred by the customer participating in the efficiency program. The benefits are the avoided supply costs of energy and demand, the reduction in transmission, distribution, generation and capacity valued at marginal costs for the periods when there is a load reduction. The costs are the program costs incurred by the utility, the incentives paid to the customers, and the increased supply costs for the periods in which load is increased.

## Total Resource Cost

The Total Resource Cost ("TRC") is a test that measures the total net resource expenditures of a DSM program from the point of view of the utility and its ratepayers. Resource costs include changes in supply

and participant costs. A DSM program that passes the TRC test (i.e., has a ratio greater than 1) is viewed as beneficial to the utility and its customers because the savings in electric costs outweigh the DSM costs incurred by the utility and its customers.

### Participant Cost Test

The Participant Cost Test ("PCT") illustrates the relative magnitude of net benefits that go to participants compared to net benefits achieved from other perspectives. The benefits derived from this test reflect reductions in a customer's bill and energy costs plus any incentives received from the utility or third parties, and any tax credit. Savings are based on gross revenues. Costs are based on out-of-pocket expenses from participating in a program, plus any increases in the customer's utility bill(s).

### Rate Impact Measure Test

The Rate Impact Measure ("RIM") Test measures the change in utility energy rates resulting from changes in revenues and operating costs. Higher RIM test scores indicate there will be less impact on increasing energy rates. While the RIM results provide a guide as to which technology has more impact on rates, generally it is not considered a pass/fail test. Instead, the amount of rate impact is usually considered at a policy level. The policy level decision is whether the entire portfolio's impact on rates is so detrimental that some net benefits have to be forgone.

### Societal Cost Test

The SCT is similar to the TRC test, but it is also intended to account for the effects of externalities (such as reductions in carbon dioxide ("$CO_2$"), nitrogen oxides ("NOx"), and sulfur dioxide ("$SO_2$"). One additional difference between the TRC and the SCT is that the SCT uses a societal discount rate in the analysis. The SCT is the regulated benefit cost analysis required in the EEES and TEP has provided a SCT that accounts for the societal discount rate. TEP is however, unable to provide a true societal test given the uncertain values of environmental externalities. As required by the Commission, TEP will work in 2011 with stakeholders to develop appropriate metrics for and to monetize the costs of water, SOx, PM10, and NOx emissions savings as part of the societal cost test in program filings. Until a true market value is available for $CO_2$, the Company will not separately monetize this gas. In compliance with Commission Decision No. 72028 (December 12, 2010), TEP will re-file the societal costs with the results of the stakeholder meetings. Table 3-13 summarizes results of the various program level cost effectiveness tests.

**Table 3-13. Comparative Benefit-Cost Test Results**

| | | 2011 - 2012 | | | | |
|---|---|---|---|---|---|---|
| | | Societal Cost Test | Total Resource Cost Test | Utility Cost Test | Participant Cost Test | Ratepayer Impact Test |
| Residential | Efficient Products | 4.8 | 4.2 | 6.3 | 11.0 | 0.6 |
| | Appliance Recycling | 1.9 | 1.7 | 2.6 | 5.0 | 0.6 |
| | Res. New Construction | 1.7 | 1.1 | 2.5 | 1.0 | 1.1 |
| | Existing Homes and Audit Direct Insta | 1.1 | 0.8 | 1.1 | 1.4 | 0.7 |
| | Shade Tree | 1.5 | 1.1 | 2.7 | 1.7 | 0.7 |
| | Low Income Weatherization | 1.2 | 0.9 | 0.4 | 2.1 | 0.3 |
| | Multi-Family | 2.5 | 2.2 | 2.2 | 15.0 | 0.5 |
| | Residential Direct Load Control - Pilot | 1.7 | 1.4 | 1.3 | N/A | 0.2 |
| | Subtotal | 2.2 | 1.7 | 2.7 | 3.8 | 0.6 |
| Commercial | C&I Comprehensive Program | 3.4 | 2.6 | 4.8 | 4.6 | 0.7 |
| | Commercial Direct Load Control | 8.1 | 7.3 | 7.3 | N/A | 0.2 |
| | Small Business Direct Install | 2.5 | 2.0 | 2.9 | 4.0 | 0.6 |
| | Commercial New Construction | 5.6 | 4.1 | 5.0 | 8.2 | 0.7 |
| | Bid for Efficiency - Pilot | 2.3 | 1.9 | 2.4 | 4.6 | 0.5 |
| | Retro-Commissioning | 3.0 | 2.5 | 3.0 | 5.9 | 0.6 |
| | Schools Facilities | 3.2 | 2.5 | 2.5 | 8.0 | 0.6 |
| | CHP Joint Program - Pilot | 8.0 | 5.7 | 84.4 | 7.7 | 0.8 |
| | Subtotal | 3.8 | 3.0 | 4.9 | 9.9 | 0.4 |
| Behavio r | Home Energy Reports | 1.0 | 1.0 | 1.0 | 4.0 | 0.3 |
| | Behavioral Comprehensive Program | 3.0 | 2.6 | 2.6 | 10.3 | 0.5 |
| | Subtotal | 2.4 | 2.1 | 2.1 | 7.8 | 0.5 |
| Support Programs | Education and Outreach | N/A | N/A | N/A | N/A | N/A |
| | Residential Energy Financing | N/A | N/A | N/A | N/A | N/A |
| | Codes Support | N/A | N/A | N/A | N/A | N/A |
| | Program Development, Analysis and Reporting Software | N/A | N/A | N/A | N/A | N/A |
| | Subtotal | N/A | N/A | N/A | N/A | N/A |
| Total | Portfolio Total | 2.8 | 2.2 | 3.4 | 6.8 | 0.5 |

Table 3-14 summarizes the benefit cost ratio of the DSM portfolio using the societal cost test as well as showing results of several other methods of calculating cost effectiveness.

**Table 3-14. DSM Portfolio Cost Effectiveness**

| Year | Societal Cost Test | Total Resource Cost Test | Utility Cost Test | Participant Cost Test | Ratepayer Impact Test |
|---|---|---|---|---|---|
| 2011 - Portfolio | 2.7 | 2.2 | 3.3 | 6.4 | 0.5 |
| 2012 - Portfolio | 2.9 | 2.3 | 3.5 | 7.2 | 0.4 |
| 2011-2012 Total | 2.8 | 2.2 | 3.4 | 6.8 | 0.5 |

## E. Environmental Benefits

TEP estimates that implementation of the proposed portfolio will result in significant reductions in $CO_2$, NOx and $SO_2$ from fossil fuel power plant emissions over the lifetime of the installed efficiency measures. Table 3-15 details both annual and lifetime environmental benefits of the 2011 and 2012 portfolio.

**Table 3-15. Environmental Benefits**

| | 2011-2012 Total | | | | | |
|---|---|---|---|---|---|---|
| Year | Annual CO2 Savings (Metric Tons) | Annual NOx Savings (Metric Tons) | Annual SOx Savings (Metric Tons) | Lifetime CO2 Savings (Metric Tons) | Lifetime NOx Savings (Metric Tons) | Lifetime SOx Savings (Metric Tons) |
| 2011 - Portfolio | 130,678 | 173 | 150 | 1,618,229 | 2,185 | 1,895 |
| 2012 - Portfolio | 153,094 | 201 | 175 | 2,230,094 | 3,011 | 2,612 |
| 2011-2012 Total | 283,772 | 375 | 325 | 3,848,322 | 5,195 | 4,507 |

# IV. Residential Programs

The following section presents a summary of TEP's residential programs including new programs, enhancements to existing programs consistent with the requirements of Section R-14-2-2407 of Decision No. 71436 (December 18, 2009), and existing programs where no changes are anticipated. Detailed program descriptions and cost-effectiveness results for each new program are included in the appendices.

## A. Efficient Products

TEP is requesting budget approval and approval to offer the additional measures shown in Table 4-1 beginning in 2012.

### Program Description

This is an existing program previously approved by the Commission in Decision No. 70383 (June 13, 2010). The Efficient Products Program (formerly called CFL Buy-Down Program) is being re-named to recognize that it will serve as the delivery channel to address other efficient products beyond CFLs, and rebated through the major retail channels. This program promotes the purchase of energy efficient retail products through in-store buy-down promotions. Starting in 2012 the promotion of energy efficient pool pumps, pool timers, residential LED lighting, and advanced power strips will be implemented.

### Program Objectives and Rationale

The new measures will offer residential customers additional opportunities to reduce their energy consumption and further the market transformation process through retail partnerships, training of retail staff, and increased stocking and selection of efficient retail products.

### New Measures for 2011-2012

Table 4-1 presents new measures to be rebated by the program in 2011 and 2012.

**Table 4-1. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| Pool Pump Timer | no timer | Pool Pump Timers | $75/unit | - | 1,500 | 4.03 |
| Variable Speed Pool Pump | single speed baseline | Variable Spd Pool Pump | $200/unit | - | 1,500 | 2.08 |
| Residential LED light (A19 type bulb) | 64W Incd/Halogen | 10 W LED | $30/bulb | - | 6,000 | 1.04 |
| Advanced Power Strips - Load Sensor | standard strips | Smart Strips - Load Sensor | $10/sensor | - | 1,500 | 2.12 |

*Additional detail on measure level saving, societal benefits/costs, and environmental benefits of both new and existing measure is included in Appendix J.

TEP is not proposing any significant changes in implementation approach or delivery strategy except for the addition of new measures starting in 2012. Delivery channels for the new measures will continue to be via a combination of both buy-downs and possible mail-in rebates with participating retailers.

Program marketing is primarily through mass-market channels (e.g., radio, newspaper, website, etc.) and through education and training of participating retailers.

Measurement, Evaluation, and Research Plan

The Measurement, Evaluation, Research ("MER") plan is consistent with the Company's previously filed strategy; however, it will incorporate review of the new measures and delivery tactics.

## B. Appliance Recycling

TEP is requesting budget approval for a new Appliance Recycling program in 2011. A full program description and benefit-cost analysis is included in Appendix A.

Program Description

This is a new program, starting in 2011, which will be an ongoing element of the program portfolio. The Program will target the removal and recycling of operable second refrigerators and freezers. An appliance recycling contractor will provide implementation services that include verification of customer eligibility, scheduling of pick-up appointments, appliance pick-up, and recycling services.

Program Objectives and Rationale

The objective of the program is to produce long-term electric energy savings in the residential sector by permanently removing operable second refrigerators and freezers from the power grid and recycling them in an environmentally safe manner.

New Measures for 2011-2012

The following table presents new measures to be rebated by the program in 2011 and 2012.

**Table 4-2. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| Refrigerator Recycling | 2nd fridge plugged in | remove 2nd refrigerator | $35/unit | 4,860 | 4,860 | 4.04 |
| Freezer Recycling | 2nd freezer plugged in | remove 2nd freezer | $35/unit | 540 | 540 | 3.07 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of new measures is included in Appendix A.

Delivery and Marketing Strategy

The program delivery strategy consists of a third party implementation contractor who will provide implementation services, including eligibility verification and scheduling of pick-ups and delivery to proper disposal and recycling centers. The implementation contractor will also coordinate prompt processing of incentive payments.

Program marketing will be primarily through mass-market channels (e.g., radio, newspaper, website, etc.) and through brochures. Materials will carry a strong consumer education message and leverage the ENERGY STAR® brand. The program will be marketed at retail point-of-sale to increase customer awareness of the program.

Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix A.

## C. Residential New Construction

TEP is requesting budget approval to continue this program with no additional modifications.

Program Description

This program is a continuation of the existing program design that was approved by Decision No. 71638 (April 4, 2010) for the "Zero Net Energy Homes" residential new construction program. The Program is designed with an incentive schedule that awards larger incentives for more efficient homes. To qualify for an incentive, homes must be tested by an approved energy rater, and meet one of the three tiers in the program based on a Home Energy Rating System ("HERS") Index score. On the HERS index scale, a score of 100 is considered the average efficiency of baseline new construction. A HERS index score of 0 represents a home that produces all of its energy through on-site generation from renewable energy. Therefore, the lower the HERS score, the more efficient the home. Tier 1 requires a minimum of a HERS that is <= 85, Tier 2 requires a minimum of HERS <= 70, and Tier 3 requires a minimum of HERS <=45.

Program Objectives and Rationale

The objectives of the residential new construction program are to advance energy efficient building practices through builder training, and customer awareness of the benefits of energy efficient construction, combined with application of and renewable technologies, such a solar photovoltaic and solar hot water systems consistent with achieving the goals of Arizona Renewable Portfolio Standard.

New Measures for 2011-2012

No new measures in particular are anticipated for 2011 or 2012.

Delivery and Marketing Strategy

Program delivery is provided by TEP staff, and participation of independent RESNET approved home energy raters ("HERs"). The contractor provides outreach to targeted builders, conduct builder training on marketing ENERGY STAR® homes and on the ENERGY STAR® performance standard, and coach and mentor participating builders and raters.

The program is marketed to select builders primarily through direct business-to-business contacts. The program is marketed to consumers at home shows, parade of homes, and other events focused on home-building as advertised through mass market and targeted media outlets.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the Company's previously filed strategy.

## D. Existing Homes and Audit Direct Install

TEP is requesting budget approval to continue this program with no additional modifications.

Program Description

The Existing Homes and Audit Direct Install Program is a newly approved a program that replaces the former Residential HVAC Program. The program was approved by Decision No.72028 (December 10, 2010). The Program is targeted to all existing homes in need of energy efficiency improvements. The program has two components, an initial energy audit with direct install of CFLs and advanced power strips, followed by identification of actionable, larger scale home energy efficiency improvements and referral to local Building Performance Institute ("BPI") certified contractors to implement major home energy improvements such as insulation, air-sealing, HVAC, et cetera.

TEP plans to submit the Existing Home Program to EPA with a request to utilize EPA labeling as Home Performance with ENERGY STAR®.

Program Objectives and Rationale

The program achieves energy and demand savings from the installation of energy efficient measures and contributes toward transforming the industry to emphasize best practice building science principles. The program invests in training and mentorship of participating contractors to understand the "house as a system" building science and to achieve BPI certification. TEP has included a Residential Financing Pilot Program in this Plan for 2011-2012 which will be used to enhance participation in this program.

Delivery and Marketing Strategy

TEP provides program management oversight and marketing. A third party implementation contractor will be responsible for recruitment, training, and mentorship of participating contractors and trained energy auditors, data tracking, rebate processing and technical support. Auditors will provide referrals to BPI certified contractors and referral information will be reported to TEP. Measure installation to residential customers will be provided by participating independent contractors. In 2011-2012 program delivery will be coordinated with APS and Southwest Gas Corporation ("Southwest Gas") to address programming overlap among the utilities.

TEP provides program marketing and customer awareness-building through website promotion, community interest groups, mass-market channels (e.g. radio, newspaper, etc.), brochures and bill inserts, high bill inquiries, trade ally marketing efforts, contractor enrollment and training.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the Company's previously filed strategy.

## E. Shade Tree

TEP is requesting budget approval to continue this program with no additional modifications.

Program Description

The Shade Tree program is an ongoing element of the program portfolio, approved in Decision No. 70455 (August 6, 2008). The Program promotes energy conservation and environmental benefits by motivating customers to plant desert-adapted trees in targeted locations where the trees will provide shade to habited dwellings, thus reducing HVAC load. TEP partners with Tress for Tucson, a local non-profit organization that manages and administers the program.

Program Objectives and Rationale

The objectives of the program are to promote the strategic planting of trees to provide shade, thereby reducing the cooling load of homes and associated energy usage and to educate school-age children and the public on the conservation and environmental benefits of planting trees.

New Measures for 2011-2012

No new measures included in the program for 2011 and 2012.

Delivery and Marketing Strategy

TEP provides DSM funds for the planting of trees within the guidelines that provide kWh savings. In addition, funds are, and will continue to be used for the Community and the Schools tree planting projects that meet the planting criteria outlined for planting residential trees. TEP's funds are leveraged with a significant in-kind contribution of labor, material and technical support from individuals and the community to make this program a success. Under TEP service territory, TEP partners with Trees for Tucson for program delivery.

Due to the popularity of the program, DSM revenues are not normally allocated for advertising and promotion. TEP employees currently inform customers about the program during speaking engagements and outreach presentations. Other efforts entail website promotion, newspaper advertising, planting and care brochure, presentations at schools, tree tours, and tree care workshops.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the Company's previously filed strategy.

## F. Low Income Weatherization

TEP is requesting budget approval to continue this program and approval to modify income eligibility from 150% of poverty level to match the poverty level set by Low-Income Home Energy Assistance Program ("LIHEAP") as it may change from time to time. The current level set by LIHEAP is 200% of poverty level.

Program Description

The Low Income Program is an ongoing element of the Program Portfolio and was approved by Decision No. 70456 (August 6, 2008). The Program helps conserve energy and lower utility bills for TEP households with limited incomes by funding the weatherization of eligible homes. Weatherization measures fall into four major categories of duct repair, pressure management/infiltration control, attic insulation, and repair or replacement of non-functional or hazardous appliances. Weatherization is conducted in accordance with the Weatherization Assistance Program ("WAP"), a program funded by the U.S. Department of Energy. Household income and participation guidelines will be consistent in an on-going manner with current policy criteria used by the Arizona Energy Office, a division of the Arizona Department of Commerce.

Program Objectives and Rationale

The objectives of the program are to coordinate with the Arizona Energy Office to follow approved state WAP rules when using funding from TEP, to lower the average household energy consumption for low-income customers and to increase the number of homes weatherized annually. The program funding provides up to $3,000 per residence for energy efficient weatherization measures, equipment replacement and/or repair, etc. for low-income customers within the TEP service area. Agencies are allowed to use up to 25% of their annual budget for Health and Safety related repairs. Agencies may request a waiver of the $3,000 limitation on a case-by-case basis;

New Measures for 2011-2012

No new measures included in the program for 2011 and 2012. However, TEP requests approval to adjust the qualifying customer income levels to consistently match those set by LIHEAP. The Current Income Threshold is 200% of the Federal Poverty Level. This change will benefit additional low income customers and streamline the process to determine eligibility by the agencies.

Delivery and Marketing Strategy

The program is delivered by Tucson Urban League ("TUL") and Pima County Community Services ("PCCS"), who are State-approved weatherization agencies, providing program administration, planning, program promotion, coordination, participant eligibility and priority, labor, materials, equipment and entering results into tracking software. Funding is provided to TUL and PCCS from TEP upon documentation of work completed.

Due to the popularity of the program, DSM revenues are not allocated for advertising and promotion. Program promotion occurs mainly through community action agency partners that deliver presentations to community organizations, and/or by leaving information at neighborhood community and recreation

centers, and by responding to calls directed from TEP. TEP also provides website promotion and information during speaking engagements and outreach presentations.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the Company's previously filed strategy.

## G. Residential Direct Load Control – Pilot

TEP is requesting budget approval to continue this program with no additional modifications.

Program Description

The Residential Direct Load Control Program is an ongoing element of the residential portfolio approved in Decision No. 71846 (August 25, 2010). This two-year pilot program, scheduled to be fielded in 2011, with the second year proposed as a contingency in the event that the first-year evaluation is not sufficient to adequately assess the functionality of the load control or communications technologies. If the pilot program proves to be successful, TEP plans to expand to a full program rollout.

The Residential and Small Commercial Direct Load Control ("DLC") Program will enable TEP to better manage peak demand and to mitigate system emergencies through direct load control of residential and small commercial central air-conditioners ("AC"). The program uses two-way communication that sends load control signals to equipment at the home or business and also provides interval consumption data back to TEP for all participants. Participants receive either 1) a free thermostat that can be programmed manually or remotely via the internet or 2) a load control device placed on their outdoor air conditioning unit. In exchange, customers permit TEP to cycle AC units or raise thermostat temperature settings for a limited number of hours or events per year. It is expected that TEP will call roughly 8 to 10 load control events each year. Customers will have the option to change thermostat settings or override cycling strategies during a control event.

Program Objectives and Rationale

The Residential DLC Program pilot program is intended to confirm the feasibility and effectiveness of direct load control of residential and small commercial air conditioners during peak hours as a cost-effective means to reduce peak system load. Load impact results and customer feedback gained through the pilot program will enable a better assessment of cost-effectiveness of DLC and inform program enhancements for a broader rollout.

Delivery and Marketing Strategy

The program's delivery strategy includes a third party implementation contractor, whose responsibilities include: provision of load control equipment and "head-end" control software that can be used by TEP to call and monitor load control events, training on software and assistance in designing effective load control strategies, recruitment of participants, participant tracking, technology installation, marketing, and call center/customer satisfaction.

For the pilot program, recruitment is based on specific criteria to ensure participants represent the population of eligible customers. Participants are required to have functioning broad band connection and receive a $50 incentive to each customer at the end of the 2-Year Pilot for participating. Customers also receive an internet-enabled programmable thermostat that will be installed by a qualified contractor at no-cost to the customer.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the previously filed strategy.

## H. Multi-Family

TEP is requesting budget approval for a new Muli-Famly program in 2012. A full program description and benefit-cost analysis is included in Appendix D.

### Program Description

This is a new program offering for the 2011-2012 TEP program portfolio and will target multi-family buildings with 5 dwelling units or greater. The Program will recruit multi-family building owners to participate in a direct-install campaign to install CFLs and low-flow water devices in individual units. Multi-family facility managers will also be referred to the Small Business Direct Install program to encourage measure installation for the common areas.

### Program Objectives and Rationale

The energy efficiency potential in the multifamily housing market remains largely untapped and represents significant efficiency potential for the TEP program portfolio. Due to various market barriers, such as split incentives, capital constraints, and lack of awareness, energy efficiency improvements typically fall far below other types of improvements on the priority list. Although the current rebate programs offer some opportunities for energy efficiency improvements in this market, primarily through the Efficient Products Program, there is not a comprehensive offering that addresses the unique needs of this market. Through the direct installation, and renovation/rehabilitation implementation framework, this program seeks to fill this important gap in the TEP program portfolio and provide substantial energy savings.

The objectives of the program are to reduce peak demand and overall energy consumption in the multifamily housing market segment; to promote energy efficiency retrofits of both dwelling units and common areas in this market segment; and to increase overall awareness about the importance and benefits of energy efficiency improvements to the landlord and property ownership community

### New Measures for 2011-2012

Table 4-3 presents new measures to be rebated by the program in 2011 and 2012.

**Table 4-3. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| ES Integral CFL | 61W Incd/Halogen | 14 W CFL | $2/bulb | - | 6,250 | 21.55 |
| Low Flow Showerheads – Electric only | 4 GPM | 1.5 GPM with hot water sensor | $40/shower | - | 625 | 3.56 |
| Faucet Aerators – - Electric WH only | 2.2 GPM | 1.5 GPM | $2/faucet | - | 625 | 20.10 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of new measures is included in Appendix D.

### Delivery and Marketing Strategy

In order to encourage energy efficiency upgrades in new construction, major renovation and rehabilitation projects, as well as, energy efficiency retrofits of existing structures, the program will initially offer the following delivery tracks:

- A direct installation of selected low cost energy efficiency improvements in existing complexes.

- Common area energy efficiency improvements in existing complexes will be handled through the Small Business Direct Install Existing Facilities Program.

As the program develops and matures, TEP will examine a third track for encouraging more comprehensive dwelling unit energy efficiency improvements in existing complexes that are not part of major renovation/rehabilitation projects.

Marketing and communications strategies will include notifying apartment managers and owners through updates to website, local newspapers and radio, bill messages and bill inserts, training seminars, call center on-hold messages, direct mail promotion, outreach to rental housing industry associations, and work with contractors and industry specialists. A primary emphasis will be placed on larger and older, less efficient complexes.

Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix D.

# V. Commercial & Industrial Programs

The following section presents a summary of TEP's Commercial and Industrial ("C&I") programs including new programs, enhancements to existing programs consistent with the requirements of Section R-14-2-2407 of Decision No. 71436, and existing programs where no changes are anticipated. Detailed program descriptions and cost-effectiveness results for each new program are included in the appendices.

Tables 5-1 through 5-7 present the average incentive levels anticipated for the new measures. We specifically note that incentive levels are averaged as they represent the weighted result of the average incentive for a measure, which varies depending on the tons or horsepower of the equipment being rebated. Actual incentives implemented may vary slightly depending again on the size of the equipment under consideration. Overall, incentive levels are designed to not exceed 75% of incremental costs, except for direct-install measures which are rebated at up to 90% to 100% of incremental cost.

## A. Small Business Direct Install

TEP is requesting budget approval to continue this program with the addition of these measures:

- Shade Screens
- Window Films
- Induction Lighting
- LED Channel Signs
- Outdoor CFL
- Reduced LPD
- T8 to T8
- Premium T8 Lighting
- Beverage Controls
- Snack Ctrls ("vending miser")
- Refrigerated Display
- Automatic Door Closers
- Refrigerated Display Gaskets
- Advanced Power Strips - Occupancy Sensors
- Advanced Power Strips - Timer Plug Strip
- Advanced Power Strips - Load Sensor

### Program Description

The Small Business Direct Install Program is an existing program that was approved by the Commission in Decision No. 70457 (August 6, 2008). The program offers incentives for a select group of retrofit ("RET") and replace-on-burnout ("ROB") energy efficiency measures in existing facilities. Eligible customers include customers who qualify for TEP's Rate 10 – Small General Service pricing plan (typically an aggregate monthly demand of 200 kW or less). The program offers incentives for the installation of energy efficiency measures including lighting equipment and controls, HVAC equipment, motors and motor drives, compressed air and refrigeration measures.

### Program Objectives and Rationale

The Small Business Direct Install program is designed to address the barriers to this market segment, including limited investment capital, limited awareness of energy cost savings, and required short-term payback. The program's purpose is to persuade small business customers to install high-efficiency equipment at their facilities and encourage contractors to promote the program.

## New Measures for 2011-2012

The following table presents new measures to be rebated by the program in 2011 and 2012.

**Table 5-1. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| Shade Screens | no screens | shading coeff: 0.24 | $2/sq ft | 750 | 750 | 3.29 |
| Window Films | no film | shading coeff: 0.578 | $2/sq ft | 1,000 | 1,000 | 4.51 |
| Induction Lighting | 229 W Metal Halide | 96 W Induction lamp | $141/lamp | 8 | 8 | 3.37 |
| LED Channel Signs | 6W/ft Neon | 1.2 W/ft LED | $9/linear ft | 150 | 150 | 1.05 |
| Outdoor CFL | 112 W incand. | 27 W CFL | $2/lamp | 1,500 | 643 | 10.78 |
| Reduced LPD | 1.21 W/sqft | 1.09 W/sqft | $1,371/building | - | - | 3.23 |
| T8 to T8 | Standard T8 | premium T8 | $24/fixture | 150 | 150 | 2.58 |
| Premium T8 Lighting | T12 Lamps | Premium T8 | $33/fixture | 40,000 | 48,000 | 2.22 |
| Beverage Controls ("Vending Miser") | no controls | occupancy sensors | $150/sensor | 11 | 11 | 5.53 |
| Snack Ctrls ("vending miser") | no controls | occupancy sensors | $75/sensor | 50 | 50 | 2.15 |
| Refrigerated Display Automatic Door Closers | standard doors | Automatic Door Closers | $40/door | 15 | 15 | 7.13 |
| Refrigerated Display Gaskets | no action | Replace Gaskets | $8/linear ft | 75 | 75 | 1.47 |
| Advanced Power Strips - Occupancy Sensors | standard strips | Smart Strips - Occupancy Sensors | $10/sensor | - | 100 | 1.61 |
| Advanced Power Strips - Timer Plug Strip | standard strips | Smart Strips - Timer Plug Strip | $10/sensor | - | 100 | 9.22 |
| Advanced Power Strips - Load Sensor | standard strips | Smart Strips - Load Sensor | $10 | - | 100 | 3.07 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits, of both new and existing measures is included in Appendix J.

## Delivery and Marketing Strategy

The program is operated as an "up-stream" market program, meaning incentives are offered to pre-qualified contractors that can provide turn-key installation services to customers. These measures are intended to reduce the measure payback to one year or less. The program also includes consumer and trade ally educational and promotional pieces designed to provide decision makers in the small business market with the information necessary to make informed choices (and increase awareness).

The marketing strategy includes education seminars tailored to the small business market, major media advertising, website promotion, outreach and presentations at professional and community forums, and direct outreach to customers with monthly demands of 200 kW or less.

## Measurement, Evaluation, and Research Plan

The MER plan is consistent with the Company's previously filed strategy.

## B. C&I Comprehensive

TEP is requesting budget approval to continue the program and approval of these additional measures:

- Heat Pump Water Heaters - Tier 1
- CO Sensors
- CO2 Sensors
- Cooling Tower Subcooling
- Economizers
- High Perf Glazing
- PTAC/PTHP
- Shade Screens
- Window Films
- EMS - Lighting Schedule
- Induction Lighting
- LED Channel Signs
- LED Pedestrian Signals
- LED Traffic Lights
- LED Street and Parking Lights
- Outdoor CFL
- T8 to T8
- Green Motor Rewind
- Beverage Ctrls ("vending miser")
- Snack Ctrls ("vending miser")
- Efficient Compressors
- Efficient Condensers
- Floating Head Pressure Controls
- Refrigerated Display Automatic Door Closers
- Refrigerated Display Gaskets
- Coin Operated Washers - Tier 1 (Existing)
- Coin Operated Washers - Tier 2 (Existing)
- Advanced Power Strips - Occupancy Sensors
- Advanced Power Strips - Timer Plug Strip
- Advanced Power Strips - Load Sensor

### Program Description

The C&I Comprehensive Program is an existing program, approved previously by the Commission in Decision No. 70403 (July 3, 2008) under the name of Non-Residential Existing Facilities Program. The Program provides prescriptive incentives to large commercial customers who are under TEP's Rate 13 and Rate 14 pricing plans (typically an aggregate monthly demand exceeding 200 kW) for the installation of energy-efficiency measures including lighting equipment and controls, HVAC equipment, motors and motor drives, compressed air and refrigeration measures. Prescriptive incentives are offered for a schedule of measures in each of these categories. Customers can also propose innovative energy efficiency solutions by offering a custom energy efficiency measure.

### Program Objectives and Rationale

The C&I Comprehensive Program is designed to address the barriers to this market segment, including limited awareness and lack of knowledge about the benefits and cost of energy efficiency improvements, performance uncertainty associated with energy efficiency projects and the required short-term payback.

The program's purpose is to persuade large business customers to install high-efficiency equipment at their facilities and encourage contractors to promote the program and provide turn-key installation services to small business customers.

New Measures and Program Enhancements for 2011-2012

Table 5-2 presents new measures to be rebated by the program in 2011 and 2012.

**Table 5-2. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| Heat Pump Water Heaters - Tier 1 | EF = .86 | EF = 2.35 | $800/unit | 4 | 4 | 4.28 |
| CO Sensors | no sensors | sensors | $250/sensor | 4 | 4 | 6.93 |
| CO2 Sensors | no sensors | sensors | $200/sensor | 4 | 4 | 3.60 |
| Cooling Tower Subcooling | no subcooling | subcooling | $200/ton | 700 | 700 | 1.58 |
| Economizers | no economizer | use of economizers | $40/ton | 40 | 40 | 2.51 |
| High Perf Glazing | standard window glazing | SHGC = .27 | $1/sq ft | 1,750 | 1,750 | 2.08 |
| PTAC/PTHP | 10 EER | 11 EER | $4/ Per kBtu/h | 1,000 | 1,000 | 2.79 |
| Shade Screens | no screens | shading coeff: 0.24 | $2/sq ft | 1,000 | 1,000 | 3.29 |
| Window Films | no film | shading coeff: 0.578 | $2/sq ft | 2,000 | 2,000 | 4.51 |
| EMS - Lighting Schedule | No EMS | use of EMS | $1/Connected watt | 8,000 | 8,000 | 0.99 |
| Induction Lighting | 229 W Metal Halide | 96 W Induction lamp | $140/Lamp | 150 | 150 | 3.37 |
| LED Channel Signs | 6W/ft Neon | 1.2 W/ft LED | $8/Linear ft | 1,750 | 1,750 | 1.35 |
| LED Pedestrian Signals | 69 W incand. | 6 W LED | $75/Signal | 150 | 150 | 1.08 |
| LED Traffic Lights | 100 W Incandescent | 8 W LED | $50/Lamp | 150 | 150 | 2.28 |
| Premium T8 | Standard T12 | Premium T8 | $23/Lamp | 24,000 | 24,000 | 2.1 |
| Outdoor CFL | 112 W incand. | 27 W CFL | $2/Lamp | 150 | 155 | 10.78 |
| T8 to T8 | standard T8 | premium T8 | $8/Lamp | 150 | 150 | 5.10 |
| Green Motor Rewind | 94.7% effy | 95.2% Effy | $1/HP | 6 | 6 | 1.95 |
| Beverage Ctrls ("vending miser") | no controls | occupancy sensors | $75/sensor | 20 | 20 | 5.58 |
| Snack Ctrls ("vending miser") | no controls | occupancy sensors | $75/sensor | 35 | 35 | 2.17 |
| Efficient Compressors | 1.85 COP | 2.2 COP | $80/Ton | 20 | 20 | 6.97 |
| Efficient Condensers | no condensers | use of condensers | $20/Ton | 20 | 20 | 3.89 |
| Floating Head Pressure Controls | no controls | Floating Head Pressure Controls | $20/Ton | 20 | 20 | 17.68 |
| Refrigerated Display Automatic Door Closers | standard doors | Automatic Door Closers | $40/Door | 10 | 10 | 7.13 |
| Refrigerated Display Gaskets | no action | Replace Gaskets | $4/Linear ft | 100 | 100 | 1.47 |
| Coin Operated Washers - Tier 1 (Existing) | 1.26 MEF | 1.8 MEF | $250/machine | 21 | 21 | 1.27 |
| Coin Operated | 1.26 MEF | 2 MEF | $250/machine | 21 | 21 | 1.33 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Washers - Tier 2 (Existing) | | | | | | |
| Advanced Power Strips - Occupancy Sensors | standard strips | Smart Strips - Occupancy Sensors | $10/sensor | - | - | 1.61 |
| Advanced Power Strips - Timer Plug Strip | standard strips | Smart Strips - Timer Plug Strip | $10/sensor | - | - | 9.22 |
| Advanced Power Strips - Load Sensor | standard strips | Smart Strips - Load Sensor | $10/sensor | - | - | 3.07 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of both new and existing measures is included in Appendix J.

TEP is requesting to change the custom incentive to 75% of the incremental costs (currently at 50%), to 12 cents per kWh (currently at 10 cents per kWh). This would align the custom incentives with other incentive available to C&I customers. This step is necessary to move the markets to other non-traditional measures that provide deeper saving to meet the future energy efficiency standard.

Delivery and Marketing Strategy

The program is delivered by a third party implementation contractor who provides program administration, application review, participation tracking and reporting, project quality control, and technical support.

In addition to the implementation contractor, key partnering relationships and marketing outreach include: the local architectural and engineering community, electrical, mechanical and building contractors, equipment manufacturers, distributors and vendors, professional and trade service associations, and the Arizona Energy Office. Marketing also includes consumer educational and promotional pieces designed to assist facility operators and decision makers with the information necessary to improve the energy efficiency of their facilities.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the Company's previously filed strategy.

## C. C&I Direct Load Control

TEP is requesting budget approval to continue this program with no additional modifications.

Program Description

The C&I Direct Load Control Program is an existing program, approved previously by the Commission in Decision No. 71787 (July 12, 2010). This is a commercial and industrial load curtailment program. Customers will be compensated with incentives for their participation at negotiated levels that will vary depending on multiple factors including the size of the facility, amount of kW under load control, and the frequency with which the resource can be utilized.

Program Objectives and Rationale

Commercial and industrial load represents a total of approximately 22% of system demand during peak hours in the late afternoon and evening during summer months. Modification of controls for chillers, rooftop AC units, lighting, fans, and other end uses is capable of significantly reducing power demand at peak times. The program anticipates enrolling enough customers to provide up to 40 MW of summer peak demand reduction, available for up to 80 hours per year, with a typical load control event lasting 3-4 hours.

In addition, the program may be used to support standard benefits of demand-response programs which include avoided firm capacity required to meet reserve requirements, reduced or avoided open-market

power purchases during periods of high energy prices, and greater grid stability and reduction in outages due to reduced grid demand.

Delivery and Marketing Strategy

The program will be delivered on a turn-key basis by a third-party implementation contractor, who will negotiate load reduction agreements with multiple customers and "aggregate" these customers to provide TEP a confirmed and guaranteed load reduction capacity available upon request. It is anticipated that the contract between TEP and the demand response ("DR") aggregator will be similar to a power purchase agreement in that the contracted party will be obligated to provide megawatts of load curtailment while maintaining a degree of flexibility in how the curtailments are achieved.

Recruitment will be targeted to help ensure that customers invited to participate are able to provide reliable and significant load control reductions. Consequently, it is not anticipated that mass media, such as radio and television will be used. Rather, the DR aggregator will conduct direct marketing according to an approach approved by TEP for purposes of ensuring a consistent message with TEP's public communications.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the Company's previously filed strategy.

## D. Bid for Efficiency – Pilot

TEP is requesting budget approval for a new Bid for Efficiency ("BFE") program in 2011. A full program description and benefit-cost analysis is included in Appendix E.

Program Description

TEP proposes to implement the program as a pilot during the 2011 through 2013 timeframe. Pilot results will be evaluated in 2013. If the market response and measure savings indicate the program is cost effective, TEP will include the full program offering in its 2014 EE Plan.

The Bid for Efficiency Pilot Program is designed to take an innovative approach to energy efficiency by using elements of competition and the potential for high rewards to enhance customer interest. The BFE concept involves creating a pool of funds that are bid on through unique proposals which include costs, savings and incentives that are unique to that project. TEP selects winning applicants based on specified criteria. The BFE concept is an innovative approach that is being successfully deployed in other jurisdictions. There are several market specific conditions that will determine the effectiveness for TEP and so TEP is proposing the BFE as a two year pilot program.

BFE participants and project sponsors may include commercial customers, ESCOs or other aggregators who organize proposals that involve multiple sites. The Pilot addresses customer market barriers such as small savings levels at multiple sites, longer payback periods and organizing implementation contractors and it offers a simplified application process. Results will be verified through Measurement and Verification ("M&V") activity.

Program Objectives and Rationale

BFE encourages customers and project sponsors to think creatively and to develop projects designed to optimize system energy use rather than considering the energy usage of each individual piece of equipment. The program will foster customer-driven project activity (e.g., customers will select appropriate measures and professionals to implement measures), and will encourage the implementation of comprehensive, multi-measure projects.

New Measures for 2011-2012

Table 5-3 presents new measures to be rebated by the program in 2011 and 2012.

**Table 5-3. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| Bid for Efficiency | Baseline building | Bid projects | $60,000/ customer | 4 | 6 | 3.16 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of new measures is included in Appendix E.

Delivery and Marketing Strategy

The program will be delivered through an implementation contractor. TEP will promote the Bid for Efficiency Pilot Program through direct promotion to key customers and aggregators. Particular emphasis will be paid to key market sectors that have historically been difficult to reach such as grocery and convenience stores. TEP, and/or its implementation contractor, also may conduct informational meetings with potential participants and project sponsors to explain the program rules and encourage participation.

Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix E.

## E. Commercial New Construction

TEP is requesting budget approval to continue this program and approval to add high performance glazing to this measure.

Program Description

The Efficient Commercial Building Design Program is being re-branded as the Commercial New Construction Program. It is an existing program, approved previously by the Commission in Decision No. 70459 (August 6, 2008). The program is intended to assist customers in designing and constructing energy efficient buildings. It is a performance based program that includes design assistance for the design team, performance based incentives for the building owner/developer, and energy design information resources. Design assistance involves efforts to integrate energy-efficiency into a customer's building plan to influence equipment/systems selection and specifications as early in the design process as possible. The performance based incentives for the building owner/developer is based on improved efficiency compared to a baseline design. The building's energy use is modeled against code based standards to determine projected energy savings. Rebate amounts are based on the estimated energy savings over a one year period.

The program also provides consumer educational and promotional pieces designed to assist building owners/developers with the information necessary to understand various energy efficiency options, encourage them to explore these options with their design professionals as early in the design process as possible, and improve the efficacy while reducing the energy use of their buildings.

Program Objectives and Rationale

The primary goal of the program is to encourage more energy efficient new building design for new non-residential projects in TEP's service area. This objective is reached through providing incentives to building owners/developers to design and build more energy efficient buildings and offering assistance to

design teams to offset the additional cost and time of exploring more energy efficient design. The program helps overcome market barriers, such as increased upfront cost of an integrated design approach, lack of awareness and knowledge about the benefits, and the cost and the performance of energy efficient measures. It encourages building owners/developers and the design community to consider energy efficiency options as early in the design process as possible.

New Measures for 2011-2012

Table 5-4 presents new measures to be rebated by the program in 2011 and 2012.

**Table 5-4. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| High Perf | Standard window glazing | SHGC = .27 | $1/sq ft | -- | -- | 2.08 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of measures is included in Appendix J.

Delivery and Marketing Strategy

There are no significant changes in implementation approach, delivery or marketing strategy for the items in this program.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the previously filed strategy.

## F. Combined Heat and Power – Pilot

TEP is requesting budget approval for a new Combined Heat and Power Pilot program in 2011. A full program description and benefit-cost analysis is included in Appendix I.

Program Description

The TEP Distributed Generation Pilot Program is a proposed Joint Utility Program to be implemented in cooperation with Southwest Gas. Distributed Generation ("DG") is defined in A.A.C. R14-2-2401 as "the production of electricity on the customer's side of the meter, for use by the customer, through a process such as CHP." R14-2-2401 goes on to define CHP as "combined heat and power, which is using a primary energy source to simultaneously produce electrical energy and useful heat." TEP proposes this program as a pilot to assist in developing methods and procedures for future joint utility programs with Southwest Gas or other utilities.

- TEP proposes to provide support for the existing Southwest Gas DG Program (Decision No. 69917 (September 27, 2007)) by sharing costs for marketing and outreach, training, and design. Specifically, TEP would pay up to 10% of the design costs for a CHP installation. This design assistance would only apply to installed projects.
- TEP will cooperate with Southwest Gas on marketing and outreach strategy to maximize marketing and outreach expenses.
- TEP proposes a 2011 budget of $74,800 for marketing and outreach, training, and design assistance for the Program.

Program Objectives and Rationale

The primary goal of the program is to provide support for the existing Southwest Gas DG program, and specifically for CHP projects. The market potential for CHP is substantial and could contribute significantly to energy conservation in Arizona, and could accrue significant societal and customer benefits as well. CHP is an affordable, clean, and reliable piece of the puzzle for meeting Arizona's energy needs and should be considered a key component to economic strategies.

New Measures for 2011-2012

Table 5-5 presents new measures to be rebated by the program in 2011 and 2012.

**Table 5-5. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| CombinedHeat and Power | | | $0 from TEP, Southwest Gas to Pay Incentive | 1 | 1 | 8.5 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of new measures is included in Appendix I.

Delivery and Marketing Strategy

Program delivery, incentives, and administration, as well as the marketing and communications strategy will be provided by Southwest Gas through its DG Program. TEP will assist with marketing and outreach, design assistance, and interconnection design expertise. TEP will assign an in-house program manager to coordinate joint program delivery with Southwest Gas.

Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix I.

## G. School Facilities

TEP is requesting budget approval for a new School Facilities program in 2012. A full program description and benefit-cost analysis is included in Appendix G.

Program Description

The TEP School Facilities Program is a new program open to participation by all existing school facilities in the TEP service territory, including charter schools, beginning in 2012. The proposed program will utilize the same delivery method and pay incentives for the same DSM measures as the existing TEP Small Business Direct Install and TEP C&I Comprehensive Programs, but with a separate budget reserved for schools. Incentives for the program will be paid at a higher level than for the Efficiency Program.

- The program will offer incentives for a select group of retrofit and replace-on-burnout ("ROB") energy efficiency measures in existing school facilities. The efficiency measures offered include high-efficiency lighting equipment upgrades, high-efficiency HVAC equipment, lighting controls, programmable thermostats, and selected refrigeration measures.
- The direct install component will utilize an on-line proposal generation and project tracking application to reduce the transaction costs. Proposed incentives for DSM measures are identical to the incentive structure in the TEP Small Business Direct Install and TEP C&I Comprehensive Programs; however TEP proposes to pay up to 100% of incremental costs for schools. The Program will have a separate incentive budget of $83,787 starting in 2012 which is reserved

exclusively for school use. If schools oversubscribe the budget, they will be allowed to request participation in the TEP Small Business Direct Install Program which only pays up to 85% of incremental cost.

Program Objectives and Rationale

The primary goal of the program is to encourage schools in TEP's service territory to install energy efficiency measures in existing facilities. More specifically, the program is designed to:

- Encourage schools to install high-efficiency lighting equipment and controls, HVAC equipment, and energy-efficient refrigeration system retrofits in their facilities.
- Encourage contractors to promote the program and provide turn-key installation services to schools.
- Assure that the participation process is clear, easy to understand and simple.
- Increase the awareness and knowledge of school facility managers and other decision-makers on the benefits of high-efficiency equipment and systems.

Since 2008, participation by schools in the TEP Small Business Direct Install and TEP C&I Comprehensive programs has been modest. In order to increase participation in energy efficiency retro-fits by schools, TEP has developed this program, which proposes to fund up to 100% of installed costs while engaging the contractor community to provide turn-key services. This is a 15% increase from the 85% allowed in the TEP Small Business Direct Install Program. The Schools Program will follow the design of the TEP Small Business Direct Install Program because the direct-install concept has a proven track record of high participation and cost-effective life cycle savings for hard-to-reach markets, including schools.

New Measures for 2011-2012

Table 5-6 presents new measures to be rebated by the program in 2012.

**Table 5-6. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| Custom Measures | no action | custom actions | $6,530/ customer | - | 6 | 3.16 |
| 14 SEER Packaged and Split Air Conditioners | SEER 13 | SEER 14 | $438/unit | - | - | 1.52 |
| 14 SEER Packaged and Split Heat Pumps | SEER 13 | SEER 14 | $438/unit | - | - | 2.04 |
| 15 SEER Packaged and Split Air Conditioners | SEER 13 | SEER 15 | $878/unit | - | - | 1.04 |
| 15 SEER Packaged and Split Heat Pumps | SEER 13 | SEER 15 | $878/unit | - | - | 1.80 |
| 16 SEER Packaged and Split Air Conditioners | SEER 13 | SEER 16 | $1,319/unit | - | - | 1.09 |
| 16 SEER Packaged and Split Heat Pumps | SEER 13 | SEER 16 | $1,319/unit | - | - | 1.54 |
| Programmable Thermostats | non-programmable | programmable | $20/unit | - | 20 | 13.48 |
| Shade Screens | no screens | shading coeff: 0.24 | $4/sq ft | - | - | 3.29 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Window Films | no film | shading coeff: 0.578 | $3/sq ft | - | - | 4.51 |
| Daylighting controls | no controls | daylighting controls | $749kW base load | - | - | 2.95 |
| Delamping | T8s and T12s | Remove T8s and T12s | $6/fixture | - | 200 | 62.43 |
| Energy efficient exit signs | Incandescent/CFL sign | LED sign | $55/fixture | - | 200 | 13.99 |
| Hard Wire CFL | 73 W Incandescent bulb | 16 W CFL | $15/bulb | - | - | 1.91 |
| HIDs to T8/T5 | 400W Metal Halide | 220 W T5/T8s | $93/fixture | - | 50 | 6.13 |
| Induction Lighting | 229 W Metal Halide | 96 W Induction lamp | $194/lamp | - | - | 3.34 |
| Integral Screw In CFL | 71 W Incandescent bulb | 16.6 W CFL | $11/bulb | - | - | 4.67 |
| Occupancy sensors | no sensors | occupancy sensors | $95/sensor | - | 30 | 3.73 |
| Outdoor CFL | 112 W incand. | 27 W CFL | $9/lamp | - | - | 10.78 |
| Reduced LPD | 1.21 W/sqft | 1.09 W/sqft | $3,460/ building | - | - | 3.23 |
| Screw in cold cathode CFL | 30 W Incandescent bulb | 6W CFL | $12/bulb | - | - | 1.34 |
| T 8 Lighting | T12 Lamps | T8 Lamps | $26/fixture | - | 40 | 0.98 |
| T8 to T8 | standard T8 | premium T8 | $20/lamp | - | - | 5.06 |
| Premium T8 | Standard T12 | Premium T8 | $57/lamp | - | 160 | 2.1 |
| Beverage Ctrls ("vending miser") | no controls | occupancy sensors | $195/sensor | - | 25 | 5.52 |
| Snack Ctrls ("Vending Miser") | no controls | occupancy sensors | $100/sensor | - | - | 2.14 |
| Advanced Power Strips - Occupancy Sensors | standard strips | Smart Strips - Occupancy Sensors | $75/sensor | - | - | 1.62 |
| Advanced Power Strips - Timer Plug Strip | standard strips | Smart Strips - Timer Plug Strip | $19/sensor | - | 10 | 9.27 |
| Advanced Power Strips - Load Sensor | standard strips | Smart Strips - Load Sensor | $32/sensor | - | - | 3.08 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of measures is included in Appendix G.

## Delivery and Marketing Strategy

TEP will assign an in-house program manager to oversee the program, provide guidance on program activities consistent with TEP's goals and customer service requirements, and provide a contact point for schools that are interested in or have concerns about the program. The implementation contractor will be responsible for application and incentive processing, monitoring the activities of the installing contractors, participation tracking and reporting, and overall quality control and management of the delivery process.

The marketing and communications strategy will be designed to inform schools of the availability and benefits of the program and how they can participate. The strategy will include specific outreach to schools and to contractors who typically do retrofits in schools. An important part of the marketing plan will be content and functionality on the TEP website, which will direct schools to information about the Program.

## Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix G.

## H. Retro-Commissioning

TEP is requesting budget approval for a new Retro-Commissioning ("RCx") program in 2012. A full program description and benefit-cost analysis is included in Appendix F.

### Program Description

The Retro-Commissioning program would use a systematic approach to identify building equipment and processes that are not achieving optimal performance or results in existing facilities. Eligible program applicants will receive free screening energy audits. Participants will also receive training to ensure proper operating and maintenance practices over time.

### Program Objectives and Rationale

The program seeks to generate significant savings for DSM portfolio objectives by tapping into energy savings opportunities in existing commercial and industrial facilities. The program will deliver customer benefits by lowering energy bills and improving building performance and occupant comfort while reducing maintenance calls. The program will also facilitate the development of an RCx contractor pool, and will enable TEP to develop relationships with commercial and industrial customers leading to other areas of participation in TEP's portfolio of DSM programs. RCx programs in other utility service territories have been shown to deliver average facility savings in the range of 5-15% per facility, and measures implemented as a result of program activity typically pay for themselves in savings in less than two years.

### New Measures for 2011-2012

Table 5-7 presents new measures to be rebated by the program in 2011 and 2012.

**Table 5-7. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| Retro Commissioning | baseline building | custom actions | $22,000/ 100k sq ft | - | 5 | 4.3 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits is included in Appendix F.

### Delivery and Marketing Strategy

The program will be marketed using traditional forms of media (print, web, newsletters, etc.), as well as targeted direct mail and outreach to engineering and trade associations. TEP and the implementation contractor will also reach out directly to contractors who currently are, or could be, practicing in this area. The TEP website will also be updated to include information and links for participation in this initiative. Account managers will also be called upon to reach out to larger customers to encourage participation.

### Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix F.

## VI. Behavioral Comprehensive Programs "Tucson Energy Partnership"

The following section presents a summary of TEP's Behavioral Suite programs including new programs, enhancements to existing programs consistent with the requirements of Section R-14-2-2407 of Decision No. 71436, and existing programs where no changes are anticipated. Detailed program descriptions and cost-effectiveness results for each new program are included in the appendices.

TEP is requesting budget approval for a new Behavioral Comprehensive program in 2011. A full program description and benefit-cost analysis is included in Appendix H.

### Program Description

The Behavioral Comprehensive program is a new program offering in the 2011-2012 program portfolio. This program is meant to work in concert with TEP's Home Energy Report program, which was filed with the Commission on August 25, 2010.

The Behavioral Comprehensive program is meant to address the fact that technology-based energy efficiency achieves only a finite amount of efficiency potential. The barriers to wider-spread implementation of energy efficiency are sociological not technological. Capturing full energy efficiency potential requires behavior change thus all energy efficiency programs need to integrate behavior change strategies into their DSM portfolios in order to fully realize their potential. Behavioral initiatives apply to all TEP customers. The focus for this effort is on behavioral change within residences.

The types of behaviors to be influenced include:

- Habitual behaviors
  - » Adjust thermostat setting
  - » Turn off unnecessary lights
- Small purchasing and maintenance behaviors
  - » Purchase and install faucet aerators and low flow shower heads
  - » Purchase and install compact fluorescent light bulbs
  - » HVAC maintenance
- Larger purchasing decisions
  - » Purchase an ENERGY STAR appliance
  - » Purchase higher EE heating and cooling system through participation in a TEP DSM program

The Behavioral Comprehensive program is made up of a suite of programs that will use six delivery mechanisms to achieve efficiency objectives, as shown in Table 6-1.

**Table 6-1. Summary of Behavioral Programs**

| Behavioral Programs | | |
|---|---|---|
| 1 | Home Energy Reports | Comparison of energy use to that of neighbors |
| 2 | Behavior Comprehensive | |
| 2a | Direct Canvassing | Door to door awareness and direct install campaign |
| 2b | K-12 Education | Classroom education including take home direct install kits |
| 2c | Community Education | "Train the trainer" approach and give away direct install kits |
| 2d | In Home Energy Use Monitors | A sub-pilot of the smart meter program, displays provide near real time usage information |
| 2e | CFL Giveaway | CFL bulb giveaways at outreach events |

## Program Objectives and Rationale

The main objective of the behavioral programs is to provide customers with more information to allow them to better understand and manage their energy usage. Several approaches are being implemented and will be assessed to determine the effectiveness and benefits of making this information available. Some of the program's major objectives include:

- Generating significant savings for DSM portfolio objectives.
- Developing relationships with TEP customers leading to other areas of participation in TEP's portfolio of DSM programs.
- Promoting efficient building operations.
- Lowering energy bills for the consumer.

## New Measures for 2011-2012

Table 6-2 presents new measures to be implemented by the program in 2011 and 2012, description of base and high efficiency, and the schedule for implementation as noted by the year in which the initiatives will be rolled out.

**Table 6-2. Measure Efficiencies, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Base Efficiency | High Efficiency | Avg. Incentive Per Unit | 2011 Est. Units | 2012 Est. Units | Measure Level Societal Cost Test |
|---|---|---|---|---|---|---|
| K-12 Education Kit | no action | 2 CFLs, Faucet Aerator, LED nightlight, Refrigerator thermometer | $20/home | 6,000 | 6,000 | 2.86 |
| Community Education Kit | no action | 2 CFLs, Showerhead, Faucet Aerator, LED nightlight, Refrigerator thermometer | $56/home | 400 | 400 | 2.29 |
| Direct Canvassing Kit | no action | 2 CFLs | $3/home | - | 41,000 | 7.28 |
| CFL Giveaway (23W) | no action | 23W CFLs | $2/home | 150,000 | - | 10.46 |
| CFL Giveaway (18W) | no action | 18W CFLs | $2/home | - | 150,000 | 6.67 |
| In Home Energy Display Pilot | no action | Home Energy Display results in 2.5% savings | $70/home | 600 | 600 | 1.13 |

*Additional detail on measure level savings, societal benefits/costs, and environmental benefits of new measures is included in Appendix H.

## Delivery and Marketing Strategy

All TEP residential customers will be eligible for this program. Delivery will be offered to various groups of customers as selected by TEP and those who attend events. Delivery will be made through implementation contractors and TEP resources. Selection of contractors will be made through a request for proposal process.

Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix H.

## A. Home Energy Reports

Program Description

TEP's Home Energy Report Program was filed with the Commission on August 25, 2010. Assuming Commission approval of this program, TEP is requesting budget approval to continue the Home Energy Reports program with no additional modifications. The Home Energy Reports program will now join "Behavioral Comprehensive" as part of TEP's comprehensive "Behavioral Energy Efficiency Programs" plan.

The Home Energy Report program is designed to affect: (1) habitual behaviors like turning off the lights or adjusting the thermostat; (2) maintenance behaviors such as changing furnace filters and cleaning refrigerator coils; and (3) purchasing behaviors such as buying efficient light bulbs and appliances as well as participation in DSM programs. The program influences behavioral change in customers to reduce their energy consumption through targeted and comparative education and awareness of their energy consumption compared to others. The Home Energy Report does so through monthly or quarterly direct-mail reports on energy consumption and tips on how to save energy, at no cost to the customer. Making customers aware of their energy consumption patterns, especially in comparison with those of the other customers, has been shown to inspire behavioral changes toward energy efficiency.

The pilot program will be offered to a select group of residential customers and phased in at four levels. TEP expects the target group of customers to be chosen based on their historical energy use (higher than average energy use). TEP expects this group to include customers who display an annual consumption of 15,000 kilowatt hours ("kWh") or more for Phase 1 (25,000 customers with a control group). In phase 2, first year program participation will be evaluated and the program refined according to findings, while in phase 3 (2nd program year), participation is planned to increase to 40,000 customers. Finally, in phase 4, an independent MER evaluation is planned.

Program Objectives and Rationale

The major objectives from this program are to: generate significant savings for DSM portfolio objectives; educate and empower customers to take advantage of other DSM programs; promote efficient building operations; and lower energy bills for consumers.

New Measures for 2011-2012

There are no new measures proposed since the August filing.

Delivery and Marketing Strategy

The implementation contractor will deliver the program with responsibility for all aspects of customer selection, report generation, energy savings quantification, customer communications, and reporting.

All Home Energy Report products will be automatically mailed to the target market by the implementation contractor. Thus, no direct marketing is anticipated for this program. TEP will, however, jointly develop the marketing message contained in the Home Energy Reports with the contractor. The program will also be included in the integrated marketing approach developed and used for all DSM measures.

Measurement, Evaluation, and Research Plan

The MER plan is consistent with the previously filed strategy.

# VII. Support Programs

Support programs cut across the other program areas and provide technical and financial support for the effective implementation of all other programs.

## A. Education and Outreach

TEP is requesting budget approval to continue this program with no additional modifications.

### Program Description

The Education and Outreach ("E&O") Program is an ongoing program previously approved in Decision No. 70402 (July 3, 2008). The program is intended to increase participation in the Company's other DSM/EE programs, but is also intended to effect a broader market transformation that includes changes in customer's behavior. The program includes three basic educational components and a budget for program evaluation. The Academic Education section of the E&O program is included in Section VI, Behavioral Comprehensive (K-12 Education). Among the E&O program components are the following:

- General Energy Efficiency advertising component to cover seasonal ad's that encourage energy savings through energy saving tips, marketing the on-line energy audit, and marketing other energy efficiency programs to customers;
- On-Line Energy Audits and Carbon calculator from Aclara for inclusion on TEP website. After approval of the Home Energy Reports Program, on-line audits will be included in Section 6.2 Behavioral Comprehensive ( Home Energy Report – Opt In clause);
- Time-of-Use education to teach residential and small commercial customers about the benefits of TOU rates and enable customers to maximize savings through load shifting;
- Program evaluation.

### Program Objectives and Rationale

The program consists of education and marketing intended to inform customers about the benefits of energy conservation and to inform those customers on how to achieve energy savings. Because the aim of this program is to change behavior it is difficult to objectively assess cost effectiveness or measure actual energy or environmental savings.

### New Measures for 2011-2012

There are no new measures in this program for 2011-2012. The program includes only existing items approved in Decision No. 70402 (July 3, 2008) and because it consists only of education and marketing, the program did not require a cost-effectiveness test.

### Delivery and Marketing Strategy

There are no significant changes in implementation approach or delivery strategy for the items in this program.

### Measurement, Evaluation, and Research Plan

The MER plan is consistent with the previously filed strategy.

## B. Codes Support - Pilot

TEP is requesting budget approval for a new Codes Support Pilot program in 2011. A full program description is included in Appendix C.

### Program Description

The Energy Codes Enhancement Program ("ECEP") will be an ongoing element of the TEP portfolio. The Program will strive to maximize energy savings through adherence to local building energy codes across the local jurisdictions within TEP service area. The program will employ a variety of tactics aimed at: 1) improving levels of compliance with existing building energy codes; and 2) supporting and informing periodic updates to energy codes as warranted by changing market conditions. Specific program activities will depend on the market needs expressed by local code officials and are likely to include a combination of efforts to:

- Better prepare code officials and building professionals to adhere to existing standards;
- Provide data and market insight to document the specific local benefits of code enforcement, and inform energy code changes over time;
- Ensure utility incentive programs align well with local energy codes;
- Collaborate with relevant stakeholders to help build a more robust community working to advance strong and effective building energy codes across the local jurisdictions within TEP, UNS Electric and UNS Gas service territories; and
- Advocate for energy code updates over time.

### Program Objectives and Rationale

The ECEP's objective is to increase energy savings in new construction and renovated buildings in both the residential and commercial sectors through efforts to: 1) improve levels of compliance with existing building energy codes; and 2) support and inform periodic energy code updates as warranted by changing market conditions.

### New Measures for 2011-2012

No new measures included in the program for 2011 and 2012.

### Delivery and Marketing Strategy

Program activities will be selected based on research into effective approaches implemented in leading jurisdictions (e.g., California and Massachusetts), as well as feedback from local code officials, and municipal leaders in locations that currently lack building codes. Once program activities are selected, program staff will maintain a consistent level of activity and engagement with relevant stakeholders. Activities might include: participation in energy code adoption committees, technical support (calculations, research, information) to code adoption committees, public testimony in support of code adoption before city councils, ensuring that ongoing DSM programs align well with energy code requirements, and funding for local code agencies to enforce and improve energy code over time.

Marketing strategy will include website promotion, direct outreach to local code officials and networks of municipal leaders who are members of committees conducting activities related to building code enhancement and communications with other TEP energy efficiency program implementation staff.

### Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix C.

## C. Residential Energy Financing

TEP is requesting budget approval for a new Residential Energy Financing pilot program in 2011. A full program description is included in Appendix B.

### Program Description

TEP anticipates starting the Residential Energy Financing Program with a two year pilot program which will allow sufficient time to evaluate the program, including participation, default rates, and overall value to customers. The program will offer energy efficiency loans to TEP customers who are seeking financing for the energy efficiency improvements to their homes. Loan proceeds can be used for energy efficiency measures that have been approved by the Commission as part of the Existing Homes/ Direct Install Program. The program may also offer classroom training sessions for contractors, and building professionals who will offer the financing program to customers, collaborate with the SWEEP and other regional groups to support research on utility financing programs; and work together with APS and Southwest Gas to determine a plan to 'partner' on financing programs offered in joint territories with different financing partners.

### Program Objectives and Rationale

The Residential Financing Program's objective is to offer low interest unsecured loans for up to $15,000 for energy efficiency measures installed in existing homes. The Financing Program will provide customers with the capital needed to make cost-effective energy efficiency upgrades to their homes and is anticipated to improve customer participation as well as expand the pool of customers that can afford to participate in energy efficiency programs.

### New Measures for 2011-2012

This program is a financing program used to support other program measure adoption. Therefore, there are no measures under this program.

### Delivery and Marketing Strategy

A utility program manager will coordinate between the Lender and TEP on all fund transfers, provide overall management, marketing oversight, planning and tracking of customer and contractor participation and coordinate all activities necessary to develop application forms and contractor training. Partnerships with community interest groups, HVAC, insulation, and air sealing contractors trained in program procedures and Arizona Energy Office or other industry experts to provide training, education and awareness.

TEP will provide program marketing and customer outreach and awareness through a range of strategies including: website promotions, brochures, training and seminars for participating trade allies and contractors, and promotions through contractors and community interest groups.

### Measurement, Evaluation, and Research Plan

An overview of the MER plan for this program is included as part of the larger program design filing, detailed in Appendix B.

## VIII. Portfolio Management

TEP will serve as the overall program administrator for delivery of the Energy Efficiency Portfolio. To expedite a quick launch of the programs, and to take advantage of cutting-edge program implementation experience from other parts of the country, TEP plans to implement programs through a combination of third-party implementation contractors and utility staff. TEP designs programs on the most cost-effective basis utilizing implementation contractors where they provide the lowest cost per kWh and likewise utilizing TEP staff when appropriate. Contractors will be selected through a competitive request for proposal process for delivery of programs.

TEP anticipates providing high-level administrative, contract management, program design and marketing oversight of the selected implementation contractors. A portfolio of this proposed size and scope will require careful management oversight. TEP will have a small and dedicated group of energy efficiency program staff overseeing third-party implemented programs and promotion of cross-sector education and awareness activities.

TEP will also develop a comprehensive tracking database to ensure accurate and comprehensive recording of all program participation Additionally, the database will allow TEP to research and track participation by customer class and geographic area, and to identify trends and untapped opportunities to advance program goals. TEP staff will also take primary responsibility for general energy efficiency education and awareness strategies and activities, including the corporate Web site, online energy audit software, mass-market general education and efficiency awareness promotions.

In summary, TEP will provide comprehensive program contract oversight, strategic planning, including management, financial planning and budgeting, as well as:

- High-level guidance and direction to the implementation contractors, including review and revision of proposed annual implementation plans and proposed milestones, and, additionally, engage with the contractor team on a daily basis when working through strategy and policy issues.
- Review and approval of implementation contractor invoices and ensure program activities are within investment and on schedule.
- Review of implementation contractor operational databases for accuracy, ensuring incorporation of data into TEP's comprehensive portfolio tracking database to be used for overall tracking and regulatory reporting.
- Review of measure saving estimates maintained by the implementation contractor.
- Oversight and coordination of evaluation, measurement, and verification contractors.
- Public education and outreach to community groups, trade allies and trade associations.
- Provide guidance and direction on new initiatives or strategies proposed by the implementation contractors.
- Communicate to implementation contractors other TEP initiatives that may provide opportunities for cross-program promotion.
- Review and approve printed materials and advertising plans from Implementation Contractors
- Create and provide collateral material for advertising on program delivered by the utility.
- Evaluate portfolio and program effectiveness and recommend modifications to programs and approach as needed.

- Perform periodic review of program metrics, conduct investment analysis, and review evolving program design.

## A. Marketing and Outreach Strategy

The marketing and outreach strategy for this portfolio of programs will encourage participation among customers, key market players and trade allies. The objective of the marketing and communications strategy is to make customers and key market actors aware of program offerings and benefits, and to influence their decision making when purchasing or installing energy systems or equipment in favor of more energy efficient options.

The specifics of the marketing strategy will depend on the program and the demographics of the group being engaged. Depending on the market to be reached, marketing will generally include a mix of broadcast, Internet, print media, radio, direct contact, direct mail, bill inserts, or presentations. The program descriptions describe the proposed marketing approach for each program.

Additionally, TEP will work with regional, state, and national programs and partners to optimize cooperative marketing programs and campaigns. Marketing efforts will be designed to dovetail with other statewide or regional efficiency programs and campaigns, including those offered by APS.

## B. Tracking and Reporting

TEP plans to build a comprehensive internal tracking and reporting system to record all activities from the energy optimization portfolio of programs. Data tracking systems are being used successfully in numerous other states, and TEP intends to benefit from the learning that has occurred there. Implementation contractors will be responsible for tracking and reporting energy efficiency program activities by entering details of each project into the comprehensive data tracking system. The system will allow customized reporting to meet any reporting requirements in a quick, transparent and accurate manner.

## C. Midstream Adjustments

While this plan presents detailed information on approach, energy efficiency measures and proposed incentive levels, unforeseen changing market conditions, will require regular review and revisions of portions of this plan to reflect new information. As such, adjustments to these programs will likely be necessary. When this is the case, the Commission will be updated in a timely manner and given opportunity to provide input.

## D. Inter-Utility Coordination

TEP will work with APS, Southwest Gas, and other utilities to maximize the effectiveness of the programs; in particular, where gas and electric services overlap, regular communication and coordination will be necessary. This collaboration will involve working together to identify savings opportunities, as well as providing consistent messaging and parallel programs to reduce confusion and difficulty for customers and trade allies. TEP intends to continue to collaborate with others to send cohesive marketing messages, as well as designing incentive programs, forms and incentive levels that are easily transferable with adjacent utilities.

## E. Leveraging Other Efficiency Initiatives

Within Arizona, several entities are promoting energy efficiency including: the state government; SWEEP; U.S. Environmental Protection Agency and U.S. Department of Energy's "ENERGY STAR®" brand; as well as Federal tax credits. TEP and its implementation contractors will work diligently to remain aware and up to date, and to cooperate with efficiency efforts being directed at Arizona energy users. Wherever feasible, co-marketing efforts will be employed in an attempt to send a clear and consistent message on the benefits of energy efficiency and the resources available to help achieve it.

Additionally, TEP is planning to benefit from experiences in other areas of the country by joining the Consortium for Energy Efficiency ("CEE") and E-Source, which will provide TEP program managers information and contacts to assist with continuous program design and delivery improvements of the portfolio.

## F. Trade Ally Coordination

Trade allies are essential to effective implementation of energy efficiency programs. Trade allies are considered program partners and will be treated accordingly. Relationships with trade allies will be cultivated and nurtured through numerous methods to ensure effective communication in both directions. Trade allies will be regularly informed of program progress. Changes and feedback from trade allies about "what is working and what is not" in the field are essential. To ensure good two-way communication, we will emphasize coordination, "listening sessions," and frequent communications with these key partners to advance program goals. A schedule of meetings, workshops, educational seminars, program update breakfasts, and clear and concise program descriptions will be distributed to the trade allies at the program kick off meetings. Ongoing training and program updates also will be a key part of program delivery.

# IX. Measurement, Evaluation & Research

TEP is required by the Commission to carry out MER activities as a means to verify program savings impacts and monitor program performance.[2] Evaluation activities will also benefit TEP's DSM program efforts by documenting actual program level savings being delivered, identifying areas for improvement and helping to maximize the efficiency and effectiveness energy efficiency investments. The evaluation principles discussed in this section, and the detailed program-specific plans that will be presented in a separate research plan, are informed by the leading guidance documents in the DSM evaluation field. These documents include:

- U.S. EPA's Model Energy Efficiency Impact Evaluation Guide: A Resource of the National Action Plan for Energy Efficiency (2007);
- Efficiency Evaluation Organization's International Performance Measurement and Verification Protocol (2009);
- California Public Utility Commission's California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals (2006); and
- EPRI's End-Use Performance Monitoring Handbook.

What is referred to as MER in Arizona is often called program evaluation, measurement, and verification (EM&V) elsewhere. Effective EM&V ensures that expected results are measurable, achieved results are robust and defensible, program delivery is effective in maximizing participation, and the overall portfolio is cost-effective.

## A. Definition of Evaluation, Measurement, and Verification

Evaluation encompasses process, impact and market evaluation activities as defined below.

### Process Evaluations

Process evaluations address whether the programs were implemented as designed, examining perceived market barriers and opportunities, measuring participant satisfaction, documenting the program process, and exploring opportunities for efficiency improvements.

### Impact Evaluations

Impact evaluations validate the energy and demand savings produced by a program. These evaluations validate program-reported savings by verifying the type, quantity and efficiency of measures installed, examining the measures replaced by the program for retrofit applications, or estimating the normal or standard baseline equipment for new construction applications.

### Market Evaluations

Market evaluations examine program and market assessment "indicators" developed for each program and assess how these indicators change over time. The indicators are typically derived from a program logic formulation developed during program design and early implementation. The program logic model is a simple representation of the program and the underlying hypotheses that are expected to account for the program's success in the market. Typically, program logic models are organized around the program inputs, processes, and outputs. From this formulation, a set of key market indicators that can be tracked over time is developed (and modified over time, as needed).

[2] Arizona Corporation Commission Decision No. 71436 (December 18, 2009) and A.A.C. R14-2-2415.

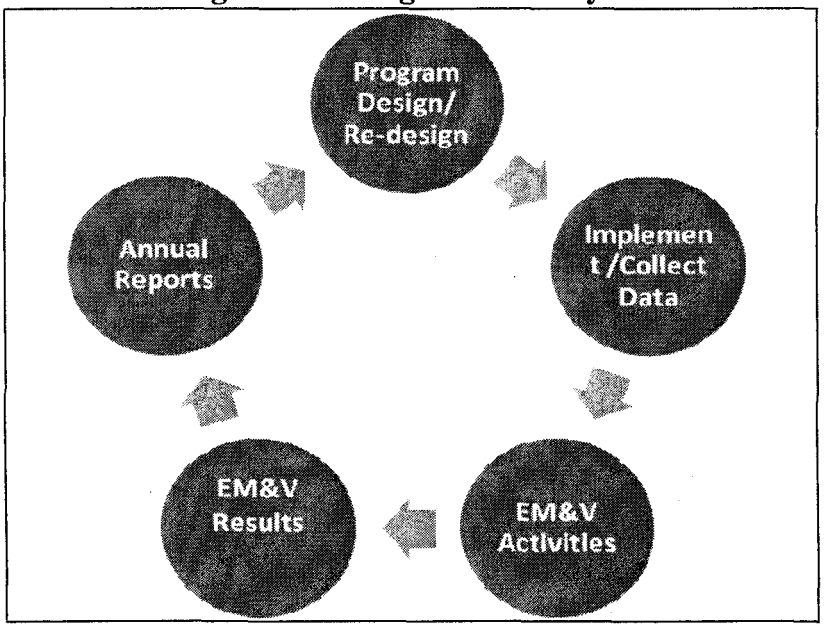
- *Monitoring* includes developing a program data tracking system to support the evaluation effort; i.e., monitoring of results and verifying the installation and retention of measures and equipment promoted by the DSM program where appropriate.
- *Verification* includes a review, audit, and verification of claimed program savings and recommendations for improvement.

## B. Approach to Evaluation

The overall evaluation approach is based on an integrated cross-disciplinary model that includes evaluators as members of "project teams" involved in the various stages of program planning, design, monitoring and evaluation. This is a cost-effective method that has proven successful for other utilities.

Figure 9-1 below shows the program evaluation cycle. As shown, the stages of the program lifecycle inform one another. Findings from MER activities provide valuable inputs into program redesign, and the MER process plays an important role in enhancing program effectiveness and improving outcomes.

**Figure 9-1. Program MER Cycle**




This approach ensures the program evaluation effort is fair and objective. MER planning must consider a variety of factors in determining the timing and scope of evaluation activities to be conducted in a given year. These factors include distribution of regulatory requirements, savings across programs, available evaluation resources, and the stage of each program's implementation.

Approximately 4% of overall portfolio program costs will be allocated to the following activities. TEP plans to invest an appropriate level of resources into the impact evaluation tasks to comply with regulatory requirements, but to ensure that sufficient resources are available to conduct market research. Allocating resources to process evaluation and market research is important because findings from this research will inform the future direction of the programs going forward.

## C. Examples of EM&V Related Activities

Implementation and/or evaluation support contractors will assist in the development of key program and evaluation related components. These include:

- Compilation and review of the savings estimates used for prescriptive measures including measure savings assumptions, including base efficiency, high efficiency, measure size, measure life, free ridership, and spillover estimates.
- Review the portfolio tracking system database that captures measure and/or project data, develops initial estimates of savings, and retains participant information to assist with subsequent EM&V activities.
- Direct market baseline research and market characterization to support improved Plan implementation.
- Review program and measure cost-effectiveness

## D. Project Savings Verification and Due Diligence

TEP will work with implementation contractors to develop and implement quality assurance/control, inspection, and due diligence procedures for those programs for which deemed savings are not appropriate. These procedures will vary by program and are necessary to assure customer eligibility, completion of installations, and the reasonableness and accuracy of savings. The activities that TEP will undertake in performing MER procedures may include, but are not limited to, the following:

- Review custom rebate applications and project proposals for eligibility and completeness
- Inspect and verify a statistically valid sample of installations for purposes of ensuring compliance with program requirements
- Prepare and facilitate MER plans where needed based on the project, and assure adherence to IPMVP protocols

## E. Independent Program Evaluations

Preliminary descriptions of proposed evaluations for each program are included in the program plans.

The key components of the process and impact evaluations include:

- Evaluations conducted by an independent, DSM evaluation consultant. Verification, by an appropriate sample, that efficiency measures are installed as expected;
- In-field measure performance measurement and data collection;
- Energy and demand savings analysis to compute the results that are being achieved;
- Cost-effectiveness analysis by program and overall DSM portfolio;
- Process evaluation to indicate how well programs are working to achieve objectives; and
- Identification of important opportunities for improvement.

## F. Assessment of Annual Impacts

TEP's MER contractor will prepare an annual report of energy efficiency program results, which will incorporate findings from evaluation activities completed that year, changes to programs, and new programs implemented, as well as gross and net savings and costs and cost-effectiveness results by program and portfolio. It is anticipated that the MER contractor's work, as well as participation in the process by the implementation contractor, will result in numerous areas where improvements and refinements are necessary.

TEP will require implementation contractors or staff to routinely contact or visit a sample of participating customers to assess the quality of program delivery and the installation of measures for which incentives were claimed.

## G. Coordinate Evaluation Activities with Other Players

As noted above, wherever it is practical and appropriate, evaluation activities will be conducted in conjunction with other utilities and agencies in the state to leverage funding and help ensure consistency.

## X. DSM Tariff

A.A.C R14-2-2405(A) requires TEP to file its initial EE Implementation Plan within 30 days of the effective date of the Electric Energy Efficiency Standard (by January 31, 2011). A.A.C. R14-2-2405(A) also requires that subsequent plans be filed on June 1 of each odd year, making TEP's next EE Plan due June 1, 2013. In order to inform the Commission of TEP's plan to meet the 2012 EEES, TEP is filing a two year implementation plan here (2011-2012). TEP will file its EE Plan for 2013 on June 1, 2012, and will follow with its 2014-2015 EE Plan in June of 2013.

So that the Company can continue its effective implementation of the EEES, TEP requests that the DSMS as filed be reviewed and implemented by June 1, 2011. This expedited review and implementation of the DSMS will keep the Company's recovery of program costs on track with the previously implemented DSM Surcharge. Moreover, it will ensure no gaps in implementation or program delivery between the previously approved DSM Plan and the newly filed EE Plan, which is critical to the Company's recovery of program costs and is in the best interest of rate payers.

TEP seeks to recover three components within its DSM Surcharge: (i) program cost recovery; (ii) performance incentive recovery; and (iii) authorized revenue requirement true-up ("ARRT"). While there are three popular models for recovery of DSM/EE costs (capitalization of DSM expenses, fixed payment for each kWh (DSM Surcharge), and increased rate of return), the Commission chose the DSM surcharge as the appropriate mechanism to provide program cost recovery and recovery of performance incentives (see Decision No. 70628 (December 1, 2008)). Given the Commission's preference of this adjustor, TEP proposes use of the DSM Surcharge to also recover shortfalls in the recovery of authorized revenue requirement until the time that decoupling can be implemented in the Company's next general rate case.

TEP recognizes that A.A.C. R14-2-2410(J) states "[t]he Commission shall review and address financial disincentives, recovery of fixed costs, and recovery of net lost income/revenue, due to Commission-approved DSM program" in the Company's rate case. But TEP has frozen rates and cannot file its next rate case until July 1, 2012 (see the Company's Proposed Settlement Agreement approved in Decision No. 70628 (December 1, 2008) in Dockets E-01933A-05-0650 and E-01933A-07-0402). By the time decoupling could be implemented for TEP, the Company will have had to meet the EE Standard for 2011, 2012, and 2013 with no mitigation of the degradation to authorized rate recovery.

TEP believes that the Commission issued Policy Statement Regarding Utility Disincentives to Energy Efficiency and Decoupled Rate Structures ("Policy Statement") (see Docket No. E-000005-08-0314) acknowledged the inability of utilities in this position to comply with the EE Standard. Specifically, the Policy Statement states "[t]he Commission believes it is critical that utility disincentives to demand side management programs and energy efficiency be addressed. As stakeholders recognized, it is unlikely that the EES can be met without addressing financing disincentive and impacts to utilities' revenues and earnings." Policy Statement page 27.

Given the foregoing, TEP believes that the Commission may implement the ARRT here. In the alternative, TEP believes that the Commission may grant it a waiver of the EE Standard(s) until such time as the Company can implement decoupling in its next rate case. Because TEP's preference would be to maintain compliance with the EES, TEP proposes cost recovery through the ARRT as a component of the DSM Surcharge as outlined in the attached EE Plan. TEP believes that the ARRT is a reasonable interim solution for the Company, and that its implementation is in the public interest.

## A. Program Cost Recovery

TEP is requesting approval to collect $51.1 Million in total DSM Program Costs. Pursuant to A.A.C. R14-2-2410(A), a utility may recover the costs that it incurs in planning, designing, implementing, and evaluating a DSM program or measure. R14-2-2410 (D) also allows utilities to recover DSM costs concurrently, on an annual basis, with spending for a DSM program or DSM measure. Table 10-1 shows the total projected spending for this 2-year plan. This 2011-2012 DSM filing will not include a true-up for the 2010 DSM filing due to the timing changes resulting from implementation of the Energy Efficiency Standard. The timing requirements of the EE Standard will result in changing the DSM filing date from April 1 to January 31 for 2011. Thus, the 2010 DSM filing reflected costs associated with the calendar year 2010 with a specified recovery period beginning June 1, 2010 and ending May 31, 2011. The 2011-2012 DSM filing is being filed prior to May 31, 2011 (the end date for the recoveries associated with the 2010 expenses) and cannot reflect a reconciliation of the revenues recovered during the twelve months ending May 31, 2011 to the twelve months of costs incurred in the calendar year 2010. That reconciliation will occur when the 2013-2014 DSM filing is made.

**Table 10-1. Total Projected Spending for 2011-2012**

| Cost Category | Costs |
|---|---|
| 2011 - 2012 Program Costs | $49,464,139 |
| Program Development, Analysis & Reporting Software | $1,634,633 |
| Grand Total | $51,098,772 |

## B. DSM Performance Incentive

### Performance Incentive Summary

TEP is requesting approval to collect $16.4 Million in pre-tax DSM Performance Incentives. The Commission has adopted the most stringent EE Standard in the country and utility Performance Incentives are widely recognized as a critical element to encourage utilities to extend efforts to meet or even exceed stringent EE Standards. Regulators recognize the need for utility DSM Performance Incentives that:

- properly align all stakeholders' interest; and
- are recovered at the same time or closely following investment in EE Programs.

The EEES as described in R14-2-2411 allows utilities to propose a utility performance incentive. TEP is requesting in this docket to update the current performance incentive structure approved by the Commission in Decision No. 70628 (December 1, 2008). The current utility performance incentive is structured using a shared incentive method based on a 10% share of "net" benefits (SCT measured) and with a 10% cap on spending. TEP is proposing a new structure for the 2011-2012 EE Plan.

### 2010 Performance Incentive

The current TEP performance incentive was approved in Decision No. 70628 (December 1, 2008). The 2010 performance incentive is calculated from 10% of net benefits capped at 10% of DSM expenditures (less LIW and Education and Outreach) and was to be collected through the 2011 DSM Adjustment Surcharge. The expected net benefits from 2010 are estimated at $43,856,831. The DSM expenditures for 2010 were $12,918,196. Thus the 2010 performance incentive to be recovered is $1,110,901.

### 2011 and 2012 Proposed Performance Incentive

TEP is proposing to continue using shared incentives based on "net" benefits but proposes to modify the performance incentive structure. This proposal reduces the percent share of net-saving and places a hard dollar cap based on 10% of net benefits rather than a cap on percent of spending. The hard dollar cap for

2011 and 2012 is proposed at $13,154,667 (after-tax). This structure is preferred over the percent spending cap because it encourages cost savings rather than spending to increase the performance incentive. The proposed tiered performance incentive, shown in Table 10-2, encourages performance over and above the established Energy Efficiency Standard and rewards utilities for this performance if accomplished at a lower cost. This model creates an atmosphere where utilities will place more emphasis on programs with the best cost-effectiveness and the highest net-benefits. This proposed tier structure is currently approved for APS and TEP supports the tiers shown in the table below. To truly capture the performance incentive TEP is requesting approval for an after-tax Performance Incentive.

**Table 10-2. Tiered Performance Incentive Model**

| Achievement of EE Goals | % of Lifetime Net Benefits |
|---|---|
| <85% | 5% |
| 85% - 95% | 6% |
| 96% - 105% | 7% |
| 106% - 115% | 8% |
| 116% - 125% | 9% |
| >125% | 10% (cap below) |
| Dollar Cap (2011 and 2012) | $13,154,667 |

- The performance incentive is calculated from the net benefits on the estimated annual energy reduction relative to the previous year's annual MWh sales as established in the EEES with the above spending cap.
- TEP is requesting approval to recover the estimated after tax 2011 and 2012 Performance Incentive through an incremental increase in the EE adjustor mechanism. The Performance Incentive will be trued-up to actual costs and benefits from the 2011 and 2012 program years when TEP files the 2013 and 2014 adjusted DSM Surcharge, respectively.
- The net-benefit ratio for all support programs including general Education and Outreach programs, Financing Programs, Codes and Standards, and for Low Income Programs is assumed to be 1.

The after-tax performance incentive for 2011 is $4,040,611; for 2012 it is $5,167,656. Both figures are based on TEP meeting 100% of the 2011 and 2012 EEES. Table 10-3 shows the expected net benefits by program in 2011 and 2012.

## Table 10-3. Net Benefits in 2011 and 2012

| | | 2011 | | | 2012 | | |
|---|---|---|---|---|---|---|---|
| | | Societal Benefit | Societal Cost | Net Societal Benefits | Societal Benefit | Societal Cost | Net Societal Benefits |
| Residential | Efficient Products | $15,149,022 | $2,553,611 | $12,595,412 | $16,228,105 | $3,919,764 | $12,308,341 |
| | Appliance Recycling | $2,554,803 | $1,315,725 | $1,239,078 | $2,554,803 | $1,318,533 | $1,236,270 |
| | Res. New Construction | $9,505,611 | $5,706,970 | $3,798,641 | $10,701,009 | $6,368,549 | $4,332,460 |
| | Existing Homes and Audit Direct Insta | $3,785,225 | $3,427,567 | $357,658 | $5,701,168 | $4,851,503 | $849,664 |
| | Shade Tree | $1,186,908 | $764,155 | $422,753 | $1,186,908 | $770,582 | $416,325 |
| | Low Income Weatherization | $522,302 | $432,165 | $90,137 | $522,302 | $437,426 | $84,875 |
| | Multi-Family | $0 | $0 | $0 | $430,515 | $169,738 | $260,777 |
| | Residential Direct Load Control - Pilot | $802,532 | $785,150 | $17,382 | $802,532 | $144,816 | $657,716 |
| | Subtotal | $33,506,403 | $14,985,343 | $18,521,061 | $38,127,342 | $17,980,913 | $20,146,429 |
| Commercial | C&I Comprehensive Program | $22,060,628 | $6,906,852 | $15,153,775 | $28,015,561 | $7,965,058 | $20,050,503 |
| | Commercial Direct Load Control | $7,024,009 | $1,285,846 | $5,738,163 | $14,048,019 | $1,299,959 | $12,748,060 |
| | Small Business Direct Install | $12,579,900 | $5,130,569 | $7,449,330 | $15,269,496 | $5,891,006 | $9,378,490 |
| | Commercial New Construction | $2,204,201 | $390,243 | $1,813,959 | $2,204,201 | $394,092 | $1,810,109 |
| | Bid for Efficiency | $883,893 | $364,261 | $519,632 | $1,388,974 | $613,092 | $775,882 |
| | Retro-Commissioning | $0 | $0 | $0 | $631,352 | $212,187 | $419,165 |
| | Schools Facilities | $0 | $0 | $0 | $500,568 | $158,687 | $341,881 |
| | CHP Joint Program - Pilot | $8,829,704 | $1,109,800 | $7,719,904 | $8,829,704 | $1,110,956 | $7,718,749 |
| | Subtotal | $53,582,335 | $15,187,571 | $38,394,764 | $70,887,875 | $17,645,037 | $53,242,839 |
| Behavio r | Home Energy Reports | $425,606 | $444,706 | -$19,100 | $680,970 | $626,990 | $53,980 |
| | Behavioral Comprehensive Program | $3,374,820 | $861,289 | $2,513,531 | $3,591,673 | $1,462,279 | $2,129,394 |
| | Subtotal | $3,800,426 | $1,305,996 | $2,494,431 | $4,272,643 | $2,089,269 | $2,183,375 |
| Support Programs | Education and Outreach* | N/A | $383,917 | $0 | N/A | $384,724 | $0 |
| | Residential Energy Financing* | N/A | $448,758 | $0 | N/A | $459,373 | $0 |
| | Codes Support* | N/A | $49,335 | $0 | N/A | $75,490 | $0 |
| | Program Development, Analysis and Reporting Software | $0 | $805,238 | -$805,238 | $0 | $829,395 | -$829,395 |
| | Subtotal | N/A | $1,687,248 | -$805,238 | N/A | $1,748,982 | -$829,395 |
| Total | Portfolio Total | $90,889,164 | $33,166,157 | $57,723,007 | $113,287,860 | $39,464,201 | $73,823,660 |

* Net Benefits are adjusted to $0. Benefits are likely to equal costs; however at this time they are not quantified

The combined net benefits from 2011 and 2012 are well over one hundred million dollars at $131,546,667. Thus the 2011-2012 after tax performance incentive at seven percent of the net benefits is $9,208,267, which is less than the $13,154,667 cap as shown in Table 10.4.

## Table 10-4. Performance Incentive After Tax for 2011 and 2012

| | 2011 | 2012 | Total |
|---|---|---|---|
| Total Lifetime Net Benefits | $57,723,007 | $73,823,660 | $131,546,667 |
| Calculated Performance Incentive* | $4,040,611 | $5,167,656 | $9,208,267 |
| Proposed Performance Incentive Cap (10% of Lifetime Net Benefits) | $5,772,301 | $7,382,366 | $13,154,667 |
| Performance Incentive (after-tax) | $4,040,611 | $5,167,656 | $9,208,267 |

*Assuming 100% of savings goal is reached, incentive is calcualted as 7% of lifetime net benefits

TEP is requesting to collect $16,394,598 in the 2011 and 2012 surcharge. This includes $9,208,267 from Table 10-4 multiplied by the gross revenue conversion factor from the last rate case (1.66) to determine the pre-tax amount added to the 2010 Performance Incentive already approved.

Table 10-5 shows the total of the 2010 Performance Incentive due TEP with the requested 2011 and 2012 Performance incentives at a pre-tax level.

**Table 10-5. Performance Incentive for 2011 and 2012 Surcharge**

| | Performance Incenitve |
|---|---|
| 2010 | $1,110,901 |
| 2011 (pre-tax) | $6,706,524 |
| 2012 (pre-tax) | $8,577,172 |
| Total | $16,394,598 |

## C. Authorized Revenue Requirement True-up

TEP is requesting approval to collect $18.2 million in Authorized Revenue Requirement True-up ("ARRT").

Successful implementation of cost-effective DSM programs will ultimately result in utility loss of authorized revenue from reduced kWh sales until those reduced sales are reflected in TEP's base rates. This occurs any time a variable energy-based (per kWh) charge is used to collect non-fuel fixed utility costs. The EEES did not provide a mechanism whereby utilities are guaranteed compensation for the loss of authorized revenue that occurs when volumetric sales decline due to energy efficiency measures.

TEP is therefore requesting approval to implement a mechanism to address this issue in the 2011 EE Plan. TEP proposes use of the DSM Surcharge as the appropriate mechanism to recover shortfalls of its authorized revenue requirement until the time that decoupling is implemented during TEP's next general rate case. TEP views this methodology as an 'interim' solution to be applied only for the years until TEP's rate settlement stay-out provision expires and revenue decoupling is approved by the Commission in TEP's next general rate case.

In implementing the ARRT, TEP proposes a straightforward authorized revenue requirement true-up mechanism that would remain in effect until approval of the next future rate case, anticipated in 2013, where revenue decoupling can be addressed. Implementation of the ARRT is critical to the Company's ability to maintain compliance with the EE Standard and as described above, the Company believes the Commission could issue a waiver to TEP for the 2011 and 2012 EE Standard to mitigate the fact the TEP cannot implement decoupling until 2013 at the earliest.

TEP proposes recovery via the Authorized Revenue Requirement True-up be calculated using the following method:

STEP 1 – Develop Monthly Energy Savings by Rate Class

The energy savings forecast was compiled by analyzing TEP historical program participation by rate class and by program. The historical numbers were used to determine the participation percentages of each rate class within the programs. The 2011and 2012 customer energy savings were determined by evaluating each program's potential participation levels by month. The monthly expected participation was then used along with the monthly deemed savings to determine the total energy savings by month. The total load reduction was then spread across the rate classes based on the actual historical participation by rate class.

The 2011 and 2012 forecasted total energy savings is the energy savings required to meet the Arizona Corporation Commission Energy Efficiency standard. It does not include energy efficiency savings from

prior years. The impact by rate class was again determined by applying the historical percentages by rate class to the forward energy savings requirement.

STEP 2 – Determine Authorized Revenue Requirement True-up by Rate Class

An Authorized Revenue Requirement True-up is equal to the non-fuel-related variable rate approved by the Commission in TEP's 2007 rate case. The Authorized Revenue Requirement True-up was derived by multiplying the monthly energy savings, as described above, to the unbundled delivery charges excluding meter services, meter reading, billing and collection and service drop for each participating rate schedule. The delivery charges excluded are charges associated with any applicable pricing plan customer charge and will be collected from all program participants and must therefore be removed from this calculation. The TEP non-fuel fixed costs items approved in the costs of service in the 2009 rate case are as follows:

- Delivery Charges consisting of meter services, meter reading, billing and collection, service drop.
- Generation capacity including fixed must-run
- Transmission capacity
- Distribution capacity
- Ancillary services consisting of system control and dispatch, reactive supply and voltage control, regulation and frequency response, spinning reserve service, and supplemental reserve service.
- System benefits defined as Uncollectible

The following classes and rate schedules are included in the Authorized Revenue Requirement True-up calculation.

- Residential - Rate R-01,
- Small General Service - Rate C-10 and Time-of-Use C-76,
- Large General Service – Rate I-13 and Time-of-Use I-85,
- Industrial I-14, and
- Other - Public Authority Rate O-40 and Lighting P-47.

The Authorized Revenue Requirement True-up, attached as Exhibit 4, shows the monthly and annual results of this calculation by rate class for calendar years 2011 and 2012. These projections are based on TEP's best estimates of market penetration for each program. TEP will recover the ARRT through the DSM Surcharge and will be reset coincident with the effective date of applicable changes to the Utility's rates or eliminate this incremental portion of the DSM Surcharge in conjunction with the approval of revenue decoupling in a manner that will not leave a gap or result in double recovery. A summary of the AART by rate class is shown in Table 10-6 for years 2011-2012.

**Table 10-6. ARRT by Rate Class**

| | Residential | Small General Service | Large General Service | Industrial | Other | Total |
|---|---|---|---|---|---|---|
| Total | $10,397,500 | $5,968,052 | $1,009,779 | $652,873 | $222,063 | $18,250,267 |

## D. Total Demand-Side Management Surcharge

The total DSMS requested in this EE Plan is comprised of: 1) Program Cost Recovery; 2) Utility Performance Incentive; and 3) Authorized Revenue Requirement True-Up. TEP is requesting approval to collect costs as shown in Table 10-7.

**Table 10-7. DSM Surcharge Total**

| Cost Category | 2011 | 2012 | | Total |
|---|---|---|---|---|
| Program Budget | $23,612,677 | $27,486,095 | | $51,098,772 |
| Performance Incentive (2010) | $1,110,901 | NA | | $1,110,901 |
| Performance Incentive | $6,706,524 | $8,577,172 | | $15,283,696 |
| ARRT | $4,402,226 | $13,848,041 | | $18,250,267 |
| **Total** | **$35,832,328** | **$49,911,308** | | **$85,743,636** |
| Requested Surcharge | | | | $0.005675 |
| Current Surcharge | | | | $0.001249 |
| Incremental Change | | | | $0.004426 |

The total DSMS for 2011-2012 will be $.005675/kWh compared to the 2010 DSMS of $.001249. The total 2011-2012 surcharge will contribute $4.99 per month to the average residential customer bill compared to $1.10 from the 2010 DSMS.

## XI. Other Administrative Requests

### Flexibility

In an effort to maintain participation in its highly successful EE programs, TEP requests Commission approval to shift approved funds between programs, and to moderately increase the budgets outlined in the 2011-2012 EE Plan where it would be cost-effective to do so. Flexibility of this sort has proven itself valuable in the implementation of the REST and TEP believes it is equally important here. In order to effectively and smoothly implement the EEES, utilities must be able to accept applications for customer inclusion in each energy efficiency program even though an individual program may, at the time, be oversubscribed. This type of flexibility is also necessary to maximize participation in the highly successful Commercial and Residential programs that TEP administers. In order to facilitate this type of flexibility, TEP respectfully requests Commission approval of the following language in its EE Plan approving Decision:

> *"TEP will be allowed to shift up to 25% of approved funds from Residential to Commercial or from Commercial to Residential programs as deemed necessary based on program activity, and TEP will be allowed the option of increasing up to 25% of the total Energy Efficiency budget where cost-effective, to continue participation until approval of the next regularly scheduled Energy Efficiency Implementation plan."*

In addition, TEP would agree to evaluate program progress and requirements to shift funds from one program to another and to provide updates to the Commission at any interval requested by the Commission.

### Reporting

Pursuant to A.A.C. R14-2-2409(D), TEP requests that the reporting requirements in the EEES supersede the Company's existing reporting requirements as found in the Company's Proposed Settlement Agreement approved in Decision No. 70628 (December 1, 2008) in Dockets E-01933A-05-0650 and E-01933A-07-0402. Specifically, TEP requests that the reporting requirements contained in R14-2-2409 replace (i) TEP's April 1st surcharge filing requirement as found in Section 9.5 of the Proposed Settlement Agreement; and (ii) TEP's requirement to file semi-annual reports on March 1st and September 1st of each year as found in Section 9.6 of the Proposed Settlement Agreement.

# EXHIBIT 1

# Memorandum

**To:** DSM Collaborative

**From:** UniSource Energy & APS

**Date:** October 1, 2010

**RE:** Arizona Benefit/Cost Analysis of DSM Programs Memo No. 1

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**Introduction:**

The attached white paper presents recommendations from APS, UniSource Energy, and various DSM Collaborative group stakeholders on the interpretation of inputs and methodologies to be used when developing the societal benefit-cost test (SCT) as prescribed in the rulemaking on electric energy efficiency[1]. This document is intended to provide a consistent, efficient, and transparent method to assess the cost effectiveness of both planned and implemented DSM activities.

Key recommendations in the white paper include;

1. Avoided cost of energy will be stated as levelized costs and will be developed using the assumptions for the forecasted marginal production costs included in the integrated resource planning (IRP) model, with adjustments as appropriate for the impacts of the energy savings planned through the energy efficiency standard.
2. Until such time that the financial and legislative impacts of carbon mitigation are developed, the marginal production costs for energy will include an estimated cost of carbon that is imbedded in the marginal production cost of energy included in the IRP filed by each individual utility. As the IRP Rule sets forth, any interested party may provide, for the Commission's consideration, analyses and supporting data pertaining to environmental impacts.
3. Avoided cost of generation capacity will be stated as annual levelized costs based primarily on the cost of the next marginal unit identified in the IRP generation plan. Utilities may also use an approach that combines the next marginal unit cost and the cost of short term market capacity where appropriate.
4. The avoided cost of generation capacity will include the value of both principal and interest payments over the term of the debt incurred in installing these resources.
5. A societal discount rate will be used that will be based on the yield for U.S. Treasury securities up to a cap of 4%.
6. Administrative costs for energy efficiency measures will be applied at the level of program cost-effectiveness analysis and do not enter into the screening of individual DSM measures. Individual measure screening will be based on savings and measure incremental costs only.
7. The net-to-gross ratio will be assigned a value of 1 in cases where free ridership, spillover, and market influence effects cannot be measured or estimated with a reasonable degree of confidence.

This document is the result of DSM Collaborative meetings held on February 5th and May 18th, 2010, to begin the process of establishing a common framework between APS, TEP, and ACC for calculating benefit-costs of DSM activities. The results of the discussions were compiled and circulated for comment to all of the interested parties by Navigant Consulting. Comments, feedback and suggestions were then incorporated into this white paper guide.

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[1] Referenced in docket number RE-00000C-09-0427, the rulemaking on electric energy efficiency.

# Benefit/Cost Analysis of DSM Programs: A Guide for Arizona Investor Owned Utilities

## Contents

# I. Objective

This white paper presents the interpretation of inputs and methodologies to be used when developing the societal benefit-cost tests prescribed in docket number RE-00000C-09-0427[2], the proposed rulemaking on electric energy efficiency. The recommended inputs and methodologies are supported by APS and Unisource Energy and will allow Arizona IOUs to apply a consistent approach in screening the cost effectiveness of new energy efficiency measures and program offerings, and also in assessing the cost effectiveness of measures and programs already deployed. This document seeks to accomplish the following;

1. Provide a common approach between the utilities and Staff to conduct benefit cost analysis of DSM measures and programs being considered for implementation or being assessed after implementation;
2. Provide a screening process that is easy to use so that both the utilities and Staff can prepare their evaluations without delaying the implementation of programs to meet the Commission's aggressive savings targets;
3. Recognizes that benefit-cost assessment is ongoing, and that more refined analysis of cost effectiveness will be conducted during the monitoring and evaluation phase. Part of the data gathering process in the monitoring and evaluation phase will be devoted to getting better information on factors which are often uncertain in the initial measure screening phase and;
4. Provide synchronization between utility IRP and DSM activities.

The document is structured to provide a brief definition of the Societal Cost Test (SCT), followed by specific recommendations on benefit-cost test inputs and methodologies. A summary of key recommendations is then presented, followed by a glossary of terms.

# II. Definition of the Societal Cost Test

The Arizona Corporation Commission (ACC) in Decision No. 71436 directed the public utilities in the state to design cost-effective Demand-Side Management (DSM) programs to meet the state's energy efficiency and load management objectives. The decision further states that the Societal Cost Test shall be used to determine cost effectiveness.

The SCT is structurally similar to the Total Resource Cost Test (TRC) but goes beyond the TRC test in that it attempts to quantify the change in the total resource costs to society as a whole rather than to only the service territory (the utility and its ratepayers). The main difference between the SCT and TRC Tests are the use of a societal discount rate and the capability to include the value of other societal benefits such as avoided environmental externalities (avoided pollution costs), non-energy benefits, reliability benefits, and fuel diversity. The ACC has chosen the term "Non-Market Benefits" to describe these benefits and has adopted the following definition:

> '"Non-market benefits" means the incremental improvements in social welfare that are not bought or sold.'

When expressed in terms of net present value, it is the ratio of the discounted total benefits of the program to the discounted total costs over some specified time period. The equation and terms of the SCT are defined as follows:

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[2] This document specifically pertains to sections R14-2-2401 and R14-2-2412 of the proposed standard

$$BCR_{SC} = (UAC_{NPV} + NMB_{NPV}) \div (PRC_{NPV} + PC_{N\text{-}NPV} + UIC_{NPV})$$

Where:

$BCR_{SC}$ = Societal Benefit/Cost Ratio

$UAC_{NPV}$ = Net Present Value of Utility Avoided Cost

$NMB_{NPV}$= Net Present Value of Non-Market Benefits (societal benefits) including environmental and other non-energy benefits

$PRC_{NPV}$ = Net Present Value of Program Administrator Program Costs

$PC_{N\text{-}NPV}$ = Net Present Value of Net Participant Costs

$UIC_{NPV}$ = Net Present Value of Utility Increased Supply Costs

Utility avoided costs (UAC) are defined as follows:

$$UAC = \Delta E_N \times ACE + \Delta D_N \times ACC + AECC$$

Where:

$\Delta E_N$ = Net energy savings

ACE = Avoided cost of energy

$\Delta D_N$ = Net demand savings

ACC = Avoided cost of capacity

AECC = Utility avoided environmental regulation compliance costs (e.g., carbon dioxide allowances, pollution control equipment).

## III. Recommended Societal Cost Test Inputs and Methodologies

The following discussion provides recommendations on inputs and methodologies for each of the terms in the Societal Cost Test as defined above. The net present value of utility increased supply costs ($UIC_{NPV}$) is not addressed in this white paper because the rulemaking on electric energy efficiency is not intended to define the cost benefits of fuel switching programs, and because the SCT test cannot be applied meaningfully to load building programs.

### A. Societal Discount Rate

The SCT allows for the use of a societal discount rate (SDR). The SDR is a reflection of a society's relative valuation on today's well-being versus well-being in the future. While no single method for determining the value of the SDR is agreed upon among industry practitioners, most agree that the value of the SDR is lower than rate of return selected for commercial investment decisions. The SDR used in evaluating energy efficiency programs and measures will be defined as follows;

- The SDR will be based on the yield from U.S. Treasury securities with a cap of 4%.
- The maturity of the Treasury security used to establish the SDR should be the same as the investment horizon of the discount rate used in the utility IRP. For example an IRP using a 20 year investment period would use the yield of the 20 year Treasury bond as the appropriate SDR.
- The date when the yield on the Treasury security is selected should be as close as possible to the date used to establish the discount rate used in the utility IRP.

## B. Utility Avoided Cost (UAC)

***Net Energy Savings ($\Delta E_N$)***

- Net Energy Savings will be defined by the following equation;

  $\Delta E_N = \Delta E_G \times (1 + ELLF) \times NTGR$

  Where:

  $\Delta E_N$ = Net energy savings

  $\Delta E_G$ = Gross energy savings (at the customer meter, not including NTG effects)

  NTGR = Net To Gross Ratio

- The value for the energy line loss factor (ELLF) will be determined by the most recent IRP.
- The calculation of the NTGR will include an estimation of free ridership, spillover and market influence factor (MIF) effects. Spillover is further defined as internal spillover and external spillover.
- The calculation of the net-to-gross ratio is conducted as follows:

  NTGR = 1 – FRF + SPF + MIF

  Where:

  FRF = Free ridership factor

  SPF = Spillover factor. This effect is comprised of two components defined as follows;

  - Internal spillover is typically defined as other measures installed in the same facility.
  - External spillover is typically defined as measures installed in other related facilities.

  MIF = Market influence factor. This factor is comprised of three components defined as follows;

  - Market Development Factor – The influence of programs on developing infrastructure, pipeline of products and service in the market, trade and professional expertise from training and education.
  - Market Maintenance Factor – The influence of programs in maintaining energy efficiency expertise and products and services in the market through ups and downs of business and economic cycles.
  - Market Transformation Factor -- The influence of programs on transforming the market over time.

- The NTGR will be assigned a value of 1 in cases where free ridership, spillover, and market influence effects cannot be measured or estimated with a reasonable degree of confidence.
- NTGR will be updated and reported through the MER process.

***Avoided Cost of Energy (ACE):***

- Avoided cost of energy will be stated as levelized costs and will be developed using the assumptions for the forecasted marginal production costs (MPC) included in the integrated resource planning model, with adjustments as appropriate for the impacts of the energy savings planned through the energy efficiency standard.
- The utilities should state if the energy efficiency standard was incorporated within the MPC model and how this was done.
- The period over which the levelized costs are presented will match the useful life of the measure or program being evaluated. For instance, if the measure life is 15 years, the value for the avoided cost of energy will be based on the levelized costs for a same 15 year period.
- The definition of summer and winter seasons, and also peak and off peak should be generally consistent with definitions used in TOU pricing structures and will be based on mutual agreement between staff and each utility and can vary by measures. At a minimum, avoided cost of energy values will be provided to ACC Staff in the following format:

| | |
|---|---|
| On-Peak Summer | Determined from On-Peak Summer TOU hours |
| Off-Peak Summer | Determined from Off-Peak Summer TOU hours |
| On-Peak Winter | Determined from On-Peak Winter TOU hours |
| Off-Peak Winter | Determined from Off-Peak Winter TOU hours |

***Avoided Cost of Carbon:***

- Until such time that the financial and legislative impacts of carbon mitigation are developed, the marginal production costs for energy will include an estimated cost of carbon that is imbedded in the marginal production cost of energy included in the IRP filed by each individual utility. As the IRP Rule sets forth, any interested party may provide, for the Commission's consideration, analyses and supporting data pertaining to environmental impacts.
- It is recognized that compliance costs associated with $CO_2$ emissions remains uncertain, and that factors such as pending legislation or developing markets that establish alternative values for $CO_2$ emissions may require this approach be revised.

***Net Demand Savings ($\Delta D_N$)***

- Net Demand Savings will be defined by the following equation;

$$\Delta D_N = \Delta D_G \times (1 + DLLF + CRF) \times NTGR$$

- The value for the line capacity reserve factor (CRF) will be determined by the most recent IRP
- The value for the demand line loss factor (DLLF) will be determined by the most recent IRP.
- The value for NTGR will be the same as defined for avoided net energy savings

***Avoided Cost of Generation Capacity (ACC):***

- Avoided cost of generation capacity will be stated as annual levelized costs based primarily on the cost of the next marginal unit identified in the IRP generation plan. Utilities may also use an approach that combines the next marginal unit cost and the cost of short term market capacity where appropriate.
- The avoided cost of generation capacity will include the value of both principal and interest payments over the term of the debt incurred in installing new capacity resources.

## C. Program Administrator Program Costs (PRC)

Program administrative costs are all non-incentive costs incurred by the utility in the process of operating and delivering DSM programs. These costs include management, administration, marketing, training, implementation services, and measurement and evaluation. For the purposes of cost-effectiveness analysis of DSM programs and measures, administrative costs are applied at the level of program cost-effectiveness analysis and do not enter into the screening of individual DSM measures. Costs included in the screening of individual DSM measures are limited to customer incremental or installed costs. This distinction is made in the application of costs because administrative costs are incurred at the program level and may be allocated arbitrarily, or may not be distributed uniformly across individual DSM measures and applications.

Thus, for program level cost-effectiveness screening the following formulation of the SCT applies:

$$BCR_{SC,\,PROGRAM} = (UAC + NMB) \div (PRC + PC_N + UIC)$$

However, for cost-effectiveness screening at the individual measure level the administrative cost term is omitted and the following formulation applies:

$$BCR_{SC,\,MEASURE} = (UAC + NMB) \div (PC_N + UIC)$$

## D. Non-Market Benefits (NMB)

The SCT allows for the inclusion of 'non-market benefits and costs to society'[3] Non-market benefits includes items such as reliability benefits (e.g. avoided blackouts as the result of less strain on distribution systems), non-energy benefits (e.g. secondary economic impacts from low income programs), fuels diversity benefits (e.g. potential to reduce risks of supply disruption or mitigating the effects of price volatility). In addition, the non-market benefits included in the SCT test are intended to value the broader societal benefits from avoided environmental externalities such as avoided pollution or reduced risk of climate change. This viewpoint differs from the inclusion of the potential financial risks of $CO_2$ emissions discussed previously in that it also considers a broader societal perspective[4]. If non-market benefits are used in the SCT for measure or program evaluations they will be indentified and defined.

## E. Net Participant Costs ($PC_N$)

- The net participant costs typically include all equipment costs, installation, operation and maintenance, cost of removal (less salvage value) paid by participants.
- The majority of participant costs are typically the incremental costs or full installed costs incurred by customers in the process of installing the DSM measure. The term 'net' implies that all relevant customer costs are included in this value, and generally includes either one of two types of costs;
    1. 'Incremental costs' that are the difference in cost between a standard efficiency and high efficiency device. Incremental costs are typically used when a device has failed and is going to be replaced anyway ('replace on burn-out'), or in the case of new construction projects.

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[3] Decision No. 71436, R14-2-2401 Definitions, Page 4.

[4] The societal discount rate is a reflection of a society's relative valuation on today's well-being versus well-being in the future. Choices about the SDR of environmental protection projects, such as funding the reduction of global warming, place a greater valuation on future generations, employing a low time preference that places more emphasis than average on their well-being in the further future.

2. 'Full installed costs' that are typically defined as the cost of replacing a working system with a higher-efficiency system. In general full installed costs include both the full cost of the material being installed and also the cost of the labor to install the measure.

- All incremental costs, including other expenses such as additional costs for designing a more efficient building, will be considered on a case by case basis as part of the measure screening process.
- Net participant costs will be updated and reported through the MER process.

## IV. Summary of Key Recommendations

Key recommendations in the white paper include;

1. Avoided cost of energy will be stated as levelized costs and will be developed using the assumptions for the forecasted marginal production costs included in the integrated resource planning (IRP) model, with adjustments as appropriate for the impacts of the energy savings planned through the energy efficiency standard.
2. Until such time that the financial and legislative impacts of carbon mitigation are developed, the marginal production costs for energy will include an estimated cost of carbon that is imbedded in the marginal production cost of energy included in the IRP filed by each individual utility. As the IRP Rule sets forth, any interested party may provide, for the Commission's consideration, analyses and supporting data pertaining to environmental impacts.
3. Avoided cost of generation capacity will be stated as annual levelized costs based primarily on the cost of the next marginal unit identified in the IRP generation plan. Utilities may also use an approach that combines the next marginal unit cost and the cost of short term market capacity where appropriate.
4. The avoided cost of generation capacity will include the value of both principal and interest payments over the term of the debt incurred in installing these resources.
5. A societal discount rate will be used that will be based on the yield for U.S. Treasury securities up to a cap of 4%.
6. Administrative costs for energy efficiency measures will be applied at the level of program cost-effectiveness analysis and do not enter into the screening of individual DSM measures. Individual measure screening will be based on savings and measure incremental costs only.
7. The net-to-gross ratio will be assigned a value of 1 in cases where free ridership, spillover, and market influence effects cannot be measured or estimated with a reasonable degree of confidence.

## Glossary of Terms

The factors included in the formulas above are further defined as follows.

- **Avoided Costs**: the generation, transmission, distribution, and fuel costs that that the utility avoids making though investing in DSM resources.
- **Free ridership: program** participants who would have installed DSM measures anyway without the influence of the program.
- **Gross demand savings:** DSM measure demand savings at the customer meter not including NTG effects (i.e., whether the measure installation was caused by the program isn't considered).
- **Gross energy savings:** DSM measure energy savings at the customer meter not including NTG effects (i.e., whether the measure installation was caused by the program isn't considered).

- **Levelized Costs:** the process of calculating levelized costs involves taking a string of costs and calculating a uniform annual cost value over the duration of the measure life. This reduces the curve to a single, levelized cost that can be used in a present value calculation. This is referred to in this memo as the levelized cost model. Levelized costs can potentially hide the volatility of fossil fuel prices (and perhaps other costs) and that, consequently, the hedge value of stably-priced energy efficiency is neglected.
- **Net demand savings:** the amount of demand savings at the generator actually attributable to the DSM program including line loss factor, capacity reserve factor and NTG effects.
- **Net energy savings:** the amount of energy savings at the generator actually attributable to the DSM program including line loss factor and NTG effects.
- **Net-to-gross ratio:** net savings/gross savings.
- **Non-market benefits**: benefits to society or reduced environmental emissions and other non-energy benefits that are not recovered through utility rates.
- **Program administrator program costs:** all non-incentive costs required to operate and deliver the program including management, administration, marketing, implementation services and measurement and evaluation.
- **Spillover:** customers who installed DSM measures due to the influence of a DSM program but did not participate in the program. This effect includes both **internal** and **external spillover**. **Internal spillover** is typically defined as other measures installed in the same facility, while **external spillover** is typically defined as measures installed in other related facilities.

# EXHIBIT 2

# CLEAN

Tucson Electric Power

A UniSource Energy Company

# Rider R-2
# Demand Side Management Surcharge (DSMS)

APPLICABILITY

The Demand Side Management Surcharge ("DSMS") applies to all customers, except those customers who take service under the Residential Lifeline Discount or Residential Lifeline/Medical Life-Support Discount pricing plans, in all territory served by the Company as mandated by the Arizona Corporation Commission, unless otherwise specified. Lifeline and Lifeline Medical customers are exempt from the DSM Surcharge.

RATE

The following DSM Surcharge will be effective June 1, 2011 through December 31, 2012. The DSMS shall be applied to all monthly net bills except lifeline customers at the following rate:

All kWhs @ $0.005675 per kWh

REQUIREMENTS

The TEP DSMS will be calculated and filed with the Arizona Corporation Commission (ACC) for approval on or before June 1st. The ACC will approve the surcharge to be billed to all applicable pricing plans for twelve (12) months beginning each January 1.

TAX CLAUSE

To the charges computed under the above rate, including any adjustments, shall be added the applicable proportionate part of any taxes or governmental impositions which are or may in the future be assessed on the basis of gross revenues of the Company and/or the price or revenue from the electric energy or service sold and/or the volume of energy generated or purchased for sale and/or sold hereunder.

RULES AND REGULATIONS

The standard Rules and Regulations of the Company as on file from time to time with the Arizona Corporation Commission shall apply where not inconsistent with this pricing plan.

# REDLINE

Tucson Electric Power

A UniSource Energy Company

# Rider R-2
# Demand Side Management Surcharge (DSMS)

APPLICABILITY

The Demand Side Management Surcharge ("DSMS") applies to all customers, except those customers who take service under the Residential Lifeline Discount or Residential Lifeline/Medical Life-Support Discount pricing plans, in all territory served by the Company as mandated by the Arizona Corporation Commission, unless otherwise specified. Lifeline and Lifeline Medical customers are exempt from the DSM Surcharge. ~~s effective June 1, 2009.~~

RATE

The following DSM Surcharge will be effective June 1, 2011 through December 31, 2012. The DSMS shall be applied to all monthly net bills except lifeline customers at the following rate:

All kWhs @ $0.00567512~~49~~ per kWh

REQUIREMENTS

The TEP DSMS will be calculated and filed with the Arizona Corporation Commission (ACC) for approval on or before ~~April~~ June 1st. The ACC will approve the surcharge to be billed to all applicable pricing plans for twelve (12) months beginning each ~~June~~ January 1.

TAX CLAUSE

To the charges computed under the above rate, including any adjustments, shall be added the applicable proportionate part of any taxes or governmental impositions which are or may in the future be assessed on the basis of gross revenues of the Company and/or the price or revenue from the electric energy or service sold and/or the volume of energy generated or purchased for sale and/or sold hereunder.

RULES AND REGULATIONS

The standard Rules and Regulations of the Company as on file from time to time with the Arizona Corporation Commission shall apply where not inconsistent with this pricing plan.

# EXHIBIT 3

## Table 1: 2010 Expenditures and 2011-2012 Proposed Budgets

| DSM Support Programs | 2010 Expenditures | 2010 Approved Budget | 2011 Budget | 2012 Budget | Combined 2011-2012 Budget |
|---|---|---|---|---|---|
| Education and Outreach | $508,714 | $510,880 | $383,917 | $384,724 | **$768,641** |
| Residential Energy Financing | NA | NA | $781,646 | $792,262 | **$1,573,908** |
| Codes Support | NA | NA | $49,335 | $75,490 | **$124,825** |
| Support Programs Subtotal | $508,714 | $510,880 | $1,214,898 | $1,252,476 | **$2,467,374** |
| Behavioral Programs | | | | | |
| Home Energy Reports | NA | NA | $400,706 | $673,790 | **$1,074,496** |
| Behavioral Comprehensive Program | NA | NA | $819,289 | $1,420,279 | **$2,239,568** |
| Behavioral Subtotal | $0 | $0 | $1,219,995 | $2,094,069 | **$3,314,064** |
| Residential Efficiency Programs | | | | | |
| Low-Income Weatherization | $350,735 | $396,392 | $611,190 | $616,451 | **$1,227,641** |
| Appliance Recycling | NA | NA | $856,725 | $859,533 | **$1,716,258** |
| Residential New Construction | $1,965,718 | $3,663,824 | $2,445,125 | $2,720,648 | **$5,165,773** |
| Existing Home (was Efficient Home Cooling) | $1,573,715 | $530,450 | $2,577,643 | $3,576,038 | **$6,153,681** |
| Shade Tree Program | $160,917 | $160,000 | $319,155 | $325,582 | **$644,737** |
| Efficient Products (CFL) | $1,751,870 | $1,535,444 | $1,926,611 | $2,431,495 | **$4,358,106** |
| Multi-Family Direct Install | NA | NA | NA | $169,738 | **$169,738** |
| Residential Subtotal | $5,802,955 | $6,286,110 | $8,736,449 | $10,699,485 | **$19,435,934** |
| Non-Residential Efficiency Programs | | | | | |
| Bid For Efficiency | NA | NA | $294,261 | $503,092 | **$797,353** |
| C&I Comprehensive Program | $2,282,897 | $2,116,735 | $3,794,134 | $4,285,856 | **$8,079,990** |
| Small Business Direct Install | $2,309,324 | $2,116,735 | $3,547,437 | $4,069,211 | **$7,616,648** |
| Commercial New Construction | $153,683 | $848,720 | $402,469 | $406,319 | **$808,788** |
| CHP Joint Program (Pilot) | NA | NA | $74,800 | $75,956 | **$150,756** |
| C&I Schools Program | NA | NA | NA | $157,941 | **$157,941** |
| Retro-Commissioning | NA | NA | NA | $175,520 | **$175,520** |
| Non-Residential Subtotal | $4,745,903 | $5,082,190 | $8,113,101 | $9,673,895 | **$17,786,996** |
| Demand Response Programs | | | | | |
| Residential & Small Commercial DLC | $914,481 | $1,090,950 | $785,150 | $184,816 | **$969,966** |
| C & I DLC | $35,254 | $809,000 | $2,737,846 | $2,751,959 | **$5,489,805** |
| Demand Response Subtotal | $949,735 | $1,899,950 | $3,522,996 | $2,936,775 | **$6,459,771** |
| **Program Totals** | **$12,007,307** | **$13,779,130** | **$22,807,439** | **$26,656,700** | **$49,464,139** |
| Program Development, Analysis & Reporting Software[1] | $650,024 | NA | $805,238 | $829,395 | **$1,634,633** |
| Baseline Study | $260,864 | $274,000 | NA | NA | **NA** |
| **Sub-total** | **$910,888** | **$274,000** | **$805,238** | **$829,395** | **$1,634,633** |
| **Total[2]** | **$12,918,196** | **$14,053,130** | **$23,612,677** | **$27,486,095** | **$51,098,772** |

*1. Expenses are necessary for compliance and reporting reqirements of EEES.*

*2. 2010 Expenditures are preliminary. Final 2010 Expenditures will be reported in the Semi-annual report due March 1, 2011.*

**Table 2: 2010 Performance Incentive Calculations**

| DSM Program | Program Cost | Societal Benefits | Societal Costs | Net Benefits |
|---|---|---|---|---|
| **Residential** | | | | |
| Low-Income Weatherization[1] | $ 350,735 | $ 350,735 | $ 370,080 | $ - |
| Guarantee Home Program | $ 1,965,718 | $ 5,943,906 | $ 2,283,584 | $ 3,660,322 |
| Shade Tree Program | $ 160,917 | $ 643,916 | $ 178,405 | $ 465,511 |
| ENERGY STAR® Lighting (CFL) | $ 1,751,870 | $ 22,738,687 | $ 1,931,620 | $ 20,807,066 |
| Efficient Home Cooling | $ 1,573,715 | $ 1,834,423 | $ 5,341,594 | $ (3,507,170) |
| **Total for Residential** | **$ 5,802,955** | **$ 31,511,667** | **$ 10,105,284** | **$ 21,425,729** |
| **Non-Residential** | | | | |
| Non-Residential Existing Facilities | $ 2,282,897 | $ 19,795,752 | $ 4,329,899 | $ 15,465,853 |
| Small Business | $ 2,309,324 | $ 11,029,955 | $ 3,550,506 | $ 7,479,449 |
| Efficient Commercial Building Design | $ 153,683 | $ 548,951 | $ 152,262 | $ 396,689 |
| **Total for Non-Residential** | **$ 4,745,903** | **$ 31,374,658** | **$ 8,032,667** | **$ 23,341,991** |
| **Portfolio Totals** | **$ 10,548,858** | **$ 62,886,326** | **$ 18,137,951** | **$ 44,767,720** |
| **Measurement, Evaluation & Research (MER)** | $ 650,024 | $ - | $ 650,024 | $ (650,024) |
| **Baseline Study** | $ 260,864 | $ - | $ 260,864 | $ (260,864) |
| **TOTAL** | **$ 11,459,747** | **$ 62,886,326** | **$ 19,048,839** | **$ 43,856,831** |
| **Performance Incentive Calculation:** | | | | |
| Total Spending[2] / Total Net Benefits | $ 11,109,012 | | | $ 43,856,831 |
| 10% of Spending / Net Benefits | $ 1,110,901 | | | $ 4,385,683 |
| **Performance Incentive for 2010** | $ 1,110,901 | | | |

*1. Consistent with Commission Staff's analysis in Arizona Corporation Commission Decision No. 70456 (August 6, 2008), the societal benefits for low-income weatherization are equal to or greater than the societal costs when taking the environmental benefits into account.*

*2. Total spending does not include Low-Income Weatherization per Arizona Corporation Commission Decision No. 70628 (December 1, 2008), which approved the TEP Performance incentive calculation. The Performance Incentive allowed is capped at 10% of Net Benefits or 10% of total spending, whichever is less.*

**Table 3: DSMS Rate Calculation**

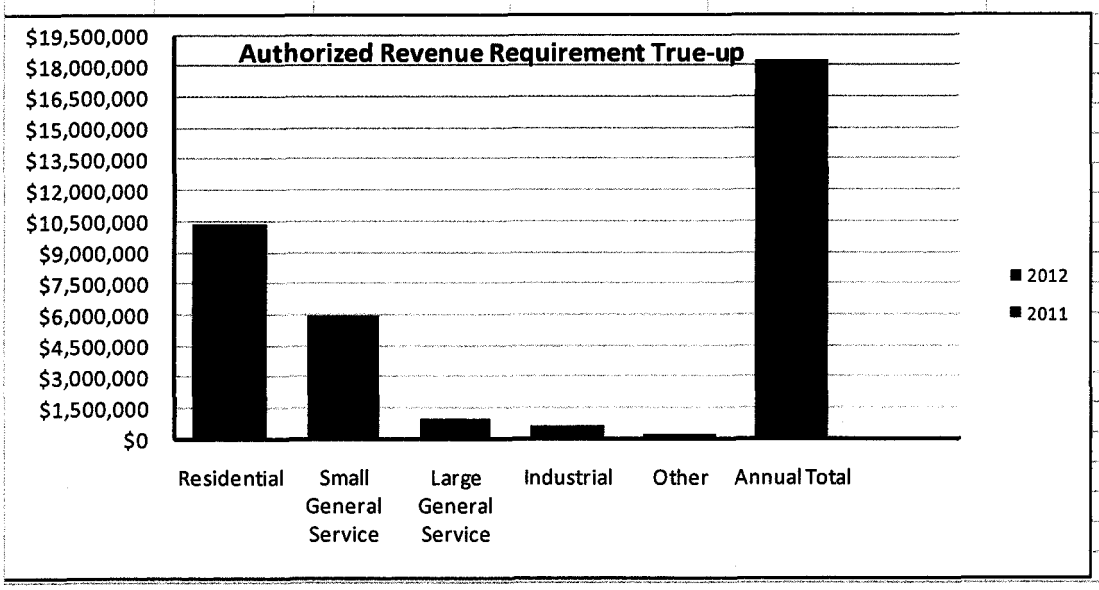
| TEP | DSM Budget | 19MoForecast | Rate/kWh |
|---|---|---|---|
| Total Expense | $51,098,772 | 15,107,305,597 | **$0.003382** |
| Performance Incentive | $16,394,597 | 15,107,305,597 | **$0.001085** |
| ARRT | $18,250,267 | 15,107,305,597 | **$0.001208** |
| | $85,743,636 | | **$0.005675** |

# EXHIBIT 4

# Exhibit 4 – ARRT

**TUCSON ELECTRIC POWER, INC.**
**Authorized Revenue Requirement True-up**

| Month | Residential | Small General Service | Large General Service | Industrial | Other | Annual Total |
|---|---|---|---|---|---|---|
| 1/1/2011 | $21,957 | $16,342 | $2,582 | $1,526 | $625 | |
| 2/1/2011 | 42,683 | 32,624 | 5,360 | 3,374 | 1,250 | |
| 3/1/2011 | 99,710 | 48,892 | 7,596 | 4,346 | 1,875 | |
| 4/1/2011 | 125,282 | 65,355 | 11,090 | 7,344 | 2,500 | |
| 5/1/2011 | 156,176 | 88,205 | 14,729 | 9,234 | 3,214 | |
| 6/1/2011 | 203,768 | 105,418 | 18,209 | 11,958 | 3,856 | |
| 7/1/2011 | 251,595 | 123,404 | 20,970 | 13,506 | 4,499 | |
| 8/1/2011 | 287,884 | 140,932 | 23,965 | 15,435 | 5,142 | |
| 9/1/2011 | 323,480 | 158,430 | 27,314 | 17,936 | 5,784 | |
| 10/1/2011 | 347,107 | 175,482 | 30,469 | 20,126 | 6,427 | |
| 11/1/2011 | 357,775 | 180,024 | 31,640 | 22,012 | 6,875 | |
| 12/1/2011 | 430,293 | 196,290 | 32,344 | 20,506 | 7,500 | |
| Total | $2,647,710 | $1,331,398 | $226,268 | $147,303 | $49,547 | $4,402,226 |
| | | | | | | |
| 1/1/2012 | $464,410 | $210,356 | $33,234 | $19,642 | $8,045 | |
| 2/1/2012 | 461,645 | 213,768 | 35,123 | 22,106 | 8,190 | |
| 3/1/2012 | 458,940 | 292,378 | 45,432 | 25,983 | 11,212 | |
| 4/1/2012 | 462,993 | 324,109 | 55,001 | 36,421 | 12,398 | |
| 5/1/2012 | 495,073 | 407,122 | 67,986 | 42,616 | 14,833 | |
| 6/1/2012 | 580,032 | 427,053 | 73,767 | 48,441 | 15,622 | |
| 7/1/2012 | 684,512 | 476,614 | 80,990 | 52,162 | 17,376 | |
| 8/1/2012 | 732,517 | 512,044 | 87,072 | 56,081 | 18,681 | |
| 9/1/2012 | 800,666 | 470,939 | 81,191 | 53,317 | 17,194 | |
| 10/1/2012 | 782,380 | 495,173 | 85,982 | 56,793 | 18,136 | |
| 11/1/2012 | 809,967 | 432,045 | 75,934 | 52,827 | 16,499 | |
| 12/1/2012 | 1,016,655 | 375,053 | 61,799 | 39,182 | 14,330 | |
| Total | $7,749,790 | $4,636,654 | $783,511 | $505,570 | $172,516 | $13,848,041 |



# APPENDIX A:

# TEP APPLIANCE RECYCLING PROGRAM

## Program Description

Tucson Electric Power Company's ("TEP" or "Company") Appliance Recycling Program ("Program") is designed to remove and responsibly recycle inefficient but operable refrigerators or freezers from the power grid which are currently being used as secondary appliances or potentially could become secondary units. The Program will offer residential customers a $35 incentive, free pick-up, and free recycling of their inefficient refrigerators or freezers. The Program will utilize an experienced appliance recycling contractor to market the Program, verify customer's eligibility, coordinate and process incentives, schedule and pick-up eligible appliances, and responsibly recycle the appliances. TEP believes this Program will reduce energy consumption in its service territory and help keep inefficient appliances out of the used appliance market. The approach utilized by this Program has been successfully implemented in many other states and TEP believes it will be successful in its service territory.

## Program Objectives and Rationale

The objective of the Program is to permanently remove operable inefficient refrigerators and freezers from the power grid and recycle them in an environmentally safe manner. This will produce long-term electric energy savings in TEP's residential sector.

The Program's rationale is to incent customers with a $35 rebate, free pick-up, and responsible recycling of their operable inefficient refrigerators and freezers. The Program will provide the consumers with an energy savings alternative to selling or donating these inefficient units to the used appliance market or utilizing the unit themselves. Additionally it saves consumers the burden of disposing of the appliance and the $35 municipal fee required to do so.

**Table 1-1. Market Barriers and Program Elements**

| Market Barrier | Program Element |
|---|---|
| • Lack of awareness about operating costs for older inefficient refrigerators and freezers<br>• Inconvenience of removing old units.<br>• Cost of disposal.<br>• Environmental impact of disposal. | • Marketing materials with operating cost estimates.<br>• Free pick-up/removal from customer site plus incentive.<br>• Free disposal.<br>• Using an environmentally responsible recycling contractor for disposal. |

## Target Market

The Program is targeted at residential customers who are currently operating inefficient refrigerators and/or freezers in their homes, or may be considering selling, donating or keeping a recently acquired inefficient unit as a secondary appliance.

## Program Eligibility

The Program is available to all residential utility customers with operable inefficient refrigerators or freezers that are between 10 and 30 cubic feet. The Program will limit the rebate to two units per year per household.

## Current Baseline Conditions

National studies have found that approximately 20% of customers have at least one secondary inefficient refrigerator or freezer in their home. Most of these units are ten years old or more.

## Products and Services

The products and services provided by the Program include:

- free pick-up and recycling of operable inefficient refrigerators or freezers;
- a $35 customer incentive;
- education and promotional efforts to inform customers about the energy saving benefits of recycling their older inefficient refrigerators or freezers, including brochures, promotional material, and utility website content;
- refrigerator and freezer recycling in accordance with established U.S. Environmental Protection Agency ("EPA") best practice industry standards to ensure optimal levels of recycled material and environmental compliance;
- working with retailers to distribute information about the Program and the energy saving benefits of recycling inefficient refrigerators and freezers
- removal and proper disposal of the chlorofluorocarbons ("CFCs") (a potent greenhouse gas used as a blowing agent in older foam insulation products) contained in many older appliances - a significant additional environmental benefit of the program; and
- customer outreach achieved when the recycling contractor leaves behind additional literature and information about other energy efficiency Demand-Side Management programs and opportunities.

## Delivery Strategy, Incentive Processing, and Administration

The strategy for Program delivery, incentive processing, and administration is as follows:

- Appliance pick-up/recycling: an implementation contractor will be selected to provide comprehensive turnkey implementation services, from eligibility verification and scheduling of pick-ups, to proper disposal and recycling of turned-in appliances.
- Incentive coordination and processing: the implementation contractor will coordinate prompt processing of incentive payments. A prompt incentive payment is essential to retailer/customer satisfaction, thus the implementation contractor will establish protocols and service level requirements that expedite payment.

Implementation-related administrative requirements will be handled by the third-party implementation contractor. The implementation contractor will be responsible for:

- management of the scheduling, pick-up, and appliance recycling processes;
- marketing strategy and messaging;
- development and placement of promotional materials and advertising;
- incentive processing;
- data tracking and reporting;
- investment tracking and reporting;
- contact (call) center services;
- managing public relations; and

- customer satisfaction/problem resolution.

The Program will use marketing messages targeted at customers with inefficient refrigerators/freezers. Mass marketing will emphasize the cost of operating inefficient refrigerators/freezers and the environmental benefits of proper disposal. The Program will be marketed at retail point-of-sale providing retailers with a responsible disposal service for those customers replacing their current inefficient refrigerator or freezer.

## Program Marketing and Communication Strategy

The marketing and communications strategy will include but is not limited to the following components:

- Direct marketing to customers on the savings benefits of removing and recycling an inefficient refrigerator or freezer on the utility website and with bill inserts.
- A Web site link to the EPA's new "ENERGY STAR® Recycle My Old Fridge Campaign" at http://www.energystar.gov/index.cfm?c=recycle.pr_refrigerators, which includes calculators to estimate savings.
- Media advertising which may include local newspapers or other selected print media, press releases, radio and/or television.
- Information provided through TEP's Customer Care Center.
- Marketing materials which may include brochures and other collateral pieces to promote the benefits and energy savings of recycling an inefficient refrigerator/freezer. TEP will also design a thank you note and leave behind materials describing other residential and small business programs available to customers.

All marketing materials will carry a strong consumer education message emphasizing the cost of operating an inefficient refrigerator or freezer and the importance of properly recycling and disposal of older units. Marketing materials will also leverage the ENERGY STAR® brand and the savings associated with purchasing ENERGY STAR® appliances.

## Program Implementation Schedule

Upon Program approval by the Arizona Corporation Commission, TEP plans to immediately engage an implementation contractor selected through a request for proposals process to deliver the Program. TEP's goal is to recycle a total of 5,400 units per year for 2011, 2012, and 2013 respectively.

## Measurement, Evaluation, and Research Plan

All evaluation activities will be conducted by TEP's measurement, evaluation, and research contractor. An integrated evaluation approach will be taken that includes the following components:

- addressing evaluation at the onset of Program design and collecting evaluation data as part of Program administration;
- assessing and documenting baseline conditions;
- establishing tracking metrics;
- developing and refining deemed savings measure databases; and
- conducting primary and secondary research as part of the impact and process evaluations.

The overall goal of the impact evaluation will be to validate/calibrate the deemed savings values of the Program, and to determine its cost-effectiveness. Primary impact metrics are savings per unit, Program participants, net-to-gross ratio, and Program cost-effectiveness.

Validation/calibration of deemed savings values will be determined by an analysis of Program records and by testing a sample of equipment picked up for recycling. Primary research may be conducted to determine the impact of variables such as size of refrigerator, effective life of the equipment, and owner utilization. Self-report surveys with both participants and non-participants will be used to assess Program awareness, barriers to participation, participant satisfaction, and other process efficiency issues. Interviews will also be conducted with Program managers and the implementation contractor. These surveys will be enhanced by collecting market data and assessing trends.

The process evaluation will be conducted during the first Program year and then coordinated with impact evaluation work. Wherever it is practical and appropriate, evaluation activities will be conducted in conjunction with other utilities and agencies in the state to efficiently utilize resources and help ensure consistency.

## Quality Assurance and Control

- Refrigerators and freezers will be checked for functionality before removal as only operating units will be picked up.
- Only operable inefficient refrigerators and freezers will be picked up.
- All refrigerators will be decommissioned by the implementation contractor, or accredited third party, in accordance with applicable local state and federal standards for proper handling of refrigerants.
- Customer satisfaction surveys will be sent to a random sample of customers.
- All Program data tracking will be performed by the Program implementer and reported to the utility monthly.
- The Program evaluation process (described above) will provide an additional level of quality assurance for the Program.

## Program Costs and Benefits

Proposed budget for Program delivery for 2011-2012 is detailed in Table 1-3.

**Table 1-2. Measure Savings, Incentive Level, and Participation, Benefit-Cost**

| Measure | Annual Energy Savings (kWh) /Unit | Peak Demand Savings (kW)/ Unit | Avg. Incentive / Unit | 2011 Units | 2012 Units | Measure Level Societal Test Result |
|---|---|---|---|---|---|---|
| Refrigerator Recycling | 1,242 | 0.15 | $120/unit | 4,860 | 4,860 | 4.04 |
| Freezer Recycling | 942 | 0.11 | $120/unit | 540 | 540 | 3.07 |

**Table 1-3. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $189,000 | $560,713 | $59,977 | $14,085 | $32,951 | $856,725 | $1,239,078 | 1.9 |
| **2012** | $189,000 | $562,822 | $60,146 | $14,507 | $33,059 | $859,533 | $1,236,270 | 1.9 |

**Table 1-4. Environmental Benefits**

| | Annual CO2 Savings (Metric Tons) | Annual NOx Savings (Metric Tons) | Annual SOx Savings (Metric Tons) | Lifetime CO2 Savings (Metric Tons) | Lifetime NOx Savings (Metric Tons) | Lifetime SOx Savings (Metric Tons) |
|---|---|---|---|---|---|---|
| **2011** | 6,411 | 8.65 | 7.51 | 38,464 | 52 | 45 |
| **2012** | 6,411 | 8.65 | 7.51 | 38,464 | 52 | 45 |

# Measure Analysis Sheet

Incentive Calculations

Appliance Recycling Program (Residential)

Remove Existing Secondary Refrigerator or Freezer

**Appliance Recycling Program**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 6 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | $72.41 |
| Summer On-pk Energy AC ($/kWh): | $0.09 |
| Summer Off-pk Energy AC ($/kWh): | $0.05 |
| Winter On-pk Energy AC ($/kWh): | $0.06 |
| Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Administrative Cost ($/unit) | $161.30 |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| Refrigerator NTG Ratio | 100% |
| Freezer NTG Ratio | 100% |

| RATE DATA | |
|---|---|
| Rate: | Res |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | $0.09954 |
| $/kWh, Off-Peak: | $0.09954 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 50% |
| Off-Pk Op. Hours: | 50% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Hourly Load Factor: | 4% |
| In-Service Rate | 100% |
| Coincidence Factor | 100% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | Removal |
| Cost Basis: | Removal |

| | DEMAND/ ENERGY SAVINGS | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Annual Energy Savings (KWh) | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive ($) | Recommended Incentive %PV | PV Program Cost ($) | NPV ($) | Incr. Cost** ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| Refrigerator | 1242 | 0.142 | 0.142 | 621 | 621 | 420 | 477 | 35 | 8% | 281 | 139 | 120 | 124 | 1.0 | 0.69 | 90% | 29% | 1.7 |
| Freezer | 942 | 0.108 | 0.108 | 471 | 471 | 319 | 362 | 35 | 11% | 281 | 38 | 120 | 94 | 1.3 | 0.91 | 10% | 29% | 1.3 |
| **Weighted Average** | | 0.138 | 0.138 | 606 | 606 | 410 | 466 | 35 | 9% | 281 | 129 | 120 | 121 | 1.0 | 0.71 | 100% | 29% | 1.7 |
| Weighted Average Check | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Kema, "Residential Refrigerator Recycling Ninth Year Retention Study", Study ID's 546B, 563; prepared for SCE, 7/22/2004; available from Calmac web site as study # SCE0130.01

**Based on IC cost to pick up refrigerator/ freezer.

File Name: ApplianceRecycling_MAS_Res_TEP_2011_01_12

# APPENDIX B:

# TEP RESIDENTIAL ENERGY EFFICIENCY FINANCING PILOT PROGRAM

## Program Description

Tucson Electric Power Co. ("TEP" or the "Company") has designed a proposed Energy Efficiency Residential Financing Pilot Program ("Program") to provide customers with the capital needed to make cost-effective energy efficiency upgrades to their homes. TEP believes that a two year pilot program will allow sufficient time for the Company to evaluate the Program, including participation, default rates, and overall value to customers. TEP's proposed Program elements include:

- Loan commitment of $2,000,000 per year for two years; this will provide approximately 424 loans per year based on an average $4,722 loan amount;
- Loans available only on energy efficiency measures meeting the Commission-required cost-effectiveness test;
- Low interest rates provided by a combination of an interest rate buy-down and a 10% loan loss reserve account;
- Limited customer exposure to default risk (10% of the loan commitment);
- Funding provided through an approved Demand-Side Management ("DSM") surcharge charged to residential customers;
- Affordable residential financing for energy efficient measures;
- Convenient customer access to and repayment of the financing;
- Standard finance product offering for all eligible, approved borrowers;
- Leveraged financing;
- Accurate Truth-in-Lending notifications and billing to customers provided by an experienced third party lender; and
- Community involvement in forming and marketing the Program.

TEP requests Commission direction on the level of impact for residential customers. Depending on the Commission direction, TEP proposes to increase DSM surcharge for residential customers by one of three levels during the first year of the two year pilot program.

- $2,000,000 in funding with no interest rate buy-down would require $0.0001 per kWh to fund the Program. The average annual cost to each residential customer would be $1.48;
- $2,000,000 in funding with a 2% interest rate buy-down would require $0.0002 per kWh to fund the Program. The average annual cost to each residential customer would be $2.13;
- $2,000,000 in funding with a 3% interest rate buy-down would require $0.0002 per kWh to fund the Program. The average annual cost to each residential customer would be $2.44.

Of note, UNS Gas, Inc. ("UNS Gas") (a related entity to TEP), requested a program nearly identical to the one requested herein for TEP. The UNS Gas program was approved in Arizona Corporation Commission ("Commission") Decision No. 72062 (January 6, 2011). In that decision, the Commission opted for the 2% interest rate buy-down option. Based on that decision, TEP recommends the 2% buy-down option, yet provides throughout this application all three buy-down options for the Commission's consideration.

## Program Objectives and Rationale

TEP believes that the Program's financing options to help cover the costs of energy efficiency measures will improve customer participation in energy efficiency programs and expand the pool of customers that can afford to participate in those programs. Although other vendors offer financing for their own individual products, the Program's comprehensive approach to home energy upgrades cuts across several potential products and includes efficiency measures not traditionally financed, such as air and duct sealing.

Prior to designing the Program, TEP developed key objectives for the Company's implementation of a financing program. Three objectives stood out from the rest as fundamental in order for TEP to provide a financing option:

- The program design must eliminate the utility from any Truth-in-Lending Law regulation implications;
- The program must provide a reasonable amount of funds at a reasonable interest rate and with a low initial investment; and
- Energy efficiency measures that qualify for TEP financing must have met the Commission's cost-effectiveness test.

With these objectives, TEP hired Harcourt Brown Energy and Finance ("Harcourt Brown") to assist with the evaluation, negotiations, and design of the Program. TEP, with guidance from Harcourt Brown, selected a Third Party Financing model secured by a combination of a 10% loan loss reserve account and an interest rate buy-down, all funded from the DSM Surcharge, as the best program offering.

## Target Market

The target market for this Program is any residential customer in TEP's service territory who owns their home. Financing is available for installation of approved and cost effective DSM energy efficiency measures.

## Program Eligibility

Eligible properties include single-family (1 to 4 unit), owner-occupied homes.

## Current Baseline Conditions

The primary program available for comparison is offered through Fannie Mae. Fannie Mae utilizes an unsecured loan program structured in a similar manner to TEP's. Fannie Mae's base interest rate is 14.99% compared to the 7.99% to 9.99% available through the TEP Program. The programs offered by Arizona Public Service Company ("APS") and Southwest Gas Corporation ("Southwest Gas") are expected to have base interest rates of 6.5% to 8.5%.

## Products and Services

Harcourt Brown evaluated the following parameters before recommending the most beneficial program to TEP:

- sources of capital;
- interest rates;
- loan terms;
- loan types and amounts;
- risk management;
- program integration;
- ease of use;
- repayment billing; and
- equitable funding.

TEP and Harcourt Brown considered several financing models and completed discussions with numerous entities nationwide before determining the most beneficial financing model for customers. The model selected by TEP uses AFC First ("AFC" or "Lender") as the third party lender. Capital resources are provided by the Pennsylvania Treasury ("PA Treasury") with loans leveraged by a loss reserve account as well as the possibility of a small interest rate buy-down. All funding will be provided by a DSM Surcharge applied to residential customers of TEP.

The Program will offer energy efficiency loans to TEP customers who are seeking financing for the energy efficiency improvements to their homes. Loan proceeds can be used for energy efficiency measures that have been approved by the Commission.

The Program is designed to provide an equitable and comprehensive approach to the financing of energy efficiency improvements in existing homes. TEP is proposing $2,000,000 in overall loan commitments to this Program for two consecutive years as a pilot program. TEP believes the size of this loan commitment is sufficient based on the number of customers in its service territory and the limited DSM energy efficiency measures available for gas customers. In order for this Program to be viable, TEP needs Commission approval of its currently pending Existing Homes and Residential Energy Assessment Programs.

TEP evaluated the customer impact of three levels of funding, as shown in Table 1-1 below. TEP assumed an average loan size of $4,722 and a maximum term of 12 years in these calculations. Actual amounts will vary by loan size and terms.

**Table 1-1. Funding Levels and Cost to Customer**

| TEP - Impact of Residential Financing Program with Buy-Down Options (Res Only) - Year 1 | | | | | |
|---|---|---|---|---|---|
| Total Loan Amount Available (ResRate 10 Only) | *Estimated # of Loans | DSM Funding for Reserve (10%) | Buy-Down Percentage | **DSM Funding for Buy-Down | Total Program Budget (Year 1) |
| $2,000,000 | 424 | $200,000 | 0% | $ - | $509,604 |
| $2,000,000 | 424 | $200,000 | 2% | $225,314 | $734,918 |
| $2,000,000 | 424 | $200,000 | 3% | $332,889 | $842,493 |

| TEP - Impact of Residential Financing Program with Buy-Down Options (Res Only) - Year 2 | | | | | |
|---|---|---|---|---|---|
| Total Loan Amount Available (ResRate 10 Only) | *Estimated # of Loans | DSM Funding for Reserve (10%) | Buy-Down Percentage | **DSM Funding for Buy-Down | ***Total Program Budget (Year 2) |
| $2,000,000 | 424 | $200,000 | 0% | $ - | $465,596 |
| $2,000,000 | 424 | $200,000 | 2% | $225,314 | $690,910 |
| $2,000,000 | 424 | $200,000 | 3% | $332,889 | $798,485 |

* Assumes average loan size $4,722

** Assumes maximum 12 year term

*** Year 2 costs reduced due to lower cost for marketing materials and contractor training

| Total 2-Year DSM Budget | |
|---|---|
| No Buydown | $ 975,201 |
| 2% Buydown | $1,485,829 |
| 3% Buydown | $1,640,978 |

**Note:** TEP proposes that the DSM Surcharge necessary to fund this program be collected only from residential customers, as the loan instruments described are restricted to residential customers.

**Table 1-2. Cost to Customer – Buy Down Options**

| TEP - Impact of Residential Financing Program with Buy-Down Options (Res Only) | | | | | |
|---|---|---|---|---|---|
| Total Program Budget | Actual kWh 2009 | Surcharge Increase/ kWh | Total # of Customers EOY 2009 (Less Lifeline) | Average kWh per Customer | Average Annual Cost |
| $ 509,604 | 3,726,945,671 | $ 0.0001 | 345,445 | 10,789 | $ 1.48 |
| $ 734,918 | 3,726,945,671 | $ 0.0002 | 345,445 | 10,789 | $ 2.13 |
| $ 842,493 | 3,726,945,671 | $ 0.0002 | 345,445 | 10,789 | $ 2.44 |

Program Funding and Terms

The proposed Program operates as follows:

1. AFC will be the Lender that originates and services the Program loans. AFC has committed to make loans according to basic underwriting terms, including approving borrowers with a Fair Isaac Corporation ("FICO") credit score of 640 or higher. Borrowers may be granted up to 12 years repayment; though interest rates are currently to be determined, TEP has secured a verbal commitment that rates will be between 7.99% and 9.99%. Interest rates will not vary due to loan size, term, or credit score and there will be no prepayment penalty.
2. Additional terms will be contractually delineated between AFC and TEP. Final rates and availability will be determined prior to Program commencement.
3. PA Treasury will contract with AFC to purchase the Program loans from AFC. The interest rates, loan terms, underwriting criteria and other relevant characteristics of the loans that PA Treasury will purchase will be contractually delineated.
4. TEP will set aside funds through a loan loss reserve account (10% of committed loan value) and/or an interest rate buy-down account. The loss reserve agreement will be negotiated with the PA Treasury.
5. AFC's loan capital will be replenished from the proceeds of TEP's sale of Program loans to the PA Treasury, thereby enabling AFC to make new loans.
6. The PA Treasury will sell the Program loans to its investors. The proceeds from these sales will enable the PA Treasury to make additional loan purchases from AFC.
7. TEP's role in this process will be to provide the loan loss reserve account, to support lending, and potentially to buy-down interest rates. Funding will be collected through the DSM surcharge from TEP residential customers. TEP will not service or originate the loans.

Interest Rate Buy-down

The interest rate buy-down referenced above may be necessary to offer a rate competitive with those rates offered in other utility financing programs in the State. The programs offered by APS and Southwest Gas have interest rates ranging from 6.5% to 8.5%. Because the interest rate buy-down will result in an additional cost that will be covered through the DSM Surcharge, TEP seeks Commission guidance on the final product offering. As previously stated, TEP recommends the 2% buy-down option based on the Commission's decision in the UNS Gas Residential Energy Efficiency Financing Pilot Program Decision No. 72062 (January 6, 2011), yet provides the data for all three options for the Commission's consideration in this matter. The cost of the interest rate buy-down will depend on (1) the market interest rate, (2) the target interest rate, (3) the loan amounts, and (4) the loan term. Table 1-3 illustrates two potential scenarios regarding the interest rate buy-down cost on a per-loan basis. Additional details are shown in Table 1-2 above.

**Table 1-3. Interest Rate Buy-Down Costs**

| Average Loan Size of $4,722 | | |
|---|---|---|
| **Buydown %** | **7-Year Term** | **12-Year Term** |
| 0.02 | 322 | 532 |
| 0.03 | 479 | 786 |

Loan Terms

TEP has worked with many lenders to develop the best loan terms for its customers. Optimal repayment terms, interest rates, fees, and application processes have been at the forefront of discussions. However, TEP cannot dictate to any lender the package of terms they must offer. The terms must be negotiated and beneficial to both the lender and the customer, and meet various standards set forth by bank regulators. The loan terms available under the Program are as follows:

**Table 1-4. Loan Terms, Rates and Payment Range**

| Financing Amount | Terms | Interest Rates | Payment Range on $4,722.00 Ave. Loan |
|---|---|---|---|
| $1,000 - $15,000 w/o Buydown | up to 144 Mos. | 7.99% - 9.99% | $51 - $56 |
| $1,000 - $15,000 w/2% Buydown | up to 144 Mos. | 5.99% - 7.99% | $46 - $51 |
| $1,000 - $15,000 w/3% Buydown | up to 144 Mos. | 4.99% - 6.99% | $44 - $49 |

As demonstrated in Table 1-4, the payment amount based on the estimated average loan size does not fluctuate greatly between an interest rate of 4.99% and 9.99% ($44 to $56 per month). As the loan size increases to the maximum ($15,000), the payment spread widens from $139 per month to $179 per month at these same rates. TEP is looking for guidance from the Commission to decide whether or not the benefit of the payment savings to these individual customers offsets the buy-down fee charged to all residential customers. As with other DSM Programs, low-income customers will be excluded from the DSM Surcharge.

Credit Underwriting

Limited credit standards will be used by the Lender in its underwriting process. Loan approval is granted based on FICO credit scores of 640 and above, debt-to-income ratios of 50% or less, and proof of income. These lower credit scores allow far greater participation for TEP residential customers than products offered by most other lenders.

Application and Approval Process

The application and approval process is designed to be simple, easily accessible and convenient to all, as shown below.

- Customers can call a 1-800 telephone number to apply and receive loan approval; or
- Applications can be filled out during the visit with the contractor; or
- Loan applications will be available on the TEP website; and
- Loan approvals will occur within 20 minutes to 48 hours of making the application.

With the help of community-action groups as well as contractor marketing and TEP marketing, the Company believes that Program loan funds will be fully used each year. At this time, the only approved residential energy efficiency measures for the TEP territory is the high-efficiency air conditioner and heat pump exchange, duct sealing, air sealing, ceiling insulation and window film/shade screens. The anticipated participation discussed herein is based on the assumed participation in the Existing Homes Program approved by the Commission in Decision No. 72028 (December 10, 2010).

While loan sizes are likely to vary, TEP estimates that 800 customers will choose to participate in the Existing Homes Program. TEP further estimates that only a percentage of those participants will install each energy efficiency measure. Details of the TEP methodology to determine the average loan size are

demonstrated in Table 1-5. With the $2,000,000 loan commitment each year available through the Program, approximately 424 loans could be made in the service territory assuming an average loan size of $4,722. If the average loan size is smaller than this estimate, the number of loans will increase proportionately.

**Table 1-5. Determination of Average Loan Size**

| TEP ESTIMATE OF LOAN SIZE | | | | | |
|---|---|---|---|---|---|
| Participants | 800 | | | | |
| Category | Annual kWh | % | Total Lost Therm | Estimated Cost of Measure | Total Financing Requirement |
| Duct Seal | 1,030 | 0.6 | 494,400 | $ 935 | $ 448,800 |
| Air Seal | 415 | 0.4 | 132,800 | $ 370 | $ 118,400 |
| Insul & Air Seal | 1,075 | 0.3 | 258,000 | $1,165 | $ 279,600 |
| Equipment & Ducts | 1,300 | 0.4 | 416,000 | $7,700 | $2,464,000 |
| Shade Screens | 1,060 | 0.6 | 508,800 | $ 708 | $ 339,840 |
| Attic Insulation Only | 660 | 0.2 | 105,600 | $ 795 | $ 127,200 |
| TOTALS | | | 1,915,600 | | $3,777,840 |
| Average Loan Size per Customer | | | | | $4,722 |

Delivery Strategy, Incentive Processing and Administration

The strategy for Program delivery and administration is as follows:

- Coordination between the Lender and TEP on all fund transfers will be managed in-house by a single TEP Program Manager;
- The Program Manager will also provide overall management, marketing oversight, planning and tracking of customer and contractor participation; and
- The Program Manager will coordinate all activities necessary to develop application forms and contractor training.

Key partnering relationships will include:

- Community interest groups;
- HVAC, insulation, and air sealing contractors trained in Program procedures; and
- The Arizona Energy Office, Pima Community College, or other industry experts to provide training, education and awareness.

The Program will use contractors initially recruited for the Existing Homes Program, encouraging them to promote TEP financing when working with customers. TEP will provide an orientation of the Program which will outline Program requirements and contractors responsibilities as well as discuss reporting and data collection procedures. Contractors interested in participating in the Program must attend the orientation.

Program Marketing and Communication Strategy

TEP will provide Program marketing and customer outreach and awareness through a range of strategies including:

- Promotions on the TEP website about the benefits of purchasing high-efficiency equipment and home performance measures;
- Promotion through contractors and through community interest groups;
- Providing information through TEP's customer care center;
- Developing marketing pieces including brochures and other collateral pieces to promote the benefits of qualifying equipment, air sealing and duct sealing, and the financing program available to fund those measures; and
- Training and seminars for participating trade allies and contractors.

The advertising campaign will communicate that high-efficiency systems and home performance measures will help reduce customer energy bills, provide equal or better comfort conditions, and are beneficial for the environment.

Program Implementation Schedule

The PA Treasury has assured Harcourt Brown that funding for the Program is available.TEP will continue working with AFC and the PA Treasury on preparation of contracts, agreements, and other documents as we await Commission approval. TEP estimates the Program could commence within 30 to 60 days of receiving Commission approval.

Measurement, Evaluation and Research Plan

TEP will adopt an integrated data collection strategy designed to provide a quality data resource for Program tracking, management, and evaluation. This approach will entail the following primary activities:

- Database management: As part of Program operation, TEP will request the Lender to provide the necessary data elements to populate the tracking database and provide periodic reporting; and
- Data collection: TEP will establish systems to collect the data needed to support effective Program management, transfer of funds from TEP to the loan loss reserve accounts, reporting, and evaluation.

Quality Assurance and Control

Due to the risks inherent with this type of program, quality assurance and control will be a daily function of the Program Manager. In order to protect its customer's interests, TEP plans to collect loan information prior to and after each loan closing, as it believes the best time to correct a mistake or avoid fraud is prior to the loan being funded. The information collected will not be used by TEP to approve the credit-worthiness of a borrower, but will be reviewed to: 1) ensure that each loan falls within what has been approved by the Commission; 2) that Commission-approved measures are the only items being financed by the loan; and 3) that the loan proceeds are for work being performed by an approved contractor. Additionally, each signed Promissory Note and Disbursement Sheet along with a copy of the disbursement check will be collected to verify the loan was closed and funded as presented to TEP.

Additional steps to keep a tight control on the portfolio are the requirements of daily, weekly and monthly reporting. Daily reporting will include daily viewing access to the Loan Loss Reserve Account, and notification of any defaults and charge offs. Lender will also provide TEP a past-due report on a weekly basis. Monthly reporting will be more extensive, with a full portfolio report provided to TEP. The monthly portfolio report will include the information TEP will need for accurate reporting and control of the Program. A monthly reconciled statement for the Loan Loss Reserve Account will also be required.

Program Costs and Benefits

Three possible budgets are detailed in Table 1-6 Potential budgets depend on whether or not a buy-down approach is used. An estimate of lost revenue resulting from installation of energy efficiency measures installed as a result of the Program has been included as a component of the Annual Budget.

**Table 1-6. Two Year Pilot Program Budget**

| ALL CALCULATIONS ASSUME AVERAGE LOAN SIZE $4,722 AND TERMS 12 YEARS | | | |
|---|---|---|---|
| Description at $2,000,000 Loan Commitment - 0% Buy-Down | 2011 | 2012 | Total |
| Loan Loss Reserve Amount | $ 200,000 | $200,000 | $400,000 |
| DSM Funds for Interest Buy-Down | $ 0 | $ 0 | $ 0 |
| Loss Default Recovery Expected 2023 @ 3% of 2011 commitment | $ 0 | $ 0 | $ 0 |
| TEP Internal Administration 1/3 FTE | $40,000 | $41,200 | $81,200 |
| Reporting | $10,000 | $10,300 | $20,300 |
| Marketing Materials | $50,000 | $25,000 | $75,000 |
| Joint Utility Coordination Transfers | $50,000 | $50,000 | $100,000 |
| Contractor Training Classes | $25,000 | $10,000 | $35,000 |
| TEP Loss Revenue Recovery | $60,847 | $60,847 | $121,695 |
| **Budget Total** | **$435,847** | **$397,347** | **$833,195** |
| Includes Estimated Lost Revenue for $2,000,000 Residential Loans | | | |

| Description at $2,000,000 Loan Commitment - 2% Buy-Down | 2011 | 2012 | Total |
|---|---|---|---|
| Loan Loss Reserve Amount | $200,000 | $200,000 | $400,000 |
| DSM Funds for Interest Buy-Down | $225,314 | $225,314 | $450,628 |
| Loss Default Recovery Expected 2023 @ 3% of 2011 commitment | $ - | $ - | $ - |
| TEP Internal Administration 1/3 FTE | $ 40,000 | $41,200 | $81,200 |
| Reporting | $10,000 | $10,300 | $20,300 |
| Marketing Materials | $50,000 | $ 25,000 | $75,000 |
| Joint Utility Coordination Transfers | $50,000 | $50,000 | $100,000 |
| Contractor Training Classes | $25,000 | $10,000 | $35,000 |
| TEP Loss Revenue Recovery | $60,847 | $60,847 | $121,695 |
| **Budget Total** | **$661,161** | **$622,661** | **$1,283,823** |
| Includes Estimated Lost Revenue for $2,000,000 Residential Loans | | | |

| Description at $2,000,000 Loan Commitment - 3% Buy-Down | 2011 | 2012 | Total |
|---|---|---|---|
| Loan Loss Reserve Amount | $200,000 | $200,000 | $400,000 |
| DSM Funds for Interest Buy-Down | $332,889 | $332,889 | $665,777 |
| Loss Default Recovery Expected 2023 @ 3% of 2011 commitment | $ - | $ - | $ - |
| TEP Internal Administration 1/3 FTE | $40,000 | $41,200 | $81,200 |
| Reporting | $10,000 | $10,300 | $20,300 |
| Marketing Materials | $50,000 | $25,000 | $75,000 |
| Joint Utility Coordination Transfers | $50,000 | $50,000 | $100,000 |
| Contractor Training Classes | $25,000 | $10,000 | $35,000 |
| TEP Loss Revenue Recovery | $60,847 | $60,847 | $121,695 |
| **Budget Total** | **$768,736** | **$ 730,236** | **$1,498,972** |
| Includes Estimated Lost Revenue for $2,000,000 Residential Loans | | | |

Upon maturity of the first set of loans (maximum of 12 years into the Program), the amount collected through the DSM surcharge for the next year will be reduced. At that point, the loan loss reserve account associated with the loans from the first year will be returned to the Program. The amount returned will equal the initial amount funded into the loan loss reserve account, plus interest accrued on the account, less any loan losses sustained.

There is no direct benefit or savings from a residential financing program, but the total DSM Portfolio Cost for TEP will increase as a result of offering the Program. However the indirect benefit and savings is measured at the program level where individual energy efficiency measures are included. TEP believes the availability of financing for the Existing Homes Program will increase participation, and thus increase the resulting societal benefits and savings reported in the program.

To compare the estimated annual savings to the estimated annual payments for the three buy-down scenarios (no buy-down, 2% buy-down and 3% buy-down) TEP provided examples of the customer benefit and savings from two likely scenarios from participation in the Existing Homes Program. This information is included in Table 1-7. As set forth in Example 1 of Table 1-7, anticipated savings would be less than estimated loan payments using a 2% or 3% buy-down. However, Example 2 demonstrates that with a lower loan size, the savings would be greater than the annual loan payments. This example demonstrates how the Program could result in cost savings to some customers, but that TEP cannot guarantee cost savings to all customers.

According to Commission Staff, societal cost tests are not applicable to a residential financing program.

**Table 1-7. Examples of Estimated Savings, Costs and Payments**

| Category | Annual kWh Savings | Annual Customer Savings $0.10/kWh | Estimated Job Cost |
|---|---|---|---|
| Duct Seal | 1030 | $103 | $935 |
| Air Seal | 415 | $42 | $370 |
| Insul & Air Seal | 1075 | $108 | $1,165 |
| Equipment & Ducts | 1300 | $130 | $7,700 |
| Shade Screens | 1060 | $106 | $708 |
| Attic Insulation Only | 660 | $66 | $795 |
| TOTALS | | | |

**Example 1:**

| Customer Chooses Envelope AND Efficient Equipment | Annual kWh Savings | Annual Customer Savings @$0.10/kWh | Estimated Job Cost | Annual Pmt 12 Year 0% | Annual Pmt 12 Year 2% | Annual Pmt 12 Year 3% |
|---|---|---|---|---|---|---|
| Equipment & Ducts | 1,300 | $130 | $7,700 | | | |
| Insulation & Air Sealing | 1,075 | $108 | $1,165 | | | |
| Totals | 2,375 | $238 | $8,865 | $1,262 | $1,149 | $1,104 |

**Example 2:**

| Customer Chooses Envelope AND Efficient Equipment | Annual kWh Savings | Annual Customer Savings @$0.10/kWh | Estimated Job Cost | Annual Pmt 12 Year 0% | Annual Pmt 12 Year 2% | Annual Pmt 12 Year 3% |
|---|---|---|---|---|---|---|
| Duct Sealing Only | 1,030 | $103 | $935 | | | |
| Insulation & Air Sealing | 1,075 | $108 | $1,165 | | | |
| Totals | 2,105 | $211 | $2,100 | $299 | $272 | $261 |

# APPENDIX C:

# TEP ENERGY CODES ENHANCEMENT PROGRAM

## Program Description

Building energy codes are widely recognized as a relatively simple, cost-effective means of achieving substantial energy savings that will accrue over the lifetime of new and renovated buildings. However, barriers to the effective implementation of improved building energy codes in Arizona exist. Tucson Electric Power Company ("TEP" or "Company") believes the Energy Codes Enhancements Program ("ECEP" or "Program") will reduce energy consumption in its service territory and help improve compliance with existing building energy codes.

## Program Objectives and Rationale

The objective of the ECEP is to increase energy savings in new construction and renovated buildings in both the residential and commercial sectors through efforts to: 1) improve levels of compliance with existing building energy codes, and 2) support and inform periodic energy code updates as warranted by changing market conditions.

As a "home rule" state, building codes vary greatly across local jurisdictions. Many code officials lack the time, knowledge and resources necessary to effectively enforce existing codes, and to stay current on market trends that may warrant gradual code updates over time. These challenges are particularly pronounced during current economic conditions. Building design and construction professionals also may be confused about certain code requirements and could likely benefit from additional education and training.

In jurisdictions that currently lack a building code of any sort, public officials could benefit from information and assistance in developing and advocating the adoption of a building code.

Following is a list of the primary barriers in this market and the program elements addressing those barriers:

**Table 1-1. Market Barriers and Program Elements**

| Market Barrier | Program Element |
|---|---|
| ▪ Lack of knowledge and resources to facilitate compliance with existing codes | ▪ Participation on committees and collaboration with relevant stakeholders to promote exchange of information |
| ▪ Inconsistency in codes across the state | ▪ Trainings for code officials and the building community |
| ▪ Lack of resources to advocate for adoption of new codes | ▪ Advocacy in support of adopting new codes, as appropriate |

## Target Market

Program staff will collaborate with: 1) local entities responsible for energy code compliance and enforcement, and approving code changes (e.g., public officials, committees, city councils, etc.), and 2) regional and national organizations that track market trends and can inform provide insight into best practices for energy code improvements and enforcement. Trainings to promote code compliance would target local code officials, building design professionals (e.g., engineers, architects and specifiers, builders and contractors.)

## Program Eligibility

A calculation methodology to apportion energy savings attribution from energy codes will be developed that satisfies the Arizona Corporation Commission ("Commission") requirements.[1]

## Current Baseline Conditions

Arizona is a "home rule" state with no mandatory state-wide energy efficiency code. However, many counties and cities have adopted an energy efficiency code, most often the 2006 International Energy Conservation Code ("IECC").

## Products and Services

The ECEP will strive to maximize energy savings through adherence to local building energy codes across the local jurisdictions within the utility service area. The program will employ a variety of tactics aimed at: 1) improving levels of compliance with existing building energy codes, and 2) supporting and informing periodic updates to energy codes as warranted by changing market conditions. Specific program activities will depend on the market needs expressed by local code officials. Activities are likely to include a combination of efforts to:

- Better prepare code officials and building professionals to adhere to existing standards;
- Provide data and market insight to document the specific local benefits of code enforcement, and inform energy code changes over time;
- Ensure utility incentive programs align well with local energy codes;
- Collaborate with relevant stakeholders to help build a more robust community working to advance strong and effective building energy codes across the local jurisdictions within TEP, UNSE and UNSG; and
- Advocate for energy code updates over time.

## Delivery Strategy, Incentive Processing and Administration

Program activities will be selected based on research into effective approaches implemented in leading jurisdictions (e.g., California and Massachusetts), as well as feedback from local code officials, and municipal leaders in locations that currently lack building codes. Once program activities are selected, program staff will maintain a consistent level of activity and engagement with relevant stakeholders.

Key elements of the implementation strategy may include:

- Supporting local energy code adoption through participation in energy code adoption committees for both minimum energy code requirements, and voluntary "stretch codes" (such as LEED and other sustainable/green codes
- Providing technical support to code adoption committees (e.g., benefit cost analysis of potential code updates, research and information sharing related to the market penetration of particular energy efficient technologies)
- Providing public testimony in support of code adoption before city councils
- Ensuring that ongoing DSM programs align well with energy code requirements

[1] Arizona Corporation Commission; Docket No. RE-00000C-09-0427, Decision No. 71436 (December 16, 2009), p. 8.

- Providing funding and/or other resources to better equip local code agencies to enforce and improve energy code compliance over time. Program staff may select a set of jurisdictions to receive a higher level of assistance on an annual basis. This will help increase the level of impact on those target communities with a high likelihood for producing the greatest amount of incremental savings. Support provided to these target jurisdictions may include activities such as:

  » classroom training sessions for code officials, and building professionals (architects, engineers, specifiers, builders and contractors);

  » brown bag training sessions for code officials, and building professionals a their places of business via a circuit rider;

  » field training sessions for code officials and building professionals;

  » purchasing energy code books for officials that currently lack such resources;

  » supporting energy code-related certifications for code officials;

  » conducting energy code compliance assessments by 2017 to fulfill ARRA requirements to demonstrate 90% energy code compliance (this could be done in coordination with energy efficiency program Measurement, Evaluation, and Research ("MER") activities); and

  » Collaborating with the Southwest Energy Efficiency Project and other regional groups to support research on and adoption of building codes and equipment standards.

TEP staff will be responsible for administering the program. Staff required to implement the program include one-quarter of a full-time-equivalent ("FTE") staff person at a middle management level, and one-quarter FTE junior staff person. Responsibilities for these staff will include coordination, planning and implementation of all program activities. MER activities would be conducted by a third-party contractor.

## Program Marketing and Communication Strategy

Key elements of the marketing strategy will include:

- Direct outreach to local code officials and to other local officials drawing on industry association contact lists (e.g., the International Code Council), and networks of municipal leaders;
- Participation in committees conducting activities related to building code enhancement;
- Communications with other TEP energy efficiency program implementation staff in order to cross-market across programs; and
- Easy-to-locate information posted on TEP websites.

## Program Implementation Schedule

Upon Program approval by the Commission, TEP plans to immediately engage stakeholders in assessing code requirements and compliance status, as well as indentifying best avenues for code enhancement throughout the service territory.

## Measurement, Evaluation, and Research Plan

All evaluation activities will be conducted by TEP's MER contractor. An integrated evaluation approach will be taken that includes the following components:

» addressing evaluation at the onset of Program design and collecting evaluation data as part of Program administration;

» assessing and documenting baseline conditions;

» establishing tracking metrics, especially baseline code compliance per major local jurisdiction;

» developing and refining deemed savings methodologies for estimating program savings from code enhancement and adoption activities; and

» conducting primary and secondary research as part of the impact and process evaluations.

The overall goal of the impact evaluation will be to develop savings methodologies for estimating savings from more stringent code adoption and increased code compliance rates in both the residential and commercial sectors.

Process related evaluation activities will review utility code promotion implementation strategies and seek to identify ways to improve program delivery and market adoption of more aggressive residential and commercial codes. Self-report surveys with key stakeholders (code officials, builders, architects, etc.) as well as on-site verification of a sample of new construction projects will be used to assess program awareness, barriers to participation, participant satisfaction, and other process efficiency issues. Interviews will also be conducted with Program managers and the implementation contractor. These surveys will be enhanced by collecting market data and assessing trends. Wherever it is practical and appropriate, evaluation activities will be conducted in conjunction with other utilities and agencies in the state to efficiently utilize resources and help ensure consistency.

## Quality Assurance and Control

- The codes enhancement program will seek to be an additional informational resource to assist code officials, architects, builders, and other stakeholders with technical guidance with respect to code adoption and compliance activities.
- Utility staff will seek to further strengthen existing contacts with code officials, builders, architects to advance code upgrades and greater levels of code compliance, which will include occasional on-site verification visits, especially for those projects receiving utility incentives for efficiency upgrades.
- For any utility sponsored code training classes, participant satisfaction surveys will be issued as a standard feature of the class.
- All Program data tracking will be performed by the Program implementer and reported to the utility monthly.
- The Program evaluation process (described above) will provide an additional level of quality assurance for the Program.

Program Costs and Benefits

**Table 1-2. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $0 | $41,250 | $6,188 | $0 | $1,898 | $49,335 | 0 | N/A |
| **2012** | $0 | $56,180 | $8,427 | $7,979 | $2,903 | $75,490 | 0 | N/A |

Energy savings from this program will be determined after the impact evaluation is approved and completed. The overall goal of the impact evaluation will be to develop savings methodologies for estimating savings from more stringent code adoption and increased code compliance rates in both the residential and commercial sectors.

# APPENDIX D:

## TEP MULTI-FAMILY HOUSING EFFICIENCY PROGRAM

## Program Description

Multi Family housing has traditionally been a difficult sector to reach for utility Demand-Side Management ("DSM") programs. These buildings represent huge efficiency potential and also substantial barriers to implementation. The major barriers include split incentives, lack of capital, and lack of knowledge/awareness of the benefits of energy efficiency improvements. Further complicating matters, multifamily housing is defined differently by different entities. Properties with 2-4 dwelling units typically fall under residential financing guidelines and the decisions makers are usually individuals. Larger properties with 5 dwelling units or more typically fall under commercial lending guidelines and decision-makers (at least for larger complexes) are typically corporate, institutional, or trusts (e.g., Real Estate Investment Trusts). As such, the decision making process and access to capital varies between these two market segments. With this distinction in mind, the 2-4 unit market segment can be best served by the residential Home Performance with ENERGY STAR® Program, and the 5+ Multifamily Housing market segment will be served by the new commercial Multifamily Efficiency Program.

In order to encourage energy efficiency upgrades in new construction, major renovation and rehabilitation projects, as well as, energy efficiency retrofits of existing structures, the program will initially offer the following delivery tracks:

- A direct installation of selected low cost energy efficiency improvements in existing complexes.
- Common area energy efficiency improvements in existing complexes will be handled through the Small Business Direct Install Existing Facilities Program.

As the program develops and matures, Tucson Electric Power Company ("TEP" or "Company") will examine a third track for encouraging more comprehensive dwelling unit energy efficiency improvements in existing complexes that are not part of major renovation/rehabilitation projects.

With these delivery options to choose from property owners and managers have a variety of solutions to fit their needs.

## Program Objectives and Rationale

Other utilities around the country are offering energy efficiency programs in an effort to capture some of the savings potential in the multifamily housing market including San Diego Gas and Electric, Southern California Edison, Pacific Gas and Electric, Austin Energy, Puget Sound Energy and others. Many of these programs offer similar incentives and delivery options to the program proposed by TEP, and the major renovation/rehabilitation track is well aligned with the ENERGY STAR® Multifamily Homes program. By delivering this program with a focus on reducing key market barriers and targeting key decision makers, this program can contribute significantly to the achievement of TEP's DSM program energy savings goals by lowering energy usage in multifamily housing complexes.

The objectives of the program are to:

- Reduce peak demand and overall energy consumption in the multifamily housing market segment
- Promote energy efficiency retrofits of both dwelling units and common areas in this market segment
- Increase overall awareness about the importance and benefits of energy efficiency improvements to the landlord and property ownership community
- Help meet the energy savings targets of the TEP DSM program portfolio

## Target Market

The Multifamily Housing Efficiency Program ("Program") will be promoted to residential rental properties with five or more units. The focus of marketing, outreach and incentives will be the property owners or managers. A primary emphasis will be placed on larger and older, less efficient complexes. This Program is being designed to mimic the Arizona Public Service Company ('APS") program as many of the large rental property owners are the same in Phoenix as in Tucson

## Program Eligibility

All existing multifamily housing complexes and new construction projects within TEP service territory with 5 dwelling units or more are eligible for the program. The program promotes energy efficiency improvements in both dwelling units and common areas. Eligible projects include new construction, acquisition renovation and rehabilitation projects, and energy efficiency retrofits to existing facilities. Eligible facilities include apartment complexes, and common areas of apartment and condominium complexes. All TEP customers who are property owners of existing residential multifamily complexes or developers of new complexes with five or more dwelling units are eligible for the program.

## Current Baseline Conditions

The energy efficiency potential in the multifamily housing market remains largely untapped and represents significant efficiency potential for the TEP program portfolio. Due to various market barriers, such as split incentives, capital constraints, and lack of awareness, energy efficiency improvements typically fall far below other types of improvements on the priority list. Thus, multifamily housing units are often very energy inefficient. Although the current rebate programs offer some opportunities for energy efficiency improvements in this market, primarily through the Consumer Products and Residential HVAC Programs, there is not a comprehensive offering that addresses the unique needs of this market. Through the direct installation, and renovation/rehabilitation implementation framework, this program seeks to fill this important gap in the TEP program portfolio and provide substantial energy savings.

## Products and Services

This program will be delivered a direct installation approach in order to encourage energy efficiency upgrades in existing complexes:

- Delivery to be through a direct installation effort, focusing on the implementation of CFL lighting, faucet aerators, and low flow showerheads in existing dwelling units. The installation will be no cost to the owner, and the program will pay the full cost of product installation. The installation can be completed either through the facility's existing maintenance or management personnel or via a program authorized installation contractor. Common area energy efficiency improvements in existing complexes will be handled through the Solutions For Business Existing Facilities Program.

As the program develops and matures, TEP will examine a third track for encouraging more comprehensive dwelling unit energy efficiency improvements in existing complexes that are not part of major renovation/rehabilitation projects.

## Program Marketing and Communication Strategy

Marketing and communications strategies will include notifying apartment managers and owners through updates to website; local newspapers and radio; bill messages and bill inserts; training seminars; call center on-hold messages; direct mail promotion; outreach to rental housing industry associations; and work with contractors and industry specialists.

## Program Implementation Schedule

To be implemented beginning in 2012

## Delivery Strategy Incentive Processing, and Administration

The direct installation and rehabilitation/new construction components of the program will be delivered by an implementation contractor. Installation contractors will be managed and quality assurance will be maintained by the implementation contractor.

## Measurement Evaluation and Research Plan

The Measurement, Evaluation, and Research ("MER") team will develop a MER research plan and conduct annual evaluation research on the achievements of this program.

## Quality Assurance and Control

On-site inspections of at least 10% of all participating facilities will be made by the implementation contractors.

## Program Costs and Benefits

**Table 1-1. Measure Savings, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Annual Energy Savings (kWh) /Unit | Peak Demand Savings (kW)/ Unit | Avg. Incentive / Unit | 2011 Units | 2012 Units | Measure Level Societal Test Result |
|---|---|---|---|---|---|---|
| ES Integral CFL | 139 | 0.005 | $2/bulb | - | 6,250 | 21.55 |
| Low Flow Showerheads – Electric Only | 256 | 0.03 | $40/shower | - | 625 | 3.56 |
| Faucet Aerators – Electric Only | 77 | 0.01 | $2/faucet | - | 625 | 20.10 |

**Table 1-2. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | N/A |
| **2012** | $40,940 | $94,234 | $13,518 | $14,507 | $6,528 | $169,738 | $260,777 | 2.5 |

**Table 1-3. Environmental Benefits**

| | Annual CO2 Savings (Metric Tons) | Annual NOx Savings (Metric Tons) | Annual SOx Savings (Metric Tons) | Lifetime CO2 Savings (Metric Tons) | Lifetime NOx Savings (Metric Tons) | Lifetime SOx Savings (Metric Tons) |
|---|---|---|---|---|---|---|
| **2011** | - | - | - | - | - | - |
| **2012** | 1,058 | - | - | - | - | - |

## Resources

1. San Diego Gas and Electric- http://www.sdge.com/documents/residential/2009applicationmultifamily.pdf

2. Southern California Edison - http://www.sce.com/NR/rdonlyres/49780CB4-30CB-4E03-9DF0-586B0AD6DEDF/0/2009_MultifamilyRebateApp.pdf

3. Southern California Edison. Multifamily Energy Efficiency Rebate Program. Program 2502, 2006.

4. Pacific Gas and Electric Company- http://www.pge.com/includes/docs/pdfs/shared/saveenergymoney/rebates/08_residential_appliance.pdf

5. U.S. EPS ENERGY STAR® Program - http://www.energystar.gov/index.cfm?c=multifam_housing.bus_multifam_housing

6. Austin Energy - http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Commercial/Multi-Family%20Properties/index.htm

7. *Puget Sound Energy* http://www.pse.com/solutions/forbusiness/Pages/comMulifamilyWeather.aspx

# Measure Analysis Sheets

Incentive Calculations
Energy Efficient Aerators

***Multi-Family DI***

| PROGRAM DATA | |
|---|---|
| Kitchen Faucet Aerator Measure Life*: | 10 |
| Bathroom Kitchen Faucet Aerator Measure Life*: | 10 |
| Program Life (yrs): | 5 |
| Kitchen Faucet Aerator Demand AC ($/kW): | $77.23 |
| Kitchen Faucet Aerator Summer On-pk Energy AC ($/kWh): | $0.10 |
| Kitchen Faucet Aerator Summer Off-pk Energy AC ($/kWh): | $0.05 |
| Kitchen Faucet Aerator Winter On-pk Energy AC ($/kWh): | $0.06 |
| Kitchen Faucet Aerator Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Bathroom Faucet Aerator Demand AC ($/kW): | $77.23 |
| Bathroom Faucet Aerator Summer On-pk Energy AC ($/kWh): | $0.10 |
| Bathroom Faucet Aerator Summer Off-pk Energy AC ($/kWh): | $0.05 |
| Bathroom Faucet Aerator Winter On-pk Energy AC ($/kWh): | $0.06 |
| Bathroom Faucet Aerator Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Kitchen Faucet Aerator Gas AC ($/therm): | $0.78 |
| Bathroom Faucet Aerator Gas AC ($/therm): | $0.78 |
| Administrative Cost: | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | $0.10 |
| $/kWh, Off-Peak: | $0.10 |

| OPERATING DATA | |
|---|---|
| Faucet Aerator On-Pk Op. Ratio: | 30% |
| Faucet Aerator Off-Pk Op. Ratio: | 70% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Faucet Aerator Coincidence Factor: | 80% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Margin: | 0% |
| Application | Retrofit |
| Cost Basis: | Full Install |

| | DEMAND/ ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Annual Energy Savings (KWh) | Non Coin Demand Savings (kW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | Gas Energy Savings (Therms) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factors (%) | (%) | BC Ratio |
| 1.5 GPM Kitchen Faucet Aerator | 100 | 0.021 | 0.017 | 30 | 71 | 0 | 52 | 63 | 2.42 | 5% | 2 | 49 | 2.42 | 10.00 | 0.2 | 0.00 | 50% | 100% | 25.9 |
| 1.5 GPM Bathroom Faucet Aerator | 54 | 0.011 | 0.009 | 16 | 38 | 0 | 28 | 34 | 2.42 | 9% | 2 | 25 | 2.42 | 5.39 | 0.4 | 0.00 | 50% | 100% | 13.9 |
| Weighted Average | 77 | 0.016 | 0.013 | 23 | 54 | 0 | 40 | 48 | 2.42 | 7% | 2 | 37 | 2.42 | 7.69 | 0.3 | 0.00 | 100% | 100% | 19.9 |

*DEER 2008.
**Incentive based on 2011 UES Program Planning.

File Name: Aerators_MAS_MultiFamily_TEP_2010_12_09

# Appendix D

Incentive Calculations
ES Integral CFL

**Multi-Family DI**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)**: | 6 |
| Program Life (yrs): | 5 |
| Demand AC ($/ kW): | 72.41 |
| Summer On-pk Energy AC ($/ kWh): | 0.09 |
| Summer Off-pk Energy AC ($/ kWh): | 0.05 |
| Winter On-pk Energy AC ($/ kWh): | 0.06 |
| Winter Off-pk Energy AC ($/ kWh): | 0.04 |
| Program Admin. Costs ($/ bulb): | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 0.00 |
| $/ kWh, On-Peak: | 0.10 |
| $/ kWh, Off-Peak: | 0.10 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 1,657 |
| Off-Pk Op. Hours: | 1,215 |
| Total Hours: | 2,872 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor***: | 0.08 |
| HVAC Interaction Factor (Demand)*: | 0.41 |
| HVAC Interaction Factor (Energy)*: | 0.13 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fixture Type | Inc. Fixture Watts | CFL Fixture Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| Screw In | 40 | 9 | 0.033 | 0.003 | 44 | 32 | 24 | 27 | 2 | 8% | 2 | 22 | 2 | 8 | 0.2 | 0.0 | 14% | 100% | 14.9 |
| | 60 | 14 | 0.049 | 0.004 | 65 | 47 | 36 | 41 | 2 | 6% | 2 | 34 | 2 | 11 | 0.2 | 0.0 | 19% | 100% | 18.7 |
| | 60 | 15 | 0.048 | 0.004 | 63 | 46 | 35 | 40 | 2 | 6% | 2 | 33 | 2 | 11 | 0.2 | 0.0 | 10% | 100% | 18.3 |
| | 75 | 18 | 0.060 | 0.005 | 80 | 59 | 45 | 51 | 3 | 6% | 3 | 42 | 3 | 14 | 0.2 | 0.0 | 3% | 100% | 19.1 |
| | 75 | 20 | 0.058 | 0.005 | 77 | 57 | 43 | 49 | 3 | 6% | 3 | 40 | 3 | 13 | 0.2 | 0.0 | 11% | 100% | 18.5 |
| | 100 | 23 | 0.081 | 0.007 | 108 | 79 | 60 | 68 | 2 | 4% | 2 | 58 | 2 | 19 | 0.1 | 0.0 | 10% | 100% | 28.0 |
| | 100 | 26 | 0.078 | 0.006 | 104 | 76 | 58 | 66 | 2 | 4% | 2 | 55 | 2 | 18 | 0.1 | 0.0 | 2% | 100% | 26.9 |
| | 100 | 27 | 0.077 | 0.006 | 103 | 75 | 57 | 65 | 2 | 4% | 2 | 55 | 2 | 18 | 0.1 | 0.0 | 32% | 100% | 26.5 |
| | Weighted Average | | 0.061 | 0.005 | 80 | 59 | 45 | 51 | 2 | 5% | 2 | 42 | 2 | 14 | 0.18 | 0.00 | 100% | 100% | 22.0 |
| Weighted Average Check | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*HVAC Interaction Factors based on 2010 MER Report.
**Measure Life and Incentive based on 2011 UES Program Planning.
***Coincidence Factor based on Building America Performance Analysis and Navigant Load Shape study.

File Name: ScrewInCFL_MAS_MultiFamily_TEP_2011_01_12

# Appendix D

Incentive Calculations

Energy Efficient Showerheads

**Multi-Family DI**

| PROGRAM DATA | |
|---|---|
| Showerhead Measure Life*: | 10 |
| Program Life (yrs): | 5 |
| Showerhead Demand AC ($/ kW): | $77.23 |
| Showerhead Summer On-pk Energy AC ($/ kWh): | $0.10 |
| Showerhead Summer Off-pk Energy AC ($/ kWh): | $0.05 |
| Showerhead Winter On-pk Energy AC ($/ kWh): | $0.06 |
| Showerhead Winter Off-pk Energy AC ($/ kWh): | $0.04 |
| Showerhead Gas AC ($/ therm): | $0.78 |
| Administrative Cost: | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 0.00 |
| $/ kWh, On-Peak: | $0.10 |
| $/ kWh, Off-Peak: | $0.10 |

| OPERATING DATA | |
|---|---|
| Showerhead On-Pk Op. Ratio: | 20% |
| Showerhead Off-Pk Op. Ratio: | 80% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Showerhead Coincidence Factor: | 31% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Margin: | 0% |
| Application | Retrofit |
| Cost Basis: | Full Install |

| | DEMAND/ ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Annual Energy Savings (KWh) | Non Coin Demand Savings (kW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | Gas Energy Savings (Therms) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** % PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factors (%) | (%) | BC Ratio |
| 1.5 GPM Showerhead | 256 | 0.082 | 0.025 | 50 | 206 | 0 | 117 | 141 | 40 | 34% | 40 | 77 | 40 | 25 | 1.6 | 0.0 | 100% | 100% | 3.5 |
| Weighted Average | 256 | 0.082 | 0.025 | 50 | 206 | 0 | 117 | 141 | 40 | 34% | 40 | 77 | 40 | 25 | 1.6 | 0.0 | 100% | 100% | 3.5 |

*DEER 2008.

**Incentive based on 2011 UES Program Planning.

File Name: Showerheads_MAS_MultiFamily_TEP_2010_12_09

# APPENDIX E:

# TEP BID FOR EFFICIENCY PILOT PROGRAM

## Program Description

Tucson Electric Power Company's ("TEP" or "Company") Bid for Efficiency Pilot Program ("Pilot" or "Program") is designed to take an innovative approach to energy efficiency ("EE") by using elements of competition and the potential for high rewards to enhance customer interest. The Bid for Efficiency ("BFE") concept involves the following steps: 1) customers or project sponsors develop projects aimed at aggregating savings ; 2) applicants submit bids identifying projected energy savings and specifying the requested incentive in $/kWh; 3) TEP selects winning applicants based on specified criteria. The BFE concept is an innovative approach that is being successfully deployed in other jurisdictions. There are several market specific conditions that will determine the effectiveness for TEP and so TEP is proposing the BFE as a two year pilot program.

BFE participants and project sponsors may include commercial customers, ESCOs or other aggregators who organize proposals that involve multiple sites. The Pilot addresses customer market barriers such as small savings levels at multiple sites, longer payback periods and organizing implementation contractors and it offers a simplified application process. Results will be verified through Measurement and Verification ("M&V") activity.

## Program Objectives and Rationale

BFE encourages customers and project sponsors to think holistically regarding energy systems, and to develop projects designed to optimize system energy use rather than considering the energy usage of each individual piece of equipment. Customers or project sponsors develop their project and then bid competitively for incentives within broad program guidelines developed by TEP.

By encouraging a systems approach to energy efficiency, the Pilot would provide an incentive for participants to use potentially multiple EE approaches at one or several sites simultaneously. TEP will encourage customers to think outside the box in submitting bids for EE projects. TEP's implementation goals for the Program are as follows:

- Ensure projects are submitted, approved, implemented and verified in a timely manner;
- Allow each project to be customer-driven; responsibility will be placed on customer (or project sponsor) to select appropriate trade and professional allies to design and implement the project and to prepare the incentive application;
- Encourage implementation of multi-measures for comprehensive projects.
- Encourage aggregated applications that involve implementation at multiple sites.

## Target Market

Initially, the Pilot's outreach will focus on market segments with significant savings potential, unique load or energy savings characteristics, and those that require specialized delivery or support services. The target market consists primarily of larger customers and customer groups that may include grocery stores, convenience stores, or data centers, business sectors that have historically been hard to reach.

Electric loads may be aggregated among multiple facilities to meet the kWh threshold. The minimum target electric energy reduction amount per proposal is 200,000 kWh in first-year savings.

## Program Eligibility

Any entity, customer, or project sponsor meeting the application requirements of achieving the minimum target electric energy reduction amount per proposal of 200,000 kWh in first-year savings may participate. Eligible project sponsors may include, but are not limited to TEP customers, Energy Service Companies, and engineering firms. Any third-party project sponsor must submit their application with the consent and support of the indentified TEP customer.

To provide participants maximum flexibility in identifying potential projects, the Program will not explicitly specify eligible measures. However, measures must meet the following requirements:

- Produce a measurable and verifiable reduction in energy consumption;
- Produce savings through an increase in energy efficiency or better utilization of energy through improved production equipment or controls;
- Be installed in a retrofit application;
- Have a useful life of five years or greater; and
- Prove cost-effective using the Societal Cost Test (applies to total project including all measures).

Examples of eligible measures are listed in the following table. Project sponsors are free to propose measures not included in the table, as long as the above requirements are met.

**Table 1-1. Examples of Potentially-Eligible Measures**

| |
|---|
| • Replacing motors with NEMA Premium® efficiency motors |
| • Variable-speed drive installations |
| • Lighting system upgrades |
| • Compressed air system improvements |
| • Energy management and control systems |
| • HVAC system improvements |
| • Chiller and refrigeration system improvements |
| • Heat recovery systems |
| • Efficient transformers |
| • Process changes that improve energy efficiency |
| • Industrial heat pumps |
| • Control upgrades resulting in improved energy efficiency |

## Current Baseline Conditions

Programs similar to the one proposed have been offered by other utilities including Mid-American Company, Iowa; San Diego Gas & Electric, California; WPPI Energy, Wisconsin; and Xcel Energy, Colorado and Minnesota. Experiences of those utilities to date indicate that the BIF concept has a high degree of effectiveness in producing energy savings.

## Products and Services

The key "product" offered by the Program is a performance-based incentive offered to winning bidders. TEP will market the Program to customers and trade allies and will select winning bidders on a quarterly basis. TEP will provide pre- and post-installation metering. The sequence of implementation activities is presented in the following section.

## Delivery Strategy, Incentive Processing, and Administration

The following implementation process is proposed for the program:

1. TEP, and or its implementation contractor, will advertise Bid for Efficiency Pilot to customers and trade allies.
2. Customers/trade allies will submit bids for their EE projects.
3. TEP/IC will evaluate projects and make awards.
4. TEP/IC will perform pre-installation metering.
5. Customer will implement proposed project.
6. TEP will pay 50% of the incentive amount prior to installation.
7. TEP/IC will perform post-installation metering.
8. TEP will pay the remaining incentive amount based on actual M&V energy savings (based on first year of operation).

## Program Marketing and Communication Strategy

TEP will promote the Bid for Efficiency Pilot Program through direct promotion to key customers and aggregators. TEP, and/or its implementation contractor, also may conduct informational meetings with potential participants and project sponsors to explain the program rules and encourage participation.

Initially, program outreach will be focused on market segments with significant savings potential, unique load or energy savings characteristics and the need for specialized delivery or support services including:

- Grocery stores
- Convenience stores
- Data centers

## Program Implementation Schedule

TEP proposes to implement the Program as a pilot during the 2011 through 2013 timeframe. Pilot results will be evaluated in 2013. If the market response and measure savings indicate the Program is cost effective, and achieving substantial savings, the Company will include the full program offering in its 2014 DSM Implementation Plan.

## Measurement, Evaluation, and Research Plan

Upon receipt of a project's pre-installation report, the program implementation contractor will identify the appropriate M&V activities (using either the established protocols for common measures or through direct metering or billing analysis for unique projects) and assist the project sponsor in establishing the baseline prior to approving the submittal and granting permission to proceed with the installation of the measures.

## Quality Assurance and Control

Pre- and post-installation metering and/or billing analysis will be required of all projects to ensure that savings estimates are in line with actual savings produced by projects. Metering activity will adhere to standard industry M&V protocols.

## Program Costs and Benefits

TEP recommends a budget of $300K beginning in 2011 for Bid for Efficiency. While it is unknown exactly what types of projects participants may submit, TEP's analysis of likely energy savings projects based on an average incentive of $0.15/kWh saved results in the estimates shown in the table below. Actual results from the Pilot will be used to update these numbers as they become available.

**Table 1-2. Measure Savings, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Annual Energy Savings (kWh) /Unit | Peak Demand Savings (kW)/ Unit | Avg. Incentive / Unit | 2011 Units | 2012 Units | Measure Level Societal Test Result |
|---|---|---|---|---|---|---|
| Bid for Efficiency | 400,000 | 36.53 | $60,000/ customer | 4 | 6 | 3.16 |

**Table 1-3. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $210,000 | $34,160 | $31,741 | $7,042 | $11,318 | $294,261 | $519,632 | 2.4 |
| **2012** | $330,000 | $85,253 | $53,983 | $14,507 | $19,350 | $503,092 | $775,882 | 2.3 |

**Table 1-4. Environmental Benefits**

| | Annual CO2 Savings (Metric Tons) | Annual NOx Savings (Metric Tons) | Annual SOx Savings (Metric Tons) | Lifetime CO2 Savings (Metric Tons) | Lifetime NOx Savings (Metric Tons) | Lifetime SOx Savings (Metric Tons) |
|---|---|---|---|---|---|---|
| **2011** | 1,372 | 1.85 | 1.61 | 13,718 | 19 | 16 |
| **2012** | 2,156 | 2.91 | 2.52 | 21,556 | 29 | 25 |

**Table 1-5. Program Cost and Savings Summary**

| | Per Project | Total Program |
|---|---|---|
| Savings versus Standard Design | 20% | 20% |
| Customer Incentive (Estimate) | $60,000 | $75,000 |
| Energy Savings per project (Estimate) | 400,000 kWh | 1,547,000 kWh |
| Non-Incentive Program Costs | $84,261 | $294,261 |
| Societal Cost-Benefit Ratio (Estimate) | 3.2 | 2.4 |

Participating projects must demonstrate the capability to produce a minimum savings of 200,000 kWh during their first year of operation to be eligible for the Program. Individual projects are estimated to produce approximately 400,000 kWh of savings during their first year of operation. First-year program-wide savings are estimated to be 1,547,000 kWh.

The cost effectiveness of each project participating in the Program, and the Program as a whole will be assessed using the Societal Cost ("SC") test.

The cost effectiveness analysis requires estimation of:

- Net demand and energy savings attributable to the Program.
- Net incremental cost to the customer of completing the EE project, and of conducting quality installation and test and repair activities.
- Program administration costs; and
- The present value of Program benefits including utility avoided costs over the life of the measures.

Appendix E

## Measure Analysis Sheets

Incentive Calculations
Bid for Efficiency

**Commercial & Industrial - Bid for Efficiency**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)**: | 10 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 77.23 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Administrative Costs ($/unit): | 0 |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Res Ave | |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | 0.10 |
| $/kWh, Off-Peak: | 0.10 |

| OPERATING DATA** | |
|---|---|
| Op Hours: | 8,760 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 80% |

| OTHER FACTORS | |
|---|---|
| Line Loss Energy Factor: | 9.5% |
| Line Loss Demand Factor: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ENERGY SAVINGS | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Non-Coincident Demand Savings** (KW) | Coincident Demand Savings (kW) | OnPeak Energy Savings** (kWh) | OffPeak Energy Savings** (kWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive* ($) | Recommended Incentive* % PV | PV Program Cost ($) | NPV ($) | Incr. Cost** ($) | Cost Savings ($) | Payback w o/Inc. (yrs) | Payback w/Inc. (yrs) | Weighting Factor** | (%) | BC Ratio |
| Per Customer | 45.66 | 36.53 | 200,000 | 200,000 | 206,760 | 250,262 | 60,000 | 29% | 80,000 | 126,760 | 80,000 | 39,816 | 2.0 | 0.5 | 100% | 75% | 3.1 |
| Weighted Average | 45.66 | 36.53 | 200,000 | 200,000 | 206,760 | 250,262 | 60,000 | 29% | 80,000 | 126,760 | 80,000 | 39,816 | 2.0 | 0.5 | 100% | 75% | 3.1 |

*Incentive based on 2011 UES Program Planning, $.15/kWh saved and 75% cap of incremental cost.
**Demand Savings, OnPk Off Pk Energy Savings, Operating Data, Weighting Factors, Incremental Costs, and Measure Life based on engineering assumptions based on past program data and program planning.

File Name: Bid4Eff_MAS_CI_TEP_2010_12_02

# APPENDIX F:

## TEP RETRO-COMMISSIONING PROGRAM

## Program Description

Retro-commissioning ("RCx") involves using a systematic approach to identify building equipment or processes that are not achieving optimal performance or results in an existing facility. Buildings are not always commissioned correctly when first built. Existing buildings also tend to drift away from their design points with age, and periodic examination and resetting of those systems is required to run an efficient facilities portfolio. Once deficiencies are identified, necessary adjustments can be made to produce energy savings along with other key benefits such as improved occupant comfort. Facility improvements made in response to RCx efforts are commonly inexpensive to implement and typically offer paybacks of less than two years.

## Program Objectives and Rationale

Some of the major objectives from the Program are to:

- Generate significant savings for DSM portfolio objectives by tapping into energy savings opportunities present in existing commercial and industrial facilities
- Develop relationships with commercial and industrial customers leading to other areas of participation in TEP's portfolio of DSM programs.
- Develop the RCx contractor base
- Promote efficient building operations
- Lower energy bills for the consumer
- Longer equipment service life
- Fewer service and maintenance calls

A 2009 study of retro-commissioning by Lawrence Berkeley National Labs[1] ("LBNL") looked at 561 RCx projects on existing buildings representing almost 100 million square feet of floor space. Median savings were 16 percent of the whole building energy costs. ENERGY STAR® recognizes RCx as a crucial first step in increasing energy efficiency in facilities. The Leadership in Energy & Environmental Design (LEED) certification also recognizes the value in retro-commissioning and offers points towards LEED for Existing Buildings: Operations and Maintenance ("LEED-EBOM") certification for existing building commissioning activities.

Documented benefits of RCx include, but are not limited to the following:

- Up to 15% energy savings
- Reduced occupant complaints and improved occupant comfort
- Increased equipment life
- Increased documentation
- Facility staff training

[1] "Building Commissioning A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions" LBNL, July, 2009

## Target Market

The Program will target large facilities who receive electric service from Tucson Electric Power Company ("TEP" or 'Company"). Large office, small office, and large retail represent the largest commercial users with lighting, cooling, and ventilation representing the largest end uses. This approach is aimed at that market of large commercial customers.

## Program Eligibility

The following eligibility requirements will apply to the RCx Program:

- The Program is available to commercial and/or industrial customers of TEP; and
- For each site there must be at least one meter that is on an eligible rate schedule.

In order to qualify for the Program, a facility must meet the following criteria:

- Have 100,000 square feet or more of conditioned area; and
- Have a dedicated facility staff.

Preference will be given to facilities with central heating and cooling plants.

## Current Baseline Conditions

The primary barriers to more widespread implementation of this cost effective strategy are lack of education and information by building operators, lack of qualified workforce and the upfront cost of the audit and associated equipment optimization.

Programs similar to the proposed pilot are being offered by a number of utilities across the nation with reputations for achieving success in energy efficiency program offerings. The strategy is proving to be an effective means for tapping into energy saving opportunities in existing facilities.

## Products and Services

In order to maximize the benefits of the Program, the process has been broken down into phases for this program. Qualified applicants will be screened for participation prior to being accepted into the program. Selected participants will then undergo a three part RCx study.

- The first phase is centered on a basic operations and maintenance review to establish the Current Facility Requirements ("CFR") and identify operations and maintenance-related facility improvement measures. Facilities may then be accepted into the second phase of investigations that are centered on commissioning the systems to ensure that they are able to meet the CFR.
- The second phase is accomplished through functional performance testing and diagnostics of the major energy systems serving the facility.
- The final phase of the process involves optimizing the existing systems. The activities in this phase are centered on determining the potential for introducing advanced control strategies or other approaches that make full use of building system controls.

## Delivery Strategy, Incentive Processing, and Administration

TEP offers will offer a streamlined application process that will be simple for applicants to complete. Customers will be able to apply for participation in the RCx Program by submitting the RCx Application on line at the TEP web site. Much of the data collection required to identify good candidates will be collected by the Program staff during the Screening Energy Audit Phase. Eligible applicants will be contacted for scheduling of the Screening Energy Audit by Program personnel, and Program staff will be available during normal business hours to facilitate the application process.

Applicants that do not meet the eligibility requirements will receive written notification explaining why the applicant doesn't qualify.

Details of each phase of the implementation process are presented below.

## Screening Energy Audits

Screening Energy Audits are provided free of charge to all eligible applicants. The screening audit will provide the applicant with a basic energy audit, identifying basic equipment upgrades and control strategies that would result in energy savings for the customer. The facilities audited will also be provided with ENERGY STAR® Portfolio Manager ratings to benchmark the facility versus similar facilities in their area. The energy audit will also be used to screen applicants for participation in the RCx Program.

## Operations and Maintenance Review Phase

The Operations and Maintenance ("O&M") Review Phase of the RCx study will be dedicated to performing a review of energy related operational procedures and determining the state of maintenance practices related to major equipment. The end result of this review will be a list of facility improvement measures with estimated savings and cost values. The O&M Review phase is provided at no cost to the customer.

The initial task of the O&M review will be to establish the CFR. The CFR is a guiding document that determines the parameters by which all systems will be evaluated. It is established based on input from the facilities team or owners rep regarding the key requirements that the facility must meet. Any variance between what has been identified in the CFR and the actual facility's performance is identified as a deficiency. After appropriate investigation, recommendations are made to resolve identified deficiencies in the form of facility improvement measures ("FIM"). The CFR has quantitative values for HVAC, comfort, scheduling, and air quality requirements. The CFR may also include qualitative information for facility performance and Company priorities. The CFR is intended to be a living document that is updated as needed and kept as a reference for future projects and training.

With the CFR established the commissioning team will review settings in the building automation system and established operational practices for compliance with the CFR. Deficiencies will be identified and either have an FIM established for the deficiency or be marked for further investigation in subsequent phases.

A basic maintenance review will be conducted to identify any limitations of the systems to meet the CFR due to maintenance issues. The maintenance review will identify if there are any simple repairs that can be performed to save energy. The review will also determine if the equipment is in sufficient condition to merit moving forward into the systems commissioning phase or if capital improvement should be implemented instead. Systems reviewed may include chillers, boilers, air handling units, air dampers,

pumps, fans and other equipment. The maintenance review will also identify any gaps in predictive or preventative maintenance procedures that could lead to an inability to meet the CFR.

Customers will receive a report of O&M-based FIMs. Customers will also receive training at the end of this phase on maintaining the CFR, O&M best practices and how to maintain the facility improvements identified in this phase.

### Systems Commissioning Phase

The Systems Commissioning Phase of the RCx Program utilizes performance testing, trending and metering to ensure that the major energy using systems are capable of meeting the CFR. For larger systems sampling of similar components will be encouraged to contain costs. The trending capability of the building automation system in conjunction with portable data loggers will be used to verify that systems are able to operate efficiently within the CFR, and to identify FIMs that will allow the systems to do so.

Measures identified during these investigations correspond with repairs, upgrades, and capitol planning that will allow existing systems to operate within the required parameters. At the end of this phase, customers will receive training on maintaining the systems commissioning and how to maintain the identified facility improvements. The Systems Commissioning Phase commissioning services costs will be paid by the Program for selected customers who implement recommendations identified during the O&M Review phase.

### Systems Optimization Phase

The Systems Optimization Phase of the RCx Program involves introducing more complex high performance building operation strategies to the current systems. This phase builds on the work done in the prior phases by introducing the cutting edge practices that have been developed for today's high performance buildings. The commissioning professionals will help the owner identify new control strategies to allow the facility to reach full potential. At the end of this phase, the customer will be provided with training on how to maintain the control strategies identified in this phase. Such strategies may include the use of alarms, and Building Automation Systems ("BAS") trending. Commissioning services for this phase are paid by the Program for selected customers who implement recommendations identified during the Systems Commissioning Phase.

### Program Marketing and Communication Strategy

The Pilot will be marketed using traditional forms of media (print, web, newsletters, etc.), as well as targeted direct mail and outreach to engineering and trade associations. The TEP website will also be updated to include information and links for participation in this initiative. Program administrators and implementation contractors will also be called upon to reach out to larger customers to encourage participation.

### Program Implementation Schedule

The RCx Pilot Program would begin accepting applications for participation in September 2011. Subsequent program year budgets and plans will be made available towards the end of the existing program year 2011.

### Measurement, Evaluation, and Research Plan

The Measurement, Evaluation, and Research ("MER") team will develop a MER research plan and conduct annual evaluation research on the achievements of this program.

Quality Assurance and Control

Quality assurance and Control are provided at several steps throughout the program application and implementation process as outlined in the sections above. Savings verification plans are required of all applicants.

Program Costs and Benefits

Program funding is subject to limitation. As a result, only a finite number of facilities will be allowed into the Pilot.

**Table 1-1. Measure Savings, Incentive Level, and Participation, Benefit-Cost**

| Measure | Annual Energy Savings (kWh) /Unit | Peak Demand Savings (kW)/ Unit | Avg. Incentive / Unit | 2011 Units | 2012 Units | Measure Level Societal Test Result |
|---|---|---|---|---|---|---|
| Retro-Commissioning | 200,000 | 18.26 | $22,000/100k sq ft | - | 5 | 4.30 |

**Table 1-2. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | N/A |
| **2012** | $110,000 | $24,141 | $20,121 | $14,507 | $6,751 | $175,520 | $419,165 | 3.0 |

**Table 1-3. Environmental Benefits**

| | Annual CO2 Savings (Metric Tons) | Annual NOx Savings (Metric Tons) | Annual SOx Savings (Metric Tons) | Lifetime CO2 Savings (Metric Tons) | Lifetime NOx Savings (Metric Tons) | Lifetime SOx Savings (Metric Tons) |
|---|---|---|---|---|---|---|
| **2011** | - | - | - | - | - | - |
| **2012** | 980 | 1.32 | 1.15 | 9,798 | 13 | 11 |

# Measure Analysis Sheets

Incentive Calculations
Custom Measures

**Commercial & Industrial - Retrocommissioning**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)**: | 10 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 77.23 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Administrative Costs ($/unit): | 0 |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Res Ave | |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | 0.10 |
| $/kWh, Off-Peak: | 0.10 |

| OPERATING DATA** | |
|---|---|
| Op Hours: | 8,760 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 80% |

| OTHER FACTORS | |
|---|---|
| Line Loss Energy Factor: | 9.5% |
| Line Loss Demand Factor: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ENERGY SAVINGS | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (kW) | OnPeak Energy Savings** (kWh) | OffPeak Energy Savings** (kWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive* ($) | Recommended Incentive* % PV | PV Program Cost ($) | NPV ($) | Incr. Cost** ($) | Cost Savings ($) | Payback w o/Inc. (yrs) | Payback w /Inc. (yrs) | Weighting Factor** | (%) | BC Ratio |
| Per 100K sqft | 22.83 | 18.26 | 100,000 | 100,000 | 103,380 | 125,131 | 22,000 | 21% | 29,333 | 74,046 | 29,333 | 19,908 | 1.5 | 0.4 | 100% | 75% | 4.3 |
| Weighted Average | 22.83 | 18.26 | 100,000 | 100,000 | 103,380 | 125,131 | 22,000 | 21% | 29,333 | 74,046 | 29,333 | 19,908 | 1.5 | 0.4 | 100% | 75% | 4.3 |

*Incentive based on 2011 UES Program Planning, $.10/kWh saved and 75% cap of incremental cost.
**OnPk Off Pk Energy Savings, Operating Data, Weighting Factors, Incremental Costs, and *Measure Life* based on engineering assumptions based on past program data and program planning.

File Name: Retro_MAS_CI_TEP_2010_12_02

# APPENDIX G:

# SCHOOL FACILITIES PROGRAM

Appendix G

## Program Description

The Tucson Electric Power Company ("TEP") School Facilities Program ("Program") is open to participation by all existing school facilities in the TEP service territory, including charter schools. The proposed Program will utilize the same delivery method and pay incentives for the same Demand-Side Management ("DSM") measures as the existing TEP C&I Comprehensive Program, but with a separate budget reserved for schools. Incentives for the Program will also be paid at a higher level than for the Efficiency Program.

- The Program will offer incentives for a select group of retrofit and replace-on-burnout ("ROB") energy efficiency measures in existing school facilities. The efficiency measures offered include high-efficiency lighting equipment upgrades, high-efficiency HVAC equipment, lighting controls, programmable thermostats, and selected refrigeration measures.
- The direct install component will utilize an on-line proposal generation and project tracking application to reduce the transaction costs. Proposed incentives for DSM measures are identical to the incentive structure in the TEP C&I Comprehensive Program; however TEP proposes to pay up to 100% of incremental costs for schools. The Program will have a separate incentive budget of $83,787 starting in 2012 which is reserved exclusively for school use. If schools oversubscribe the budget, they will be allowed to request participation in the TEP C&I Comprehensive Program which only pays up to 85% of incremental cost.

## Program Objectives and Rationale

The primary goal of the Program is to encourage schools in TEP's service territory to install energy efficiency measures in existing facilities. More specifically, the Program is designed to:

- Encourage schools to install high-efficiency lighting equipment and controls, HVAC equipment, and energy-efficient refrigeration system retrofits in their facilities. Encourage contractors to promote the Program and provide turn-key installation services to schools.
- Assure that the participation process is clear, easy to understand and simple.
- Increase the awareness and knowledge of school facility managers and other decision-makers on the benefits of high-efficiency equipment and systems.

Since 2008, participation by schools in the TEP C&I Comprehensive Program has been modest. In order to increase participation in energy efficiency retro-fits by schools, TEP has developed this Program, which proposes to fund up to 100% of installed costs while engaging the contractor community to provide turn-key services. This is a 15% increase from the 85% allowed in the TEP C&I Comprehensive Program. The Schools Program will follow the design of the TEP C&I Comprehensive Program because the direct-install concept has a proven track record of high participation and cost-effective life cycle savings for hard-to-reach markets, including schools.

## Target Market

The target market for this Program is all kindergarten through twelfth grade ("K-12") public schools, including charter schools, in the TEP service territory.

## Program Eligibility

Customers must receive electric service from TEP to be eligible for participation. For the purposes of this Program, school is defined as a "school entity." In the case of traditional public schools, a school entity is a public school district. In the case of a charter school, a school entity is one that has a state charter.

## Current Baseline Conditions

Schools represent a market segment that has historically been underserved. This Program has been designed explicitly to increase the participation of schools in the TEP DSM programs. Incentive levels and Program structure have been customized to address and overcome market barriers.

## Products and Services Provided

The Program has an upstream market incentive design that provides incentives directly to installing contractors for the installation of energy efficiency measures. More specifically, the Program offers the following products and services:

- Educational and promotional pieces designed to assist contractors with marketing the Program to schools; and
- Education and promotional efforts for schools and contractor allies on how the Program functions, what energy efficiency technologies are offered, what incentives are provided and the benefits of the measures.

The lighting measures to be included in the Program are:

- T8 retrofits – retrofit of T12 fluorescent lighting with T8 lighting.
- Screw-in compact fluorescent light ("CFL") retrofits – replacement of incandescent lamps with screw-in fluorescent lamps.
- Exit sign retrofits – retrofit of incandescent and CFL exit signs with LED or electroluminescent exit signs lighting.
- Occupancy sensors – installation of occupancy sensor controls on lighting systems.
- De-lamping – de-lamping of lower efficiency fluorescent lighting fixtures or overlit areas.
- Reduced lighting power density ("LPD") – bringing lighting levels down to appropriate levels.
- High intensity discharge ("HID") lamps – to T8 or T5.
- Standard T8 to premium T8

The HVAC measures to be included in the Program are:

- High-efficiency AC/HP – installation of high-efficiency packaged air conditioners and heat pumps.
- Programmable thermostats – replacement of standard thermostats with programmable set-back thermostats.
- Shade screens and window films to reduce solar insolation.

The Program will also utilize variable speed drive motors to optimize performance, vending miser sensors, which turn off or turn down refrigeration and lighting on vending machines when not in use, and smart strips to better control plug loads. Whole Building custom incentive applications will also be considered where appropriate. Additionally, see Table 1-1 for a summary of the incentives offered for each of the Program measures.

**Table 1-1. School Facilities Efficiency Incentive Summary**

| LIGHTING MEASURES | COST PER FIXTURE |
|---|---|
| Replace T12 Systems & Magnetic Ballasts w/ T8 Systems & Electronic Ballasts | $55/fixture |
| Energy Efficient Integral Compact Fluorescent Lighting | $11/lamp |
| Replace Incandescent and CFL Exit Signs | $55/sign |
| Install Occupancy Sensors on Lighting Fixtures | $96/sensor |
| Daylighting controls | $751/kW base load |
| Hard Wire CFL | $15/bulb |
| HIDs to T8/T5 | $96/fixture |
| Induction Lighting | $196/lamp |
| Outdoor CFL | $9/lamp |
| Reduced LPD | $4,472/customer |
| Screw in cold cathode CFL | $12/bulb |
| T8 to T8 | $21/lamp |
| Delamping | $6/fixture |
| **HVAC MEASURES** | |
| Programmable Thermostats | $204/thermostat |
| High-Efficiency Packaged AC and Heat Pumps (<65,000 Btuh) | $440 to $1,321 (depending on size and SEER rating) |
| Shade Screens | $4/sq. ft. |
| Window Films | $3/sq. ft. |
| **MOTORS** | |
| Variable speed drives | $377/HP |
| **PLUG LOADS** | |
| Beverage Controls ("Vending Miser") | $199/sensor |
| Snack Controls ("Vending Miser") | $103/sensor |
| Advanced Power Strips - Load Sensor | $32/strip |
| Advanced Power Strips - Occupancy Sensors | $90/strip |
| Advanced Power Strips - Timer Plug Strip | $19/strip |
| **WHOLE BUILDING** | |
| Custom measures | $6,535/customer |

## Program Delivery Strategy, Incentive Processing, and Administration

The Program is an upstream market incentive program that will utilize contractors to provide turn-key installation services to schools. The Program will be implemented by employing the same implementation contractor that delivers the TEP C&I Comprehensive Program. Incentives will be paid directly to contractors and are designed to offset up to 100% of project installation costs. The participation process will be facilitated by an internet-based system that will provide an analysis of project savings, cost and cost savings and automated proposal preparation.

TEP will assign an in-house program manager to oversee the Program, provide guidance on program activities that is consistent with TEP's goals and customer service requirements, and provide a contact point for schools that are interested in or have concerns about the Program. The implementation contractor will be responsible for program administration, application and incentive processing, monitoring the activities of the installing contractors, participation tracking and reporting, and overall quality control and management of the delivery process. As part of the implementation plan, the implementation contractor will conduct outreach to contractors, marketing and promotion to schools, and education and training on the benefits and functioning of the program.

The installing contractors will promote the program directly to schools, provide turn-key installation services and have access to the internet processing system to prepare proposals.

## Program Marketing and Communications Strategy

The marketing and communications strategy will be designed to inform schools of the availability and benefits of the Program and how they can participate. The strategy will include specific outreach to schools and to contractors who typically do retrofits in schools. An important part of the marketing plan will be content and functionality on the TEP website, which will direct schools to information about the Program. More specifically, the marketing and communications plan will include:

- Direct outreach to schools within the TEP service territory;
- Direct outreach to existing trade allies that specifically target schools for the Program;
- Website content at uesaz.com providing Program information resources, contact information, and links to other relevant service and information resources;
- Customer care representatives will be available to answer any questions regarding the Program; and
- Presentations by the Program Manager and Implementation Contractor specifically targeted to schools.

## Program Implementation Schedule

The Program will be implemented immediately upon Arizona Corporation Commission approval.

## Measurement, Evaluation, and Research

TEP will adopt a strategy that calls for integrated data collection that is designed to provide a quality data resource for program tracking, management and evaluation. This approach will entail the following primary activities:

- Database management - As part of program operation, TEP will collect the necessary data elements to populate the tracking database and provide periodic reporting.
- Integrated implementation data collection - TEP will work with the Implementation Contractor to establish systems to collect the data needed to support effective program management and evaluation through the implementation and customer application processes. The database tracking system will be integrated with implementation data collection processes.
- Field verification - TEP will conduct field verification of the installation of a sample of measures throughout the implementation of the Program.
- Tracking of savings using deemed savings values - TEP will develop deemed savings values for each measure and technology promoted by the Program and periodically review and revise the savings values to be consistent with program participation and accurately estimated the savings being achieved by the Program.

This approach will provide TEP with ongoing feedback on program progress and enable program management to adjust or correct the program so as to be more effective, provide a higher level of service, and be more cost beneficial. Integrated data collection will also provide a high quality data resource for evaluation activities.

## Quality Assurance and Control

Training on program rules and installation guidelines will be provided to interested contractors.
Contractors will be made aware that their work may be inspected pre or post installation and that customer feedback on their performance will be solicited. The implementation contractor will randomly inspect at least 10% of all jobs to verify fixture counts, hours of use and functionality of the installed equipment.

## Program Costs and Benefits

**Table 1-2. Measure Savings, Incentive Level, and Participation, Benefit-Cost**

| Measure Name | Annual Energy Savings (kWh) /Unit | Peak Demand Savings (kW)/ Unit | Avg. Incentive / Unit | 2011 Units | 2012 Units | Measure Level Societal Test Result |
|---|---|---|---|---|---|---|
| Custom Measures | 32,674 | 2.98 | $6,535/customer | - | 6 | 3.16 |
| 14 SEER Packaged and Split Air Conditioners | 489 | 0.20 | $440/unit | - | - | 1.52 |
| 14 SEER Packaged and Split Heat Pumps | 764 | 0.23 | $440/unit | - | - | 2.04 |
| 15 SEER Packaged and Split Air Conditioners | 912 | 0.10 | $880/unit | - | - | 1.04 |
| 15 SEER Packaged and Split Heat Pumps | 1,525 | 0.30 | $880/unit | - | - | 1.80 |
| 16 SEER Packaged and Split Air Conditioners | 1,283 | 0.27 | $1,321/unit | - | - | 1.09 |
| 16 SEER Packaged and Split Heat Pumps | 2,129 | 0.27 | $1,321/unit | - | - | 1.54 |
| Programmable Thermostats | 5,688 | 0.00 | $204/unit | - | 20 | 13.48 |
| Shade Screens | 16 | 0.003 | $4/sq ft | - | - | 3.29 |
| Window Films | 8 | 0.003 | $3/sq ft | - | - | 4.51 |
| Daylighting controls | 1,824 | 0.60 | $751/kW base load | - | - | 2.95 |
| Delamping | 266 | 0.08 | $6/fixture | - | 200 | 49.81 |
| Energy efficient exit signs | 668 | 0.08 | $55/fixture | - | 200 | 12.49 |
| Hard Wire CFL | 188 | 0.06 | $16/bulb | - | - | 1.56 |
| HIDs to T8/T5 | 1,007 | 0.21 | $196/fixture | - | 50 | 6.13 |
| Induction Lighting | 451 | 0.15 | $196/lamp | - | - | 3.34 |
| Integral Screw In CFL | 374 | 0.07 | $11/bulb | - | - | 4.10 |
| Occupancy sensors | 461 | 0.06 | $96/sensor | - | 30 | 3.73 |
| Outdoor CFL | 382 | 0.001 | $9/lamp | - | - | 10.78 |
| Reduced LPD | 12,508 | 3.43 | $3,464/ building | - | - | 3.23 |
| Screw in cold cathode CFL | 194 | 0.001 | $12/bulb | - | - | 1.34 |
| Standard T8 Lighting | 72 | 0.02 | $27/fixture | - | 40 | 1.27 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Premium T8 Lighting | 152 | 0.06 | $59/fixture | - | 160 | 2.20 |
| T8 to T8 | 22 | 0.01 | $20/lamp | - | - | 1.35 |
| Variable Speed Drives | 2,312 | 0.00 | $377/HP | - | - | 5.11 |
| Beverage Ctrls ("vending miser") | 1,610 | 0.15 | $199/sensor | - | 25 | 5.52 |
| Snack Ctrls ("Vending Miser") | 322 | 0.03 | $103/sensor | - | - | 2.14 |
| Advanced Power Strips - Occupancy Sensors | 170 | 0.04 | $10/sensor | - | - | 1.62 |
| Advanced Power Strips - Timer Plug Strip | 213 | 0.05 | $10/sensor | - | 10 | 9.27 |
| Advanced Power Strips - Load Sensor | 118 | 0.03 | $10/sensor | - | - | 3.08 |

**Table 1-3. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | N/A |
| **2012** | $78,158 | $52,287 | $6,914 | $14,507 | $6,075 | $157,941 | $341,881 | 3.1 |

**Table 1-4. Environmental Benefits**

| | Annual $CO_2$ Savings (Metric Tons) | Annual $NO_x$ Savings (Metric Tons) | Annual $SO_x$ Savings (Metric Tons) | Lifetime $CO_2$ Savings (Metric Tons) | Lifetime $NO_x$ Savings (Metric Tons) | Lifetime $SO_x$ Savings (Metric Tons) |
|---|---|---|---|---|---|---|
| **2011** | - | - | - | - | - | - |
| **2012** | 618 | 0.83 | 0.72 | 7,828 | 11 | 9 |

## Measure Analysis Sheets

Incentive Calculations

**Schools - New Hot Water**

Replacing Electric Water Heaters with Heat Pump Water Heaters

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 13 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 93.60 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/kWh, saved) | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours Ratio: | 35% |
| Off-Pk Op. Hours Ratio: | 65% |
| Summer Ratio: | 46% |
| Winter Ratio: | 54% |
| Coincidence Factor: | 98% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | ROB |
| Cost Basis: | Incremental |

| | | | DEMAND/ENERGY SAVINGS | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | COP | Market Sector | Baseline Efficiency (%) | Baseline Energy (kWh) | EE Efficiency (%) | EE Energy (kWh) | Non-Coincident Demand Savings (kW) | Coincident Demand Savings (kW) | On-pk Energy Savings (kWh) | Off-pk Energy Savings (kWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor* | | BC Ratio |
| HP Water Heater | 2.35 | Education | 86% | 6,153 | 235% | 2,252 | 0.276 | 0.269 | 1,364 | 2,537 | 2,284 | 2,891 | 1,910.00 | 84% | 1,910 | 981 | 1,910.00 | 246 | 7.8 | 0.0 | 50% | 100% | 1.5 |
| | 2.51 | Education | 86% | 6,153 | 251% | 2,108 | 0.286 | 0.279 | 1,415 | 2,630 | 2,368 | 2,997 | 2,775.00 | 117% | 2,777 | 220 | 2,776.66 | 255 | 10.9 | 0.0 | 50% | 100% | 1.1 |
| Weighted Average | | | 86% | 6,153 | 243% | 2,180 | 0.281 | 0.274 | 1,389 | 2,584 | 2,326 | 2,944 | 2,343 | 100% | 2,343 | 600 | 2,343.33 | 251 | 9.3 | 0.0 | 100% | 100% | 1.3 |
| Weighted Average Check | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Weighting Factor based on engineering assumptions.

**Incentive based on UES 2011 Program Planning.

File Name: HPWaterHeaters_MAS_Schools_TEP_2011_01_14

# Appendix G

**Schools Program - New HVAC**

Incentive Calculations
NonRes Split and Packaged AC SEER-rated
13 SEER Baseline

| PROGRAM DATA | |
|---|---|
| Conservation Life (yrs): | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 97.13 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/unit): | NA |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate Class: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk EFLH: | 709 |
| Off-Pk EFLH: | 1133 |
| On-Pk Ratio: | 38% |
| Off-Pk Ratio: | 62% |
| Summer Ratio: | 78% |
| Winter Ratio: | 22% |
| Coincidence Factor: | 0.89 |
| Equipment pk hr load factor: | 1.00 |

| OTHER FACTORS | |
|---|---|
| Line Loss Demand Factor: | 9.5% |
| Line Loss Energy Factor: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application: | ROB |
| Cost Basis: | Incremental |

| | DEMAND/ENERGY SAVINGS | | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Unit Size (Tons) | EE SEER | EE EER* | Base SEER | Base EER | Non-Coin Demand Savings Per Unit (KW) | Coin Demand Savings Per Unit (kWh) | On-pk Savings Per Unit (KWh) | Off-pk Savings Per Unit (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive (Per Unit)** ($) | Recommended Incentive (Per Unit)** %PV | PV Cost Per Unit ($) | NPV ($) | Incr. Cost Per Unit ($) | Cost Savings Per Ton ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor*** (%) | % | BC Ratio |
| Packaged and Sp | 2 | 14 | 11.6 | 13 | 11.0 | 0.113 | 0.101 | 93 | 149 | 253 | 329 | 360 | 143% | 364 | -112 | 364.19 | 25 | 14.3 | 0.2 | 0% | 99% | 0.90 |
| Air Conditioners | 2.5 | 14 | 11.6 | 13 | 11.0 | 0.141 | 0.126 | 117 | 187 | 316 | 411 | 380 | 120% | 383 | -67 | 382.97 | 32 | 12.0 | 0.1 | 5% | 99% | 1.07 |
| 14 SEER | 3 | 14 | 11.6 | 13 | 11.0 | 0.169 | 0.151 | 140 | 224 | 379 | 493 | 400 | 106% | 402 | -23 | 401.74 | 38 | 10.5 | 0.0 | 15% | 100% | 1.23 |
| | 3.5 | 14 | 11.6 | 13 | 11.0 | 0.197 | 0.176 | 164 | 261 | 442 | 575 | 420 | 95% | 421 | 22 | 420.51 | 45 | 9.4 | 0.0 | 20% | 100% | 1.37 |
| | 4 | 14 | 11.6 | 13 | 11.0 | 0.226 | 0.201 | 187 | 299 | 505 | 657 | 435 | 86% | 439 | 66 | 439.28 | 51 | 8.6 | 0.1 | 25% | 99% | 1.50 |
| | 5 | 14 | 11.6 | 13 | 11.0 | 0.282 | 0.251 | 234 | 374 | 631 | 822 | 475 | 75% | 477 | 155 | 476.82 | 64 | 7.5 | 0.0 | 35% | 100% | 1.72 |
| Weighted Average | | | | | | 0.227 | 0.202 | 188 | 301 | 508 | 662 | 438 | 89% | 440 | 68 | 440.22 | 51 | 8.9 | 0.0 | 100% | 99% | 1.50 |
| Packaged and Sp | 2 | 15 | 11.3 | 13 | 11.0 | 0.058 | 0.052 | 175 | 279 | 348 | 453 | 725 | 208% | 728 | -381 | 728.39 | 31 | 23.2 | 0.1 | 0% | 100% | 0.62 |
| Air Conditioners | 2.5 | 15 | 11.3 | 13 | 11.0 | 0.072 | 0.065 | 218 | 349 | 435 | 566 | 765 | 176% | 766 | -331 | 765.93 | 39 | 19.5 | 0.0 | 5% | 100% | 0.74 |
| 15 SEER | 3 | 15 | 11.3 | 13 | 11.0 | 0.087 | 0.077 | 262 | 418 | 522 | 679 | 800 | 153% | 803 | -282 | 803.47 | 47 | 17.1 | 0.1 | 15% | 100% | 0.84 |
| | 3.5 | 15 | 11.3 | 13 | 11.0 | 0.101 | 0.090 | 305 | 488 | 609 | 792 | 840 | 138% | 841 | -232 | 841.02 | 55 | 15.3 | 0.0 | 20% | 100% | 0.94 |
| | 4 | 15 | 11.3 | 13 | 11.0 | 0.116 | 0.103 | 349 | 558 | 696 | 905 | 875 | 126% | 879 | -183 | 878.56 | 63 | 14.0 | 0.1 | 25% | 100% | 1.03 |
| | 5 | 15 | 11.3 | 13 | 11.0 | 0.145 | 0.129 | 436 | 697 | 870 | 1,132 | 950 | 109% | 954 | -84 | 953.64 | 79 | 12.1 | 0.0 | 35% | 100% | 1.19 |
| Weighted Average | | | | | | 0.117 | 0.104 | 351 | 561 | 700 | 911 | 878 | 129% | 880 | -180 | 880.44 | 63 | 14.3 | 0.0 | 100% | 100% | 1.03 |
| Packaged and Sp | 2 | 16 | 11.8 | 13 | 11.0 | 0.148 | 0.132 | 245 | 392 | 543 | 707 | 1,090 | 201% | 1,093 | -550 | 1,092.58 | 51 | 21.4 | 0.1 | 0% | 100% | 0.65 |
| Air Conditioners | 2.5 | 16 | 11.8 | 13 | 11.0 | 0.185 | 0.165 | 307 | 490 | 679 | 883 | 1,145 | 169% | 1,149 | -470 | 1,148.90 | 64 | 18.0 | 0.1 | 5% | 100% | 0.77 |
| 16 SEER | 3 | 16 | 11.8 | 13 | 11.0 | 0.222 | 0.198 | 368 | 588 | 814 | 1,060 | 1,205 | 148% | 1,205 | -391 | 1,205.21 | 77 | 15.7 | 0.0 | 15% | 100% | 0.88 |
| | 3.5 | 16 | 11.8 | 13 | 11.0 | 0.259 | 0.231 | 429 | 686 | 950 | 1,236 | 1,260 | 133% | 1,262 | -311 | 1,261.52 | 90 | 14.1 | 0.0 | 20% | 100% | 0.98 |
| | 4 | 16 | 11.8 | 13 | 11.0 | 0.296 | 0.264 | 491 | 784 | 1,086 | 1,413 | 1,315 | 121% | 1,318 | -232 | 1,317.84 | 102 | 12.9 | 0.0 | 25% | 100% | 1.07 |
| | 5 | 16 | 11.8 | 13 | 11.0 | 0.370 | 0.330 | 614 | 980 | 1,357 | 1,766 | 1,430 | 105% | 1,430 | -73 | 1,430.47 | 128 | 11.2 | 0.0 | 35% | 100% | 1.23 |
| Weighted Average | | | | | | 0.298 | 0.265 | 494 | 789 | 1,093 | 1,422 | 1,319 | 124% | 1,321 | -228 | 1,320.65 | 103 | 13.2 | 0.0 | 100% | 100% | 1.08 |

*EE EER value based on Efficient Home Cooling MER Report 2010
**Incentives based on UES 2011 Program Planning.
***Weighting Factors based on engineering assumptions.

File Name: AC SEER_MAS_Schools_TEP_2011_01_14

# Appendix G

**Schools - New HVAC**

Incentive Calculations
NonRes Split and Packaged HP SEER-rated
13 SEER Baseline

| PROGRAM DATA | |
|---|---|
| Conservation Life (yrs): | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/ kW): | 97.13 |
| Summer On-pk Energy AC ($/ kWh): | 0.10 |
| Summer Off-pk Energy AC ($/ kWh): | 0.06 |
| Winter On-pk Energy AC ($/ kWh): | 0.07 |
| Winter Off-pk Energy AC ($/ kWh): | 0.05 |
| Program Admin Costs ($/ unit): | NA |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate Class: | |
| $/ kW: | 8.78 |
| $/ kWh, On-Peak: | 0.06 |
| $/ kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk EFLH Cooling: | 709 |
| Off-Pk EFLH Cooling: | 1133 |
| On-Pk EFLH Heating: | 485 |
| Off-Pk EFLH Heating: | 776 |
| Summer Ratio: | 54% |
| Winter Ratio: | 46% |
| Coincidence Factor: | 0.89 |
| Equipment pk hr load factor: | 1.00 |

| OTHER FACTORS | |
|---|---|
| Line Loss Demand Factor: | 9.5% |
| Line Loss Energy Factor: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application: | ROB, NEW |
| Cost Basis: | Incremental |

| | | DEMAND/ ENERGY SAVINGS | | | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Unit Size (Tons) | EE SEER | EE EER* | Base SEER | Base EER | EE HSPF | Base HSPF | Non-Coin Demand Savings Per Unit (KW) | Coin Demand Savings Per Unit (KW) | On-pk Savings Per Unit (KWh) | Off-pk Savings Per Unit (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive (Per Unit)** ($) | Recommended Incentive (Per Unit)** %PV | PV Cost Per Unit ($) | NPV ($) | Incr. Cost Per Unit ($) | Cost Savings Per Unit ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor*** (%) | (%) | BC Ratio |
| Packaged and Split | 2 | 14 | 11.7 | 13 | 11.0 | 8.30 | 8.00 | 0.131 | 0.116 | 146 | 234 | 339 | 442 | 360 | 106% | 364 | -25 | 364.19 | 35 | 10.4 | 0.1 | 0% | 99% | 1.21 |
| Heat Pump | 2.5 | 14 | 11.7 | 13 | 11.0 | 8.30 | 8.00 | 0.163 | 0.145 | 183 | 292 | 424 | 552 | 380 | 90% | 383 | 41 | 382.97 | 44 | 8.8 | 0.1 | 5% | 99% | 1.44 |
| 14 SEER | 3 | 14 | 11.7 | 13 | 11.0 | 8.30 | 8.00 | 0.196 | 0.174 | 219 | 350 | 509 | 663 | 400 | 79% | 402 | 107 | 401.74 | 52 | 7.7 | 0.0 | 15% | 100% | 1.65 |
| | 3.5 | 14 | 11.7 | 13 | 11.0 | 8.30 | 8.00 | 0.228 | 0.204 | 256 | 409 | 594 | 773 | 420 | 71% | 421 | 173 | 420.51 | 61 | 6.9 | 0.0 | 20% | 100% | 1.84 |
| | 4 | 14 | 11.7 | 13 | 11.0 | 8.30 | 8.00 | 0.261 | 0.233 | 292 | 467 | 679 | 883 | 435 | 64% | 439 | 240 | 439.28 | 70 | 6.3 | 0.1 | 25% | 99% | 2.01 |
| | 5 | 14 | 11.7 | 13 | 11.0 | 8.30 | 8.00 | 0.326 | 0.291 | 365 | 584 | 848 | 1,104 | 475 | 56% | 477 | 372 | 476.82 | 87 | 5.5 | 0.0 | 35% | 100% | 2.32 |
| Weighted Average | | | | | | | | 0.263 | 0.234 | 294 | 470 | 683 | 889 | 438 | 66% | 440 | 243 | 440.22 | 70 | 6.4 | 0.0 | 100% | 99% | 2.02 |
| Packaged and Split | 2 | 15 | 11.9 | 13 | 11.0 | 8.70 | 8.00 | 0.165 | 0.147 | 292 | 466 | 600 | 781 | 725 | 121% | 728 | -128 | 728.39 | 60 | 12.2 | 0.1 | 0% | 100% | 1.07 |
| Heat Pump | 2.5 | 15 | 11.9 | 13 | 11.0 | 8.70 | 8.00 | 0.206 | 0.184 | 365 | 583 | 750 | 976 | 765 | 102% | 766 | -16 | 765.93 | 75 | 10.3 | 0.0 | 5% | 100% | 1.27 |
| 15 SEER | 3 | 15 | 11.9 | 13 | 11.0 | 8.70 | 8.00 | 0.248 | 0.221 | 438 | 699 | 900 | 1,171 | 800 | 89% | 803 | 97 | 803.47 | 90 | 9.0 | 0.0 | 15% | 100% | 1.46 |
| | 3.5 | 15 | 11.9 | 13 | 11.0 | 8.70 | 8.00 | 0.289 | 0.257 | 510 | 816 | 1,050 | 1,367 | 840 | 80% | 841 | 209 | 841.02 | 104 | 8.1 | 0.0 | 20% | 100% | 1.62 |
| | 4 | 15 | 11.9 | 13 | 11.0 | 8.70 | 8.00 | 0.330 | 0.294 | 583 | 932 | 1,200 | 1,562 | 875 | 73% | 879 | 322 | 878.56 | 119 | 7.4 | 0.0 | 25% | 100% | 1.78 |
| | 5 | 15 | 11.9 | 13 | 11.0 | 8.70 | 8.00 | 0.413 | 0.368 | 729 | 1,165 | 1,500 | 1,952 | 950 | 63% | 954 | 547 | 953.64 | 149 | 6.4 | 0.0 | 35% | 100% | 2.05 |
| Weighted Average | | | | | | | | 0.332 | 0.296 | 587 | 938 | 1,208 | 1,572 | 878 | 75% | 880 | 327 | 880.44 | 120 | 7.5 | 0.0 | 100% | 100% | 1.79 |
| Packaged and Split | 2 | 16 | 11.8 | 13 | 11.0 | 9.00 | 8.00 | 0.148 | 0.132 | 407 | 651 | 771 | 1,003 | 1,090 | 141% | 1,093 | -322 | 1,092.58 | 75 | 14.6 | 0.0 | 0% | 100% | 0.92 |
| Heat Pump | 2.5 | 16 | 11.8 | 13 | 11.0 | 9.00 | 8.00 | 0.185 | 0.165 | 509 | 813 | 964 | 1,254 | 1,145 | 119% | 1,149 | -185 | 1,148.90 | 93 | 12.3 | 0.0 | 5% | 100% | 1.09 |
| 16 SEER | 3 | 16 | 11.8 | 13 | 11.0 | 9.00 | 8.00 | 0.222 | 0.198 | 611 | 976 | 1,157 | 1,505 | 1,205 | 104% | 1,205 | -49 | 1,205.21 | 112 | 10.8 | 0.0 | 15% | 100% | 1.25 |
| | 3.5 | 16 | 11.8 | 13 | 11.0 | 9.00 | 8.00 | 0.259 | 0.231 | 713 | 1,139 | 1,349 | 1,756 | 1,260 | 93% | 1,262 | 88 | 1,261.52 | 131 | 9.7 | 0.0 | 20% | 100% | 1.39 |
| | 4 | 16 | 11.8 | 13 | 11.0 | 9.00 | 8.00 | 0.296 | 0.264 | 814 | 1,301 | 1,542 | 2,007 | 1,315 | 85% | 1,318 | 224 | 1,317.84 | 149 | 8.8 | 0.0 | 25% | 100% | 1.52 |
| | 5 | 16 | 11.8 | 13 | 11.0 | 9.00 | 8.00 | 0.370 | 0.330 | 1,018 | 1,627 | 1,928 | 2,508 | 1,430 | 74% | 1,430 | 497 | 1,430.47 | 187 | 7.7 | 0.0 | 35% | 100% | 1.75 |
| Weighted Average | | | | | | | | 0.298 | 0.265 | 820 | 1,310 | 1,552 | 2,019 | 1,319 | 0.9 | 1,321 | 231 | 1,320.65 | 150 | 9.1 | 0.0 | 100% | 100% | 1.53 |

*EE EER value based on Efficient Home Cooling MER Report 2010
**Incentives based on UES 2011 Program Planning.
***Weighting Factor based on engineering assumptions.

File Name: HP SEER_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations

Programmable Thermostats (Heating Setback / Cooling Setup)

**Schools Program - New HVAC**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 11 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 78.64 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Admin Costs ($/unit): | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate Class: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA** | |
|---|---|
| On-Pk Savings Ratio: | 0% |
| Off-Pk Savings Ratio: | 100% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.00 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application: | RET |
| Cost Basis: | Full Installed |

| | | DEMAND/ENERGY SAVINGS | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Bldg Type | Bldg Area (sq.ft.) | Non-Coin. Demand Savings Per Tstat (KW) | Coin. Demand Savings Per Tstat (KW) | On-pk Savings Per Tstat (KWh) | Off-pk Savings Per Tstat (KWh) | IRP PV Benefit Per Tstat ($) | Social PV Benefit Per T stat ($) | Incentive (Per Tstat)*** ($) | Incentive (Per Tstat)*** %PV | PV Cost Per Tstat ($) | NPV ($) | Incr. Cost Per Tstat ($) | Cost Savings Per Tstat ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor** | (%) | BC Ratio |
| Prog Therm | Education | 374,999 | 0.00 | 0.00 | 0 | 5,688 | 2,221 | 2,730 | 200 | 9% | 204 | 2,017 | 204 | 312 | 0.7 | 0.0 | 100% | 97.8% | 13.4 |
| | Weighted Average | 374,999 | 0.00 | 0.00 | 0 | 5,688 | 2,221 | 2,730 | 200 | 9% | 204 | 2,017 | 204 | 312 | 0.7 | 0.0 | 100% | 97.8% | 13.4 |
| Weighted Average Check | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Measure Lifetime based on DEER 2008 evaluations.

**Operating data, weighting factors based on engineering assumptions.

***Incentive based on 2011 Program Planning.

File Name: ProgTherm_MAS_Schools_TEP_2011_01_17

# Appendix G

Incentive Calculations
Shade Screens

**Schools - New HVAC**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 10 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 77.23 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Administrative Costs ($/kWh) | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Pea | 0.06 |
| $/kWh, Off-Pea | 0.05 |

| OPERATING DATA*** | |
|---|---|
| On-Pk Op. Hours % | 70% |
| Off-Pk Op. Hours % | 30% |
| Summer Ratio: | 100% |
| Winter Ratio: | 0% |
| Coincidence Factor | 100% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ ENERGY SAVINGS | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Window Film | Shading Coefficient | Non-Coin. Demand Savings (kW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost/ sq ft ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor*** (%) | (%) | BC Ratio |
| Electric Cool/ Heat | | | | | | | | | | | | | | | | | | |
| SunTex 80 | 0.29 | 0.002 | 0.002 | 10 | 4 | 10 | 13 | 4.00 | 38% | 4.13 | 8.52 | 4.13 | 1.10 | 3.8 | 0.1 | 15% | 97% | 3.1 |
| SunTex 90 | 0.19 | 0.003 | 0.003 | 12 | 5 | 12 | 14 | 4.00 | 34% | 4.13 | 10.18 | 4.13 | 1.24 | 3.3 | 0.1 | 15% | 97% | 3.5 |
| Textilene 80 | 0.30 | 0.002 | 0.002 | 10 | 4 | 10 | 12 | 4.00 | 39% | 4.13 | 8.35 | 4.13 | 1.08 | 3.8 | 0.1 | 15% | 97% | 3.0 |
| Textilene 90 | 0.19 | 0.003 | 0.003 | 12 | 5 | 12 | 14 | 4.00 | 34% | 4.13 | 10.18 | 4.13 | 1.24 | 3.3 | 0.1 | 15% | 97% | 3.5 |
| Electric Cool / Gas Heat | | | | | | | | | | | | | | | | | | |
| SunTex 80 | 0.29 | 0.002 | 0.002 | 10 | 4 | 11 | 13 | 4.00 | 38% | 4.13 | 8.65 | 4.13 | 1.11 | 3.7 | 0.1 | 10% | 97% | 3.1 |
| SunTex 90 | 0.19 | 0.003 | 0.003 | 12 | 5 | 12 | 15 | 4.00 | 33% | 4.13 | 10.39 | 4.13 | 1.26 | 3.3 | 0.1 | 10% | 97% | 3.5 |
| Textilene 80 | 0.30 | 0.002 | 0.002 | 10 | 4 | 10 | 13 | 4.00 | 38% | 4.13 | 8.47 | 4.13 | 1.09 | 3.8 | 0.1 | 10% | 97% | 3.1 |
| Textilene 90 | 0.19 | 0.003 | 0.003 | 12 | 5 | 12 | 15 | 4.00 | 33% | 4.13 | 10.39 | 4.13 | 1.26 | 3.3 | 0.1 | 10% | 97% | 3.5 |
| Weighted Average | | 0.003 | 0.003 | 11 | 5 | 11 | 13 | 4.00 | 36% | 4.13 | 9.37 | 4.13 | 1.17 | 3.54 | 0.11 | 100% | 97% | 3.3 |
| Weighted Average Check | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

* DEER 2008.
**Incentives based on UES 2011 Program Planning.
***Weighting Factors and Operating Data based on engineering assumptions.

File Name: ShadeScreens_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
Window Films

**Schools - New HVAC**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 97.13 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Administrative Costs ($/kWh) | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Pea | 0.06 |
| $/kWh, Off-Pea | 0.05 |

| OPERATING DATA*** | |
|---|---|
| On-Pk Op. Hours % | 70% |
| Off-Pk Op. Hours % | 30% |
| Summer Ratio: | 100% |
| Winter Ratio: | 0% |
| Coincidence Factor | 100% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Window Film | Emissivity | Shading Coefficient | Non Coin Demand Savings (kW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor*** (%) | (%) | BC Ratio |
| Electric Cool/ Heat | | | | | | | | | | | | | | | | | | | |
| VS60 | 0.67 | 0.52 | 0.003 | 0.003 | 6 | 3 | 10 | 14 | 2.55 | 24% | 3 | 11 | 2.63 | 0.86 | 3.1 | 0.1 | 15% | 97% | 5.2 |
| VS61 | 0.67 | 0.58 | 0.003 | 0.003 | 5 | 2 | 9 | 12 | 2.55 | 28% | 3 | 9 | 2.63 | 0.74 | 3.5 | 0.1 | 15% | 97% | 4.5 |
| VS70 | 0.66 | 0.56 | 0.003 | 0.003 | 6 | 2 | 9 | 12 | 2.55 | 27% | 3 | 10 | 2.63 | 0.78 | 3.4 | 0.1 | 15% | 97% | 4.7 |
| VS80BL | 0.82 | 0.65 | 0.002 | 0.002 | 5 | 2 | 7 | 10 | 2.55 | 34% | 3 | 7 | 2.63 | 0.61 | 4.3 | 0.1 | 15% | 97% | 3.7 |
| Electric Cool Only | | | | | | | | | | | | | | | | | | | |
| VS60 | 0.67 | 0.52 | 0.003 | 0.003 | 6 | 3 | 10 | 13 | 2.55 | 25% | 3 | 11 | 2.63 | 0.84 | 3.1 | 0.1 | 10% | 97% | 5.1 |
| VS61 | 0.67 | 0.58 | 0.003 | 0.003 | 5 | 2 | 9 | 12 | 2.55 | 29% | 3 | 9 | 2.63 | 0.73 | 3.6 | 0.1 | 10% | 97% | 4.4 |
| VS70 | 0.66 | 0.56 | 0.003 | 0.003 | 6 | 2 | 9 | 12 | 2.55 | 27% | 3 | 9 | 2.63 | 0.77 | 3.4 | 0.1 | 10% | 97% | 4.6 |
| VS80BL | 0.82 | 0.65 | 0.002 | 0.002 | 4 | 2 | 7 | 10 | 2.55 | 35% | 3 | 7 | 2.63 | 0.60 | 4.4 | 0.1 | 10% | 97% | 3.6 |
| Weighted Average | | | 0.003 | 0.003 | 5 | 2 | 9 | 12 | 2.55 | 29% | 3 | 9 | 2.63 | 0.74 | 3.59 | 0.10 | 100% | 97% | 4.5 |
| Weighted Average Check | | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Based on average of 3M warranty periods http://solutions.3m.com/wps/portal/3M/en_US/Window_Film/Solutions/Resources/Links/Warranties/
**Incentive based on 2011 UES Program Planning.
***Weighting Factor and Operating Data based on engineering assumptions.

File Name: WindowFilms_MAS_Schools_TEP_2011_01_14

# Appendix G

**Schools - New Lighting**

Incentive Calculations
Energy-Efficient Incandescent Fixtures -- Retrofit Applications
Replace Incandescents with CFLs

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 2 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 50.92 |
| Summer On-pk Energy AC ($/kWh): | 0.07 |
| Summer Off-pk Energy AC ($/kWh): | 0.04 |
| Winter On-pk Energy AC ($/kWh): | 0.05 |
| Winter Off-pk Energy AC ($/kWh): | 0.03 |
| Program Admin Costs ($/kWh): | 0 |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 1,317 |
| Off-Pk Op. Hours: | 1,585 |
| Total Op. Hours: | 2,902 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand): | 1.18 |
| HVAC Interaction Factor (Energy): | 1.14 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | | DEMAND/ENERGY SAVINGS | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | CFL Fixt. Watts | Incand. Fixt. Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/Inc. (yrs) | Payback w/Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| Screw In/ Integral Screw In | 19 | 79 | 0.071 | 0.066 | 90 | 109 | 25 | 26 | 11 | 47% | 11 | 15 | 11 | 19 | 0.6 | 0.0 | 100% | 99% | 2.3 |
| Plug In/ Hardwire | 16 | 73 | 0.067 | 0.063 | 86 | 103 | 23 | 25 | 15 | 67% | 16 | 9 | 16 | 18 | 0.9 | 0.0 | 100% | 99% | 1.6 |

Notes:
* Based on average manufacturer rated life and deemed annual usage hours.
**Based on 2011 UES Program Planning.

File Name: CFLs_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations

**Schools - New Lighting**

ENERGY-EFFICIENT COLD CATHODE FLUORESCENT LIGHTING (CC CFL)

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 6 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 72.41 |
| Summer On-pk Energy AC ($/kWh): | 0.09 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Admin Costs ($/unit): | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 999 |
| Off-Pk Op. Hours: | 3,381 |
| Total Hours | 4,380 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.02 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full |

| | DEMAND/ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fixture Type | Inc. Fixture Watts | Cold Cathode Fixture Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/Inc. (yrs) | Payback w/Inc. (yrs) | Weighting Factor* | | BC Ratio |
| SCREW-IN | 25 | 3 | 0.022 | 0.000 | 22 | 74 | 25 | 28 | 12.25 | 49% | 12 | 12 | 12.46 | 8 | 1.6 | 0.0 | 10% | 98% | 2.3 |
| | 30 | 5 | 0.025 | 0.000 | 25 | 85 | 28 | 32 | 11.00 | 39% | 11 | 17 | 11.01 | 9 | 1.3 | 0.0 | 2% | 100% | 2.9 |
| | 40 | 5 | 0.035 | 0.001 | 35 | 118 | 40 | 45 | 11.00 | 28% | 11 | 29 | 11.01 | 12 | 0.9 | 0.0 | 30% | 100% | 4.1 |
| | 45 | 8 | 0.037 | 0.001 | 37 | 125 | 42 | 47 | 13.00 | 31% | 13 | 29 | 13.15 | 13 | 1.0 | 0.0 | 2% | 99% | 3.6 |
| | 50 | 8 | 0.042 | 0.001 | 42 | 142 | 48 | 54 | 13.00 | 27% | 13 | 34 | 13.15 | 15 | 0.9 | 0.0 | 2% | 99% | 4.1 |
| | 54 | 8 | 0.046 | 0.001 | 46 | 156 | 52 | 59 | 13.00 | 25% | 13 | 39 | 13.15 | 16 | 0.8 | 0.0 | 2% | 99% | 4.5 |
| | 60 | 8 | 0.052 | 0.001 | 52 | 176 | 59 | 67 | 13.00 | 22% | 13 | 46 | 13.15 | 18 | 0.7 | 0.0 | 40% | 99% | 5.1 |
| | 65 | 8 | 0.057 | 0.001 | 57 | 193 | 64 | 73 | 13.00 | 20% | 13 | 51 | 13.15 | 20 | 0.7 | 0.0 | 2% | 99% | 5.6 |
| | 75 | 8 | 0.067 | 0.001 | 67 | 227 | 76 | 86 | 13.00 | 17% | 13 | 63 | 13.15 | 23 | 0.6 | 0.0 | 10% | 99% | 6.5 |
| Weighted Average | | | 0.044 | 0.001 | 44 | 150 | 50 | 57 | 12.29 | 27% | 12 | 38 | 12.40 | 15 | 0.87 | 0.01 | 100% | 99% | 4.6 |
| Weighted Average Check | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Weighting Factor based on engineering assumption. Measure Life based on lifetime assumption of 25000 hours.

**Incentive based on UES 2011 Program Planning.

File Name: *ColdCathode_MAS_Schools_TEP_2011_01_14*

# Appendix G

Incentive Calculations
Daylighting Controls

**Schools - New Lighting**

| PRGORAM DATA | |
|---|---|
| Measure Life (yrs): | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/ kW): | 97.13 |
| Summer On-pk Energy AC ($/ kWh): | 0.10 |
| Summer Off-pk Energy AC ($/ kWh): | 0.06 |
| Winter On-pk Energy AC ($/ kWh): | 0.07 |
| Winter Off-pk Energy AC ($/ kWh): | 0.05 |
| Program Admin Costs ($/ unit): | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 8.78 |
| $/ kWh, On-Peak: | 0.06 |
| $/ kWh, Off-Peak: | 0.05 |

| INCENTIVE LEVEL** | |
|---|---|
| $ / connected kW | 0.12 |

| OPERATING DATA* | |
|---|---|
| On-Pk Op. Hours: | 1,316 |
| Off-Pk Op. Hours: | 1,584 |
| Total Hours: | 2,900 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand): | 0.20 |
| HVAC Interaction Factor (Energy): | 0.17 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET / NEW |
| Cost Basis: | Full Installed |

| | DEMAND/ ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control Type | Connected Load*** (Watts) | Dayl. Savings Fraction**** | Non-Coin. Demand Savings Per kW (KW) | Coin. Demand Savings Per kW (KW) | On-pk Savings Per kW (KWh) | Off-pk Savings Per kW (KWh) | IRP PV Benefit Per kW ($) | Social PV Benefit Per KW ($) | Recommended Incentive ($) | Recommended Incentive %PV | PV Cost Per kW ($) | NPV ($) | Incr. Cost Per kW ($) | Cost Savings Per kW ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| SIDELIGHTING - ON/ OFF | 1000 | 32% | 0.384 | 0.357 | 493 | 593 | 1006 | 1309 | 775 | 1 | 775 | 230 | 775.41 | 101 | 7.7 | 0.0 | 10% | 100% | 1.7 |
| SIDELIGHTING - STEP | 1000 | 44% | 0.528 | 0.491 | 678 | 815 | 1383 | 1799 | 775 | 1 | 775 | 607 | 775.41 | 139 | 5.6 | 0.0 | 10% | 100% | 2.3 |
| SIDELIGHTING - CONTINUOU | 1000 | 56% | 0.672 | 0.625 | 862 | 1038 | 1760 | 2290 | 1,355 | 1 | 1358 | 402 | 1357.97 | 177 | 7.7 | 0.0 | 20% | 100% | 1.7 |
| SKYLIGHTING - ON/ OFF | 1000 | 52% | 0.624 | 0.580 | 801 | 964 | 1634 | 2126 | 175 | 0 | 176 | 1458 | 175.58 | 165 | 1.1 | 0.0 | 15% | 100% | 12.1 |
| SKYLIGHTING - STEP | 1000 | 57% | 0.684 | 0.636 | 878 | 1056 | 1791 | 2331 | 175 | 0 | 176 | 1616 | 175.58 | 180 | 1.0 | 0.0 | 15% | 100% | 13.3 |
| SKYLIGHTING - CONTINUOU | 1000 | 62% | 0.744 | 0.692 | 955 | 1149 | 1948 | 2535 | 900 | 0 | 905 | 1044 | 904.79 | 196 | 4.6 | 0.0 | 30% | 99% | 2.8 |
| Weighted Average | 1000 | 54% | 0.645 | 0.600 | 828 | 996 | 1689 | 2198 | 749 | 46% | 751 | 938 | 750.78 | 170 | 4.5 | 0.0 | 100% | 100% | 2.9 |
| Weighted Average Check | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*HVAC interaction factors from "Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2: Fundamental Equations for Residential and Commercial End Uses," EPRI, 1993. This source shows a summer demand IC of 0.40.
**Incentives based on 2011 UES Program Planning.
***Connected load assumes 8 fixtures at 136 watts per fixture
****Daylighting Savings Fractions are sourced from Lawerence Berkely Labs Nomographs

File Name: Daylighting_MAS_Schools_TEP_2011_01_14

**Schools - New Lighting**

Incentive Calculations
Delamping
Removing lamps with no replacement

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 97.13 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/kWh): | 0 |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 1,447 |
| Off-Pk Op. Hours: | 1,741 |
| Total Op. Hours: | 3,187 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand): | 1.22 |
| HVAC Interaction Factor (Energy): | 1.15 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application: | RET |
| Cost Basis: | Retrofit |

| | | DEMAND/ENERGY SAVINGS | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Wghtd Base Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| Delamping | 72 | 0.088 | 0.082 | 121 | 145 | 241 | 314 | 6.25 | 3% | 6 | 308 | 6.36 | 24 | 0.3 | 0.0 | 100% | 98% | 49.3 |

Notes:
* Based on DEER 2008 EUL of 70,000 (rate life of ballast)/ annual operating hours by building type or 15, whichever is lower.
**Based on 2011 UES Program Planning.

File Name: Delamping_MAS_Schools_TEP_2011_01_14

# Appendix G

**Schools - New Lighting**

Incentive Calculations
Energy-Efficient Exit Signs – Retrofit Applications
Replace Inefficient Exit Signs with LED Exit Signs

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 16 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 98.92 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/kWh): | 0 |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 3,976 |
| Off-Pk Op. Hours: | 4,784 |
| Total Op. Hours: | 8,760 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 1.00 |
| HVAC Interaction Factor (Demand): | 1.24 |
| HVAC Interaction Factor (Energy): | 1.17 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | | DEMAND/ ENERGY SAVINGS | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | EE Watts | Wghtd Base Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost*** ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| Exit Signs | 5 | 70 | 0.081 | 0.081 | 303 | 365 | 517 | 682 | 55 | 11% | 55 | 627 | 55.10 | 46 | 1.2 | 0.0 | 100% | 100% | 12.4 |

* Based on DEER 2008.
**Based on UES 2011 Program Planning.
***2010 MER Report.

File Name: ExitSigns_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
ENERGY-EFFICIENT HID FIXTURES
Replace HID Systems with Linear Fluorescent T8 and T5 Systems

**Schools - New Lighting**

| PROGRAM DATA | |
|---|---|
| Conservation Life (yrs): | 18 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 102.76 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/unit): | NA |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 999 |
| Off-Pk Op. Hours: | 3,381 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | | | DEMAND/ENERGY SAVINGS | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Fixture Type | Base Lamp Type | Base Lamp Watts | Base Fxt. Watts | EE Lamp Type*** | EE Fixture Config*** | EE Lamp Watts*** | EE Fxt. Watts*** | Non-Coincident Demand Savings (kW) | Coincident Demand Savings (kW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Reccommended Incentives**** ($) | Reccommended Incentives**** % PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor* | (%) | BC Ratio |
| HID SYSTEMS | MH | 150 | 185 | F54T5/HO | 2-Lamp | 54 | 117 | 0.07 | 0.06 | 68 | 230 | 260 | 562 | 80 | 31% | 83 | 177 | 82.65 | 24 | 3.5 | 0.1 | 0% | 97% | 6.8 |
| | MH | 250 | 290 | F54T5/HO | 3-Lamp | 54 | 179 | 0.11 | 0.10 | 111 | 375 | 424 | 917 | 100 | 24% | 102 | 322 | 102.44 | 39 | 2.7 | 0.1 | 5% | 98% | 8.9 |
| | MH | 400 | 458 | F54T5/HO | 4-Lamp | 54 | 234 | 0.22 | 0.21 | 224 | 757 | 857 | 1,850 | 105 | 12% | 109 | 747 | 109.09 | 78 | 1.4 | 0.1 | 35% | 96% | 17.0 |
| | MH | 750 | 810 | F54T5/HO | 6-Lamp | 54 | 351 | 0.46 | 0.43 | 459 | 1,552 | 1,755 | 3,791 | 165 | 9% | 168 | 1,587 | 168.47 | 160 | 1.1 | 0.0 | 1% | 98% | 22.5 |
| | MH | 1000 | 1080 | 2xF54T5/HO | 4-Lamp | 54 | 468 | 0.61 | 0.57 | 612 | 2,069 | 2,340 | 5,054 | 215 | 9% | 218 | 2,122 | 218.19 | 213 | 1.0 | 0.0 | 2% | 99% | 23.2 |
| | | | | | | | | | | 0 | 0 | | | | | | | | | | | | | |
| | MH | 150 | 185 | F32T8 | 2-Lamp | 32 | 72 | 0.11 | 0.11 | 113 | 382 | 432 | 933 | 40 | 9% | 42 | 390 | 41.95 | 39 | 1.1 | 0.0 | 0% | 95% | 22.2 |
| | MH | 250 | 290 | F32T8 | 3-Lamp | 32 | 114 | 0.18 | 0.16 | 176 | 595 | 673 | 1,453 | 55 | 8% | 57 | 616 | 57.37 | 61 | 0.9 | 0.0 | 5% | 96% | 25.3 |
| | MH | 400 | 458 | F32T8 | 6-Lamp | 32 | 219 | 0.24 | 0.22 | 239 | 808 | 914 | 1,974 | 70 | 8% | 74 | 840 | 74.03 | 83 | 0.9 | 0.0 | 20% | 95% | 26.7 |
| | MH | 750 | 810 | 2x F32T8 | 6-Lamp | 32 | 438 | 0.37 | 0.35 | 372 | 1,258 | 1,423 | 3,072 | 145 | 10% | 148 | 1,274 | 148.06 | 129 | 1.1 | 0.0 | 1% | 98% | 20.7 |
| | MH | 1000 | 1080 | 2xF32T8 | 6-Lamp | 32 | 438 | 0.64 | 0.60 | 641 | 2,170 | 2,455 | 5,302 | 145 | 6% | 148 | 2,307 | 148.06 | 223 | 0.7 | 0.0 | 1% | 98% | 35.8 |
| | | | | | | | | | | 0 | 0 | | | | | | | | | | | | | |
| | HPS | 150 | 190 | F54T5/HO | 2-Lamp | 54 | 117 | 0.07 | 0.07 | 73 | 247 | 279 | 603 | 80 | 29% | 83 | 197 | 82.65 | 25 | 3.3 | 0.1 | 0% | 97% | 7.3 |
| | HPS | 250 | 295 | F54T5/HO | 3-Lamp | 54 | 179 | 0.12 | 0.11 | 116 | 392 | 444 | 958 | 100 | 23% | 102 | 341 | 102.44 | 40 | 2.5 | 0.1 | 5% | 98% | 9.4 |
| | HPS | 400 | 464 | F54T5/HO | 4-Lamp | 54 | 234 | 0.23 | 0.21 | 230 | 778 | 880 | 1,899 | 105 | 12% | 109 | 770 | 109.09 | 80 | 1.4 | 0.1 | 10% | 96% | 17.4 |
| | | | | | | | | | | 0 | 0 | | | | | | | | | | | | | |
| | HPS | 150 | 190 | F32T8 | 2-Lamp | 32 | 72 | 0.12 | 0.11 | 118 | 399 | 451 | 974 | 40 | 9% | 42 | 409 | 41.95 | 41 | 1.0 | 0.0 | 0% | 95% | 23.2 |
| | HPS | 250 | 295 | F32T8 | 3-Lamp | 32 | 114 | 0.18 | 0.17 | 181 | 612 | 692 | 1,495 | 55 | 8% | 57 | 635 | 57.37 | 63 | 0.9 | 0.0 | 5% | 96% | 26.1 |
| | HPS | 400 | 464 | F32T8 | 6-Lamp | 32 | 219 | 0.25 | 0.23 | 245 | 828 | 937 | 2,023 | 70 | 7% | 74 | 863 | 74.03 | 85 | 0.9 | 0.0 | 10% | 95% | 27.3 |
| Weighted Average | | 395 | 452 | | | 45 | 222 | 0.23 | 0.21 | 230 | 777 | 879 | 1,898 | 93 | 11% | 96 | 783 | 96.29 | 80 | 1.3 | 0.0 | 100% | 96% | 19.7 |

*Weighting Factors based on engineering assumptions.
** HVAC interaction factors from "Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2: Fundamental Equations for Residential and Commercial End Uses," EPRI, 1993. This source shows a summer demand IC of 0.40.
***See Energy Assumptions tab for more details.
****Incentives based on 2011 UES Program Planning.

File Name: HID_MAS_Schools_TEP_2011_01_14

# Appendix G

**Schools - New Lighting**

Incentive Calculations
ENERGY-EFFICIENT INDUCTION LIGHTING
Replace HID Systems with Induction Lighting Systems

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 18 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 102.76 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/unit); | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA** | |
|---|---|
| On-Pk Op. Hours: | 1,316 |
| Off-Pk Op. Hours: | 1,584 |
| Total Hours: | 2,900 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand)*: | 0.20 |
| HVAC Interaction Factor (Energy)*: | 0.17 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor (Demand): | 9.5% |
| Line Loss Factor (Energy): | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ ENERGY SAVINGS | | | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Lamp Type | Base Lamp Watts | Base Fixt. Watts | EE Lamp Type | EE Lamp Watts | EE Fixt. Watts | Delta Lamp Watts | Delta Fixture Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP Benefit ($) | Societal PV Benefit ($) | Recommended Incentive*** ($) | Recommended Incentive*** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| MH - 70W | 70 | 94 | Induction - 40 W | 40 | 41 | 30 | 53 | 0.064 | 0.059 | 82 | 98 | 192 | 259 | 150 | 78% | 153 | 39 | 152.74 | 17 | 9.1 | 0.2 | 6% | 98% | 1.7 |
| MH - 100W | 100 | 126 | QL - 55W | 55 | 56 | 45 | 70 | 0.084 | 0.078 | 108 | 129 | 252 | 341 | 145 | 58% | 146 | 106 | 145.75 | 22 | 6.6 | 0.0 | 6% | 99% | 2.3 |
| MH - 100W | 100 | 126 | ICETRON - 70W | 70 | 71 | 30 | 55 | 0.065 | 0.061 | 84 | 101 | 196 | 266 | 145 | 74% | 146 | 51 | 145.89 | 17 | 8.5 | 0.1 | 6% | 99% | 1.8 |
| MH - 100W | 100 | 126 | QL - 85W | 85 | 87 | 15 | 39 | 0.047 | 0.044 | 60 | 73 | 141 | 191 | 145 | 103% | 146 | -5 | 146.02 | 12 | 11.8 | 0.1 | 6% | 99% | 1.3 |
| MH - 150W | 150 | 185 | QL - 55W | 55 | 56 | 95 | 129 | 0.155 | 0.144 | 198 | 239 | 464 | 628 | 150 | 32% | 151 | 313 | 151.40 | 41 | 3.7 | 0.0 | 6% | 99% | 4.2 |
| MH - 150W | 150 | 185 | ICETRON - 70W | 70 | 71 | 80 | 114 | 0.136 | 0.127 | 175 | 210 | 409 | 554 | 150 | 37% | 152 | 258 | 151.54 | 36 | 4.2 | 0.0 | 6% | 99% | 3.7 |
| MH - 150W | 150 | 185 | QL - 85W | 85 | 87 | 65 | 98 | 0.118 | 0.110 | 151 | 182 | 354 | 479 | 150 | 42% | 152 | 202 | 151.67 | 31 | 4.9 | 0.1 | 6% | 99% | 3.2 |
| MH - 150W | 150 | 185 | ICETRON - 100W | 100 | 102 | 50 | 83 | 0.099 | 0.092 | 128 | 154 | 299 | 404 | 155 | 52% | 159 | 139 | 159.43 | 26 | 6.1 | 0.2 | 6% | 97% | 2.5 |
| MH - 175W | 175 | 210 | QL - 85W | 85 | 87 | 90 | 123 | 0.148 | 0.137 | 190 | 228 | 444 | 601 | 155 | 35% | 156 | 288 | 155.86 | 39 | 4.0 | 0.0 | 6% | 99% | 3.9 |
| MH - 175W | 175 | 210 | ICETRON - 100W | 100 | 102 | 75 | 108 | 0.129 | 0.120 | 166 | 200 | 389 | 526 | 160 | 41% | 164 | 225 | 163.62 | 34 | 4.8 | 0.1 | 6% | 98% | 3.2 |
| MH - 250W | 250 | 295 | ICETRON - 150W | 150 | 153 | 100 | 142 | 0.170 | 0.158 | 218 | 263 | 511 | 692 | 195 | 38% | 200 | 311 | 199.77 | 45 | 4.5 | 0.1 | 6% | 98% | 3.5 |
| MH - 250W | 250 | 295 | QL - 165W | 165 | 169 | 85 | 126 | 0.152 | 0.141 | 195 | 234 | 456 | 617 | 205 | 45% | 208 | 248 | 207.52 | 40 | 5.2 | 0.1 | 6% | 99% | 3.0 |
| HPS - 150W | 150 | 188 | QL - 55W | 55 | 56 | 95 | 132 | 0.158 | 0.147 | 203 | 244 | 475 | 643 | 250 | 53% | 253 | 222 | 253.47 | 42 | 6.1 | 0.1 | 6% | 99% | 2.5 |
| HPS - 150W | 150 | 188 | ICETRON - 70W | 70 | 71 | 80 | 117 | 0.140 | 0.130 | 179 | 216 | 420 | 568 | 250 | 60% | 254 | 166 | 253.61 | 37 | 6.9 | 0.1 | 6% | 99% | 2.2 |
| HPS - 250W | 250 | 295 | QL - 85W | 85 | 87 | 165 | 208 | 0.250 | 0.232 | 321 | 386 | 750 | 1,016 | 245 | 33% | 249 | 501 | 248.97 | 66 | 3.8 | 0.1 | 6% | 98% | 4.1 |
| HPS - 250W | 250 | 295 | ICETRON - 100W | 100 | 102 | 150 | 193 | 0.231 | 0.215 | 297 | 357 | 695 | 941 | 255 | 37% | 257 | 438 | 256.73 | 61 | 4.2 | 0.0 | 6% | 99% | 3.7 |
| HPS - 400W | 400 | 463 | ICETRON - 150W | 150 | 153 | 250 | 310 | 0.372 | 0.346 | 477 | 574 | 1,116 | 1,511 | 285 | 26% | 288 | 829 | 287.89 | 98 | 2.9 | 0.0 | 6% | 99% | 5.2 |
| HPS - 400W | 400 | 463 | QL - 165W | 165 | 169 | 235 | 294 | 0.353 | 0.329 | 454 | 546 | 1,061 | 1,436 | 295 | 28% | 296 | 766 | 295.64 | 93 | 3.2 | 0.0 | 6% | 100% | 4.9 |
| Weighted Average | | | | | | | | 0.160 | 0.148 | 205 | 246 | 479 | 649 | 194 | 48% | 196 | 283 | 195.97 | 42 | 5.6 | 0.1 | 100% | 99% | 3.3 |
| Weighted Average Check | | | | | | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

* HVAC interaction factors from "Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2: Fundamental Equations for Residential and Commercial End Uses," EPRI, 1993. This source shows a summer demand IC of 0.40.
**Operation hours are based on HID swap outs for interior applications such as warehouses, showrooms, and corridors. However, induction lighting is found in outdoor applications such as tunnels, parking lots, street lights, which affect operation hours. This is still being researched.
***Incentive based on 2011 UES Program Planning.

File Name: Induction_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
LED Channel Lights

**Schools - New Lighting**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 10 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 77.23 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Admin Costs ($/kWh, saved) | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA* | |
|---|---|
| On-Pk Op. Hours: | 730 |
| Off-Pk Op. Hours: | 4,380 |
| Total Op. Hours: | 5,110 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincident Load Factor: | 4% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| *Capacity Reserve Factor:* | 0% |
| Application | RET |
| Cost Basis: | Full Cost |

| DEMAND/ENERGY SAVINGS | | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Name | Common Units | Base Lamp Type | Base Lamp Watts | LED Lamp Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** % PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/Inc. (yrs) | Payback w/Inc. (yrs) | Weighting Factor | | BC Ratio |
| LED Channel Lights | per linear foot | Neon | 6 | 1.2 | 0.005 | 0.003 | 3.5 | 21.1 | 11.2 | 13.5 | 13 | 116% | 13.0 | 0.5 | 13 | 1.9 | 7.0 | 0.0 | 100% | 100% | 1.0 |
| Weighted Average | | | 6 | 1.2 | 0.005 | 0.003 | 3.5 | 21.1 | 11.2 | 13.5 | 13 | 116% | 13.0 | 0.5 | 13 | 1.9 | 7.0 | 0.0 | 100% | 100% | 1.0 |
| Weighted Average Check | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Hours of operation: Assume 12 hours of operation during night (off peak hours) and up to 2 hours a day during on peak times (to account for wintertime and storm events when lights are needed).
**Incentives based on 2011 UES Program Planning.

File Name: LEDChannel_MAS_Schools_TEP_2010_11_20

# Appendix G

**Schools - New Lighting**

Incentive Calculations
Occupancy Sensors
Install Occupancy Sensors on Lighting and Outdoor Fixtures

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 12 |
| Program Life (yrs): | 5 |
| Demand AC ($/ kW): | 80.30 |
| Summer On-pk Energy AC ($/ kWh): | 0.10 |
| Summer Off-pk Energy AC ($/ kWh): | 0.06 |
| Winter On-pk Energy AC ($/ kWh): | 0.06 |
| Winter Off-pk Energy AC ($/ kWh): | 0.05 |
| Program Admin Costs ($/ unit): | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 8.78 |
| $/ kWh, On-Peak: | 0.06 |
| $/ kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 1,316 |
| Off-Pk Op. Hours: | 1,584 |
| Total Op. Hours: | 2,900 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand)*: | 0.20 |
| HVAC Interaction Factor (Energy)*: | 0.17 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET / NEW |
| Cost Basis: | Full Installed |

| | DEMAND/ ENERGY SAVINGS | | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Space Type | Coverage Floor Area (SF)** per sensor | Lighting Power Density (Watts/ SF) | Connected Load (Watts) per sensor | Energy Savings Factor | Demand Savings Factor | Non-Coin. Demand Savings Per Snsr (KW) | Coin. Demand Savings Per Snsr (KW) | On-pk Savings Per Snsr (KWh) | Off-pk Savings Per Snsr (KWh) | IRP PV Benefit Per Snsr ($) | Social PV Benefit Per Snsr ($) | Recommended Incentive (Per Snsr)*** ($) | Recommended Incentive (Per Snsr)*** %PV | PV Costs Per Snsr ($) | NPV ($) | Incr. Cost Per Snsr ($) | Cost Savings Per Snsr ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor** | (%) | BC Ratio |
| Office (Open Plan) | 300 | 1.3 | 390 | 26% | 10% | 0.05 | 0.04 | 154 | 185 | 209 | 261 | 95 | 45% | 96 | 113 | 96.42 | 24 | 4.0 | 0.1 | 11% | 99% | 2.7 |
| Office (Executive / Private) | 150 | 1.5 | 225 | 31% | 12% | 0.03 | 0.03 | 107 | 129 | 146 | 182 | 95 | 65% | 96 | 49 | 96.42 | 17 | 5.8 | 0.1 | 6% | 99% | 1.9 |
| Corridor | 200 | 0.7 | 140 | 39% | 16% | 0.03 | 0.02 | 84 | 101 | 114 | 143 | 95 | 83% | 96 | 18 | 96.42 | 13 | 7.3 | 0.1 | 11% | 99% | 1.5 |
| Classroom | 500 | 1.6 | 800 | 32% | 13% | 0.12 | 0.12 | 398 | 479 | 541 | 675 | 95 | 18% | 96 | 445 | 96.42 | 62 | 1.5 | 0.0 | 11% | 99% | 7.0 |
| Restrooms | 120 | 1.0 | 120 | 46% | 18% | 0.03 | 0.02 | 84 | 102 | 115 | 143 | 95 | 83% | 96 | 18 | 96.42 | 13 | 7.3 | 0.1 | 11% | 99% | 1.5 |
| Conference Room | 300 | 1.5 | 450 | 37% | 15% | 0.08 | 0.07 | 257 | 309 | 349 | 435 | 95 | 27% | 96 | 253 | 96.42 | 40 | 2.4 | 0.0 | 6% | 99% | 4.5 |
| Warehouse | 625 | 1.4 | 844 | 50% | 20% | 0.20 | 0.19 | 650 | 782 | 883 | 1101 | 95 | 11% | 96 | 786 | 96.42 | 101 | 1.0 | 0.0 | 11% | 99% | 11.4 |
| Mech / Elec Room | 150 | 1.3 | 195 | 39% | 16% | 0.04 | 0.03 | 118 | 142 | 160 | 199 | 95 | 59% | 96 | 63 | 96.42 | 18 | 5.2 | 0.1 | 11% | 99% | 2.1 |
| Storage | 150 | 1.1 | 165 | 48% | 19% | 0.04 | 0.03 | 121 | 145 | 164 | 205 | 95 | 58% | 96 | 68 | 96.42 | 19 | 5.1 | 0.1 | 11% | 99% | 2.1 |
| Copy Room | 100 | 1.5 | 150 | 40% | 16% | 0.03 | 0.03 | 93 | 112 | 127 | 158 | 95 | 75% | 96 | 30 | 96.42 | 15 | 6.6 | 0.1 | 11% | 99% | 1.6 |
| Weighted Average | 263 | 1.3 | 349 | 39% | 16% | 0.07 | 0.06 | 209 | 252 | 284 | 355 | 95 | 53% | 96 | 188 | 96.42 | 33 | 5 | 0.1 | 100% | 99% | 3.7 |

*HVAC interaction factors from "Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2: Fundamental Equations for Residential and Commercial End Uses," EPRI, 1993. This source shows a summer demand IC of 0.40.
**Coverage floor area, Weighting Factors from engineering judgment.
***Incentives based on UES 2011 Program Planning.

File Name: OccSensor_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
High Efficiency Outdoor Lighting

**Schools - New Lighting**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 5 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 71.39 |
| Summer On-pk Energy AC ($/kWh): | 0.08 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Admin Cost ($/unit): | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 999 |
| Off-Pk Op. Hours: | 3381 |
| Total Hours: | 4380 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.02 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | DEMAND/ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EE Measure Type | Base Measure Type | Base Fixture Watts | EE Fixture Watts | Non-Coin. Demand Savings (KW) | Coin. Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor* | (%) | BC Ratio |
| CFL (screw-in, spiral) | Incandescent | 40 | 9 | 0.031 | 0.001 | 31 | 105 | 29 | 33 | 6.50 | 22% | 7 | 23 | 6.56 | 11 | 0.6 | 0.0 | 5% | 99% | 5.0 |
| CFL (screw-in, spiral) | Incandescent | 60 | 13 | 0.047 | 0.001 | 47 | 159 | 44 | 49 | 6.50 | 15% | 7 | 38 | 6.56 | 16 | 0.4 | 0.0 | 11% | 99% | 7.5 |
| CFL (screw-in, spiral) | Incandescent | 75 | 18 | 0.057 | 0.001 | 57 | 193 | 54 | 60 | 6.50 | 12% | 7 | 47 | 6.56 | 20 | 0.3 | 0.0 | 21% | 99% | 9.1 |
| CFL (screw-in, spiral) | Incandescent | 100 | 23 | 0.077 | 0.001 | 77 | 260 | 73 | 81 | 6.50 | 9% | 7 | 66 | 6.56 | 27 | 0.2 | 0.0 | 32% | 99% | 12.4 |
| CFL (screw-in, spiral) | Incandescent | 150 | 32 | 0.118 | 0.002 | 118 | 399 | 111 | 124 | 7.75 | 7% | 8 | 103 | 7.89 | 41 | 0.2 | 0.0 | 21% | 98% | 15.7 |
| CFL (screw-in, spiral) | Incandescent | 250 | 55 | 0.195 | 0.003 | 195 | 659 | 184 | 205 | 24.75 | 13% | 25 | 159 | 24.78 | 68 | 0.4 | 0.0 | 10% | 100% | 8.3 |
| | Weighted Average | | | 0.087 | 0.001 | 87 | 295 | 82 | 92 | 8.51 | 11% | 9 | 74 | 8.59 | 30 | 0.3 | 0.0 | 100% | 99% | 10.7 |
| Weighted Average Check | | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Weighting Factor based on engineering assumptions.
**Incentive based on 2011 UES Program Planning.

File Name: OutdoorCFL_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
High Efficiency Outdoor Lighting

**Schools - New Lighting**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 5 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 71.39 |
| Summer On-pk Energy AC ($/kWh): | 0.08 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Admin Cost ($/unit): | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 999 |
| Off-Pk Op. Hours: | 3381 |
| Total Hours: | 4380 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.02 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | DEMAND/ ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EE Measure Type | Base Measure Type | Base Fixture Watts | EE Fixture Watts | Non-Coin. Demand Savings (KW) | Coin. Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** % PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor* | (%) | BC Ratio |
| CFL (screw-in, spiral) | Incandescent | 40 | 9 | 0.031 | 0.001 | 31 | 105 | 29 | 33 | 6.50 | 22% | 7 | 23 | 6.56 | 11 | 0.6 | 0.0 | 5% | 99% | 5.0 |
| CFL (screw-in, spiral) | Incandescent | 60 | 13 | 0.047 | 0.001 | 47 | 159 | 44 | 49 | 6.50 | 15% | 7 | 38 | 6.56 | 16 | 0.4 | 0.0 | 10% | 99% | 7.5 |
| CFL (screw-in, spiral) | Incandescent | 75 | 18 | 0.057 | 0.001 | 57 | 193 | 54 | 60 | 6.50 | 12% | 7 | 47 | 6.56 | 20 | 0.3 | 0.0 | 20% | 99% | 9.1 |
| CFL (screw-in, spiral) | Incandescent | 100 | 23 | 0.077 | 0.001 | 77 | 260 | 73 | 81 | 6.50 | 9% | 7 | 66 | 6.56 | 27 | 0.2 | 0.0 | 30% | 99% | 12.4 |
| CFL (screw-in, spiral) | Incandescent | 150 | 32 | 0.118 | 0.002 | 118 | 399 | 111 | 124 | 7.75 | 7% | 8 | 103 | 7.89 | 41 | 0.2 | 0.0 | 20% | 98% | 15.7 |
| CFL (screw-in, spiral) | Incandescent | 250 | 55 | 0.195 | 0.003 | 195 | 659 | 184 | 205 | 24.75 | 13% | 25 | 159 | 24.78 | 68 | 0.4 | 0.0 | 9% | 100% | 8.3 |
| CFL (screw-in, flood) | Halogen PAR38 | 45 | 9 | 0.036 | 0.001 | 36 | 122 | 34 | 38 | 6.50 | 19% | 7 | 27 | 6.56 | 13 | 0.5 | 0.0 | 1% | 99% | 5.8 |
| CFL (screw-in, flood) | Halogen PAR38 | 60 | 14 | 0.046 | 0.001 | 46 | 156 | 43 | 48 | 6.50 | 15% | 7 | 37 | 6.56 | 16 | 0.4 | 0.0 | 1% | 99% | 7.4 |
| CFL (screw-in, flood) | Halogen PAR38 | 75 | 16 | 0.059 | 0.001 | 59 | 199 | 56 | 62 | 6.50 | 12% | 7 | 49 | 6.56 | 21 | 0.3 | 0.0 | 1% | 99% | 9.5 |
| CFL (screw-in, flood) | Halogen PAR39 | 100 | 23 | 0.077 | 0.001 | 77 | 260 | 73 | 81 | 6.50 | 9% | 7 | 66 | 6.56 | 27 | 0.2 | 0.0 | 1% | 99% | 12.4 |
| CFL (screw-in, flood) | Halogen PAR40 | 150 | 32 | 0.118 | 0.002 | 118 | 399 | 111 | 124 | 7.75 | 7% | 8 | 103 | 7.89 | 41 | 0.2 | 0.0 | 1% | 98% | 15.7 |
| CFL (screw-in, flood) | Halogen PAR41 | 250 | 56 | 0.194 | 0.003 | 194 | 656 | 183 | 204 | 24.75 | 14% | 25 | 158 | 24.78 | 68 | 0.4 | 0.0 | 1% | 100% | 8.2 |
| | Weighted Average | | | 0.087 | 0.002 | 87 | 295 | 82 | 92 | 8.59 | 11% | 9 | 74 | 8.66 | 30 | 0.3 | 0.0 | 100% | 99% | 10.6 |
| Weighted Average Check | | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Weighting Factor based on engineering assumptions.
**Incentive based on 2011 UES Program Planning.

File Name: OutdoorLighting_MAS_Schools_TEP_2011_01_14

# Appendix G

**Schools - New Lighting**

Incentive Calculations
Energy-Efficient Fluorescent Fixtures
Replace Standard T12 and T8 Systems with Premium T8 Systems

| PROGRAM DATA | |
|---|---|
| Present Year | 2011 |
| Baseline Change*** | 2017 |
| Total Measure Life | 15 |
| Measure Life (yrs)*: | 6 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 72.41 |
| Summer On-pk Energy AC ($/kWh): | 0.09 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.05 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Admin Costs ($/kWh, saved) | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |
| Measure Life (yrs)*: | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 97.13 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/kWh, saved) | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 1,314 |
| Off-Pk Op. Hours: | 1,581 |
| Total Op. Hours: | 2,896 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand): | 1.22 |
| HVAC Interaction Factor (Energy): | 1.15 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | | | | | DEMAND/ENERGY SAVINGS | | | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Length | # of Lamps in Fixture | EE Lamp Type | EE Lamp Watts | EE Fix. Watts**** | 2011-2017 Base Lamp Type | 2011-2017 Base Lamp Watts | 2011-2017 Base Fix. Watts | 2017+ Base Lamp Type | 2017+ Base Lamp Watts | 2017+ Base Fix. Watts | 2011-2017 NC Demand Savings (kW) | 2011-2017 Coin. Demand Savings (kW) | 2017+ NC Demand Savings (kW) | 2017+ Coin. Demand Savings (kW) | 2011-2017 On-Pk Energy Savings (kWh) | 2011-2017 Off-Pk Energy Savings (kWh) | 2017+ On-Pk Energy Savings (kWh) | 2017+ Off-Pk Energy Savings (kWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive***** ($) | Recommended Incentive***** % PV | PV Program Cost ($) | NPV ($) | Incr. Cost** ($) | Cost Savings ($) | Payback w/o Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor***** | | BC Ratio |
| T12 and Standard T8 to Premium T8*** Per Fixture | 4-foot | 4 | F32T8 / ES | 27 | 85 | T12 | 34 | 144 | F32T8 | 32 | 110 | 0.073 | 0.068 | 0.031 | 0.028 | 90 | 108 | 38 | 46 | 126 | 156 | 60 | 48% | 62 | 94 | 61.93 | 19 | 3.3 | 0.1 | 33% | 97% | 2.5 |
| | | 3 | F32T8 / ES | 27 | 64 | T12 | 34 | 103 | F32T8 | 32 | 84 | 0.048 | 0.045 | 0.024 | 0.022 | 59 | 72 | 30 | 36 | 68 | 111 | 60 | 88% | 62 | 49 | 62.05 | 12 | 5.0 | 0.2 | 33% | 97% | 1.8 |
| | | 2 | F32T8 / ES | 27 | 42 | T12 | 37 | 81 | F32T8 | 32 | 57 | 0.047 | 0.043 | 0.017 | 0.016 | 58 | 70 | 22 | 26 | 63 | 96 | 50 | 79% | 52 | 44 | 51.58 | 12 | 4.3 | 0.1 | 33% | 97% | 1.9 |
| | | 1 | F32T8 / ES | 27 | 23 | T12 | 37 | 47 | F32T8 | 32 | 30 | 0.029 | 0.027 | 0.009 | 0.008 | 36 | 43 | 11 | 13 | 37 | 54 | 45 | 120% | 47 | 7 | 46.89 | 7 | 6.3 | 0.3 | 0% | 96% | 1.2 |
| Weighted Average | | | | 27 | 64 | | 35 | 109 | | 32 | 83 | 0.055 | 0.052 | 0.024 | 0.022 | 69 | 83 | 30 | 36 | 86 | 121 | 57 | 72% | 59 | 62 | 58.52 | 14 | 4.2 | 0.1 | 100% | 97% | 2.1 |
| T12 and Standard T8 to Premium T8*** Per Lamp | 4-foot | 4 | F32T8 / ES | 27 | 21 | T12 | 34 | 36 | F32T8 | 32 | 27 | 0.018 | 0.017 | 0.008 | 0.007 | 23 | 27 | 9 | 11 | 31 | 39 | 15 | 48% | 15 | 23 | 15.48 | 5 | 3.3 | 0.1 | 33% | 97% | 2.5 |
| | | 3 | F32T8 / ES | 27 | 21 | T12 | 34 | 34 | F32T8 | 32 | 28 | 0.016 | 0.015 | 0.008 | 0.007 | 20 | 24 | 10 | 12 | 23 | 37 | 20 | 88% | 21 | 16 | 20.68 | 4 | 5.0 | 0.2 | 33% | 97% | 1.8 |
| | | 2 | F32T8 / ES | 27 | 21 | T12 | 37 | 40 | F32T8 | 32 | 28 | 0.023 | 0.022 | 0.009 | 0.008 | 29 | 35 | 11 | 13 | 32 | 48 | 25 | 79% | 26 | 22 | 25.79 | 6 | 4.3 | 0.1 | 33% | 97% | 1.9 |
| | | 1 | F32T8 / ES | 27 | 23 | T12 | 37 | 47 | F32T8 | 32 | 30 | 0.029 | 0.027 | 0.009 | 0.008 | 36 | 43 | 11 | 13 | 37 | 54 | 45 | 120% | 47 | 7 | 46.89 | 7 | 6.3 | 0.3 | 0% | 96% | 1.2 |
| Weighted Average | | | | 27 | 21 | | 35 | 37 | | | 28 | 0.019 | 0.018 | 0.008 | 0.008 | 24 | 29 | 10 | 12 | 29 | 41 | 20 | 72% | 21 | 21 | 20.65 | 5 | 4.2 | 0.1 | 100% | 97% | 2.0 |
| Weighted Average Check | | | | | | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Measure life based on DEER 2008 EUL data.
** Incremental cost is total cost for a new T8 under the assumption that customers do not buy new T12 fixtures/lamps
***Definition of a Premium T8 as a 28W or 25W 4' lamp is based on the Consortium for Energy Efficiency's definition for Reduced Wattage T8 Systems.
****Based on EE Fixture Watts, 4-foot Premium T8s use an average of 78% of the wattage of 4-foot Regular T8s. Assumed that the same is true for 3-foot and 2-foot Premium T8s.
*****Weighting Factor based on engineering assumptions
******Incentives based on 2011 UES Program Planning.
******* Code change 2012 - inventory of T 12s will end in 2017 based on RUL approximation

File Name: PremiumT8_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
REDUCED LIGHTING POWER DENSITY

**Schools - New Lighting**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 12 |
| Program Life (yrs): | 5 |
| Demand AC ($/ kW): | 80.30 |
| Summer On-pk Energy AC ($/ kWh): | 0.10 |
| Summer Off-pk Energy AC ($/ kWh): | 0.06 |
| Winter On-pk Energy AC ($/ kWh): | 0.06 |
| Winter Off-pk Energy AC ($/ kWh): | 0.05 |
| Program Admin Cost ($/ unit): | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 8.78 |
| $/ kWh, On-Peak: | 0.06 |
| $/ kWh, Off-Peak: | 0.05 |

| INCENTIVE LEVEL | |
|---|---|
| $ / kW reduced: | 350 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: (Short / Long) | 1,316 |
| Off-Pk Op. Hours: (Short / Long) | 1,584 |
| Total Hours: | 2,900 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand)****: | 0.20 |
| HVAC Interaction Factor (Energy)****: | 0.17 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | NEW |
| Cost Basis: | Incremental |

| | DEMAND/ ENERGY SAVINGS | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Building Type | Floor Area Sq.Ft.* | Baseline LPD** (Watts/ SF) | EE LPD (Watts/ SF) | LPD Savings Factor | Non-Coin. Demand Savings (KW) | Coin. Demand Savings (KW) | On-pk Savings (KWh) | Off-pk Savings (KWh) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive*** ($) | Recommended Incentive*** %PV | PV Costs Per Prjct ($) | NPV ($) | Incr. Cost Per Prjct ($) | Cost Savings Per Prjct ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor**** | (%) | BC Ratio |
| School/University | 25,600 | 1.2 | 1.08 | 10% | 3.7 | 3.4 | 5,677 | 6,831 | 8,894 | 11,093 | 3,460 | 39% | 3,464 | 5,429 | 3,464.46 | 1,089 | 3.2 | 0.0 | 100% | 100% | 3.2 |
| Weighted Average | 25,600 | 1.2 | 1.08 | 10% | 3.7 | 3.4 | 5,677 | 6,831 | 8,894 | 11,093 | 3,460 | 39% | 3,464 | 5,429 | 3,464.46 | 1,089 | 3.2 | 0.0 | 100% | 100% | 3.2 |
| Weighted Average Check | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

* 2003 CBECS Detailed Tables, released June 2006, BECS Table B1. Summary Table: Total and Means of Floorspace, Number of Workers, and Hours of Operation for Non-Mall Buildings, 2003
**ANSI/ ASHRAE/ IESNA Standard 90.1-2004, Table 9.5.1 Lighting Power Densities Using the Building Area Method
***Incentives based on 2011 UES Program Planning.
****HVAC Interaction Factors and Weighting Factors based on engineering assumptions.

# Appendix G

**Schools - New Lighting**

Incentive Calculations
Standard T8
Replace T12 Systems and Magnetic Ballasts with T8 Systems and Electronic Ballasts

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 6 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 72.41 |
| Summer On-pk Energy AC ($/kWh): | 0.09 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Admin Costs ($/kWh): | 0 |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 1,314 |
| Off-Pk Op. Hours: | 1,581 |
| Total Op. Hours: | 2,896 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand): | 1.22 |
| HVAC Interaction Factor (Energy): | 1.15 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | | | DEMAND/ ENERGY SAVINGS | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Length (ft) | # of Lamps in Fixture | Ballast Type | Base Fixt. Watts | EE Lamp Watts | EE Fixt. Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** % PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| Standard T8s | 2 | 1 | Standard | 30 | 17 | 27 | 0.003 | 0.003 | 4 | 5 | 4 | 4 | 25.00 | 666% | 25 | -21 | 25.34 | 1 | 29.6 | 0.4 | 0.13% | 99% | 0.2 |
| | | 2 | Standard | 48 | 17 | 34 | 0.017 | 0.015 | 21 | 25 | 19 | 21 | 27.00 | 143% | 28 | -6 | 27.51 | 4 | 6.4 | 0.1 | 0.56% | 98% | 0.8 |
| | | 2 | High Power | 48 | 17 | 35 | 0.015 | 0.014 | 19 | 23 | 17 | 20 | 28.00 | 161% | 28 | -8 | 28.16 | 4 | 7.1 | 0.0 | 0.28% | 99% | 0.7 |
| | | 2 | Low Power | 48 | 17 | 32 | 0.019 | 0.018 | 24 | 29 | 22 | 25 | 27.00 | 123% | 28 | -3 | 27.69 | 5 | 5.5 | 0.1 | 0.01% | 98% | 0.9 |
| | 3 | 1 | Standard | 45 | 30 | 26 | 0.022 | 0.021 | 28 | 33 | 25 | 29 | 26.00 | 103% | 27 | 2 | 26.57 | 6 | 4.6 | 0.1 | 0.02% | 98% | 1.1 |
| | | 4 | High Power | 133 | 30 | 76 | 0.069 | 0.064 | 85 | 103 | 78 | 89 | 38.00 | 49% | 38 | 50 | 38.35 | 18 | 2.2 | 0.0 | 0.03% | 99% | 2.3 |
| | 4 | 1 | Standard | 48 | 32 | 33 | 0.018 | 0.017 | 22 | 27 | 20 | 23 | 24.00 | 117% | 25 | -1 | 24.57 | 5 | 5.3 | 0.1 | 2.65% | 98% | 0.9 |
| | | 1 | High Power | 48 | 32 | 39 | 0.011 | 0.010 | 14 | 16 | 12 | 14 | 24.00 | 194% | 25 | -11 | 24.98 | 3 | 8.8 | 0.3 | 0.28% | 96% | 0.6 |
| | | 1 | Low Power | 48 | 32 | 33 | 0.019 | 0.018 | 23 | 28 | 21 | 24 | 24.00 | 112% | 25 | -1 | 24.90 | 5 | 5.1 | 0.2 | 0.10% | 96% | 1.0 |
| | | 2 | Standard | 84 | 32 | 65 | 0.022 | 0.021 | 28 | 33 | 25 | 29 | 25.00 | 98% | 26 | 3 | 25.97 | 6 | 4.5 | 0.2 | 57.79% | 96% | 1.1 |
| | | 2 | High Power | 84 | 32 | 74 | 0.011 | 0.011 | 14 | 17 | 13 | 15 | 26.00 | 202% | 27 | -12 | 26.61 | 3 | 9.1 | 0.2 | 23.44% | 98% | 0.5 |
| | | 2 | Low Power | 84 | 32 | 51 | 0.040 | 0.037 | 49 | 59 | 45 | 51 | 26.00 | 58% | 26 | 25 | 26.14 | 10 | 2.5 | 0.0 | 2.17% | 99% | 2.0 |
| | | 3 | Standard | 103 | 32 | 97 | 0.007 | 0.007 | 9 | 11 | 8 | 9 | 30.00 | 370% | 30 | -21 | 30.27 | 2 | 16.4 | 0.1 | 0.32% | 99% | 0.3 |
| | | 3 | High Power | 103 | 32 | 100 | 0.003 | 0.003 | 4 | 5 | 4 | 4 | 32.00 | 892% | 33 | -28 | 32.51 | 1 | 39.8 | 0.6 | 0.07% | 98% | 0.1 |
| | | 3 | Low Power | 103 | 32 | 65 | 0.046 | 0.043 | 57 | 69 | 52 | 59 | 34.00 | 65% | 34 | 25 | 34.44 | 12 | 2.9 | 0.0 | 1.23% | 99% | 1.7 |
| | | 4 | Standard | 144 | 32 | 101 | 0.052 | 0.048 | 65 | 78 | 59 | 67 | 28.00 | 47% | 29 | 38 | 28.62 | 13 | 2.1 | 0.0 | 3.51% | 98% | 2.3 |
| | | 4 | High Power | 144 | 32 | 106 | 0.046 | 0.043 | 57 | 69 | 52 | 59 | 30.00 | 57% | 30 | 29 | 30.34 | 12 | 2.5 | 0.0 | 0.51% | 99% | 2.0 |
| | | 4 | Low Power | 144 | 32 | 66 | 0.095 | 0.088 | 118 | 142 | 107 | 122 | 28.00 | 26% | 29 | 93 | 28.63 | 24 | 1.2 | 0.0 | 4.08% | 98% | 4.3 |
| | 8 | 1 | High Power | 93 | 54 | 77 | 0.019 | 0.018 | 24 | 29 | 22 | 25 | 36.00 | 165% | 36 | -12 | 36.46 | 5 | 7.3 | 0.1 | 0.01% | 99% | 0.7 |
| | | 2 | Standard | 184 | 54 | 119 | 0.079 | 0.074 | 99 | 119 | 90 | 102 | 40.00 | 44% | 41 | 61 | 40.68 | 21 | 2.0 | 0.0 | 0.01% | 98% | 2.5 |
| | | 2 | Low Power | 184 | 54 | 107 | 0.094 | 0.087 | 117 | 140 | 107 | 121 | 41.00 | 38% | 41 | 80 | 41.03 | 24 | 1.7 | 0.0 | 2.70% | 100% | 2.9 |
| | | 2 | Standard | 184 | 59 | 119 | 0.079 | 0.074 | 99 | 119 | 90 | 102 | 40.00 | 44% | 40 | 62 | 40.23 | 21 | 2.0 | 0.0 | 0.07% | 99% | 2.5 |
| | | 4 | Standard | 278 | 54 | 238 | 0.049 | 0.046 | 61 | 74 | 56 | 63 | 50.00 | 90% | 51 | 13 | 50.52 | 13 | 4.0 | 0.0 | 0.01% | 99% | 1.3 |
| Weighted Average | | | | 90 | 32 | 69 | 0.026 | 0.024 | 33 | 39 | 30 | 34 | 26.08 | 118% | 27 | 7 | 26.87 | 7 | 5.3 | 0.2 | 100% | 97% | 1.3 |

* Measure life based on DEER 2008 EUL data, new codes standard.
**Incentive based on UES 2011 Program Planning.

File Name: T8_MAS_Schools_TEP_2011_01_14

# Appendix G

**Schools - New Lighting**

Incentive Calculations
Energy-Efficient Fluorescent Fixtures
Replace Standard T8 Systems with Premium T8 Systems

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 97.13 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/kWh, saved) | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 1,314 |
| Off-Pk Op. Hours: | 1,581 |
| Total Op. Hours: | 2,896 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.93 |
| HVAC Interaction Factor (Demand): | 1.22 |
| HVAC Interaction Factor (Energy): | 1.15 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | | DEMAND/ ENERGY SAVINGS | | | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Length | # of Lamps in Fixture | Base Lamp Type | Base Lamp Watts | Base Fixt. Watts | EE Lamp Type | EE Lamp Watts | EE Fixt. Watts**** | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (kW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive****** ($) | Recommended Incentive****** % PV | PV Program Cost ($) | NPV ($) | Incr. Cost** ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor***** | | BC Ratio |
| Std T8 to Prem T8*** Per Fixture | 4-foot | 4 | F32T8 | 32 | 109.5 | F32T8 / ES | 27 | 85 | 0.031 | 0.028 | 38 | 46 | 78 | 102 | 60 | 77% | 62 | 40 | 61.93 | 8 | 7.9 | 0.2 | 33% | 97% | 1.6 |
| | | 3 | F32T8 | 32 | 83.5 | F32T8 / ES | 27 | 64 | 0.024 | 0.022 | 30 | 36 | 62 | 80 | 60 | 97% | 62 | 18 | 62.05 | 6 | 10.0 | 0.3 | 33% | 97% | 1.3 |
| | | 2 | F32T8 | 32 | 56.5 | F32T8 / ES | 27 | 42 | 0.017 | 0.016 | 22 | 26 | 45 | 58 | 50 | 112% | 52 | 6 | 51.58 | 4 | 11.5 | 0.4 | 33% | 97% | 1.1 |
| | | 1 | F32T8 | 32 | 30 | F32T8 / ES | 27 | 23 | 0.009 | 0.008 | 11 | 13 | 22 | 28 | 45 | 206% | 47 | -18 | 46.89 | 2 | 21.2 | 0.9 | 0% | 96% | 0.6 |
| Weighted Average | | | | 32 | 83 | | 27 | 64 | 0.024 | 0.022 | 30 | 36 | 61 | 80 | 57 | 95% | 59 | 21 | 58.52 | 6 | 9.8 | 0.3 | 100% | 97% | 1.4 |
| Std T8 to Prem T8*** Per Lamp | 4-foot | 4 | F32T8 | 32 | 27.4 | F32T8 / ES | 27 | 21 | 0.008 | 0.007 | 9 | 11 | 20 | 25 | 15 | 77% | 15 | 10 | 15.48 | 2 | 7.9 | 0.2 | 33% | 97% | 1.6 |
| | | 3 | F32T8 | 32 | 27.8 | F32T8 / ES | 27 | 21 | 0.008 | 0.007 | 10 | 12 | 21 | 27 | 20 | 97% | 21 | 6 | 20.68 | 2 | 10.0 | 0.3 | 33% | 97% | 1.3 |
| | | 2 | F32T8 | 32 | 28.3 | F32T8 / ES | 27 | 21 | 0.009 | 0.008 | 11 | 13 | 22 | 29 | 25 | 112% | 26 | 3 | 25.79 | 2 | 11.5 | 0.4 | 33% | 97% | 1.1 |
| | | 1 | F32T8 | 32 | 30.0 | F32T8 / ES | 27 | 23 | 0.009 | 0.008 | 11 | 13 | 22 | 28 | 45 | 206% | 47 | -18 | 46.89 | 2 | 21.2 | 0.9 | 0% | 96% | 0.6 |
| Weighted Average | | | | 32 | 28 | | 27 | 21 | 0.008 | 0.008 | 10 | 12 | 21 | 27 | 20 | 95% | 21 | 6 | 20.65 | 2 | 9.8 | 0.3 | 100% | 97% | 1.3 |
| Weighted Average Check | | | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

*Measure life based on DEER 2008 EUL data.
** Incremental cost is total cost for a new T8 under the assumption that customers do not buy new T12 fixtures/ lamps
***Definition of a Premium T8 as a 28W or 25W 4' lamp is based on the Consortium for Energy Efficiency's definition for Reduced Wattage T8 Systems.
****Based on EE Fixture Watts, 4-foot Premium T8s use an average of 78% of the wattage of 4-foot Regular T8s. Assumed that the same is true for 3-foot and 2-foot Premium T8s.
*****Weighting Factor based on engineering assumptions
******Incentives based on 2011 UES Program Planning.

File Name: PremiumT8_MAS_Schools_TEP_2011_01_14

**Schools - Existing Motors**

Incentive Calculations
VSD's Installed on ODP Motors
1800 RPM

| PROGRAM DATA | |
|---|---|
| Conservation Life (yrs): | 15 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 97.13 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/unit): | NA |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| SAVINGS FACTOR ASSUMPTIONS | |
|---|---|
| VFD Efficiency: | 95% |
| Peak Flow Ratio (Dem | 0.95 |
| Avg Flow Ratio (Energ | 0.55 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 2440 |
| Off-Pk Op. Hours: | 2643 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 0.95 |
| Load Factor: | 0.68 |
| Demand Savings Factor: | 0.0% |
| Energy Savings Factor: | 76.9% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application | RET / NEW |
| Cost Basis: | Full Installed |

| | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | % Inc. | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Motor HP | Motor Eff. | Non Coin Demand Savings Per HP (KW) | Coin Demand Savings Per HP (kW) | On-pk Savings Per HP (KWh) | Off-pk Savings Per HP (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive (Per HP)* ($) | Recommended Incentive (Per HP)* % PV | PV Cost Per HP ($) | NPV ($) | Incr. Cost Per HP ($) | Cost Savings Per HP ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) | BC Ratio |
| 1 | 80.4% | 0.00 | 0.00 | 1,188 | 1,287 | 1,570 | 2,328 | 5,045 | 321.38% | 5,045 | -3,476 | 5,045.45 | 139 | 36.4 | 0.0 | 0.0% | 100% | 0.5 |
| 1.5 | 84.8% | 0.00 | 0.00 | 1,126 | 1,220 | 1,488 | 2,207 | 3,430 | 230.51% | 3,433 | -1,945 | 3,433.25 | 131 | 26.1 | 0.0 | 0.0% | 100% | 0.6 |
| 2 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 2,615 | 177.55% | 2,618 | -1,146 | 2,618.34 | 130 | 20.1 | 0.0 | 0.0% | 100% | 0.8 |
| 3 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 1,795 | 121.87% | 1,798 | -325 | 1,797.96 | 130 | 13.8 | 0.0 | 5.0% | 100% | 1.2 |
| 5 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 1,125 | 76.38% | 1,129 | 344 | 1,128.88 | 130 | 8.7 | 0.0 | 4.0% | 100% | 1.9 |
| 7.5 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 785 | 53.30% | 786 | 687 | 785.94 | 130 | 6.0 | 0.0 | 2.0% | 100% | 2.8 |
| 10 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 610 | 41.42% | 611 | 861 | 611.41 | 130 | 4.7 | 0.0 | 4.0% | 100% | 3.6 |
| 15 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 430 | 29.20% | 433 | 1,040 | 432.95 | 130 | 3.3 | 0.0 | 9.0% | 99% | 5.0 |
| 20 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 340 | 23.08% | 341 | 1,132 | 341.26 | 130 | 2.6 | 0.0 | 13.0% | 100% | 6.4 |
| 25 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 280 | 19.01% | 285 | 1,188 | 284.62 | 130 | 2.2 | 0.0 | 23.0% | 98% | 7.7 |
| 30 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 245 | 16.63% | 246 | 1,227 | 246.14 | 130 | 1.9 | 0.0 | 4.0% | 100% | 8.9 |
| 40 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 195 | 13.24% | 196 | 1,276 | 196.50 | 130 | 1.5 | 0.0 | 9.0% | 99% | 11.1 |
| 50 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 165 | 11.20% | 166 | 1,307 | 165.74 | 130 | 1.3 | 0.0 | 5.0% | 100% | 13.2 |
| 60 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 140 | 9.51% | 145 | 1,328 | 144.58 | 130 | 1.1 | 0.0 | 2.0% | 97% | 15.1 |
| 75 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 120 | 8.15% | 123 | 1,350 | 122.73 | 130 | 0.9 | 0.0 | 0.0% | 98% | 17.8 |
| 100 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 100 | 6.79% | 100 | 1,373 | 100.04 | 130 | 0.8 | 0.0 | 4.0% | 100% | 21.8 |
| 125 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 85 | 5.77% | 86 | 1,387 | 85.87 | 130 | 0.7 | 0.0 | 6.0% | 99% | 25.4 |
| 150 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 75 | 5.09% | 76 | 1,397 | 75.92 | 130 | 0.6 | 0.0 | 0.0% | 99% | 28.8 |
| 200 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 60 | 4.07% | 63 | 1,410 | 62.70 | 130 | 0.5 | 0.0 | 1.0% | 96% | 34.8 |
| 300 | 85.7% | 0.00 | 0.00 | 1,115 | 1,207 | 1,473 | 2,185 | 48 | 3.26% | 49 | 1,424 | 48.51 | 130 | 0.4 | 0.0 | 3.0% | 99% | 45.0 |
| 501-1000 | 92.3% | 0.00 | 0.00 | 1,034 | 1,121 | 1,367 | 2,028 | 48 | 3.51% | 49 | 1,318 | 48.51 | 121 | 0.4 | 0.0 | 3.0% | 99% | 41.8 |
| 1000+ | 92.3% | 0.00 | 0.00 | 1,034 | 1,121 | 1,367 | 2,028 | 48 | 3.51% | 49 | 1,318 | 48.51 | 121 | 0.4 | 0.0 | 3.0% | 99% | 41.8 |
| Weighted Average | | 0 | 0 | 1,110 | 1,202 | 1,466 | 2,175 | 375 | 25% | 377 | 1,090 | 376.88 | 130 | 2.9 | 0.0 | 100% | 99% | 5.8 |

*Based on 2011 UES Program Planning.

File Name: VSD_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
Advanced Power Strips

**Schools - New Plug Loads**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)*: | 12 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 80.30 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Admin Costs ($/kWh, saved) | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 8.78 |
| $/kWh, On-Peak: | 0.06 |
| $/kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 38% |
| Off-Pk Op. Hours: | 62% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 1.00 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | | DEMAND/ENERGY SAVINGS | | | | | INCENTIVE CALCULATIONS | | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Size | # of Smart Strips | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive** ($) | Recommended Incentive** %PV | Program Admin Costs ($) | PV Total Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/Inc. (yrs) | Payback w/Inc. (yrs) | Weighting Factor*** | (%) | BC Ratio |
| **Occupancy** | 8-outlet | 1 | 0.044 | 0.044 | 65 | 105 | 116 | 145 | 75 | 65% | 75 | 150 | -5 | 75.00 | 14 | 5.3 | 0.0 | 100% | 100% | 1.0 |
| | Weighted Average | | 0.044 | 0.044 | 65 | 105 | 116 | 145 | 75 | 65% | 75 | 150 | -5 | 75.00 | 14 | 5.3 | 0.0 | 100% | 100% | 1.0 |
| **Load Sensor** | 6-outlet | 1 | 0.023 | 0.023 | 36 | 59 | 64 | 80 | 30 | 47% | 30 | 60 | 20 | 30.00 | 8 | 3.9 | 0.0 | 31% | 100% | 1.3 |
| | 7-outlet | 1 | 0.023 | 0.023 | 37 | 61 | 66 | 82 | 31 | 47% | 32 | 63 | 19 | 31.50 | 8 | 4.0 | 0.1 | 8% | 98% | 1.3 |
| | 8-outlet | 1 | 0.026 | 0.026 | 42 | 69 | 74 | 93 | 32 | 43% | 32 | 64 | 29 | 32.00 | 9 | 3.6 | 0.0 | 31% | 100% | 1.4 |
| | 10-outlet | 1 | 0.034 | 0.034 | 57 | 93 | 100 | 124 | 34 | 34% | 34 | 68 | 56 | 34.00 | 12 | 2.8 | 0.0 | 31% | 100% | 1.8 |
| | Weighted Average | | 0.027 | 0.027 | 45 | 73 | 78 | 98 | 32 | 42% | 32 | 64 | 34 | 31.96 | 9 | 3.5 | 0.0 | 100% | 100% | 1.5 |
| **Timer Plug** | 8-outlet | 1 | 0.047 | 0.047 | 81 | 132 | 140 | 175 | 19 | 14% | 19 | 38 | 137 | 19.00 | 17 | 1.1 | 0.0 | 100% | 100% | 4.6 |
| | Weighted Average | | 0.047 | 0.047 | 81 | 132 | 140 | 175 | 19 | 14% | 19 | 38 | 137 | 19.00 | 17 | 1.1 | 0.0 | 100% | 100% | 4.6 |

*Measure life based on information in *Final Report Electronics and Energy Efficiency: A Plug Load Characterization Study* SCE0284. Prepared for Southern California Edison by Research Into Action. January 29, 2010.
**Incentives based on 2011 UES Program Planning.
***Weighting Factor based on engineering assumptions.

File Name: AdvancedStrips_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations

Occupancy Sensor Vending Machine and Reach-in Cooler Controls

**Schools - New Refrigerators**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 12 |
| Program Life (yrs): | 5 |
| Demand AC ($/ kW): | 80.30 |
| Summer On-pk Energy AC ($/ kWh): | 0.10 |
| Summer Off-pk Energy AC ($/ kWh): | 0.06 |
| Winter On-pk Energy AC ($/ kWh): | 0.06 |
| Winter Off-pk Energy AC ($/ kWh): | 0.05 |
| Program Admin Costs ($/ unit): | NA |
| Discount Rate: | 8.03% |
| Social Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 8.78 |
| $/ kWh, On-Peak: | 0.06 |
| $/ kWh, Off-Peak: | 0.05 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours Fraction: | 24% |
| Off-Pk Op. Hours Fraction: | 76% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 100% |
| Demand Load Factor**: | 0.60 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | RET, NEW |
| Cost Basis: | Installed |

| | | DEMAND/ ENERGY SAVINGS | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Description | Type | Base Annual kWh | Demand Savings Fraction* | Energy Savings Fraction* | Non-Coin. Demand Savings Per Unit (KW) | Coin. Demand Savings Per Unit (KW) | On-pk Savings Per Unit (KWh) | Off-pk Savings Per Unit (KWh) | IRP PV Benefit Per Unit ($) | Social PV Benefit Per Unit ($) | Recommended Incentive (Per Unit)*** ($) | Recommended Incentive (Per Unit)*** %PV | PV Cost Per Unit ($) | NPV ($) | Incr. Cost Per Unit ($) | Cost Savings Per Unit ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor** | (%) | BC Ratio |
| Reach-in Cooler Controls | CoolerMiser | 4,000 | 15% | 30% | 0.11 | 0.11 | 293 | 907 | 651 | 813 | 195 | 30% | 199 | 452 | 199 | 79 | 2.5 | 0.1 | 33% | 98% | 4.1 |
| Beverage Case Controls | VendMiser | 3,500 | 23% | 46% | 0.15 | 0.15 | 393 | 1,217 | 874 | 1,090 | 195 | 22% | 199 | 675 | 199 | 105 | 1.9 | 0.0 | 33% | 98% | 5.5 |
| Snack Machine Controls | SnackMiser | 700 | 23% | 46% | 0.03 | 0.03 | 79 | 243 | 175 | 218 | 100 | 57% | 103 | 72 | 103 | 21 | 4.9 | 0.1 | 33% | 97% | 2.1 |
| Weighted Average | | 2,733 | 20% | 41% | 0.10 | 0.10 | 255 | 789 | 567 | 707 | 163 | 36% | 167 | 400 | 167 | 68 | 3.1 | 0.1 | 100% | 98% | 4.2 |

*Personal correspondence with USA technologies/ verifiable through "Evaluation of the LiteVend Program" Ecos 2004: http://calmac.org/publications/Final_Report_063004.pdf

**Demand Load Factor and Weighting Factor based on engineering assumptions.

***Incentives based on UES 2011 Program Planning.

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weighted Average Check | | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |

File Name: VendingMiser_MAS_Schools_TEP_2011_01_14

# Appendix G

Incentive Calculations
Custom Measures

**Schools - Custom Measures**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)**: | 10 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 77.23 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.05 |
| Winter On-pk Energy AC ($/kWh): | 0.06 |
| Winter Off-pk Energy AC ($/kWh): | 0.04 |
| Program Administrative Costs ($/unit): | 0 |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Res Ave | |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | 0.10 |
| $/kWh, Off-Peak: | 0.10 |

| OPERATING DATA** | |
|---|---|
| Op Hours: | 8,760 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 80% |

| OTHER FACTORS | |
|---|---|
| Line Loss Energy Factor: | 9.5% |
| Line Loss Demand Factor: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ENERGY SAVINGS | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (kW) | OnPeak Energy Savings** (kWh) | Off Peak Energy Savings** (kWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive* ($) | Recommended Incentive* % PV | PV Program Cost ($) | NPV ($) | Incr. Cost** ($) | Cost Savings ($) | Payback w o/Inc. (yrs) | Payback w /Inc. (yrs) | Weighting Factor** | (%) | BC Ratio |
| Per Customer | 3.73 | 2.98 | 16,337 | 16,337 | 16,889 | 20,442 | 6,530 | 39% | 6,535 | 10,354 | 6,534.76 | 3,252 | 2.0 | 0.0 | 100% | 100% | 3.1 |
| Weighted Average | 3.73 | 2.98 | 16,337 | 16,337 | 16,889 | 20,442 | 6,530 | 39% | 6,535 | 10,354 | 6,534.76 | 3,252 | 2.0 | 0.0 | 100% | 100% | 3.1 |

*Incentive based on 2011 UES Program Planning.
**OnPk Off Pk Energy Savings, Operating Data, Weighting Factors, Incremental Costs, and Measure Life based on engineering assumptions based on past program data and program planning.

File Name: Custom_MAS_Schools_TEP_2011_01_14

# APPENDIX H:

# BEHAVIORAL COMPREHENSIVE PROGRAM

## Program Description

In its desire to increase savings yields from Demand-Side Management ("DSM") programs, Tucson Electric Power Company ("TEP") is taking several approaches: introducing new programs and measures to existing programs, and increasing participation in existing programs. Behavior based programs have elements of all of these approaches.

Behavioral programs are designed to affect habitual behaviors like turning off lights or adjusting the thermostat, purchasing behaviors such as buying efficient lights and appliances and the behavior of participating in utility DSM programs. The new Behavioral Comprehensive programs target specific and relevant efficiency recommendations to each customer, including information about key energy efficiency programs, making it easier for each customer to take action on the recommendations and programs most relevant to them.

The types of behaviors to be influenced include:

- Habitual behaviors
  - » Adjust thermostat setting
  - » Adjust water heater set point
  - » Unplug appliances or use smart strips
  - » Turn off unnecessary lights
  - » Run dishwasher only when full
  - » Wash clothes in cold water
  - » Line dry laundry
- Small purchasing and maintenance behaviors
  - » Purchase install and program a programmable thermostat
  - » Purchase and install faucet aerators and low flow shower heads
  - » Purchase and install compact fluorescent light bulbs
  - » Request home energy audit to improve EE
  - » HVAC maintenance
  - » Clean refrigerator coils
- Larger purchasing decisions
  - » Purchase an ENERGY STAR appliance
  - » Install extra insulation and implement air sealing to make home more EE
  - » Install EE windows and doors
  - » Purchase higher EE heating and cooling system

TEP will influence these behaviors through a suite of initiatives including:

- Home energy reports (filed previously);
- Direct canvassing – a grass roots, door to door approach;
- K-12 education, harnessing the enthusiasm of kids and the community focal point of schools to mobilize for energy efficiency;

- In home energy displays (pilot) providing customers feedback on their energy use; and
- Community Education – enhancing the efforts of community organizations with hands on training for efficiency mentors and community members.

## Program Objectives and Rationale

Technology-based energy efficiency achieves only a fraction of total efficiency potential. The barriers to wider spread implementation of energy efficiency are sociological not technological. In fact, in recent Federal testimony, the American Council for an Energy-Efficient Economy ("ACEEE") stated that recent studies suggest that:

*"...the potential behavior-related energy savings in the residential sector alone represent roughly 25 percent of current residential sector energy consumption."*

Capturing a larger fraction of energy efficiency potential requires behavior change. Recognition of behavior change as efficiency potential is essential to the evolution of utility energy efficiency programs. Efficiency programs will need to integrate behavior change strategies into their DSM portfolios in order to fully realize their achievable potential.

There is much utility interest in behavior based initiatives as is evidenced by significant increase in the number and attendance of events taking place in this nascent field. Data is accumulating that show the real and measurable savings to be had through behavior based initiatives. That being said, some behavior based programs represent a divergence from the historical approach to energy efficiency program design, implementation and evaluation and care must be taken to design programs that will generate verifiable savings that will sustain the rigor of evaluation protocol.

Behavioral science-based marketing, data analytics, and cutting-edge software are the tools being applied in this program to broadly and deeply engage utility customers. Utility based behavior initiatives can be categorized into 4 broad categories: Mass Media/Social Media, Community Based Social Marketing, Feedback and Competitions. TEP's proposed plan includes aspects of all of these.

The primary barriers to wider spread implementation of this approach are:

- Efficiency is invisible;
- Most people when asked if they want to save energy will say yes. Often they think they are already doing what they can to be energy efficient;
- Not knowing what to do, or what to do first;
- Not knowing where to obtain energy efficient products and services;
- Perceptions of cost, financial constraints;
- Doubt regarding the ability to make a significant difference in energy use/cost;
- Methodologies to measure savings through behavioral initiatives are not widely known; and
- Questions regarding the persistence of savings from behavioral initiatives.

Some of the major objectives from this program are to:

- Generate significant savings for DSM portfolio objectives;
- Develop relationships with TEP customers leading to other areas of participation in TEP's portfolio of DSM programs;
- Promote efficient building operations;
- Lower energy bills for the consumer; and
- Plant seeds for future energy users through school and community outreach.

## Target Market

Behavioral initiatives apply to all TEP customers. They can be targeted at homes and/or businesses. The focus for this effort is on behavioral change within residences.

## Program Eligibility

All TEP residential customers will be eligible for the overall program. Some measures however are targeted specifically for certain groups. As an example Direct Canvassing is designed primarily as an outreach program for neighborhoods difficult to reach with traditional messaging.

## Current Baseline Conditions

While consumer attitudes and awareness regarding the impacts of our energy use and the potential of energy efficiency are increasing, and an ever increasing percentage of people express a willingness to take action, there is often confusion about energy efficiency terms, what concrete steps can be taken and how much of an impact they will have. Awareness of and favorable attitudes toward energy efficiency in general do not necessarily correlate with intentions to purchase specific energy efficient products or take particular energy efficient actions. There is also typically a significant gap between awareness and action that must be addressed through specific targeted actionable messages. Many people believe they are "doing all they can" while the reality is they could easily do more.

*"Consumers have been conditioned to think that their driving habits are the best way to help the environment. They have not realized that the biggest thing they can do is use less electricity and be more energy efficient" —Shelton Research Group*

## Products and Services

Behavior programs are made up of the Home Energy Reports Program, filed separately and the Behavior Comprehensive Program which is made up of several unique initiatives as follows:

- Direct Canvassing
- K-12 Education
- In Home Energy Display – Pilot
- Community Education
- CFL Give-Away

Each initiative is described in some detail in the succeeding sections.

Delivery Strategy, Incentive Processing and Administration

Doug McKenzie-Mohr, PhD, is an environmental psychologist and a leading expert in the design of programs to promote sustainable behavior. Dr. McKenzie-Mohr, a noted pioneer and expert in behavior based energy efficiency initiatives, suggests the following steps in designing a successful behavior based campaign:

- Identify barriers and benefits
- Develop strategies using behavior change tools
- Pilot the initiative as a carefully designed experiment and refine according to findings
- Implement
- Evaluate

As outlined throughout this section, this plan follows that path. In addition to being new, behavior based programs are relatively unique and require specialized expertise to implement. Accordingly, TEP put out an RFP for behavior based implementation providers and all of the five behavior based approaches are being delivered by separate implementation contractors. At the writing of this filing, all implementation contractors had not yet been selected.

### *I.A.1.1 Home Energy Reports*

This approach, Home Energy Reports, a part of the Behavioral suite of programs, was filed separately.

### *I.A.1.2 Direct Canvassing*

The direct canvassing initiative is a grass-roots, door to door approach to inducing behavior change for energy efficiency. Volunteers from local community organizations are trained and deployed to go door to door and talk to customers about energy efficiency. Two CFL bulbs are left behind with the customers as well as program materials for appropriate TEP DSM programs. This approach capitalizes on the sociological research which shows people are more likely to take action when the information is delivered by a trusted source, such as a member of their own community.

### *I.A.1.3 K-12 Education*

The K-12 Education approach is an extension of the existing TEP education program. In this approach, in addition to energy based class room curriculum, students will be instructed in energy saving approaches that can be implemented in their homes. Students will be provided a take home kit which includes several energy saving devices such as CFL's, refrigerator thermometers and educational materials regarding actions that can be taken to reduce energy use.

### *I.A.1.4 In-Home Display Pilot*

The In-Home Display Pilot Program works by providing a digital display that show customers their individual current cost of energy in cents per hour and their cumulative cost for the month. The program makes customers aware of their energy consumption with instant, easy to access information. It also allows them to monitor changes in household energy usage as they choose behavioral modifications suitable for their individual lifestyle. The concept is simple: once customers are able to identify energy savings after making behavioral modifications, sociological instincts take over and customers are induced to use less energy. Providing feedback in this and other forms such as home energy reports have been demonstrated to provide real and measurable savings. TEP will evaluate and report any reduction in energy consumption and will recommend continuation of the program pending positive results showing this as a cost-effective option producing measurable energy savings.

### *I.A.1.5 Community Education*

The Community Education Program will engage community groups and work with public entities with "train the trainer" hands-on energy efficiency seminars. Community trainers will be given a broad based review of energy, efficiency and comfort principles. This creates a level of understanding which dovetails into identifying specific actions and behaviors to reduce energy consumption at home, work or play. Community groups such as the Metropolitan Energy Commission, the Sonoran Environmental Research Organization, and other neighborhood organizations are engaged both to identify mentors to be trained and to schedule sessions led by these mentors for community members on a grass roots level. The seminars include hands-on training with a wide sample of materials such as weather stripping, low flow showerheads, caulk or foam sealant, CFL's, etc. provided to participants. Energy savings are attributed to the direct install items included in the seminar materials for neighborhood participants. Efforts to coordinate neighborhood sessions with school curriculum activities or to reinforce direct canvassing initiatives will aid the adoption and retention of energy efficient behaviors.

### *I.A.1.6 CFL Give-Away*

The Compact Florescent Light Give-Away program will complement TEP's presence at community events, its overall education and outreach efforts, and efficiency messaging. Free compact fluorescent light bulbs will be made available at community events and to community organizations such as those involved in our Community Education Program. Flexibility to add methods and develop partnerships to aid in the distribution of these bulbs is a program design element which will enhance program effectiveness over its lifespan.

Program Marketing and Communication Strategy

Marketing of the behavior approaches will be handled by the implementation contractors and coordinated with TEP's overall messaging to reinforce the effectiveness of the behavior programs. The Behavioral Comprehensive program will be a key part of our overall consumer awareness campaign and be marketed through both traditional and non-traditional channels. Each approach will also involve a unique strategy:

- Home energy reports will be offered in an opt out approach; in other words, participants will be chosen at random. The program is a tool to educate and encourage behaviors like participating in other programs.
- The recipients of the direct canvassing approach will be chosen by TEP based on criteria regarding which demographic group is wished to be reached. Those who receive direct canvassing will be limited to the demographic group or geographic area designated by TEP. The program will be marketed for widespread community awareness in advance.
- The K-12 Education approach involves sending students home with energy conservation kits. Those who receive the kits will be those who receive the energy curriculum provided by the implementation contractor. The program will not be marketed through traditional channels. Effort will be made when possible to coordinate the school program with other outreach efforts in the same neighborhood.
- The in home display pilot program will take an additional advantage of the web portal displays provided to 600 participants in the direct load control program, 200 customers in this group will also receive a separate in home display which is always available for the family to look at. These customers will be chosen at random. The program will not be marketed through traditional channels.
- Community education seminars will be channeled through public and social organizations in order to maximize the effectiveness of the energy efficiency outreach efforts of those organizations. The program will not be marketed through traditional channels.

- The CFL Give-Away program will provide up to 150,000 free compact fluorescent light bulbs per year to TEP customers at community events, through community organizations and additional efforts. Marketing messages are anticipated in conjunction with other programs and through traditional channels.

## Program Implementation Schedule

Table 1-1shows the estimated timeline for key program activities by quarter.

**Table 1-1. Implementation Schedule**

| Program Activities | 2011 | | | | 2012 | | | |
|---|---|---|---|---|---|---|---|---|
| Submit program for approval | | | | | | | | |
| Program approval (estimated) | | | | | | | | |
| Selection of implementation contractors | | | | | | | | |
| Create marketing materials, hire staff, set up AZ office | | | | | | | | |
| Program kick-off and implementation | | | | | | | | |

## Measurement, Evaluation, and Research Plan

TEP will conduct an evaluation of Program participants to assess the effectiveness of behavior program initiatives. TEP will determine how effective the initiatives have been in encouraging customers to make behavioral changes that save energy and how effective the initiatives have been in encouraging participation in other available EE programs. TEP will also measure energy savings of to determine which of the initiatives are most effective. Results will be analyzed and Program design refined according to findings. Other similar behavioral applications may also be analyzed in the future to take advantage of new found insights.

In recognition of the fact that behavior based initiatives must provide a highly reliable evaluation protocol, we have proactively designed one that gets at the key issues of:

- Boomerang effect: Low-energy users may respond to the usage feedback and neighbor comparison by increasing energy consumption.
- Growth/decay effect: Over time the treatment effect may evolve, perhaps growing (energy savings increases), perhaps decaying.
- Treatment persistence: Energy savings may persist after termination of treatment.
- Rebound effect: After an extended period without treatment a household may respond to renewed treatment with a savings "bounce".

In order to accomplish this, the pilot design for Home Energy Reports includes setup of test and control groups:

- Divide targeted population into two statistically equivalent groups
- Verify Groups: Verify no historical difference in usage between test and control groups Deploy the strategy to test group only, no action taken with control group
- Measure Impact: Compare average energy use pre and post reports for both groups

TEP will evaluate the energy savings from other behavioral initiatives by using a third party evaluator experienced in evaluating behavioral initiatives.

## Quality Assurance and Control

The initiatives will be delivered by implementation contractors. Implementation contractors each have internal QC protocols appropriate to their specific approach. The implementation contractors will be managed and quality assurance will be maintained by the program administrator. Customers will be surveyed and spot checks made to assure quality program delivery

## Program Costs and Benefits

**Table 1-2. Measure Savings, Incentive Level, and Participation, Benefit-Cost**

| Measure | Annual Energy Savings (kWh) /Unit | Peak Demand Savings (kW)/ Unit | Avg. Incentive / Unit | 2011 Units | 2012 Units | Measure Level Societal Test Result |
|---|---|---|---|---|---|---|
| K-12 Education Kit | 142 | 0.01 | $20/home | 6,000 | 6,000 | 2.86 |
| Community Education Kit | 183 | 0.01 | $56/home | 400 | 400 | 2.29 |
| Direct Canvassing | 68 | 0.01 | $3/home | - | 41,000 | 7.28 |
| In Home Energy Displays | 268 | 0.03 | $70/home | 600 | 600 | 1.13 |
| CFL Giveaway (23 W CFL) | 56 | 0.01 | $2/home | 150,000 | - | 10.46 |
| CFL Giveaway (18 W CFL) | 41 | 0.005 | $2/home | - | 150,000 | 6.67 |

**Table 1-3. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $422,900 | $300,794 | $50,000 | $14,085 | $31,511 | $819,289 | $2,513,531 | 3.9 |
| **2012** | $602,380 | $698,765 | $50,000 | $14,507 | $54,626 | $1,420,279 | $2,129,394 | 2.5 |

**Table 1-4. Environmental Benefits**

| | Annual CO2 Savings (Metric Tons) | Annual NOx Savings (Metric Tons) | Annual SOx Savings (Metric Tons) | Lifetime CO2 Savings (Metric Tons) | Lifetime NOx Savings (Metric Tons) | Lifetime SOx Savings (Metric Tons) |
|---|---|---|---|---|---|---|
| **2011** | 9,244 | 12.48 | 10.83 | 55,308 | 75 | 65 |
| **2012** | 9,849 | 13.30 | 11.53 | 58,938 | 80 | 69 |

# Measure Analysis Sheets

Incentive Calculations

**CFL Give-Away**

**Behavioral Programs**

| PROGRAM DATA | |
|---|---|
| 18 W Measure Life (yrs): | 5 |
| 23 W Measure Life (yrs): | 6 |
| Program Life (yrs): | 20 |
| 18 W Demand AC ($/ kW): | $71.39 |
| 18 W Summer On-pk Energy AC ($/ kWh): | $0.08 |
| 18 W Summer Off-pk Energy AC ($/ kWh): | $0.05 |
| 18 W Winter On-pk Energy AC ($/ kWh): | $0.06 |
| 18 W Winter Off-pk Energy AC ($/ kWh): | $0.04 |
| 23 W Demand AC ($/ kW): | $72.41 |
| 23 W Summer On-pk Energy AC ($/ kWh): | $0.09 |
| 23 W Summer Off-pk Energy AC ($/ kWh): | $0.05 |
| 23 W Winter On-pk Energy AC ($/ kWh): | $0.06 |
| 23 W Winter Off-pk Energy AC ($/ kWh): | $0.04 |
| Admin Costs per Bulb: | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 0.00 |
| $/ kWh, On-Peak: | $0.10 |
| $/ kWh, Off-Peak: | $0.10 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 274 |
| Off-Pk Op. Hours: | 577 |
| Summer Ratio: | 41% |
| Winter Ratio: | 59% |
| Coincidence Factor: | 0.08 |
| In-Service Rate | 75% |
| Leakage Rate | 0% |
| HVAC Interaction Factor (Demand): | 0.41 |
| HVAC Interaction Factor (Energy): | 0.13 |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | ROB |
| Cost Basis: | Incremental |

| | DEMAND/ ENERGY SAVINGS | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kit Contents | Number per Kit | Inc. Fixture Watts | CFL Fixture Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive ($) | Recommended Incentive %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) |
| 23 Watt Twist | 1 | 100 | 23 | 0.081 | 0.007 | 18 | 38 | 17 | 19 | 2 | 11% | 2 | 15 | 2 | 6 | 0.3 | 0.0 | 100% | 100% |
| 18 Watt Twist | 1 | 75 | 18 | 0.060 | 0.005 | 13 | 28 | 11 | 12 | 2 | 20% | 2 | 8 | 2 | 4 | 0.5 | 0.0 | 100% | 100% |

File Name: CFLGiveAway_MAS_Res_TEP_2010_12_20

**Education and Outreach - Community Education**

Incentive Calculations
Community Energy Education Program Kit

| PROGRAM DATA | |
|---|---|
| CFL 13 W Measure Life: | 6 |
| Faucet Aerator Life**: | 10 |
| Showerhead Measure Life**: | 10 |
| Night Light Measure Life: | 16 |
| Program Life (yrs): | 5 |
| CFL 13 W Demand AC ($/kW): | $72.41 |
| CFL 13 W Summer On-pk Energy AC ($/kWh): | $0.09 |
| CFL 13 W Summer Off-pk Energy AC ($/kWh): | $0.05 |
| CFL 13 W Winter On-pk Energy AC ($/kWh): | $0.06 |
| CFL 13 W Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Faucet Aerator Demand AC ($/kW): | $77.23 |
| Faucet Aerator Summer On-pk Energy AC ($/kWh): | $0.10 |
| Faucet Aerator Summer Off-pk Energy AC ($/kWh): | $0.05 |
| Faucet Aerator Winter On-pk Energy AC ($/kWh): | $0.06 |
| Faucet Aerator Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Faucet Aerator Gas AC ($/therm): | $0.78 |
| Showerhead Demand AC ($/kW): | $77.23 |
| Showerhead Summer On-pk Energy AC ($/kWh): | $0.10 |
| Showerhead Summer Off-pk Energy AC ($/kWh): | $0.05 |
| Showerhead Winter On-pk Energy AC ($/kWh): | $0.06 |
| Showerhead Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Showerhead Gas AC ($/therm): | $0.78 |
| Night Light Demand AC ($/kW): | $98.92 |
| Night Light Summer On-pk Energy AC ($/kWh): | $0.10 |
| Night Light Summer Off-pk Energy AC ($/kWh): | $0.06 |
| Night Light Winter On-pk Energy AC ($/kWh): | $0.07 |
| Night Light Winter Off-pk Energy AC ($/kWh): | $0.05 |
| Administrative Cost: | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | $0.10 |
| $/kWh, Off-Peak: | $0.10 |

| OPERATING DATA | |
|---|---|
| CFL On-Pk Op. Ratio: | 23% |
| CFL Off-Pk Op. Ratio: | 77% |
| Faucet Aerator On-Pk Op. Ratio: | 30% |
| Faucet Aerator Off-Pk Op. Ratio: | 70% |
| Showerhead On-Pk Op. Ratio: | 20% |
| Showerhead Off-Pk Op. Ratio: | 80% |
| Night Light On-Pk Op. Ratio*: | 0% |
| Night Light Off-Pk Op. Ratio*: | 100% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| CFL 13 W Coincidence Factor: | 8% |
| Faucet Aerator Coincidence Factor: | 80% |
| Showerhead Coincidence Factor: | 31% |
| LED Night Light Coincidence Factor: | 0% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Margin: | 0% |
| Application | Retrofit |
| Cost Basis: | Full Install |

| | DEMAND/ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | %Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Annual Energy Savings (KWh) | Non Coin Demand Savings (kW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | Gas Energy Savings (Therms) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive*** ($) | Recommended Incentive*** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factors for Program Cost | (%) | BC Ratio |
| 2 CFLs (13 W) | 91 | 0.099 | 0.008 | 21 | 70 | N/A | 26 | 30 | 28 | 106% | 28 | -2 | 28 | 9 | 3.1 | 0.00 | 50% | 100% | 1.1 |
| 1 Bathroom Faucet Aerator | 11 | 0.002 | 0.002 | 3 | 7 | 3 | 22 | 27 | 3 | 14% | 3 | 19 | 3 | 1 | 3.1 | 0.00 | 6% | 100% | 8.4 |
| 1 Showerhead | 50 | 0.016 | 0.005 | 10 | 40 | 15 | 35 | 39 | 15 | 44% | 15 | 19 | 15 | 5 | 3.1 | 0.00 | 27% | 100% | 2.6 |
| 1 LED Night Light | 32 | 0.007 | 0.000 | 0 | 32 | N/A | 17 | 22 | 10 | 58% | 10 | 7 | 10 | 3 | 3.1 | 0.00 | 17% | 100% | 2.3 |
| Total Kit (Measure Level) | 183 | 0.124 | 0.015 | 34 | 149 | 19 | 100 | 119 | 56 | 56% | 56 | 44 | 56 | 18 | 3.1 | 0.00 | 100% | 100% | 2.1 |

* The ratios are our best engineering assumptions, pending detailed MER work.
**DEER 2008.
***Based on UES 2011 Program Planning.

File Name: CommunityEducation_MAS_Res_TEP_2011_01_09

# Appendix H

Incentive Calculations

**Direct Canvass Program Kit**

**Behavioral Programs**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 6 |
| Program Life (yrs): | 20 |
| Demand AC ($/ kW): | $72.41 |
| Summer On-pk Energy AC ($/ kWh): | $0.09 |
| Summer Off-pk Energy AC ($/ kWh): | $0.05 |
| Winter On-pk Energy AC ($/ kWh): | $0.06 |
| Winter Off-pk Energy AC ($/ kWh): | $0.04 |
| Admin Costs per Bulb: | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/ kW: | 0.00 |
| $/ kWh, On-Peak: | $0.10 |
| $/ kWh, Off-Peak: | $0.10 |

| OPERATING DATA | |
|---|---|
| On-Pk Op. Hours: | 274 |
| Off-Pk Op. Hours: | 577 |
| Summer Ratio: | 41% |
| Winter Ratio: | 59% |
| Coincidence Factor: | 0.08 |
| In-Service Rate | 75% |
| Leakage Rate | 0% |
| HVAC Interaction Factor (Demand): | 0.41 |
| *HVAC Interaction Factor (Energy):* | 0.13 |

| *OTHER FACTORS* | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Factor: | 0% |
| Application | ROB |
| Cost Basis: | Incremental |

| | DEMAND/ ENERGY SAVINGS | | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | %Incent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kit Contents | Number per Kit | Inc. Fixture Watts | CFL Fixture Watts | Non-Coincident Demand Savings (KW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (KWh) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive ($) | Recommended Incentive %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factor | (%) |
| 13 Watt Twist | 2 | 60 | 13 | 0.099 | 0.008 | 22 | 46 | 21 | 24 | 3 | 16% | 3 | 18 | 3 | 7 | 0.5 | 0.0 | 100% | 100% |

File Name: DirectCanvassing_MAS_Res_TEP_2010_12_20

# Appendix H

Incentive Calculations
In Home Energy Display

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs): | 5 |
| Program Life (yrs): | 1 |
| Demand AC ($/kW): | $71.39 |
| Summer On-pk Energy AC ($/kWh): | $0.08 |
| Summer Off-pk Energy AC ($/kWh): | $0.05 |
| Winter On-pk Energy AC ($/kWh): | $0.06 |
| Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Weighted Energy AC ($/kWh): | $0.04 |
| Administrative Costs ($): | 0 |
| Discount Rate: | 8.03% |
| Societal Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | |
| $/kWh, On-Peak: | $0.10 |
| $/kWh, Off-Peak: | $0.10 |

| OPERATING DATA | |
|---|---|
| On-Pk Ratio: | 32% |
| Off-Pk Ratio: | 68% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 100% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor-Demand: | 9.5% |
| Line Loss Factor-Energy: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application | Existing |
| Cost Basis: | Retrofit |

| DEMAND/ ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Savings (%of Sales) | Customer Energy Savings (kWh/yr) | Non-Coin. Demand Savings (KW) | Coin. Demand Savings (KW) | On-pk Savings (KWh) | Off-pk Savings (KWh) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive ($) | Recommended Incentive %PV | PV Program Cost ($) | NPV ($) | Incr. Cost ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factors | BC Ratio |
| 2.50% | 268 | 0.031 | 0.031 | 86 | 182 | 70 | 78 | 70 | 100% | 70 | 0 | 70 | 27 | 2.6 | 0.00 | 100% | 1.1 |

Absent meaningful program data, savings are assumed to be spread throughout the day and year following the same trend as typical daily and annual loadshape for TEP.

File Name: InHomeEnergyDisplays_MAS_Res_TEP_2011_01_12

# Appendix H

Incentive Calculations
School Energy Education Program Kit

**Education and Outreach - School Education**

| PROGRAM DATA | |
|---|---|
| CFL 13 W Measure Life: | 6 |
| Faucet Aerator Measure Life**: | 10 |
| Night Light Measure Life**: | 16 |
| Refrigerator Therm Measure Life*: | 3 |
| Program Life (yrs): | 5 |
| CFL 13 W Demand AC ($/kW): | $72.41 |
| CFL 13 W Summer On-pk Energy AC ($/kWh): | $0.09 |
| CFL 13 W Summer Off-pk Energy AC ($/kWh): | $0.05 |
| CFL 13 W Winter On-pk Energy AC ($/kWh): | $0.06 |
| CFL 13 W Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Faucet Aerator Demand AC ($/kW): | $77.23 |
| Faucet Aerator Summer On-pk Energy AC ($/kWh): | $0.10 |
| Faucet Aerator Summer Off-pk Energy AC ($/kWh): | $0.05 |
| Faucet Aerator Winter On-pk Energy AC ($/kWh): | $0.06 |
| Faucet Aerator Winter Off-pk Energy AC ($/kWh): | $0.04 |
| Faucet Aerator Gas AC ($/therm): | $0.78 |
| Night Light Demand AC ($/kW): | $98.92 |
| Night Light Summer On-pk Energy AC ($/kWh): | $0.10 |
| Night Light Summer Off-pk Energy AC ($/kWh): | $0.06 |
| Night Light Winter On-pk Energy AC ($/kWh): | $0.07 |
| Night Light Winter Off-pk Energy AC ($/kWh): | $0.05 |
| Refrigerator Demand AC ($/kW): | $74.32 |
| Refrigerator Summer On-pk Energy AC ($/kWh): | $0.08 |
| Refrigerator Summer Off-pk Energy AC ($/kWh): | $0.04 |
| Refrigerator Winter On-pk Energy AC ($/kWh): | $0.05 |
| Refrigerator Winter Off-pk Energy AC ($/kWh): | $0.03 |
| Administrative Cost: | NA |
| Discount Rate: | 8.03% |
| Societal Discount Rate: | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Rate: | |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | $0.10 |
| $/kWh, Off-Peak: | $0.10 |

| OPERATING DATA | |
|---|---|
| CFL On-Pk Op. Ratio: | 23% |
| CFL Off-Pk Op. Ratio: | 77% |
| Faucet Aerator On-Pk Op. Ratio: | 30% |
| Faucet Aerator Off-Pk Op. Ratio: | 70% |
| Night Light On-Pk Op. Ratio*: | 0% |
| Night Light Off-Pk Op. Ratio*: | 100% |
| Refrigerator Therm On-Pk Op. Ratio*: | 25% |
| Refrig Therm Off-Pk Op. Ratio*: | 75% |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| CFL 13 W Coincidence Factor: | 8% |
| Faucet Aerator Coincidence Factor: | 80% |
| LED Night Light Coincidence Factor: | 0% |
| Refrigerator Coincidence Factor: | 93% |

| OTHER FACTORS | |
|---|---|
| Line Loss Factor - Demand: | 9.5% |
| Line Loss Factor - Energy: | 9.5% |
| Capacity Reserve Margin: | 0% |
| Application | Retrofit |
| Cost Basis: | Full Install |

| | DEMAND/ ENERGY SAVINGS | | | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/ SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Type | Annual Energy Savings (kWh) | Non Coin Demand Savings (kW) | Coincident Demand Savings (KW) | On-pk Energy Savings (KWh) | Off-pk Energy Savings (kWh) | Gas Energy Savings (Therms) | IRP PV Benefit ($) | Societal PV Benefit ($) | Recommended Incentive*** ($) | Recommended Incentive*** %PV | PV Program Cost ($) | NPV ($) | Incr. Cost*** ($) | Cost Savings ($) | Payback wo/ Inc. (yrs) | Payback w/ Inc. (yrs) | Weighting Factors for Program Cost | (%) | BC Ratio |
| 2 CFLs (13 W) | 91 | 0.099 | 0.008 | 21 | 70 | N/A | 26 | 30 | 13 | 49% | 13 | 13 | 13 | 9 | 1.4 | 0.00 | 64% | 100% | 2.3 |
| 1 Bathroom Faucet Aerator | 11 | 0.002 | 0.002 | 3 | 7 | 3 | 22 | 27 | 1 | 7% | 1 | 21 | 1 | 1 | 1.4 | 0.00 | 7% | 100% | 18.2 |
| 1 LED Night Light | 32 | 0.007 | 0.000 | 0 | 32 | N/A | 17 | 22 | 4 | 27% | 4 | 12 | 4 | 3 | 1.4 | 0.00 | 22% | 100% | 5.0 |
| 1 Refrigerator Thermometer | 9 | 0.001 | 0.001 | 2 | 6 | N/A | 1 | 1 | 1 | 96% | 1 | 0 | 1 | 1 | 1.4 | 0.00 | 6% | 100% | 1.1 |
| Total Kit (Measure Level) | 142 | 0.109 | 0.011 | 26 | 115 | 3 | 67 | 81 | 20 | 30% | 20 | 47 | 20 | 14 | 1.4 | 0.00 | 100% | 100% | 4.0 |

* The ratios are our best engineering assumptions, pending detailed MER work.
**DEER 2008.
***Based on UES 2011 Program Planning.

File Name: SchoolEducation_MAS_Res_TEP_2011_01_03

# APPENDIX I:

## TEP COMBINED HEAT AND POWER PROGRAM

## Program Description

The Tucson Electric Power Company ("TEP") Distributed Generation Pilot Program ("DG Program") is a proposed Joint Utility Program to be implemented in cooperation with Southwest Gas Corporation ("Southwest Gas"). Distributed Generation ("DG") is defined as "the production of electricity on the customer's side of the meter, for use by the customer, through a process such as CHP."[1] CHP is defined as "combined heat and power, which is using a primary energy source to simultaneously produce electrical energy and useful heat."[2] TEP proposes this Program as a pilot to assist in developing methods and procedures for future joint utility programs with Southwest Gas or other utilities.

- TEP proposes to provide support for the existing Southwest Gas DG Program (Decision No. 69917 (December 27, 2007)) by sharing costs for marketing and outreach, training, and design. Specifically, TEP would pay up to 10% of the design costs for a CHP installation. This design assistance would only apply to installed projects.
- TEP will cooperate with Southwest Gas on marketing and outreach strategy to maximize marketing and outreach expenses.
- TEP proposes a 2011 budget of $74,800 for marketing and outreach, training, and design assistance for the Program.

## Program Objectives and Rationale

The primary goal of the Program is to provide support for the existing Southwest Gas DG Program, specifically for CHP projects. The market potential for CHP is substantial and could contribute significantly to energy conservation in Arizona, and could accrue significant societal and customer benefits as well. CHP is an affordable, clean, and reliable piece of the puzzle for meeting Arizona's energy needs and should be considered a key component to economic strategies.

## Target Market

In order for a CHP project to be cost effective a CHP unit must generate the right electrical and thermal loads to meet a specific facility's energy needs. A facility utilizing boilers may be able to offset the natural gas used to operate the boilers by using the waste heat generated by a CHP unit. Typical facilities that are excellent candidates for a CHP application include:

- Hospitals with central boilers
- Hotels and apartment buildings with central boilers
- Manufacturing or processing facilities with central boilers or process heat needs
- Universities and colleges with central boilers for heating or domestic hot water

The program will focus on large commercial and industrial customers with the potential to utilize CHP applications.

## Program Eligibility

Customers must receive electric service from TEP and natural gas service from Southwest Gas to be eligible for participation. To qualify for rebates, customers must complete a preliminary feasibility study. The preliminary feasibility study is necessary to identify those customers that are good candidates for a

[1] Arizona Administrative Code R14-2-2401
[2] ibid

CHP system. To help customers obtain the preliminary feasibility study, Southwest Gas and TEP will be working with the U.S. Department of Energy Intermountain Clean Energy Application Center, which offers the studies at no cost.

## Products and Services

TEP will provide joint marketing and outreach in cooperation with Southwest Gas. In addition TEP will pay up to 10% of design costs for installed CHP projects, and will also provide engineering expertise for interconnection design.

## Delivery Strategy, Incentive Processing, and Administration

Program delivery, incentives and administration will be provided by Southwest Gas through its DG Program. TEP will assist with marketing and outreach, design assistance, and interconnection design expertise. TEP will assign an in-house program manager to coordinate joint Program delivery with Southwest Gas.

## Program Marketing and Communication Strategy

The marketing and communications strategy will be primarily designed by Southwest Gas through its existing DG Program. TEP will coordinate and assist with marketing and outreach as needed.

## Program Implementation Schedule

The Program will be implemented immediately upon Arizona Corporation Commission approval.

## Quality Assurance and Control

Quality assurance will be provided by Southwest Gas as part of its DG Program.

## Measurement, Evaluation and Research

Measurement, evaluation and research will be provided by Southwest Gas as part of its DG Program.

## Program Costs and Benefits

**Table 1-1. Measure Savings, Incentive Level, and Participation, Benefit-Cost**

| Measure | Annual Energy Savings (kWh) /Unit | Peak Demand Savings (kW)/ Unit | Avg. Incentive / Unit | 2011 Units | 2012 Units | Measure Level Societal Test Result |
|---|---|---|---|---|---|---|
| Combined Heat and Power | 7,200,000 | 900 | $0/facility | 1 | 1 | 8.53 |

**Table 1-2. Program Budgets**

| | Incentives | Program Delivery | Program Marketing | Utility Program Administration | Evaluation | Total Program Cost | Lifetime Net Benefits ($) | Program Level Societal Cost Test |
|---|---|---|---|---|---|---|---|---|
| **2011** | $0 | $68,000 | $6,800 | $0 | $0 | $74,800 | $7,719,904 | 8.0 |
| **2012** | $0 | $53,133 | $5,313 | $17,510 | $0 | $75,956 | $7,718,749 | 7.9 |

**Table 1-3. Environmental Benefits**

| | Annual CO2 Savings (Metric Tons) | Annual NOx Savings (Metric Tons) | Annual SOx Savings (Metric Tons) | Lifetime CO2 Savings (Metric Tons) | Lifetime NOx Savings (Metric Tons) | Lifetime SOx Savings (Metric Tons) |
|---|---|---|---|---|---|---|
| **2011** | 7,055 | 9.52 | 8.26 | 141,095 | 190 | 165 |
| **2012** | 7,055 | 9.52 | 8.26 | 141,095 | 190 | 165 |

## Measure Analysis Sheets

Incentive Calculations
CHP

**Combined Heat & Power**

| PROGRAM DATA | |
|---|---|
| Measure Life (yrs)**: | 20 |
| Program Life (yrs): | 5 |
| Demand AC ($/kW): | 113.36 |
| Summer On-pk Energy AC ($/kWh): | 0.10 |
| Summer Off-pk Energy AC ($/kWh): | 0.06 |
| Winter On-pk Energy AC ($/kWh): | 0.07 |
| Winter Off-pk Energy AC ($/kWh): | 0.05 |
| Program Administrative Costs ($/unit): | 0 |
| IRP Discount Rate: | 8.03% |
| Social Discount Rate | 4.00% |
| NTG Ratio: | 100% |

| RATE DATA | |
|---|---|
| Res Ave | |
| $/kW: | 0.00 |
| $/kWh, On-Peak: | 0.10 |
| $/kWh, Off-Peak: | 0.10 |

| OPERATING DATA** | |
|---|---|
| Op Hours: | 8,760 |
| Summer Ratio: | 50% |
| Winter Ratio: | 50% |
| Coincidence Factor: | 100% |

| OTHER FACTORS | |
|---|---|
| Line Loss Energy Factor: | 9.5% |
| Line Loss Demand Factor: | 9.5% |
| Capacity Reserve Factor: | 0.0% |
| Application | RET |
| Cost Basis: | Full Installed |

| | DEMAND/ENERGY SAVINGS | | | | INCENTIVE CALCULATIONS | | | | | | CUSTOMER COST/SAVINGS | | | | WGT. | % Incent | Societal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure Type | Non-Coincident Demand Savings** (KW) | Coincident Demand Savings (kW) | OnPeak Energy Savings** (kWh) | Off Peak Energy Savings** (kWh) | IRP PV Benefit ($) | Social PV Benefit ($) | Recommended Incentive* ($) | Recommended Incentive* % PV | PV Program Cost ($) | NPV ($) | Incr. Cost** ($) | Cost Savings ($) | Payback w o/Inc. (yrs) | Payback w/Inc. (yrs) | Weighting Factor** | (%) | BC Ratio |
| Per Customer | 900.00 | 900.00 | 2,303,240 | 4,896,760 | 6,307,244 | 8,750,016 | 0 | 0% | 1,035,000 | 5,272,244 | 1,035,000 | 716,696 | 1.4 | 1.4 | 100% | 0% | 8.5 |
| Weighted Average | 900.00 | 900.00 | 2,303,240 | 4,896,760 | 6,307,244 | 8,750,016 | 0 | 0% | 1,035,000 | 5,272,244 | 1,035,000 | 716,696 | 1.4 | 1.4 | 100% | 0% | 8.5 |

*Incentive based on 2011 UES Program Planning.
**Demand Savings, OnPk Off Pk Energy Savings, Operating Data, Weighting Factors, Incremental Costs, and Measure Life based on engineering assumptions based on past program data and program planning.

File Name: CombinedHP_MAS_CI_TEP_2011_01_11

# APPENDIX J:

# MEASURE APPENDIX

# TEP Measure Appendix - Appendix J

**This information has been provided to ACC Staff via electronic copy on a separate excel file and is available upon request to interested parties.**

| Sector | Existing/ New Measure | Program Name | RET/ ROB/ NC | End Use | Measure Name | Unit Basis | Baseline Practice Description | Efficient Practice Description | 2013 Participation Units | 2013 Participation Units | Expected Life (years) | Energy and Demand Savings per Unit: Net Annual Energy Demand Saved (kWh) | Coincident Peak Demand Saved (kW) | On Peak kWh | Off Peak kWh | Total Incremental Cost per unit | Program Incentive as percent | Incentive as % of Inc. Cost | Measure Level Societal Cost Effectiveness (only includes Incremental Costs, no program Costs): Societal Benefits | Societal Costs | Net Present Benefits | Societal Cost /kW | Measure level societal CO2 savings lifetime (tons) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commercial | Existing | C&I Comprehensive Program | RET | Whole Bui | Custom Measures | per customer | no action | custom actions | 70 | 80 | 10 | 3.73 | 2.98 | 16,337 | 16,337 | $6,595 | $4,901 | 75% | $20,629 | $6,595 | $14,094 | 3.16 | 28.97 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 14 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 14 | 4 | 4 | 15 | 0.23 | 0.21 | 194 | 294 | $440 | $200 | 45% | $678 | $440 | $238 | 1.54 | 0.43 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 14 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 14 | 7 | 7 | 15 | 0.26 | 0.25 | 304 | 460 | $440 | $200 | 45% | $923 | $440 | $482 | 2.10 | 0.68 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 15 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 15 | 11 | 11 | 15 | 0.12 | 0.11 | 363 | 550 | $880 | $275 | 31% | $921 | $880 | $41 | 1.05 | 0.81 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 15 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 15 | 4 | 4 | 15 | 0.33 | 0.31 | 607 | 919 | $880 | $275 | 31% | $1,626 | $880 | $746 | 1.85 | 1.35 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 16 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 16 | 11 | 11 | 15 | 0.50 | 0.28 | 510 | 772 | $1,321 | $350 | 27% | $1,446 | $1,321 | $125 | 1.09 | 1.14 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 16 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 16 | - | - | 15 | 0.30 | 0.28 | 847 | 1,282 | $1,321 | $350 | 27% | $2,084 | $1,321 | $763 | 1.58 | 1.89 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 17 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 17 | - | - | 15 | 0.50 | 0.28 | 640 | 970 | $1,761 | $425 | 24% | $1,729 | $1,761 | -$32 | 0.98 | 1.43 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 17 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 17 | 4 | 4 | 15 | 0.23 | 0.21 | 1,004 | 1,611 | $1,761 | $425 | 24% | $2,453 | $1,761 | $693 | 1.39 | 2.37 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 18 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 18 | - | - | 15 | 0.62 | 0.58 | 756 | 1,145 | $2,201 | $500 | 23% | $2,339 | $2,201 | $138 | 1.06 | 1.69 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | 18 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 18 | - | - | 15 | 0.40 | 0.38 | 1,287 | 1,949 | $2,201 | $500 | 23% | $3,107 | $2,201 | $906 | 1.41 | 2.87 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | Air Cooled Chillers - 150 tons | Per ton | 1.28 kW ton | 1.12 kW ton | 400 | 400 | 20 | 0.13 | 0.12 | 66 | 100 | $141 | $50 | 35% | $391 | $141 | $250 | 2.77 | 0.15 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | Air Cooled Chillers - 150 tons | Per ton | 1.28 kW ton | 1.12 kW ton | 525 | 525 | 20 | 0.13 | 0.12 | 68 | 102 | $413 | $66 | 89% | $397 | $113 | $284 | 3.52 | 0.15 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | Air Cooled Chillers - 150 tons | Per ton | 1.28 kW ton | 1.12 kW ton | 525 | 525 | 20 | 0.13 | 0.12 | 68 | 102 | $413 | $66 | 89% | $397 | $113 | $284 | 3.52 | 0.15 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | EER Rated Packaged AC (> 20tons ,10.9 EER) | Per Unit | 9.5 EER | 10.8 EER | 11 | 11 | 15 | 3.67 | 3.45 | 2,688 | 4,070 | $3,789 | $2,800 | 74% | $9,969 | $3,789 | $6,180 | 2.63 | 5.99 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | EER Rated Packaged AC (11.5 - 20 tons ,11.24 EER) | Per Unit | 9.3 EER | 11.1 EER | 14 | 15 | 15 | 3.41 | 3.20 | 2,498 | 3,784 | $1,888 | $850 | 46% | $9,267 | $1,888 | $7,379 | 4.91 | 5.57 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | EER Rated Packaged AC (5.4 - 11.25 tons ,11.36 EER) | Per Unit | 10 EER | 11.6 EER | 42 | 42 | 15 | 1.48 | 1.39 | 1,081 | 1,637 | $1,005 | $481 | 48% | $4,009 | $1,003 | $3,006 | 4.00 | 2.41 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | EER Rated Packaged HP (5.4 - 11.25 tons ,11.36 EER) | Per Unit | 9.5 EER | 10.8 EER | 4 | 4 | 15 | 3.67 | 3.45 | 3,391 | 5,135 | $5,304 | $3,000 | 74% | $11,256 | $5,304 | $5,952 | 2.12 | 7.56 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | EER Rated Packaged HP (> 20 tons ,11.11 EER) | Per Unit | 9.3 EER | 11.1 EER | - | 1 | 15 | 3.41 | 3.20 | 2,944 | 4,458 | $1,888 | $625 | 33% | $10,025 | $1,888 | $8,137 | 5.31 | 6.56 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | EER Rated Packaged HP (5.4 - 11.25 tons ,11.36 EER) | Per Unit | 10 EER | 11.6 EER | 6 | 6 | 15 | 1.48 | 1.39 | 1,320 | 1,999 | $1,005 | $625 | 62% | $4,434 | $1,005 | $3,431 | 4.42 | 2.94 |
| Commercial | Existing | C&I Comprehensive Program | RET | HVAC | Programmable Thermostats | Per Unit | non-programmable | programmable | 98 | 95 | 11 | 0.00 | 0.00 | - | 4,096 | $204 | $50 | 24% | $1,984 | $204 | $1,780 | 9.70 | 3.63 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | Variable Speed Screw Compressor | PerHp | single stage modulating | 1 or 2 stage variable speed | - | - | 15 | 0.10 | 0.10 | 109 | 159 | $262 | $50 | 19% | $336 | $262 | $74 | 1.28 | 0.24 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | Water Cooled Chillers - 200 tons | Per ton | 0.75 kW Ton | 0.60 kW Ton | - | 600 | 20 | 0.15 | 0.14 | 104 | 158 | $145 | $45 | 31% | $526 | $146 | $380 | 3.67 | 0.25 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | Water Cooled Chillers - 400 tons | Per ton | 0.64 kW Ton | 0.50 kW Ton | 5,000 | 6,000 | 20 | 0.11 | 0.11 | 79 | 119 | $77 | $35 | 45% | $405 | $77 | $328 | 5.26 | 0.18 |
| Commercial | Existing | C&I Comprehensive Program | ROB | HVAC | Water Cooled Chillers 201 - 400 tons | Per ton | 0.72 kW Ton | 0.52 kW Ton | 1,000 | 1,500 | 20 | 0.16 | 0.15 | 113 | 172 | $107 | $48 | 45% | $584 | $107 | $477 | 5.46 | 0.25 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | Daylighting controls | Per kW base load | no controls | daylighting controls | - | 5 | 15 | 0.65 | 0.60 | 885 | 940 | $751 | $120 | 16% | $2,238 | $751 | $1,487 | 2.98 | 1.62 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | Delamping | Per fixture | T8s and T12s | Remove T8s and T12s | 6,500 | 8,000 | 15 | 0.09 | 0.08 | 129 | 137 | $6 | $6 | 100% | $320 | $6 | $313 | 50.26 | 0.24 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | Energy efficient exit signs | Per fixture | Incandescent CFL sign | LED sign | 1,500 | 2,000 | 16 | 0.06 | 0.06 | 324 | 345 | $55 | $25 | 45% | $670 | $55 | $615 | 12.15 | 0.59 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | HIDs to T8 T5 | Per Fixture | 400W Metal Halide | 320 W T5 T8s | 1,072 | 2,000 | 18 | 0.23 | 0.21 | 230 | 777 | $96 | $75 | 78% | $1,201 | $96 | $1,105 | 12.51 | 0.89 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | Integral Screw In CFL | Per Bulb | 29.3 W Incandescent bulb | 19.1 W CFL | 4,600 | 6,000 | 2 | 0.07 | 0.07 | 97 | 103 | $11 | $2 | 17% | $27 | $11 | $16 | 2.53 | 0.18 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | Occupancy sensors | Per sensor | no sensors | occupancy sensors | 840 | 840 | 12 | 0.06 | 0.05 | 207 | 234 | $98 | $50 | 51% | $342 | $98 | $244 | 3.49 | 0.39 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | Screw in cold cathode CFL | Per Bulb | 30 W Incandescent bulb | 6W CFL | 200 | 200 | 6 | 0.04 | 0.00 | 44 | 150 | $12 | $4 | 26% | $87 | $12 | $45 | 4.65 | 0.17 |
| Commercial | Existing | C&I Comprehensive Program | RET | Lighting | Standard T8 Lighting | Per Fixture | T12 Lamps | Standard T8 Lamps | 6,000 | 6,000 | 6 | 0.03 | 0.02 | 35 | 57 | $37 | $111 | 40% | $395 | $37 | $58 | 1.28 | 0.06 |
| Commercial | Existing | C&I Comprehensive Program | ROB | Motors | Energy efficient ODP motors | per HP | 91.7 % effy | 93.2% effy | 195 | 98 | 15 | 0.01 | 0.01 | 34 | 36 | $12 | $3 | 25% | $74 | $12 | $62 | 6.39 | 0.06 |
| Commercial | Existing | C&I Comprehensive Program | ROB | Motors | Energy Efficient TEFC Motors | per HP | 91.7 % effy | 93.2% effy | 225 | 115 | 15 | 0.01 | 0.01 | 27 | 29 | $33 | $3 | 7% | $58 | $33 | $25 | 1.75 | 0.05 |
| Commercial | Existing | C&I Comprehensive Program | RET | Motors | Variable Speed Drives | per HP | no VSD | VSD | 2,500 | 3,500 | 15 | 0.00 | 0.00 | 1,110 | 1,202 | $377 | $100 | 27% | $1,926 | $377 | $1,549 | 5.11 | 2.05 |
| Commercial | Existing | C&I Comprehensive Program | RET | Refrigerat | Anti sweat heater controls | Per Door | no controls | antisweat controls | 800 | 898 | 12 | 0.06 | 0.06 | 85 | 247 | $189 | $130 | 69% | $255 | $189 | $66 | 1.35 | 0.29 |
| Commercial | Existing | C&I Comprehensive Program | RET | Refrigerat | High Efficiency Evaporator Fan Motors | Per Unit | shaded pole muter | PCS or EC motor | 884 | 885 | 15 | 0.32 | 0.32 | 730 | 2,110 | $156 | $40 | 26% | $2,538 | $156 | $2,382 | 16.27 | 2.52 |
| Commercial | Existing | C&I Comprehensive Program | ROB | Refrigerat | High Efficiency Ice Makers | Per Unit | Standard Ice-maker | ACEEE Tier 2 | 6 | 6 | 12 | 0.12 | 0.12 | 269 | 779 | $549 | $50 | 9% | $740 | $549 | $191 | 1.35 | 0.93 |
| Commercial | Existing | C&I Comprehensive Program | ROB | Refrigerat | High Efficiency Reach-in Refrigerators and Freezers | Per Unit | standard reach-in | EnergyStar Reach-in | 4 | 4 | 15 | 0.20 | 0.19 | 265 | 766 | $183 | $125 | 68% | $1,013 | $183 | $830 | 5.53 | 0.91 |
| Commercial | Existing | C&I Comprehensive Program | RET | Refrigerat | Strip Curtains and Night Covers | Per linear feet | No curtains covers | Curtains and Covers | 781 | 781 | 4 | 0.01 | 0.01 | 84 | 331 | $58 | $10 | 22% | $81 | $58 | $43 | 2.15 | 0.37 |
| Commercial | Existing | Commercial New Construction | NC | HVAC | EER Rated Packaged AC (> 20tons ,10.9 EER) | Per Unit | 9.5 EER | 10.8 EER | 4 | 4 | 15 | 3.67 | 3.45 | 2,688 | 4,070 | $3,789 | $2,800 | 74% | $9,969 | $3,789 | $6,180 | 2.63 | 5.99 |
| Commercial | Existing | C&I Comprehensive Program | NC | HVAC | EER Rated Packaged AC (11.5 - 20 tons ,11.24 EER) | Per Unit | 9.3 EER | 11.1 EER | 8 | 8 | 15 | 3.41 | 3.20 | 2,498 | 3,784 | $1,888 | $859 | 46% | $9,267 | $1,888 | $7,379 | 4.91 | 5.57 |
| Commercial | Existing | Commercial New Construction | NC | HVAC | EER Rated Packaged AC (5.4 - 11.25 tons ,11.36 EER) | Per Unit | 10.0 EER | 11.6 EER | 8 | 8 | 15 | 1.48 | 1.39 | 1,081 | 1,637 | $1,003 | $481 | 48% | $4,009 | $1,003 | $3,006 | 4.00 | 2.41 |
| Commercial | Existing | Commercial New Construction | NC | HVAC | EER Rated Packaged AC (5.4 - 11.25 tons ,11.36 EER) | Per Unit | 10.0 EER | 11.6 EER | 8 | 8 | 15 | 1.48 | 1.39 | 1,081 | 1,637 | $1,003 | $481 | 48% | $4,009 | $1,003 | $3,006 | 4.00 | 2.41 |
| Commercial | Existing | Commercial New Construction | NC | HVAC | Performance Rebates From NC Design Assistance | Per Customer | Baseline Building Design | 20% savings over baseline | 11 | 11 | 20 | 17.81 | 17.81 | 46,800 | 109,200 | $20,800 | $15,600 | 75% | $187,102 | $20,800 | $166,302 | 9.00 | 138.33 |
| Commercial | Existing | Small Business Direct Install | RET | HVAC | Programmable Thermostats | Per Unit | non-programmable | programmable | 400 | 500 | 11 | 0.00 | 0.00 | - | 4,096 | $204 | $150 | 73% | $1,984 | $204 | $1,780 | 9.70 | 3.63 |
| Commercial | Existing | Small Business Direct Install | ROB | HVAC | 14 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 14 | 75 | 75 | 15 | 0.23 | 0.21 | 194 | 294 | $271 | $226 | 83% | $678 | $271 | $407 | 2.50 | 0.43 |
| Commercial | Existing | Small Business Direct Install | ROB | HVAC | 14 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 14 | 75 | 75 | 15 | 0.26 | 0.25 | 304 | 460 | $353 | $226 | 64% | $923 | $353 | $569 | 2.77 | 0.68 |
| Commercial | Existing | Small Business Direct Install | ROB | HVAC | 15 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 15 | 75 | 75 | 15 | 0.12 | 0.11 | 363 | 550 | $542 | $453 | 83% | $921 | $542 | $379 | 1.70 | 0.81 |
| Commercial | Existing | Small Business Direct Install | ROB | HVAC | 15 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 15 | 75 | 75 | 15 | 0.33 | 0.31 | 607 | 919 | $660 | $453 | 68% | $1,626 | $660 | $966 | 2.44 | 1.35 |
| Commercial | Existing | Small Business Direct Install | ROB | HVAC | 16 SEER Packaged and Split AC's | Per Unit | SEER 13 | SEER 16 | 75 | 75 | 15 | 0.50 | 0.28 | 510 | 772 | $773 | $453 | 71% | $1,446 | $813 | $633 | 1.78 | 1.14 |
| Commercial | Existing | Small Business Direct Install | ROB | HVAC | 16 SEER Packaged and Split HP's | Per Unit | SEER 13 | SEER 16 | 75 | 75 | 15 | 0.30 | 0.28 | 847 | 1,282 | $998 | $858 | 58% | $2,084 | $998 | $1,086 | 2.09 | 1.89 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Daylighting controls | Per kW base load | no controls | daylighting controls | - | 5 | 15 | 0.65 | 0.60 | 885 | 940 | $751 | $120 | 16% | $2,238 | $751 | $1,487 | 2.98 | 1.62 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Delamping | Per fixture | T8s and T12s | Remove T8s and T12s | 1,188 | 5,188 | 15 | 0.09 | 0.08 | 129 | 137 | $6 | $6 | 100% | $320 | $6 | $313 | 50.26 | 0.24 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Energy efficient exit signs | Per fixture | Incandescent CFL sign | LED sign | 1,264 | 1,264 | 16 | 0.06 | 0.06 | 324 | 345 | $55 | $25 | 45% | $670 | $55 | $615 | 12.15 | 0.59 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Hard Wire CFL | Per Bulb | 73.4 W Incandescent bulb | 16.6 W CFL | 8,000 | 12,000 | 2 | 0.07 | 0.06 | 171 | 182 | $16 | $16 | 100% | $42 | $16 | $26 | 2.69 | 0.31 |
| Commercial | Existing | Small Business Direct Install | ROB | HVAC | HIDs to T8 T5 | Per Fixture | 400W Metal Halide | 320 W T5 T8s | 2,904 | 2,904 | 18 | 0.23 | 0.21 | 230 | 777 | $96 | $75 | 78% | $1,201 | $96 | $1,105 | 12.51 | 0.89 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Integral Screw In CFL | Per Bulb | 29.3 W Incandescent bulb | 19.1 W CFL | 8,100 | 14,100 | 2 | 0.07 | 0.07 | 97 | 103 | $11 | $10 | 89% | $27 | $11 | $16 | 2.58 | 0.18 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Occupancy sensors | Per sensor | no sensors | occupancy sensors | 540 | 540 | 12 | 0.06 | 0.05 | 207 | 234 | $98 | $66 | 68% | $342 | $98 | $244 | 3.49 | 0.39 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Screw in cold cathode CFL | Per Bulb | 30 W Incandescent bulb | 6W CFL | - | - | 6 | 0.04 | 0.00 | 44 | 150 | $12 | $12 | 94% | $57 | $12 | $45 | 4.65 | 0.17 |
| Commercial | Existing | Small Business Direct Install | RET | Lighting | Standard T8 Lighting | Per Fixture | T12 Lamps | Standard T8 Lamps | 10,000 | 10,000 | 6 | 0.03 | 0.02 | 35 | 57 | $37 | $6 | 60% | $395 | $37 | $58 | 1.28 | 0.06 |
| Commercial | Existing | Small Business Direct Install | RET | Motors | Variable Speed Drives | per HP | no VSD | VSD | 170 | 171 | 15 | 0.00 | 0.00 | 1,110 | 1,202 | $377 | $100 | 27% | $1,926 | $377 | $1,549 | 5.11 | 2.05 |
| Commercial | Existing | Small Business Direct Install | RET | Refrigerat | Anti sweat heater controls | Per Door | no controls | antisweat controls | 300 | 300 | 12 | 0.06 | 0.06 | 85 | 247 | $189 | $130 | 69% | $255 | $189 | $66 | 1.35 | 0.29 |
| Commercial | Existing | Small Business Direct Install | RET | Refrigerat | Strip Curtains and Night Covers | Per linear feet | No curtains covers | Curtains and Covers | 225 | 225 | 4 | 0.01 | 0.01 | 84 | 331 | $58 | $15 | 40% | $81 | $58 | $43 | 2.15 | 0.37 |
| Commercial | Existing | Bid for Efficiency - Pilot | RET | Whole Bui | Bid for Efficiency | per customer | baseline building | Bid for efficiency | 4 | 6 | 10 | 45.66 | 36.53 | 200,000 | 200,000 | $80,000 | $60,000 | 75% | $252,541 | $80,000 | $172,541 | 3.16 | 351.70 |
| Commercial | New | Commercial Direct Load Control | RET | Whole Bui | Direct Load Control for Large Commercial | per MW savings | no action | load control measures | 20 | 40 | 5 | 1000.00 | 1000.00 | 4,380,000 | - | $0 | $0 | #DIV/0! | $581,200 | $0 | $581,200 | #DIV/0! | 3,883.92 |
| Commercial | New | C&I Comprehensive Program | ROB | Hot Water | Heat Pump Water Heaters - Tier 1 | Per Unit | EF = .86 | EF = .86 | 4 | 4 | 13 | 3.10 | 3.01 | 2,575 | 4,915 | $1,910 | $800 | 42% | $8,185 | $1,910 | $6,275 | 4.28 | 6.64 |
| Commercial | New | C&I Comprehensive Program | ROB | Hot Water | Heat Pump Water Heaters - Tier 2 | Per Unit | EF = .86 | EF = 2.51 | - | - | 13 | 3.21 | 3.12 | 2,667 | 5,096 | $2,777 | $0 | 0% | $8,684 | $2,777 | $5,907 | 3.06 | 6.88 |
| Commercial | New | C&I Comprehensive Program | RET | HVAC | CO Sensors | Per Sensor | no sensors | sensors | 4 | 4 | 8 | 5.82 | 2.50 | 13,876 | 15,876 | $2,500 | $250 | 13% | $15,860 | $2,000 | $11,860 | 6.93 | 24.61 |
| Commercial | New | C&I Comprehensive Program | RET | HVAC | CO2 Sensors | Per Sensor | no sensors | sensors | 4 | 4 | 15 | 1.81 | 1.70 | 960 | 454 | $950 | $200 | 21% | $8,454 | $950 | $2,479 | 3.60 | 1.26 |
| Commercial | New | C&I Comprehensive Program | RET | HVAC | Cooling Tower Subcooling | Per Ton | no subcooling | subcooling | 700 | 700 | 15 | 0.48 | 0.45 | 585 | 585 | $828 | $200 | 24% | $1,309 | $828 | $481 | 1.58 | 0.79 |
| Commercial | New | C&I Comprehensive Program | RET | HVAC | Economizers | Per Ton | no economizer | use of economizers | 40 | 40 | 15 | 0.00 | 0.00 | 92 | 139 | $60 | $40 | 50% | $200 | $80 | $120 | 2.81 | 0.21 |
| Commercial | New | C&I Comprehensive Program | ROB | HVAC | High Perf Glazing | Per sq ft | standard window glazing | SHGC = .27 | 1,750 | 1,750 | 20 | 0.00 | 0.00 | 1 | 1 | $2 | $1 | 26% | $4 | $2 | $2 | 2.08 | 0.00 |
| Commercial | New | C&I Comprehensive Program | ROB | HVAC | PTAC PTHP | Per kBtu h | 10 EER | 11 EER | 1,000 | 1,000 | 15 | 0.01 | 0.01 | 10 | 15 | $11 | $4 | 36% | $31 | $11 | $20 | 2.79 | 0.02 |
| Commercial | New | C&I Comprehensive Program | RET | HVAC | Shade Screens | Per Sq Ft | no screens | shading coeff: 0.24 | 1,000 | 1,000 | 10 | 0.00 | 0.00 | 11 | 5 | $4 | $2 | 48% | $14 | $4 | $9 | 3.29 | 0.01 |
| Commercial | New | C&I Comprehensive Program | RET | HVAC | Window Films | Per Sq Ft | no film | shading coeff: 0.578 | 2,000 | 2,000 | 15 | 0.00 | 0.00 | 5 | 2 | $3 | $2 | 76% | $12 | $3 | $9 | 4.51 | 0.01 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | EMS - Lighting Schedule | Per connected W | No EMS | use of EMS | 8,000 | 8,000 | 15 | 0.00 | 0.00 | 0 | 1 | $1 | $1 | 35% | $1 | $1 | $0 | 0.99 | 0.00 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | Induction Lighting | Per Lamp | 250 W Metal Halide | 96 W induction lamp | 150 | 150 | 18 | 0.16 | 0.15 | 218 | 253 | $196 | $140 | 71% | $660 | $196 | $464 | 5.37 | 0.40 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | LED Channel Signs | Per Linear Ft | 6W R Neon | 1.2 W/ft LED | 1,750 | 1,750 | 10 | 0.00 | 0.00 | 4 | 21 | $140 | $84 | 74% | $144 | $140 | $4 | 1.35 | 0.02 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | LED Pedestrian Signals | Per Signal | 69 W incand | 6 W LED | 150 | 150 | 5 | 0.06 | 0.06 | 164 | 328 | $134 | $75 | 56% | $146 | $134 | $11 | 1.08 | 0.84 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | LED Traffic Lights | Per Lamp | 150 W Incandescent | 8 W LED | 150 | 150 | 7 | 0.04 | 0.04 | 131 | 261 | $271 | $50 | 71% | $161 | $71 | $90 | 2.28 | 0.55 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | LED Street and Parking Lights | Per Lamp | 250 W Metal Halide | 33 W LED | - | - | 11 | 0.22 | 0.00 | 217 | 734 | $800 | $75 | 9% | $524 | $800 | -$276 | 0.66 | 0.84 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | Outdoor CFL | Per Lamp | 142 W incand | 27 W CFL | 150 | 158 | 5 | 0.09 | 0.00 | 87 | 295 | $9 | $2 | 20% | $93 | $9 | $84 | 10.78 | 0.34 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | T8 to T8 | Per Lamp | standard T8 | premium T8 | 150 | 150 | 15 | 0.01 | 0.01 | 11 | 11 | $20 | $8 | 40% | $28 | $20 | $7 | 1.36 | 0.02 |
| Commercial | New | C&I Comprehensive Program | RET | Lighting | Premium T8 Lighting | Per Fixture | T12 Lamps | Premium T8 Lamps | 24,000 | 24,000 | 10 | 0.07 | 0.06 | 74 | 79 | $59 | $23 | 40% | $130 | $59 | $72 | 2.22 | 0.14 |
| Commercial | New | C&I Comprehensive Program | ROB | Motors | Green Motor Rewind | Per HP | 94.7% effy | 95.2% Effy | 6 | 6 | 5 | 0.00 | 0.00 | 9 | 9 | $3 | $1 | 41% | $6 | $3 | $3 | 1.95 | 0.02 |
| Commercial | New | C&I Comprehensive Program | RET | Plug Load | Beverage Ctrls ("vending miser") | Per Sensor | no controls | occupancy sensors | 20 | 20 | 12 | 0.15 | 0.15 | 414 | 1,196 | $199 | $75 | 38% | $1,112 | $199 | $912 | 5.58 | 1.43 |
| Commercial | New | C&I Comprehensive Program | RET | Plug Load | Snack Ctrls ("vending miser") | Per Sensor | no controls | occupancy sensors | 35 | 35 | 12 | 0.03 | 0.03 | 83 | 239 | $108 | $75 | 73% | $222 | $108 | $128 | 2.17 | 0.29 |
| Commercial | New | C&I Comprehensive Program | ROB | Refrigerat | Efficient Compressors | Per Ton | 1.85 COP | 2.3 COP | 20 | 20 | 15 | 0.35 | 0.25 | 495 | 1,427 | $247 | $80 | 32% | $1,722 | $247 | $1,475 | 6.97 | 1.70 |
| Commercial | New | C&I Comprehensive Program | ROB | Refrigerat | Efficient Condensers | Per Ton | no condensers | use of condensers | 20 | 20 | 10 | 0.03 | 0.03 | 67 | 194 | $39 | $20 | 51% | $153 | $39 | $114 | 3.89 | 0.23 |
| Commercial | New | C&I Comprehensive Program | RET | Refrigerat | Floating Head Pressure Controls | Per Ton | no controls | Floating Head Pressure Controls | 20 | 20 | 15 | 0.21 | 0.21 | 472 | 1,366 | $93 | $20 | 22% | $1,043 | $93 | $1,550 | 17.68 | 1.63 |
| Commercial | New | C&I Comprehensive Program | RET | Refrigerat | Refrigerated Display Automatic Door Closers | Per Door | standard doors | Automatic Door Closers | 10 | 10 | 5 | 0.49 | 0.39 | 908 | 2,627 | $142 | $40 | 28% | $1,012 | $142 | $870 | 7.13 | 3.13 |
| Commercial | New | C&I Comprehensive Program | RET | Refrigerat | Refrigerated Display Gaskets | Per Linear Ft | no action | Replace Gaskets | 100 | 100 | 3 | 0.01 | 0.01 | 27 | 77 | $12 | $4 | 38% | $17 | $12 | $5 | 1.47 | 0.09 |
| Commercial | New | C&I Comprehensive Program | ROB | Washing | Coin Operated Washers - Advanced (Proposed) | Per Machine | 1.26 MEF | 2.6 MEF | - | - | 11 | 0.08 | 0.09 | 295 | 424 | $837 | $0 | 0% | $681 | $837 | $141 | 1.27 | 0.66 |
| Commercial | New | C&I Comprehensive Program | ROB | Washing | Coin Operated Washers - Tier 1 (Existing) | Per Machine | 1.26 MEF | 1.8 MEF | 21 | 21 | 11 | 0.05 | 0.05 | 149 | 247 | $346 | $250 | 73% | $443 | $346 | $98 | 1.27 | 0.35 |
| Commercial | New | C&I Comprehensive Program | ROB | Washing | Coin Operated Washers - Tier 1 (Proposed) | Per Machine | 1.26 MEF | 2 MEF | - | - | 11 | 0.06 | 0.07 | 183 | 305 | $211 | $0 | 0% | $461 | $211 | $250 | 2.18 | 0.43 |
| Commercial | New | C&I Comprehensive Program | ROB | Washing | Coin Operated Washers - Tier 2 (Existing) | Per Machine | 1.26 MEF | 2 MEF | 21 | 21 | 11 | 0.06 | 0.07 | 183 | 305 | $419 | $250 | 60% | $858 | $419 | $439 | 1.33 | 0.43 |
| Commercial | New | C&I Comprehensive Program | ROB | Washing | Coin Operated Washers - Tier 2 (Proposed) | Per Machine | 1.26 MEF | 2.2 MEF | - | - | 11 | 0.06 | 0.08 | 212 | 352 | $326 | $0 | 0% | $566 | $326 | $240 | 1.75 | 0.50 |
| Commercial | New | C&I Comprehensive Program | ROB | Washing | Coin Operated Washers - Tier 3 (Existing) | Per Machine | 1.26 MEF | 2.2 MEF | - | - | 11 | 0.06 | 0.08 | 212 | 352 | $492 | $0 | 0% | $662 | $492 | $171 | 1.35 | 0.50 |
| Commercial | New | C&I Comprehensive Program | ROB | Washing | Coin Operated Washers - Tier 3 (Proposed) | Per Machine | 1.26 MEF | 2.4 MEF | - | - | 11 | 0.07 | 0.09 | 235 | 391 | $307 | $0 | 0% | $627 | $307 | $320 | 2.04 | 0.56 |
| Commercial | New | C&I Comprehensive Program | RET | Plug Load | Advanced Power Strips - Occupancy Sensors | Per Sensor | standard strips | Smart Strips - Occupancy Sensors | - | - | 12 | 0.04 | 0.04 | 65 | 105 | $90 | $10 | 11% | $143 | $90 | $55 | 1.61 | 0.15 |
| Commercial | New | C&I Comprehensive Program | RET | Plug Load | Advanced Power Strips - Timer Plug Strip | Per Sensor | standard strips | Smart Strips - Timer Plug Strip | - | - | 12 | 0.05 | 0.05 | 81 | 132 | $19 | $10 | 53% | $175 | $19 | $156 | 9.22 | 0.19 |
| Commercial | New | C&I Comprehensive Program | RET | Plug Load | Advanced Power Strips - Load Sensor | Per Sensor | standard strips | Smart Strips - Load Sensor | - | - | 12 | 0.03 | 0.03 | 45 | 73 | $32 | $10 | 31% | $98 | $32 | $66 | 3.07 | 0.10 |
| Commercial | New | Commercial New Construction | ROB | HVAC | High Perf Glazing | Per sq ft | standard window glazing | SHGC = .27 | - | - | 20 | 0.00 | 0.00 | 1 | 1 | $2 | $1 | 26% | $4 | $2 | $2 | 2.08 | 0.00 |
| Commercial | New | Retro-Commissioning | RET | Whole Bui | Retro-Commissioning | per 100k sqft | Baseline building | custom actions | - | 5 | 10 | 22.83 | 18.26 | 100,000 | 100,000 | $29,355 | $22,000 | 75% | $126,270 | $29,355 | $96,915 | 4.30 | 177.35 |
| Commercial | New | Small Business Direct Install | RET | HVAC | Shade Screens | Per Sq Ft | no screens | shading coeff: 0.24 | 750 | 750 | 10 | 0.00 | 0.00 | 11 | 5 | $4 | $2 | 48% | $14 | $4 | $9 | 3.29 | 0.01 |
| Commercial | New | Small Business Direct Install | RET | HVAC | Window Films | Per Sq Ft | no film | shading coeff: 0.578 | 1,000 | 1,000 | 15 | 0.00 | 0.00 | 5 | 2 | $3 | $2 | 76% | $12 | $3 | $9 | 4.51 | 0.01 |

TEP Measure Appendix - Appendix J

**This information has been provided to ACC Staff via electronic copy on a separate excel file and is available upon request to interested parties.**