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May 28, 2004

Ms. Blanca Bayo
Records and Recording
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Docket No. 040035-EG

Dear Ms. Bayo:

Enclosed find original and seven (7) copies of the following documents for filing regarding the above-referenced docket:

060125-04 1. 2004 OUC Numeric Conservation Goals; Demand-Side Management Measure Evaluation

060126-04 2. 2004 OUC Numeric Conservation Goals; Demand-Side Management Plan

060127-04 3. Direct Testimony and Exhibits of Myron R. Rollins

060128-04 4. Direct Testimony and Exhibits of Thomas A. Gross

Thank you for your assistance.

CMP
COM 5 + orig. Ct. Rpr.
CTR
ECR
GCL
OPC
MMS
RCA
SCR
SEC 1
OTH

Very truly yours,

Roy C. Young

Roy C. Young

RCY:swp
Enclosures

cc: Doug Spencer (w/o enclosures)
Tom Tart (w/o enclosures)

sparrett\ouc\blanca bayo re 2004 Numeric Goals, etc.

Orlando Utilities Commission
Docket No. 040035-EG
Exhibit OUC-1

Orlando Utilities Commission

2004 Numeric Conservation Goals: Demand-Side Management Measure Evaluation

Submitted to the Florida Public Service Commission
B&V Project Number 137328.0040

June 2004

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BLACK & VEATCH

List of Tables

Executive Summary

In accordance with Rules 25-17.0021-.005, Florida Administrative Code, the Florida Public Service Commission (FPSC, or the Commission) must establish numeric conservation goals for Orlando Utilities Commission (OUC), as OUC is classified as an affected electric utility as defined in Section 366.82(1), Florida Statutes. This report provides details of the thorough evaluation of conservation measures, and presents the proposed numeric conservation goals which are hereby being submitted to the FPSC for approval.

Demand-Side Management (DSM) measures which had the potential to be cost-effective for OUC were compiled from multiple sources, including previous filings with the FPSC and the Commission-approved measures for the *2000 Demand-Side Management Plan* filing, as well as other sources. For each of these potentially cost-effective DSM measures, inputs and assumptions were developed by OUC and Black & Veatch. Additionally, information related to OUC's economic parameters and its avoided supply-side generating resource was gathered.

Once all pertinent information was compiled, it was input into the FPSC-approved Florida Integrated Resource Evaluator (FIRE) model to evaluate the cost-effectiveness of DSM measures. The FIRE model evaluates whether a specific measure is cost-effective through three tests - the *Rate Impact Test*, the *Total Resource Test*, and the *Participant Test*. These three tests, as well as the FIRE model itself, are described in detail in Section 2.0 herein.

From OUC's perspective, a DSM measure is only cost-effective if it passes the Rate Impact Test. This criterion is consistent with OUC's previous *Numeric Conservation Goals* filings, as well as those of other Florida utilities. In this regard, OUC utilized the results of the Rate Impact Test to develop numeric conservation goals for the ten-year period encompassing 2005 through 2014. The results of the Rate Impact Test performed on the numerous DSM measures indicated that none would be cost-effective. Based on these results, OUC proposes zero numeric conservation goals for its residential, commercial, and industrial sectors.

1.0 Introduction

In accordance with Rules 25-17.0021-.005, Florida Administrative Code, the Florida Public Service Commission (FPSC, or the Commission) must establish numeric conservation goals for Orlando Utilities Commission (OUC), as OUC is classified as an affected electric utility as defined in Section 366.82(1), Florida Statutes. This report describes the thorough evaluation of conservation measures, and presents the proposed numeric conservation goals which are hereby being submitted to the FPSC for approval.

In support of its *2000 Demand-Side Management Plan* filing, OUC evaluated the demand-side management (DSM) measures found to be most cost-effective by Florida Power & Light, as well as existing programs available to OUC's customers. A cost-effectiveness analysis was performed with the FPSC-approved Florida Integrated Resource Evaluator (FIRE) model (described in more detail in Section 2.0). Results of that cost-effectiveness analysis are presented in Table 1-1. Because there were no cost-effective DSM measures identified in the 2000 analyses (i.e., results of the Rate Impact Test were less than one), the FPSC approved OUC's proposal of zero conservation goals for its residential, commercial, and industrial sectors.

Table 1-1.
2000 Numeric Conservation Goals Cost-Effectiveness Analysis Results

Program Name	Rate Impact Test
Residential Energy Survey	0.22
Residential Heat Pump	0.79
Residential Weatherization	0.34
Low Income Energy Fix-Up	0.19
Residential Direct Load Control	0.99
Commercial Energy Survey	0.42
Commercial Lighting	0.35
Off-Peak Battery Charging	0.43

Source: OUC 2000 Demand-Side Management Plan Filing. Docket # 990722

The factors influencing the cost-effectiveness of DSM measures have changed in various ways since 2000. While some changes improve the cost-effectiveness of DSM, others tend to favor supply-side resources. Recent volatility in natural gas prices, as well as an increase in current fuel pricing and forecasts as compared to projections developed in 2000, tend to increase the cost-effectiveness of DSM measures now as compared to in 2000. Conversely, the reduction in project financing costs for new supply side resources to historic lows serves to decrease the cost-effectiveness of DSM measures. Another consideration when comparing the cost-effectiveness of DSM in the current market

versus the evaluations performed in 2000 is the avoided generating unit assumption. The *2000 Demand-Side Management Plan* filing was based on OUC's avoided unit being a combined cycle plant, which was subsequently constructed and placed into commercial operation on October 1, 2003, as Stanton A, while OUC's current avoided generating unit is a simple cycle combustion turbine. Some DSM measures compare more favorably with a simple cycle combustion turbine rather than a combined cycle, making those DSM measures relatively more cost-effective. On the other hand, DSM measures which compare more favorably with a combined cycle are relatively less cost-effective. These competing forces will have varying effects on the cost-effectiveness of DSM measures.

The remainder of this report is organized into five sections and associated appendices, as follows, and presents the comprehensive analyses of DSM measures performed by Black & Veatch on behalf of OUC for the *2004 Numeric Conservation Goals* proceeding:

- Section 2.0 provides a description of the FIRE model.
- Section 3.0 outlines the methodology used by OUC to evaluate a myriad of potential DSM measures.
- Section 4.0 presents the general and measure-specific assumptions used in the FIRE model to determine cost-effectiveness.
- Section 5.0 presents OUC's proposed numeric conservation goals for the period encompassing 2005 through 2014.
- The appendices present the fuel forecasts used in the evaluation (Appendix A), the sources utilized to determine appropriate assumptions for each DSM measure (Appendix B), the assumptions used in the DSM measure analysis (Appendix C), the summary of the cost-effectiveness of existing DSM measures and programs (Appendix D), and the cost-effective analysis results of potential new DSM measures (Appendix E).

2.0 Florida Integrated Resource Evaluator (FIRE) Model

OUC tested the cost-effectiveness of numerous DSM measures with the FPSC-approved FIRE model, which provides output in the form of the *Rate Impact Test*, the *Total Resource Test*, and the *Participant Test*. The remainder of this section provides an explanation of the FIRE model, including FIRE model methodology, general assumptions, inputs, and outputs.

2.1 FIRE Model Methodology

The FIRE model evaluates the economic impact of existing and proposed conservation measures by determining the relative cost-effectiveness of the measures versus an avoided supply-side resource (the avoided unit). The FIRE model was developed by the Florida Power Corporation (now Progress Energy Florida) and is used by several utilities in Florida, as the FPSC has accepted it as an effective program to evaluate the cost-effectiveness of demand-side management measures.

2.1.1 FIRE Model Assumptions

The cost-effectiveness evaluation performed with the FIRE model is based upon the following assumptions about the electric system:

- System demand is growing. Demand reductions due to DSM will result in reduced need for system expansion.
- Individual demand reductions can be related to a reduced need for system generation expansion.
- The generation reduction will be evaluated with respect to specified generation.
- Decreases or increases in revenue due to demand-side programs will impact rate levels and will be passed on to all customers.
- Additional conservation taking place after the next deferred generating unit will affect subsequent units.

2.1.2 FIRE Model Inputs

There are two types of FIRE model input files. The first input file contains data specific to the utility's next proposed unit, the avoided unit. The second input file contains data specific to the DSM measure being tested for cost-effectiveness. Input data for the avoided unit is placed on a per kW basis, allowing the potential DSM measures to be tested individually to evaluate cost-effectiveness.

2.1.3 Avoided Unit

The avoided unit is the utility's next planned capacity addition, which for OUC is a General Electric 7FA simple cycle combustion turbine, as presented in OUC's *2004 Ten-Year Site Plan*. The avoided unit is assumed to be located at OUC's existing Stanton Energy Center with commercial operation in 2008.

2.1.4 FIRE Model Outputs

FIRE model results are presented in the form of three cost-effectiveness tests, all of which are based on the comparison of discounted present worth benefits to costs for each specific DSM measure. Each of the three tests is designed to measure costs and benefits from a different perspective.

- The Total Resource Test measures the benefit to cost ratio of a specific measure by comparing the total benefits (both the participant's and utility's) to the total costs (equipment costs, utility costs, participant costs, etc.).
- The Participant Test measures the impact of the DSM measure on the participating customer. Benefits to the participant may include bill reductions, incentives, and tax credits. Participants' costs may include equipment costs, operation and maintenance expenses, equipment removal, etc. The Participant Test is important because customers will not participate in a program if it is not cost-effective from their perspective.
- The Rate Impact Test is an indicator of the expected impact on customer rates resulting from a DSM measure. The test statistic is the ratio of the utility's benefits (avoided supply costs and increased revenues) compared to the utility's costs (implementation costs, incentives paid, increased supply costs, and revenue losses). A value of less than one indicates an upward pressure on electricity rates as a result of the DSM program. Like many other Florida utilities, OUC views the Rate Impact Test as the primary test for determining the cost-effectiveness of a DSM measure on their system.

3.0 Evaluation Methodology

The methodology utilized by OUC for the analysis of the cost-effectiveness of DSM measures in 2004 varies from that used in 2000 to reach the current numeric conservation goals. In 2000, the investor owned utilities (IOUs) were required to submit their results of the DSM cost-effectiveness evaluation before the municipal utilities. As a result, OUC was able to narrow the scope of its analysis to only those measures that were proven to be cost-effective by the IOUs. This was possible because the cost of financing supply-side resources is typically lower for a municipal utility than for an IOU. Consequently, a given measure would appear less cost-effective for a municipal utility than it would for an IOU. However, the *2004 Numeric Conservation Goals* proceeding requires that all of the municipal utilities and IOUs submit their cost-effectiveness analysis results pursuant to an identical schedule. Therefore, OUC has elected to perform a comprehensive analysis of approximately 200 potential DSM measures, including those programs currently offered to OUC customers.

The initial step in the cost-effectiveness evaluation was to select potential DSM measures for analysis using the FIRE model. Sources used to determine which DSM measures should be evaluated included the FPSC suggested measures for evaluation (Document No. 12017-97 in Docket Nos. 971004, 971005, 971006, 971007), existing OUC conservation measures, FPSC filings from the other Florida utilities, and various other sources.

Once it was determined which DSM measures should be evaluated, the next step was to develop general, economic, measure-specific, and avoided unit assumptions. These assumptions, as well as descriptions of the measures analyzed, are summarized and presented in Section 4.0 and Appendix C herein. Sources used to determine measure-specific assumptions are presented in Appendix B.

Next, each potential measure was evaluated for cost-effectiveness by using the FPSC-approved FIRE model. The model evaluates the economic impact of existing and proposed conservation measures by determining three benefit-to-cost ratios. The methodology used by the FIRE model to evaluate cost-effectiveness is presented in Section 2.0.

Finally, based on the cost-effectiveness analysis, proposed numeric conservation goals were developed. The proposed numeric conservation goals were calculated based on the demand and energy savings associated with the cost-effective measures. The proposed numeric conservation goals are presented in Table 5-1, while the results of the

cost-effective analysis supporting the proposed numeric conservation goals are presented in Appendices D and E.

4.0 Assumptions and Inputs for the Cost-Effective Analysis

This section presents the general, DSM measure-specific, economic, and avoided unit assumptions used in the cost-effectiveness analysis.

4.1 General Assumptions

General assumptions were developed in order to compare all DSM measures on an equivalent economic basis. These assumptions were extracted from the OUC 2004 Ten-Year Site Plan, input from OUC, and other sources as appropriate. General cost-effectiveness analysis assumptions are presented in Table 4-1 below.

Table 4-1.
General Cost-Effective Analysis Assumptions and Sources

- The study period for the cost-effectiveness evaluation encompasses 20 years (2005-2024).
- The fuel forecast and economic parameters were taken from OUC's 2004 Ten-Year Site Plan.
- The system average fuel cost was derived from the production cost model developed for OUC's 2004 Ten-Year Site Plan.
- The non-fuel cost in residential customers' bills is based on the OUC residential rate schedule.
- The non-fuel cost in commercial customers' bills is based on the OUC General Service Non-Demand, General Service Demand, and General Service Large Demand rate schedules.
- The customer demand charge is based on the OUC General Service Demand and General Service Large Demand rate schedules.
- The transmission capital cost is based on input from OUC.
- The transmission fixed O&M cost is based on input from OUC.
- The distribution capital cost is based on input from OUC.
- The distribution fixed O&M cost is based on input from OUC.

4.2 Demand-Side Management Assumptions

This section presents a brief summary of each DSM measure evaluated for cost-effectiveness. The DSM measure assumptions were derived from multiple sources, including annual Florida Energy Efficiency and Conservation Act (FEECA) reports, *OUC's 2000 Demand-Side Management Plan*, *OUC's 2004 Ten-Year Site Plan*, FPSC filings, and various other sources. A summary of the sources used for each measure is presented in Appendix B, while assumptions related to each DSM measure are presented in Appendix C.

4.2.1 Residential New Construction Measures

Efficient Clothes Washer

This measure assumes that a new home owner chooses to purchase an Energy Star qualified clothes washer rather than a standard efficiency model. The standard efficiency model is assumed to have a Modified Energy Factor (MEF) of 1.04 while the high efficiency model is assumed to have an MEF of 1.42. The annual energy usage values are based on national averages.

Direct Load Control - Main

This measure assumes that an FM/VHF radio system will be used to cycle and control central air conditioners, electric furnaces, heat pump auxiliary heat operation, and electric water heaters in single family homes. The assumed 2.24 kW savings is based on the average of the summer and winter loads. The program assumes a reduction of 0.93 kW from the central air conditioner, 0.29 kW from electric water heating, and 0.75 kW from pool pumps for the summer. The program assumes a reduction of 1.5 kW from the electric furnace, 0.76 kW from the heat pump, and 0.74 kW from electric water heating.

Direct Load Control – Pool Pumps

This measure assumes that an FM/VHF radio system will be used to cycle, shed, and control pool pumps on single family homes.

Energy Efficient Freezer (Manual)

This measure assumes that a residential customer with a new home chooses to purchase an Energy Star qualified manual defrost freezer rather than a standard efficiency unit. Energy savings are calculated based on a nominal 22 ft^3 freezer.

Compact Fluorescent Lights

This measure assumes that two each of 40 W, 60 W, and 100 W incandescent lights are replaced with the same number of 9 W, 15 W, and 26 W compact fluorescent lights. Energy savings are based on 2,000 hours of operation annually.

High Pressure Sodium Lighting (Outdoor)

This measure assumes that one 100 W outdoor incandescent fixture is replaced with one 70 W high pressure sodium lighting fixture.

On-Call Direct Load Control

This measure assumes that FM/VHF switches are installed to cycle off central AC, central heating, electric water heaters, and pool pumps during peak times. Table 4-2 shows the incentives offered for the 15 minute and extended peak times. The 15 minute savings option allows the utility to cycle off the appliances for up to 15 minutes out of every 30 minute period. The extended savings option allows the utility to cycle off the air conditioner for up to three hours, and the other appliances up to four hours.

Table 4-2.
On-Call Direct Load Control Incentives.

15 Minute Savings		
Appliance	**Season**	**Savings**
Central Air Conditioner	April - October	$21/year
Central Heater	November - March	$10/year
Extended Savings		
Central Air Conditioner	April - October	$63/year
Central Heater	November - March	$20/year
Water Heater	All year	$18/year
Pool Pump	All year	$36/year

Source: www.fpl.com.

Energy Efficient Refrigerator (Frost-Free)

This measure assumes that a residential customer with a new home chooses to purchase an Energy Star qualified frost-free refrigerator rather than a standard efficiency unit. Energy savings are calculated based on a nominal 20 ft^3 refrigerator.

Energy Efficient Refrigerator (Manual)

This measure assumes that a residential customer with a new home chooses to purchase an Energy Star qualified manual defrost refrigerator rather than a standard efficiency unit. Energy savings are calculated based on a nominal 20 ft^3 refrigerator.

Light Colored Roof Material

This measure assumes that a new home owner installs white galvanized steel roofing instead of standard black asphalt shingles. Demand and energy savings are taken from the recently completed study sponsored by FPL entitled *Comparative Evaluation of the Impact of Roofing Systems on Residential Cooling Energy Demand in Florida.*

High Efficiency Central AC

A high efficiency air conditioning (AC) unit with a seasonal energy efficiency ratio (SEER) of 13.0 is assumed to replace a standard unit with a SEER of 10.0. The air conditioner is assumed to operate at an annual capacity factor of 25 percent.

High Efficiency Room AC

This measure assumes that a customer purchases a high efficiency room AC unit with an energy efficiency ratio (EER) of 11.0 rather than a standard efficiency unit with an EER of 8.8. The room air conditioner is assumed to be a 1-ton unit (12,000 Btu/hr), and operates at an annual capacity factor of 25 percent. Customer equipment cost was estimated with *RSMeans Mechanical Cost Data.*

Direct Load Control of Central AC

This measure involves the use of FM/VHF switches to control residential space cooling systems to reduce peak load by load shedding or cycling. The demand and energy savings are estimated in the OUC *1995 Demand-Side Management Plan* filing. The measure administrative costs are estimated to be consistent with that in the OUC *2000 Demand-Side Management Plan* filing and have been escalated to 2004 dollars.

Direct Load Control - Electric Furnace

This measure consists of installing a radio controlled switch on the power supply to the electric furnace in residential dwellings. A rebate of $30 per year is assumed. Program administrative costs are assumed to consistent with those estimated for the *2000 Demand-Side Management Plan* filing, escalated for inflation.

High Efficiency Electric Water Heater

This measure assumes that a new home owner decides to buy a high efficiency water heater with an Energy Factor (EF) of 0.95 rather than purchase a standard efficiency unit with an EF of 0.92. Demand and energy savings are estimated to be 6.5 percent.

Direct Load Control of Water Heater

This measure assumes that an FM/VHF switch is installed on the power supply for the electric water heater. Demand and energy savings are estimated to be consistent with those in the OUC *1995 Conservation Goals* filing. Program administrative costs are estimated to be consistent with those in the OUC *2000 Demand-Side Management Plan* filing, and have been escalated to 2004 dollars. It is assumed that the rebate offered to

customers would be consistent with that offered by FPL for direct load control of electric water heaters.

Supplemental Solar Water Heater

This measure assumes that a supplemental solar water heater is installed in new homes. Demand and energy savings are taken from a recent study performed by the Florida Solar Energy Center entitled *Research Highlights from a Large Scale Residential Monitoring Study in a Hot Climate.*

Heat Recovery Water Heater

This measure assumes that a supplemental heat recovery water heater is installed and connected to the air conditioner exhaust heat. Demand and energy savings are taken from the recent study performed by the Florida Solar Energy Center entitled *Research Highlights from a Large Scale Residential Monitoring Study in a Hot Climate.*

Add-On Heat Pump Water Heater

This measure assumes that an add-on heat pump water heater is installed in new residences. Energy and demand savings are estimated based on a 40 gallon electric resistance back-up water heater, and an average daily demand for hot water of 60 gallons.

DWH Pipe Insulation

This measure assumes that a new home owner installs 70 feet of hot water piping insulation.

4.2.2 Commercial & Industrial New Construction Measures

Business On-Call

This measure assumes that FM/VHF switches are installed to cycle off air conditioning units for 15 minutes out of every 30 minute period during peak times from April through October. An incentive of $2 per ton of cooling capacity per month is paid for the seven months that the air conditioner is on-call.

Energy Efficient Electric Fryer

This measure assumes that a new business owner chooses to install a high efficiency electric fryer with an electric demand of 2.4 kW rather than a standard efficiency unit with an electric demand of 2.8 kW.

Cool Thermal Storage

This measure assumes that a chiller (50-ton for GSD and 150-ton for GSLD) is augmented with a cooled water thermal storage system. The system is sized for four hours at full chiller capacity. The chiller is assumed to have a coefficient of performance (COP) of 4.75 for the GSD rate class and a COP of 5.9 for the GSLD rate class. It is also assumed that existing pumps are capable of circulating the stored chilled water through the air conditioning system during peak hours, so there is no assumed energy savings or energy use increase from the pumps.

Incandescent Replacement with Compact Fluorescent

This measure assumes that a new commercial building owner decides to use 10 each of 15 W, 18 W and 27 W compact fluorescent lamps instead of 60 W, 75 W, and 100 W incandescent lamps. The increased cost is assumed to be only the cost of the compact fluorescent lamps.

Incandescent Replacement with 2 18 W Compact Fluorescent

This measure consists of the installation of ten 2 x 18 W compact fluorescent fixtures instead of the installation of ten 1 x 150 W incandescent fixtures.

High Efficiency Chiller

This measure assumes that a high efficiency screw chiller with a COP of 5.9 is installed instead of a standard efficiency reciprocating chiller with a COP of 4.2 for the GSD rate class. For the GSLD rate class, a high efficiency centrifugal chiller with a COP of 6.4 is installed instead of a standard efficiency centrifugal chiller with a COP of 5.6. The chillers for the GSD rate class are assumed to be 100 tons; chillers for the GSLD rate class are assumed to be 200 tons. The chillers are assumed to operate at an annual capacity factor of 25 percent.

High Efficiency Chiller with ASD

This option consists of installing an adjustable speed drive (ASD) controller onto high efficiency centrifugal chillers. The same assumptions apply here as in the high efficiency chiller option. The high efficiency chiller with an ASD is compared with a high efficiency chiller to estimate savings, assumed to be 30 percent for demand and energy.

High Efficiency DX AC Units

This measure assumes that a new building is constructed with a high efficiency direct expansion (DX) AC unit (5-ton for GSND, 20-ton for GSD, and 100-ton for GSLD) with an EER rating of 13.0, rather than the standard of 10.3. It is assumed that the unit operates with an annual capacity factor of 25 percent.

High Efficiency Room AC Units

This measure assumes that a new building owner chooses to install a high efficiency room AC unit with an EER of 12.6 rather than a standard efficiency unit with an EER of 8.3. The room AC unit is assumed to have a cooling rating of 17,000 Btu/h. Equipment cost is estimated with *RSMeans Mechanical Cost Data.*

Leak Free Ducts

This measure consists of the utilization of aerosol duct sealing on the new commercial building's duct system. Cooling and ventilation demand and energy savings of are estimated to be 3 percent. Savings are calculated based on a roof-top air conditioner (5-ton for GSND, 20-ton for GSD, and 100-ton for GSLD) with an EER of 10.0 and an annual capacity factor of 25 percent. The buildings are assumed to have floor areas of 5,000 ft^2, 20,000 ft^2, and 100,000 ft^2 for the GSND, GSD, and GSLD rate classes, respectively.

High Efficiency Motors - Chiller

This measure assumes that a new building owner installs a high efficiency motor (96 percent efficiency) rather than a standard efficiency motor (91 percent efficiency) in a chiller. Savings are based on a 150 hp motor operating for an equivalent of 2,190 hours per year.

High Efficiency Motors – DX AC

This measure assumes that a new building owner installs a high efficiency motor (94 percent efficiency) rather than a standard efficiency motor (87 percent efficiency) in a DX AC unit. Savings are based on an air conditioning unit (5-ton for GSND, 20-ton for GSD, and 100-ton for GSLD) operating for 2,190 hours per year.

Heat Pump Water Heater

This measure assumes that a heat pump water heater is installed in combination with an electric resistance water heater. Demand and energy savings estimates are based on a hot water demand of 500 gallons per day, 2,000 gallons per day, and 5,000 gallons

per day for GSND, GSD, and GSLD rate classes, respectively. The water is assumed to be supplied at a temperature of 135 °F, over a period of 12 hours per day (for GSND and GSD rate classes) and 24 hours for the GSLD rate class. The electric resistance water heater is assumed to have a COP of 0.92 while the heat pump water heater is assumed to have a COP of 3.0.

Heat Recovery Water Heater

This measure consists of an electric water heater that utilizes a supplemental heat source from the cooling system waste heat recovered from a double bundle chiller or condenser heat exchanger. There is an assumed 25 percent energy savings based on the *WAPA Guidebook of Commercial DSM Technologies,* while assuming summer and winter demand savings of 35 percent and 15 percent, respectively.

4.2.3 Residential Existing Construction Measures

Efficient Clothes Washer

This measure consists of the replacement of an existing clothes washer with a model compliant with Energy Star standards. The existing model is assumed to have an MEF of 0.81 while the high efficiency unit is assumed to have an MEF of 1.42. The annual energy usage values are based on national averages.

Direct Load Control – Pool Pumps

This measure assumes that an FM/VHF switch will be used to cycle, shed, and control pool pumps on single family homes.

Direct Load Control - Main

This measure assumes that an FM/VHF switch will be used to cycle and control central air conditioners, electric furnaces, heat pump auxiliary heat operation, and electric water heaters in single family homes. The assumed 1.97 kW savings is based on the average of the summer and winter loads. The program assumes a reduction of 0.93 kW from the central air conditioner, 0.29 kW from electric water heating, and 0.75 kW from pool pumps for the summer. The program assumes a reduction of 1.5 kW from the electric furnace, 0.76 kW from the heat pump, and 0.74 kW from electric water heating.

Energy Efficient Freezer (Manual)

This measure assumes that a residential customer replaces an existing freezer with an Energy Star qualified manual defrost freezer. Energy savings are calculated based on a nominal 22 ft^3 refrigerator.

Compact Fluorescent Lights

This measure assumes that two each of 40 W, 60 W, and 100 W incandescent lights are replaced with the same number of 9 W, 15 W, and 26 W compact fluorescent lights. Energy savings are based on 2,000 hours of operation annually.

High Pressure Sodium Lighting (Outdoor)

This measure assumes that one 100 W outdoor incandescent fixture is replaced with one 70 W high pressure sodium lighting fixture.

High Efficiency Pool Pump - Residential

This measure assumes that a standard efficiency (82.5 percent) pool filter motor and circulation pump is replaced with a premium efficiency motor (85.5 percent). The motor is assumed to operate at full load for an equivalent of 2,190 hours per year. Equipment cost is estimated with *RSMeans Electrical Cost Data*.

Remove Second Freezer

This measure consists of the removal of a second freezer.

Remove Second Refrigerator

This measure consists of the removal of a second refrigerator.

On-Call Direct Load Control

This measure assumes that FM/VHF switches are installed to cycle off central AC, central heating, electric water heaters, and pool pumps during peak times. Table 4-3 shows the incentives offered for the 15 minute and extended peak times. The 15 minute savings option allows the utility to cycle off the appliances for up to 15 minutes out of every 30 minute period. The extended savings option allows the utility to cycle off the air conditioner for up to three hours, and the other appliances for up to four hours.

Table 4-3.
On-Call Direct Load Control Incentives.

15 Minute Savings		
Appliance	**Season**	**Savings**
Central Air Conditioner	April - October	$21/year
Central Heater	November - March	$10/year
Extended Savings		
Central Air Conditioner	April - October	$63/year
Central Heater	November - March	$20/year
Water Heater	All year	$18/year
Pool Pump	All year	$36/year

Source: www.fpl.com.

Energy Efficient Refrigerator (Frost-Free)

This measure assumes that a residential customer replaces an existing frost-free refrigerator with an Energy Star qualified model. Energy savings are calculated based on a nominal 20 ft^3 refrigerator.

Energy Efficient Refrigerator (Manual)

This measure assumes that a residential customer replaces an existing manual refrigerator with an Energy Star qualified model. Energy savings are calculated based on a nominal 20 ft^3 refrigerator.

Ceiling Insulation (R-0 to R-19)

This measure only applies to existing dwellings with no ceiling insulation and assumes the installation of R-19 rated insulation in the ceiling.

Ceiling Insulation (R-11 to R-30)

This measure only applies to existing dwellings with R-11 ceiling insulation and involves the installation of insulation with an R-value of R-19 for a total R-value of R-30.

Window Film / Reflective Windows

This measure assumes that existing homes with single pane windows install window films. Savings of 10 percent of air conditioner energy and demand usage are assumed.

Low Emissivity Glass

For this measure, double pane glass with an argon gas fill and a low emissivity coating on the inner surface of the outer pane replaces single and double pane clear glass windows. This measure reduces heat transmission through the windows.

Window Shade Screens

This measure assumes that four windows are retrofitted with retractable shade screens. Demand and energy savings are estimated to be 30 percent and are calculated based on a 3-ton central air conditioner with a SEER rating of 10.0.

Light Colored Roof Material

This measure involves the replacement of existing dark colored roofing materials with white galvanized steel roofing. Demand and energy savings are taken from the recently completed study sponsored by FPL entitled *Comparative Evaluation of the Impact of Roofing Systems on Residential Cooling Energy Demand in Florida.*

High Efficiency Central AC

A high efficiency AC unit with a SEER rating of 13.0 replaces a standard unit with an SEER of 10.0. The air conditioner is assumed to operate at an annual capacity factor of 25 percent.

High Efficiency Room AC

A high efficiency AC unit with an EER of 11.0 replaces a standard unit with an EER of 8.8. The room air conditioner is assumed to be a 1-ton unit (12,000 Btu/hr), and operates at an annual capacity factor of 25 percent. Customer equipment cost was estimated with *RSMeans Mechanical Cost Data.*

Air Conditioning System Maintenance

This measure assumes than an existing air conditioner is serviced by a professional. Demand and energy savings are estimated to be 10 percent, and are calculated based on a 3-ton air conditioner with a SEER of 10.0.

Direct Load Control of Central AC

This measure involves the use of FM/VHF switches to control residential space cooling systems to reduce peak load by load shedding or cycling. The demand and energy savings are estimated in the OUC *1995 Demand-Side Management Plan* filing.

The measure administrative costs are estimated to be consistent with that in the OUC *2000 Demand-Side Management Plan* filing, and have been escalated to 2004 dollars.

Direct Load Control - Electric Furnace

This measure consists of installing an FM/VHF switch on the power supply to the electric furnace in residential dwellings. A rebate of $30 per year is assumed. Program administrative costs are assumed to consistent with that estimated for the OUC *2000 Demand-Side Management Plan* filing, escalated for inflation.

High Efficiency Electric Water Heater

This measure assumes that a standard efficiency electric water heater with an EF of 0.86 is replaced with a high efficiency model with an EF of 0.95. Demand and energy savings are assumed to be 9.5 percent.

Direct Load Control of Water Heater

This measure assumes that a radio frequency controlled switch is installed on the power supply for the electric water heater. Demand and energy savings are estimated to be consistent with that in the OUC *1995 Conservation Goals* filing. Program administrative costs are estimated to be consistent with that in the OUC *2000 Demand-Side Management Plan* filing, and have been escalated to 2004 dollars. It is assumed that the rebate offered to customers would be consistent with that offered by FPL for direct load control of electric water heaters.

Supplemental Solar Water Heater

This measure assumes that a supplemental solar water heater is installed in existing homes. Demand and energy savings are taken from a recent study performed by the Florida Solar Energy Center entitled *Research Highlights from a Large Scale Residential Monitoring Study in a Hot Climate*.

Heat Recovery Water Heater

This measure assumes that a supplemental heat recovery water heater is installed and connected to the air conditioner exhaust heat. Demand and energy savings are taken from the recent study performed by the Florida Solar Energy Center entitled *Research Highlights from a Large Scale Residential Monitoring Study in a Hot Climate.*

Add-On Heat Pump Water Heater

This measure assumes that an add-on heat pump water heater is installed in existing residences. Energy and demand savings are estimated based on a 40 gallon electric resistance back-up water heater, and an average daily demand for hot water of 60 gallons.

DWH Tank Insulation

This measure consists of the installation of a water heater jacket with an R-value of at least 6.7.

DWH Pipe Insulation

This measure includes the installation of pipe insulation to all accessible domestic hot water piping, assumed to be 20 feet.

DWH Heat Trap

This measure consists of the installation of a heat trap on the inlet and outlet piping of an electric resistance water heater. Energy savings are estimated to be 2.0 percent.

Low-Flow Showerhead

This measure assumes that a low-flow showerhead is installed in place of an existing showerhead. Energy savings are estimated to be 12.5 percent of annual water heater energy usage and is calculated based on a standard efficiency electric water heater with an EF of 0.86.

4.2.4 Commercial & Industrial Existing Construction Measures

Business On-Call

This measure assumes that FM/VHF switches are installed that cycle off air conditioning units for 15 minutes out of every 30 minute period during peak times from April through October. An incentive of $2 per ton of cooling capacity per month is paid for the seven months that the air conditioner is on-call.

Energy Efficient Electric Fryer

This measure assumes that an existing electric fryer with an energy demand of 2.8 kW is replaced with a high efficiency unit with a demand of 2.4 kW. The annual load factor is assumed to be 25 percent.

Cool Thermal Storage

This measure assumes that a chiller (50-ton for GSD and 150-ton for GSLD) is augmented with a cooled water thermal storage system. The system is sized for four hours at full chiller capacity. The chiller is assumed to have a COP of 4.0. It is also assumed that existing pumps are capable of circulating the stored chilled water through the air conditioning system during peak hours, so there is no assumed energy savings or energy use increase from the pumps.

4' 34W with Reflector Replacement

This measure assumes that a commercial building replaces 20 4' x 4 (40 W) fixtures with 20 percent 4' x 2 (40 W) fixtures with reflectors and 80 percent 4' x 2 (34 W) fixtures with reflectors. The lights are assumed to operate for 4,400 hours per year. Equipment cost was estimated with *RSMeans Electrical Cost Data.*

8' 75W Delamping with Reflector Kit

This measure assumes that a commercial building replaces 20 8' x 2 (75 W) fixtures with 20 4' T8 lamps (32 W) and a reflector kit, and electronic ballasts. The lights are assumed to operate for 4,400 hours per year.

High Pressure Sodium Lighting (70 W/100 W/150 W/250 W) Replacement

This measure considers a mix of five each of 70 W, 100 W, 150 W, and 250 W high pressure sodium lamps/fixtures replacing the same mix of 100 W, 175 W, 250 W, and 400 W mercury vapor lamps/fixtures. It is assumed that each of the lamps operates for 4,400 hours per year.

Outdoor High Pressure Sodium Lighting (70 W) Replacement

This measure considers replacing five 150 W incandescent lamps with five 70 W high pressure sodium fixtures. The lamps are assumed to operate for 4,400 hours per year. Equipment cost was estimated with *RSMeans Electrical Cost Data.*

Incandescent Replacement with Compact Fluorescent

This measure considers replacing 10 each of 60 W, 75 W, and 100 W incandescent lamps with the same mix of 15 W, 18 W and 27 W compact fluorescent lamps in existing buildings.

Incandescent Replacement with 2 18 W Compact Fluorescent

This measure consists of ten 2 x 18 W compact fluorescent tubes within a single fixture which replace ten 1 x 150 W incandescent fixtures.

4' Fluorescent with Electronic Ballast Replacement

This measure assumes that a commercial building replaces 20 4' x 2 (40 W) fluorescent fixtures with 20 4' x 2 (34 W) fluorescent lamps. Equipment and installation cost was estimated from *RSMeans Electrical Cost Data*.

8' Fluorescent with Electronic Ballast Replacement

This measure assumes that a commercial building replaces 20 8' x 2 (75 W) fluorescent fixtures with 8' x 2 fluorescent lamps with a total fixture rating of 95 W. The lights are assumed to operate for 4,400 hours per year. Equipment and installation cost was estimated from *RSMeans Electrical Cost Data*.

4' T8 Lamp Replacement

This measure assumes that a commercial building replaces 20 4' x 2 (40 W) fluorescent fixtures with 20 4' x 2 T8 (32 W) fluorescent lamps and an electronic ballast with a total fixture rating of 60 W. The lights are assumed to operate for 4,400 hours per year. Equipment and installation cost was estimated from *RSMeans Electrical Cost Data.*

4' Fluorescent with Reflector Replacement

This measure assumes that a commercial building replaces 20 4' x 4 (40 W) fluorescent fixtures with 4' x 2 (40 W) fluorescent lamps with a reflector. The lamps are assumed to operate for 4,400 hours per year.

4' Fluorescent with T8 and Reflector Replacement

This measure assumes that a commercial building replaces 20 4' x 4 (40 W) fluorescent fixtures with 4' x 2 T8 (32 W) fluorescent lamps with a reflector. The lamps are assumed to operate for 4,400 hours per year. Equipment cost was estimated with *RSMeans Electrical Cost Data.*

Off-Peak Battery Charging

This measure typically applies to golf courses and requires that they charge golf carts during off-peak hours (at night). Equipment to automatically start and control the charging process must be purchased by the customer.

Multiplex Refrigeration System with No Sub-Cooling

This measure assumes that an existing grocery store replaces an existing single compressor system with a multiplex refrigeration system. The single compressor system is assumed to have an EER of 9.0, while the multiplex system is assumed to have an annual EER of 11.0.

Multiplex Refrigeration System with Ambient Sub-Cooling

This measure assumes that an existing grocery store replaces an existing single compressor system with a multiplex system with ambient sub-cooling. The single compressor is assumed to have an EER of 9.0, while the multiplex system with ambient sub-cooling is assumed to have an EER of 11.22.

Multiplex Refrigeration System with Mechanical Sub-Cooling

This measure assumes that an existing grocery store replaces an existing single compressor system with a multiplex system with mechanical sub-cooling. The single compressor is assumed to have an EER of 9.0, while the multiplex system with mechanical sub-cooling is assumed to have an EER of 12.65.

Multiplex Refrigeration System: Ambient and Mechanical Sub-Cooling

This measure consists of various air-cooled refrigeration systems that are compared to a stand-alone compressor system. Systems include a multiplex system with or without ambient or mechanical sub-cooling, an external liquid suction heat exchanger, in addition to an open-drive refrigeration system. This measure is assumed applicable to restaurant, grocery, warehouse, and hospital market segments.

High Efficiency Chiller

This measure consists of comparing standard efficiency (compressor COP = 4.0) reciprocating chillers to high efficiency (compressor COP = 5.9) screw chillers for the GSD rate class. For the GSLD rate class, standard efficiency (compressor COP 5.0) centrifugal chillers are replaced with high efficiency (compressor COP = 6.4) centrifugal chillers. The chillers for the GSD rate class are assumed to be 100 tons; chillers for the GSLD rate class are assumed to be 200 tons. The chillers are assumed to operate at an annual capacity factor of 25 percent.

Roof Insulation - Chiller

This measure assumes that buildings with an existing R-Value of 2.53 upgrade roof insulation to an average R-Value of 10.0. The roofs are assumed to have areas of 10,000 ft^2 and 50,000 ft^2 for the GSD and GSLD rate classes, respectively. Energy savings are calculated as the reduction in water chiller power and energy demand.

Roof Insulation – DX AC

This measure assumes that buildings with an existing R-Value of 2.53 upgrade roof insulation to an average R-Value of 10.0. The roofs are assumed to have areas of 5,000 ft^2, 10,000 ft^2, and 50,000 ft^2 for the GSND, GSD, and GSLD rate classes, respectively. Energy Savings are calculated as the reduction in DX AC power and energy demand.

High Efficiency Chiller with ASD

This option consists of retrofitting an ASD controller onto high efficiency centrifugal chillers. The same assumptions apply here as in the high efficiency chiller option. The high efficiency chiller with an ASD is compared with a high efficiency chiller to estimate savings, assumed to be 30 percent for demand and energy.

Window Film - Chiller

This option consists of installing window film on existing construction. The shading coefficient is assumed to improve from 0.85 to 0.23 and the U-value from 1.06 to 0.69.

Window Film - DX AC

This option consists of installing window film on existing construction. The shading coefficient is assumed to improve from 0.85 to 0.23 and the U-value from 1.06 to 0.69.

Light Colored Roof - Air Chiller

This measure assumes that commercial buildings with a black, flat roof with an albedo of 0.05 install a light colored Energy Star rated white membrane with an albedo of 0.75. The roofs are assumed to have areas of 10,000 ft^2 and 50,000 ft^2 for the GSD and GSLD rate classes, respectively. Savings are calculated based on the use of standard efficiency air cooled screw chillers with COP values of 3.0 (100-ton for the GSD rate class and a 200-ton chiller for the GSLD rate class), and an annual capacity factor of 25 percent.

Light Colored Roof - Water Chiller

This measure assumes that commercial buildings with a black, flat roof with an albedo of 0.05 install a light colored Energy Star rated white membrane with an albedo of 0.75. The roofs are assumed to have areas of 10,000 ft^2 and 50,000 ft^2 for the GSD and GSLD rate classes, respectively. Savings are calculated based on the use of standard efficiency water cooled reciprocating chillers with COP values of 4.0 (100-ton for the GSD rate class and a 200-ton chiller for the GSLD rate class), and an annual capacity factor of 25 percent.

Light Colored Roof - DX AC

This measure assumes that commercial buildings with a black, flat roof with an albedo of 0.05 install a light colored Energy Star rated white membrane with an albedo of 0.75. The roofs are assumed to have areas of 5,000 ft^2, 10,000 ft^2, and 50,000 ft^2 for the GSND, GSD, and GSLD rate classes, respectively. Savings are calculated based on the use of standard efficiency DX AC units with EER ratings of 8.9 (100-ton for GSLD, 20-ton for GSD, and 5-ton for GS).

High Efficiency DX AC Units

This measure assumes that an existing DX AC unit with an EER of 8.9 is replaced with a DX AC unit with an EER of 13.0. The DX AC unit is assumed to be a 100-ton unit, a 20-ton unit, or a 5-ton unit for the GSLD, GSD, and GSND rate classes, respectively. All chillers are assumed to operate at a 25 percent annual capacity factor.

High Efficiency Room AC Units

This measure assumes that an existing room AC unit with an EER of 8.3 is replaced with a room AC unit with an EER of 12.6. The room AC unit is assumed to have a cooling rating of 17,000 Btu/h. Equipment cost is estimated with *RSMeans Mechanical Cost Data.*

2-Speed Motor for Cooling Tower

This measure assumes that a 5 hp, 2-speed motor is installed in an existing cooling tower. Demand and energy savings are assumed to be 80 percent of that for installation of an adjustable speed drive. Equipment cost is estimated with *RSMeans Electrical Cost Data.*

Speed Control for Cooling Tower Motors

This measure assumes that an adjustable speed drive is installed on one 5 hp cooling tower motor. Savings are assumed to be 30 percent for demand and energy. Equipment cost is estimated with *RSMeans Electrical Cost Data.*

Leak Free Ducts

This measure consists of the utilization of aerosol duct sealing on the existing building's duct system. Cooling and ventilation demand and energy savings are estimated to be 7.0 percent. Savings are calculated based on the use of standard efficiency DX AC units with EER values of 8.9 (100 ton for GSLD, 20 ton for GSD, and 5 ton for GSND) and an annual capacity factor of 25 percent. The buildings are assumed to have floor areas of 5,000 ft^2, 20,000 ft^2, and 100,000 ft^2 for the GSND, GSD, and GSLD rate classes, respectively.

High Efficiency Motors - Chiller

This measure assumes that standard efficiency motors of 91 percent efficiency are replaced with high efficiency motors of 96 percent in water chillers. Savings are based on a 150 hp motor operating for an equivalent of 2,190 hours per year. Equipment cost was estimated with *RSMeans Electrical Cost Data.*

High Efficiency Motors - DX AC

This measure assumes that standard efficiency motors of 89 percent efficiency are replaced with high efficiency motors of 95 percent in direct expansion AC units. Savings are based on a 100-ton air conditioning unit (100 hp motor) for GSLD, 20-ton air conditioning unit (20 hp motor) for GSD, and a 5-ton air conditioning unit (5 hp motor) for GSND operating for 2,190 hours per year. Equipment cost was estimated with *RSMeans Electrical Cost Data.*

Heat Pump Water Heater

This measure assumes that a heat pump water heater is installed in combination with an electric resistance water heater. Demand and energy savings estimates are based on a hot water demand of 500 gallons per day, 2,000 gallons per day, and 5,000 gallons per day for GSND, GSD, and GSLD rate classes, respectively. The water is assumed to be supplied at a temperature of 135 °F, over a period of 12 hours per day (for GSND and GSD rate classes) and 24 hours for the GSLD rate class. The electric resistance water heater is assumed to have a COP of 0.89 while the heat pump water heater is assumed to have a COP of 3.0.

Heat Recovery Water Heater

This measure consists of an electric water heater that utilizes a supplemental heat source from the cooling system waste heat recovered from a double bundle chiller or condenser heat exchanger. There is an assumed 25 percent energy savings based on the *WAPA Guidebook of Commercial DSM Technologies*, while assuming summer and winter demand savings of 35 percent and 15 percent, respectively.

Water Heater Insulation

This is a retrofit measure consisting of wrapping an existing water tank with additional insulation. Energy and demand savings of 5.0 percent is assumed.

Water Heater Heat Trap

This retrofit measure reduces hot water energy due to backflow through the pipes from natural convection. The energy savings is 10 percent based on the *WAPA Guidebook of Commercial DSM Technologies,* while demand savings is expected to be 2.0 percent.

Low or Variable Flow Showerhead

This retrofit measure can easily be installed in place of existing showers and faucets to reduce the flow of hot water. It is assumed that there are approximately two showerheads and four faucets per water heater. Estimated energy and demand energy savings is 15 percent.

4.3 Economic Parameters

The economic parameters used in the DSM cost-effectiveness evaluation were obtained from OUC's 2004 Ten-Year Site Plan and are presented in the following subsections.

4.3.1 Inflation and Escalation Rates

The general inflation rate and the escalation rate are 2.5 percent annually. The escalation rate is applied to capital costs, operations and maintenance (O&M) expenses, and various other DSM program expenses.

4.3.2 Present Worth Discount Rate

The present worth discount rate utilized in the study is equal to 8.0 percent.

4.3.3 OUC Municipal Bond Interest Rate

The long-term municipal bond interest rate is assumed to be 6.0 percent. This rate is based on the current bond rate for OUC.

4.3.4 Interest During Construction Rate

The interest during construction interest rate for OUC is assumed to be equal to the bond rate of 6.0 percent.

4.3.5 Fixed Charge Rate

The levelized fixed charge rate is assumed to be the sum of the capital recovery rate and the insurance rate. Based on the weighted average cost of capital of 8.0 percent, a 1.0 percent annual insurance cost, and a capital recovery period of 20 years, the levelized fixed charge rate is assumed to be 11.19 percent.

4.4 Avoided Unit

The avoided unit is the utility's next planned capacity addition, which for OUC is a General Electric 7FA simple cycle combustion turbine, as presented in OUC's 2004 Ten-Year Site Plan. The avoided unit is assumed to be located at OUC's existing Stanton Energy Center with commercial operation in 2008. The estimated capital cost for the simple cycle 7FA avoided unit and its projected performance is presented in Table 4-4.

Table 4-4.
Avoided Generating Unit Characteristics -- GE 7FA Combustion Turbine

Total Capital Cost (2004 $)[1]	$43,300,000
O&M Cost-Baseload Duty	
Fixed O&M Cost (2004 $/kW-year)	5.69
Variable O&M Cost (2004 $/MWh)	0.201
Economic Life (years)	25
Net Plant Capacity @ 72°F (MW)	156
Net Plant Heat Rate @ 72°F (Btu/kWh, HHV)	10,940
Equivalent Availability (%)	96.2
Equivalent Forced Outage Rate (%)	1.96
Planned Maintenance Outage (weeks/year)	1
Construction Period (months)	12

1. Total capital cost does not include interest during construction.

5.0 Proposed Numeric Conservation Goals

The proposed numeric conservation goals for OUC are based on the FIRE model results for the Rate Impact Test. Because none of the DSM measures evaluated resulted in Rate Impact Test results of 1.0 or greater, none were considered cost-effective from OUC's perspective. As such, OUC's proposed numeric conservation goals shown in Table 5-1 are zero for the 2005 through 2014 period. Appendix E presents the results of the cost-effectiveness analysis in support of OUC's proposed numeric conservation goals.

Table 5-1.
OUC Proposed Numeric Conservation Goals

	Residential kW and MWh Reduction			Commercial/Industrial kW and MWh Reduction		
Year	Summer kW	Winter kW	MWh	Summer kW	Winter kW	MWh
2005	0	0	0	0	0	0
2006	0	0	0	0	0	0
2007	0	0	0	0	0	0
2008	0	0	0	0	0	0
2009	0	0	0	0	0	0
2010	0	0	0	0	0	0
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0

Appendix A. Fuel Forecast

Table A-1.
Fuel Forecast (nominal cents/kWh)

Year	Utility Average System Fuel Cost	Replacement Fuel Cost	Avoided Marginal Fuel Cost (Residential)	Increased Marginal Fuel Cost (Residential)	Avoided Marginal Fuel Cost (C&I)	Increased Marginal Fuel Cost (C&I)
2004	2.523	2.523	2.920	2.290	3.000	2.250
2005	2.464	2.464	2.800	2.260	2.870	2.220
2006	2.448	2.448	2.870	2.190	2.970	2.150
2007	2.555	2.555	3.050	2.230	3.220	2.190
2008	2.634	2.658	3.000	2.410	3.090	2.370
2009	2.792	2.851	3.140	2.590	3.250	2.570
2010	2.799	2.804	3.090	2.620	3.180	2.600
2011	2.848	2.867	3.150	2.650	3.270	2.630
2012	2.992	2.999	3.360	2.750	3.540	2.740
2013	3.125	3.128	3.540	2.850	3.740	2.840
2014	3.200	3.203	3.619	2.922	3.837	2.916
2015	3.277	3.280	3.700	2.995	3.936	2.995
2016	3.355	3.359	3.782	3.071	4.038	3.075
2017	3.436	3.439	3.866	3.148	4.142	3.158
2018	3.518	3.522	3.953	3.228	4.250	3.243
2019	3.603	3.606	4.041	3.309	4.360	3.330
2020	3.689	3.693	4.131	3.392	4.472	3.419
2021	3.778	3.782	4.223	3.478	4.588	3.511
2022	3.869	3.872	4.317	3.565	4.707	3.606
2023	3.961	3.965	4.413	3.655	4.829	3.702

Appendix B. DSM Measure Sources

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
Measures Currently Offered by OUC	
Residential Home Energy Survey – Walk-Through	OUC 2004 Conservation Report
Residential Home Energy Survey – Video & CD	OUC 2004 Conservation Report
Residential Home Energy Survey – On-Line Survey	OUC 2004 Conservation Report
Gold Ring Program	OUC 2004 Conservation Report
Residential Insulation Billed Solution	OUC 2004 Conservation Report
Residential Heat Pump	OUC 2004 Conservation Report
Energy Efficiency Rebate – Duct Repair	OUC 2004 Conservation Report
Energy Efficient Rebate – Weatherwise	OUC 2004 Conservation Report
Low-Income Energy Fix-Up	OUC 2004 Conservation Report
Commercial Energy Survey	OUC 2004 Conservation Report
Commercial Lighting	OUC 2004 Conservation Report
Residential New Construction Measures	
Efficient Clothes Washer	www.energystar.gov
Direct Load Control – Main	OUC 2000 Conservation Goals (Docket # 990122-EG)
Direct Load Control – Pool Pumps	OUC 2000 Conservation Goals (Docket # 990122-EG)
Energy Efficient Freezer (Manual)	www.energystar.gov
Compact Fluorescent Lights	www.cmhc-schl.gc.ca, www.hydroonenetworks.com, www.homedepot.com
High Pressure Sodium Lighting (Outdoor)	www.cmhc.schl.gc.ca, RSMeans Electrical Cost Data
On-Call Direct Load Control	OUC 2000 Conservation Goals (Docket # 991788)
Energy Efficient Refrigerator (Frost-Free)	www.energystar.gov
Energy Efficient Refrigerator (Manual)	www.energystar.gov
Light Colored Roof Material	FSEC "Comparative Evaluation of the Impact of Roofing Systems on Residential Cooling Energy Demand in Florida:, RSMeans Building Construction Cost Data

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
High Efficiency Central AC	RSMeans Mechanical Cost Data, Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), Consortium for Energy Efficiency
High Efficiency Room AC	RSMeans Mechanical Cost Data, USDOE-EERE "How to Buy and Energy Efficient Room Air Conditioner", Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
Direct Load Control of Central AC	OUC 1995 Conservation Goals (Docket # 930558-EG), OUC 2000 Conservation Goals (Docket # 990122-EG), FPL Residential On-Call Program
Direct Load Control – Electric Furnace	OUC 1995 Conservation Goals (Docket # 930558-EG), OUC 2000 Conservation Goals (Docket # 990122-EG)
High Efficiency Electric Water Heater	USDOE Center for Energy Efficiency and Renewable Energy, www.energystar.gov, library.energyguide.com
Direct Load Control of Water Heater	OUC 1995 Conservation Goals (Docket # 930558-EG), OUC 2000 Conservation Goals (Docket # 990122-EG), FPL Residential On-Call Program
Supplemental Solar Water Heater	FSEC "Research Highlights from a Large-Scale Residential Monitoring Study in a Hot Climate", Florida Energy Extension Service
Heat Recovery Water Heater	FSEC "Research Highlights from a Large-Scale Residential Monitoring Study in a Hot Climate", Florida Energy Extension Service
Add-On Heat Pump Water Heater	USDOE "Federal Technology Alert: Residential Heat Pump Water Heaters", www.energystar.gov
DWH Pipe Insulation	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Mechanical Cost Data
Commercial and Industrial New Construction Measures	
Business On-Call	FPL 2000 Conservation Goals (Docket # 991788)
Energy Efficient Electric Fryer	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.pge.com
Cool Thermal Storage	www.xcelenergy.com, WSU "Energy Efficiency Fact Sheet: Thermal Energy Storage", Florida Solar Energy Center

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
Incandescent Replacement with Compact Fluorescent	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, hydroonenetworks.com, www.homedepot.com
Incandescent Replacement with 2 x 18 W Compact Fluorescent	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, hydroonenetworks.com, www.homedepot.com
High Efficiency Chiller	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), Florida Solar Energy Center, RSMeans Mechanical Cost Data
High Efficiency Chiller with ASD	www.energyusernews.com, www.wapa.gov, RSMeans Electrical Cost Data
High Efficiency DX AC Units	FSEC "Energy Efficient Design for Florida Educational Facilities", www.fpl.com, www.bchydro.com, RSMeans Mechanical Cost Data
High Efficiency Room AC Units	FSEC "Energy Efficient Design for Florida Educational Facilities", USDOE "How to Buy an Energy Efficient Room Air Conditioner", Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Mechanical Cost Data
Leak Free Ducts	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), ASHRAE Journal "Emerging Technologies: Improved Duct Sealing"
High Efficiency Motors - Chiller	USDOE "Opportunities for Energy Savings in the Residential and Commercial Sectors with High Efficiency Electric Motors", www.ase.org, RSMeans Electrical Cost Data
High Efficiency Motors – DX AC	USDOE "Opportunities for Energy Savings in the Residential and Commercial Sectors with High Efficiency Electric Motors", www.ase.org, RSMeans Electrical Cost Data
Heat Pump Water Heater	US DOE "Federal Technology Alert – Commercial Heat Pump Water Heaters", www.energy.wsu.edu
Heat Recovery Water Heater	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
Residential Existing Construction Measures	
Efficient Clothes Washer	www.energystar.gov
Direct Load Control – Pool Pumps	OUC 2000 Conservation Goals (Docket # 990122-EG)
Direct Load Control - Main	OUC 2000 Conservation Goals (Docket # 990122-EG)

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
Energy Efficient Freezer (Manual)	www.energystar.gov
Compact Fluorescent Lights	www.cmhc-schl.gc.ca, www.hydroonenetworks.com, www.homedepot.com
High Pressure Sodium Lighting (Outdoor)	www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
High Efficiency Pool Pump - Residential	NYSEG "Home Energy Use Guide", USDOE "Opportunities for Energy Savings in the Residential and Commercial Sectors with High Efficiency Electric Motors", RSMeans Electrical Cost Data
On-Call Direct Load Control	FPL 2000 Conservation Goals (Docket # 991788)
Energy Efficient Refrigerator (Frost-Free)	www.energystar.gov
Energy Efficient Refrigerator (Manual)	www.energystar.gov
Ceiling Insulation (R-0 to R-19)	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Building Construction Cost Data
Ceiling Insulation (R-11 to R-30)	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Building Construction Cost Data
Window Film / Reflective Windows	Library.energyguide.com, www.wbdg.org
Low Emissivity Glass	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
Window Shade Screens	Arizona Public Service Company "Energy Answers: Shade Screens and Window Treatments", Home Energy Magazine Online "Snapshots of Shading Options, www.homedepot.com
Light Colored Roof Material	FSEC "Comparative Evaluation of the Impact of Roofing Systems on Residential Cooling Energy Demand in Florida:, RSMeans Building Construction Cost Data
High Efficiency Room AC	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), USDOE-EERE "How to Buy and Energy Efficient Room Air Conditioner", RSMeans Mechanical Cost Data
Air Conditioning System Maintenance	www.energy.iastate.edu/news/pr/pr-acmaintenance.html, www.energystar.gov/index.cfm?c=heat_cool.pr_maintenance

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
Direct Load Control of Central AC	OUC 1995 Conservation Goals (Docket # 930558-EG), OUC 2000 Conservation Goals (Docket # 990122-EG), FPL Residential On-Call Program
Direct Load Control – Electric Furnace	OUC 1995 Conservation Goals (Docket # 930558-EG), OUC 2000 Conservation Goals (Docket # 990122-EG)
High Efficiency Electric Water Heater	USDOE Center for Energy Efficiency and Renewable Energy, www.energystar.gov, library.energyguide.com
Direct Load Control of Water Heater	OUC 1995 Conservation Goals (Docket # 930558-EG), OUC 2000 Conservation Goals (Docket # 990122-EG), FPL Residential On-Call Program
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Heat Recovery Water Heater	FSEC "Research Highlights from a Large-Scale Residential Monitoring Study in a Hot Climate", Florida Energy Extension Service
Add-On Heat Pump Water Heater	USDOE "Federal Technology Alert: Residential Heat Pump Water Heaters", www.energystar.gov
DWH Tank Insulation	Frontier Associates, LLC for Texas PUC "Deemed Savings: Installation & Efficiency Standards", RSMeans Mechanical Cost Data
DWH Pipe Insulation	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Mechanical Cost Data
DWH Heat Trap	FSEC "Research Highlights from a Large Scale Residential Monitoring Study in a Hot Climate", www.dcec.com
Low-Flow Showerhead	Frontier Associates, LLC for Texas PUC "Deemed Savings: Installation & Efficiency Standards", RSMeans Mechanical Cost Data
Commercial and Industrial Existing Construction Measures	
Business On-Call	FPL 2000 Conservation Goals (Docket # 991788)
Energy Efficient Electric Fryer	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.pge.com
Cool Thermal Storage	www.xcelenergy.com, WSU "Energy Efficiency Fact Sheet: Thermal Energy Storage", Florida Solar Energy Center

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
4' 34 W with Reflector Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
8' 75 W Delamping with Reflector Kit	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
High Pressure Sodium Lighting (70 W/100 W/150 W/250 W) Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
Outdoor High Pressure Sodium Lighting (70 W) Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
Incandescent Replacement with Compact Fluorescent	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, www.hydroonenetworks.com, www.homedepot.com
Incandescent Replacement with 2 18 W Compact Fluorescent	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, www.hydroonenetworks.com, www.homedepot.com
4' Fluorescent with Electronic Ballast Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, SKR Energy Systems
8' Fluorescent with Electronic Ballast Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, SKR Energy Systems
4' T8 Lamp Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
4' Fluorescent with Reflector Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
4' Fluorescent with T8 and Reflector Replacement	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.cmhc-schl.gc.ca, RSMeans Electrical Cost Data
Off-Peak Battery Charging	FPL Docket No. 971004-EG & FPL Supplemental Data Request for FPL 1999 Ten-Year Site Plan
Multiplex Refrigeration System with no Sub-Cooling	LBNL "Technology Data Characterizing Refrigeration in Commercial Buildings", IEA "Annex 26: Advanced Supermarket Refrigeration and Heat Recovery Systems"

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
Multiplex Refrigeration System with Ambient Sub-Cooling	LBNL "Technology Data Characterizing Refrigeration in Commercial Buildings", IEA "Annex 26: Advanced Supermarket Refrigeration and Heat Recovery Systems"
Multiplex Refrigeration System with Mechanical Sub-Cooling	LBNL "Technology Data Characterizing Refrigeration in Commercial Buildings", IEA "Annex 26: Advanced Supermarket Refrigeration and Heat Recovery Systems"
Multiplex Refrigeration System: Ambient and Mechanical Sub-Cooling	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
High Efficiency Chiller	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), Florida Solar Energy Center, RSMeans Mechanical Cost Data
Roof Insulation - Chiller	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Building Construction Cost Data
Roof Insulation – DX AC	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Building Construction Cost Data
High Efficiency Chiller with ASD	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), www.energyusernews.com, www.wapa.gov, RSMeans Electrical Cost Data
Window Film - Chiller	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
Window Film – DX AC	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
Light Colored Roof – Air Chiller	www.bchydro.com, www.energy.wsu.edu
Light Colored Roof – Water Chiller	www.bchydro.com, www.energy.wsu.edu
Light Colored Roof – DX AC	www.bchydro.com, www.energy.wsu.edu
High Efficiency DX AC Units	FSEC "Energy Efficient Design for Florida Educational Facilities", www.fpl.com, www.bchydro.com, RSMeans Mechanical Cost Data
High Efficiency Room AC Units	FSEC "Energy Efficient Design of Florida Educational Facilities", USDOE "How to Buy an Energy Efficient Room Air Conditioner", Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Mechanical Cost Data

Table B-1.
DSM Measure Sources

DSM Measures	Data Source
2-Speed Motor for Cooling Tower	USDOE "Opportunities for Energy Savings in the Residential and Commercial Sectors with High Efficiency Electric Motors", Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Electrical Cost Data
Speed Control for Cooling Tower Motors	USDOE "Opportunities for Energy Savings in the Residential and Commercial Sectors with High Efficiency Electric Motors", Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Electrical Cost Data
Leak Free Ducts	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), ASHRAE Journal "Emerging Technologies: Improved Duct Sealing"
High Efficiency Motors - Chiller	USDOE "Opportunities for Energy Savings in the Residential and Commercial Sectors with High Efficiency Electric Motors", www.ase.org, RSMeans Electrical Cost Data
High Efficiency Motors – DX AC	USDOE "Opportunities for Energy Savings in the Residential and Commercial Sectors with High Efficiency Electric Motors", www.ase.org, RSMeans Electrical Cost Data
Heat Pump Water Heater	US DOE "Federal Technology Alert – Commercial Heat Pump Water Heaters", www.energy.wsu.edu
Heat Recovery Water Heater	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
Water Heater Insulation	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG), RSMeans Mechanical Cost Data
Water Heater Heat Trap	Lakeland McIntosh 5 Need for Power (Docket # 990023-EG)
Low or Variable Flow Showerhead	www.cpuc.ca.gov, www.eere.energy.gov, energydepot.com

Appendix C. DSM Measure Assumptions

Table C-1.
Residential New Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
Efficient Clothes Washer - New - Residential	0.25	0	361	25	0	300	0	0
Direct Load Control - Pool Pumps - New - Residential	0.75	0	0	242.33	41.34	0	0	23.7
Direct Load Control - Main - New -Residential	1.97	0	0	242.33	51.88	0	0	63.3
Energy Efficient Freezer (Manual) - New - Residential	0.02	0	62	25	0	33	0	0
Compact Fluorescent Lights - New - Residential	0.3	0	600	25	0	122	0	0
High Pressure Sodium (Outdoor) - New - Residential	0.03	0	132	25	0	0	0	0
On-Call Direct Load Control - Residential	1.21	0	23	32.66	0	0	0	71.96
Energy Efficient Refrigerator (Frost-Free) - New - Residential	0.02	0	75	25	0	50	0	0
Energy Efficient Refrigerator (Manual) - New - Residential	0.02	0	68	25	0	50	0	0
Light Colored Roof Material - New - Residential	0.79	0	1610	25	0	2191	0	0
High Efficiency Central AC - New - Residential	0.83	0	1819	25	0	483	0	0
High Efficiency Room AC - New - Residential	0.27	0	597	25	0	126	0	0
Direct Load Control of Central AC - New - Residential	0.93	0	0	242.33	51.88	0	0	21
Direct Load Control - Electric Furnace - New - Residential	1.5	0	0	242.33	51.88	0	0	30
High Efficiency Electric Water Heater - New - Residential	0.29	0	333	25	0	75	35	0
Direct Load Control of Water Heater - New - Residential	0.478	0	0	242.33	51.88	0	0	18
Supplemental Solar Water Heater - New - Residential	0.21	0	1420	25	0	4997	0	0
Heat Recovery Water Heater - New - Residential	0.104	0	636	25	0	400	0	0
Add-On Heat Pump Water Heater - New - Residential	0.2	0	1739	25	0	700	0	0
DWH Pipe Insulation - Existing - Residential	0.014	0	33	25	0	234	0	0

Table C-2.
Commercial & Industrial New Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
Business On-Call Direct Load Control - New - GSND	0.85	0	60	32.24	0	0	0	38.95
Business On-Call Direct Load Control - New - GSD	0.85	0	60	32.24	0	0	0	38.95
Business On-Call Direct Load Control - New - GSLD	0.85	0	60	32.24	0	0	0	38.95
Energy Efficient Electric Fryer - New - GSD	0.4	0	876	50	0	1000	0	0
Energy Efficient Electric Fryer - New - GS	0.4	0	876	50	0	1000	0	0
Energy Efficient Electric Fryer - New - GSLD	0.4	0	876	50	0	1000	0	0
Cool Thermal Storage - New - GSD	37.45	16516	15729	50	0	18000	9363	0
Cool Thermal Storage - New - GSLD	90.4	39868	37969	50	0	54000	22601	0
Incandescent Replacement w/ Compact Fluorescent - New - GS	1.75	0	7700	50	0	610	0	0
Incandescent Replacement w/ Compact Fluorescent - New - GSD	1.75	0	7700	50	0	610	0	0
Incandescent Replacement w/ Compact Fluorescent - New - GSLD	1.75	0	7700	50	0	610	0	0
Incandescent Replacement w/ 2 18W Compact Fluorescent - New - GS	1.14	0	5016	50	0	120	0	0
Incandescent Replacement w/ 2 18W Compact Fluorescent - New - GSD	1.14	0	5016	50	0	120	0	0
Incandescent Replacement w/ 2 18W Compact Fluorescent - New - GSLD	1.14	0	5016	50	0	120	0	0
High Efficiency Chiller - New - GSD	22.94	0	50234	50	0	5000	0	0
High Efficiency Chiller - New - GSLD	18.02	0	39473	50	0	14176	0	0
High Efficiency Chiller w/ASD - New - GSD	18.08	0	39596	50	0	12204	0	0
High Efficiency Chiller w/ASD - New - GSLD	32.87	0	71979	50	0	20827	0	0
High Efficiency DX AC Units - New - GS	1.21	0	3439	50	0	2151	0	0
High Efficiency DX AC Units - New - GSD	6.28	0	13755	50	0	24035	0	0
High Efficiency DX AC Units - New - GSLD	31.4	0	68774	50	0	62404	0	0
High Efficiency Room AC Units - New - GS	0.4	0	883	50	0	79	0	0
Leak Free Ducts - New - GSND	0.18	0	394	50	0	2000	0	0
Leak Free Ducts - New - GSD	0.72	0	1577	50	0	8000	0	0
Leak Free Ducts - New - GSLD	3.6	0	7884	50	0	40000	0	0
High Efficiency Motors - Chiller - New - GSD	6.4	0	14026	50	0	1307	0	0
High Efficiency Motors - Chiller - New - GSLD	6.4	0	14026	50	0	1307	0	0
High Efficiency Motors - DX AC New - GS	0.377	0	827	50	0	122	0	0

Table C-2 (continued).
Commercial & Industrial New Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
High Efficiency Motors - DX AC - New - GSD	1.277	0	2797	50	0	201	0	0
High Efficiency Motors - DX AC - New - GSLD	5.294	0	11594	50	0	868	0	0
Heat Pump Water Heater - New - GSND	4.44	0	19453	50	0	5000	0	0
Heat Pump Water Heater - New - GSD	17.77	0	77811	50	0	16000	0	0
Heat Pump Water Heater - New - GSLD	22.21	0	194527	50	0	18000	0	0
Heat Recovery Water Heater - New - GSND	0.702	0	2383.87	50	0	693	0	0
Heat Recovery Water Heater - New - GSD	0.702	0	2383.87	50	0	693	0	0
Heat Recovery Water Heater - New - GSLD	0.702	0	2383.87	50	0	693	0	0

Table C-3
Residential Existing Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
Efficient Clothes Washer - Existing - Residential	0.5	0	808	25	0	750	0	0
Direct Load Control - Pool Pumps - Existing - Residential	0.75	0	0	242.33	41.34	0	0	23.7
Direct Load Control - Main - Existing -Residential	1.97	0	0	242.33	51.88	0	0	63.3
Energy Efficient Freezer (Manual) - Freezer - Existing - Residential	0.07	0	276	25	0	362	0	0
Compact Fluorescent Lights - Existing - Residential	0.3	0	600	25	0	122	0	0
High Pressure Sodium (Outdoor) - Existing - Residential	0.03	0	132	25	0	0	0	0
High Efficiency Pool Pump - Existing - Residential	0.03	0	69	25	0	306	0	0
Remove Second Freezer - Residential	0.21	0	1556.2	67.09	0	0	0	0
Remove Second Refrigerator - Residential	0.21	0	1707	67.09	0	0	0	0
On-Call Direct Load Control - Residential	1.21	0	23	32.66	0	0	0	71.96
Energy Efficient Refrigerator (Frost-Free) - Existing - Residential	0.17	0	588	25	0	1140	0	0
Energy Efficient Refrigerator (Manual) - Existing - Residential	0.09	0	309	25	0	500	0	0
Ceiling Insulation (R0-R19) - Existing - Residential	0.461	0	1010	25	0	495	0	0
Ceiling Insulation (R11-R30) - Existing - Residential	0.189	0	414	25	0	495	0	0
Window Film / Reflective Windows - Existing - Residential	0.36	0	788	25	0	750	0	0
Low Emissivity Glass - Existing - Residential	0.975	0	2135	25	0	1358	0	0
Window Shade Screens - Existing - Residential	1.03	0	1892	25	0	1000	0	0
Light Colored Roof Material - Existing - Residential	0.79	0	1610	25	0	9142	0	0
High Efficiency Central AC - Existing - Residential	0.83	0	1819	25	0	5308	0	0
High Efficiency Room AC - Existing - Residential	0.27	0	597	25	0	1263	0	0
Air Conditioning System Maintenance - Existing - Residential	0.36	0	631	25	0	125	0	0
Direct Load Control of Central AC - Existing - Residential	0.93	0	0	242.33	51.88	0	0	21
Direct Load Control - Electric Furnace - Existing - Residential	1.5	0	0	242.33	51.88	0	0	30
High Efficiency Electric Water Heater - Existing - Residential	0.43	0	484	25	0	500	0	0
Direct Load Control of Water Heater - Existing - Residential	0.478	0	0	242.33	51.88	0	0	18
Supplemental Solar Water Heater - Existing - Residential	0.21	0	1420	25	0	4997	0	0
Heat Recovery Water Heater - Existing - Residential	0.104	0	636	25	0	400	0	0
Add-On Heat Pump Water Heater - Existing - Residential	0.21	0	1867	25	0	1000	0	0

Table C-3 (continued).
Residential Existing Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
DHW Tank Insulation - Existing - Residential	0.01	0	100	25	0	16.25	0	0
DWH Pipe Insulation - Existing - Residential	0.014	0	33	25	0	67	0	0
DWH Heat Trap - Existing - Residential	0.09	0	102	25	0	10	0	0
Low-Flow Showerhead - Existing - Residential	0.04	0	335	25	0	10	0	0

Table C-4.
Commercial & Industrial Existing Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
Business On-Call Direct Load Control - Existing - GSND	0.85	0	60	32.24	0	0	0	38.95
Business On-Call Direct Load Control - Existing - GSD	0.85	0	60	32.24	0	0	0	38.95
Business On-Call Direct Load Control - Existing - GSLD	0.85	0	60	32.24	0	0	0	38.95
Energy Efficient Electric Fryer - Existing - GSD	0.4	0	876	50	0	3500	0	0
Energy Efficient Electric Fryer - Existing - GSND	0.4	0	876	50	0	3500	0	0
Energy Efficient Electric Fryer - Existing - GSLD	0.4	0	876	50	0	3500	0	0
Cool Thermal Storage - Existing - GSD	43.25	19073	18165	50	0	18000	10812	0
Cool Thermal Storage - Existing - GSLD	129.75	57219	54494	50	0	54000	32437	0
4' 34W w/ Reflector Replacement - Existing - GSND	2.13	0	9381	50	0	440	0	0
4' 34W w/ Reflector Replacement - Existing - GSD	2.13	0	9381	50	0	440	0	0
4' 34W w/ Reflector Replacement - Existing - GSLD	2.13	0	9381	50	0	440	0	0
8' 75W Delamping w/ Reflector Kit - Existing - GSND	1.54	0	6776	50	0	720	0	0
8' 75W Delamping w/ Reflector Kit - Existing - GSD	1.54	0	6776	50	0	720	0	0
8' 75W Delamping w/ Reflector Kit - Existing - GSLD	1.54	0	6776	50	0	720	0	0
High Pressure Sodium (70W/100W/150W/250W) Replacement - Existing - GSND	1.78	0	7810	50	0	12497	0	0
High Pressure Sodium (70W/100W/150W/250W) Replacement - Existing - GSD	1.78	0	7810	50	0	12497	0	0
High Pressure Sodium (70W/100W/150W/250W) Replacement - Existing - GSLD	1.78	0	7810	50	0	12497	0	0
Outdoor High Pressure Sodium (70W) Replacement - Existing - GSND	0.4	0	1760	50	0	2987	0	0
Outdoor High Pressure Sodium (70W) Replacement - Existing - GSD	0.4	0	1760	50	0	2987	0	0
Outdoor High Pressure Sodium (70W) Replacement - Existing - GSLD	0.4	0	1760	50	0	2987	0	0
Incandescent Replacement w/ Compact Fluorescent - Existing - GSND	1.75	0	7700	50	0	610	0	0
Incandescent Replacement w/ Compact Fluorescent - GSD	1.75	0	7700	50	0	610	0	0
Incandescent Replacement w/ Compact Fluorescent - GSLD	1.75	0	7700	50	0	610	0	0
Incandescent Replacement w/ 2 18W Compact Fluorescent - Existing - GS	1.14	0	5016	50	0	500	0	0

Table C-4 (continued)
Commercial & Industrial Existing Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
Incandescent Replacement w/ 2 18W Compact Fluorescent - Existing - GSLD	1.14	0	5016	50	0	500	0	0
4' Fluorescent w/ Electronic Ballast Replacement - Existing - GSND	0.36	0	1584	50	0	2210.66	0	0
4' Fluorescent w/ Electronic Ballast Replacement - Existing - GSD	0.36	0	1584	50	0	2210.66	0	0
4' Fluorescent w/ Electronic Ballast Replacement - Existing - GSLD	0.36	0	1584	50	0	2210.66	0	0
8' Fluorescent w/ Electronic Ballast Replacement - Existing - GSND	1.18	0	5192	50	0	0	0	0
8' Fluorescent w/ Electronic Ballast Replacement - GSD	1.18	0	5192	50	0	0	0	0
8' Fluorescent w/ Electronic Ballast Replacement - GSLD	1.18	0	5192	50	0	0	0	0
4' T8 Lamp Replacement - Existing - GSND	0.66	0	2904	50	0	0	0	0
4' T8 Lamp Replacement - Existing - GSD	0.66	0	2904	50	0	0	0	0
4' T8 Lamp Replacement - Existing - GSLD	0.66	0	2904	50	0	0	0	0
4' Fluorescent with Reflector Replacement - Existing - GSND	1.86	0	8184	50	0	440	0	0
4' Fluorescent with Reflector Replacement - Existing - GSD	1.86	0	8184	50	0	440	0	0
4' Fluorescent with Reflector Replacement - Existing - GSLD	1.86	0	8184	50	0	440	0	0
4' Fluorescent with Reflector Replacement - Existing - GSND	2.52	0	11088	50	0	670	0	0
4' Fluorescent with Reflector Replacement - Existing - GSD	2.52	0	11088	50	0	670	0	0
4' Fluorescent with Reflector Replacement - Existing - GSLD	2.52	0	11088	50	0	670	0	0
Off-Peak Battery Charging - Existing - GSD	1	0	0	73.78	0	285.73	0	0
Off-Peak Battery Charging - Existing - GSLD	1	0	0	73.78	0	285.73	0	0
Multiplex Refrigeration with No Sub-cooling - Existing - GSD	9.79	0	85737	50	0	120158	0	0
Multiplex Refrigeration with No Sub-cooling - Existing - GSLD	9.79	0	85737	50	0	120158	0	0
Multiplex Refrigeration with Ambient Sub-cooling - Existing - GSD	10.98	0	96163	50	0	123808	0	0
Multiplex Refrigeration with Ambient Sub-cooling - Existing - GSLD	10.98	0	96163	50	0	123808	0	0

Table C-4 (continued)
Commercial & Industrial Existing Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
Multiplex Refrigeration with Mechanical Sub-cooling - Existing - GSLD	17.93	0	1431	50	0	124932	0	0
Multiplex Refrigeration: Ambient and Mechanical Sub-cooling - Existing - GSD	16	0	149549.5	50	0	26895	0	0
Multiplex Refrigeration: Ambient and Mechanical Sub-cooling - Existing - GSLD	16	0	149549.5	50	0	26895	0	0
High Efficiency Chiller - Existing - GSD	26.23	0	57445	50	0	35000	0	0
High Efficiency Chiller - Existing - GSLD	22.34	0	48927	50	0	89831	0	0
Roof Insulation - Chiller - Existing - GSD	2.89	0	6329	50	0	14681	0	0
Roof Insulation - Chiller - Existing - GSLD	2.89	0	6329	50	0	73404	0	0
Roof Insulation - DX AC - Existing - GSND	2.39	0	5238	50	0	7340	0	0
Roof Insulation - DX AC - Existing - GSD	2.39	0	5238	50	0	14681	0	0
Roof Insulation - DX AC - Existing - GSLD	2.39	0	5238	50	0	73404	0	0
High Efficiency Chiller w/ASD - Existing - GSD	18.08	0	39596	50	0	12204	0	0
High Efficiency Chiller w/ASD - Existing - GSLD	32.87	0	71979	50	0	20827	0	0
Window Film - Chiller - Existing - GSD	2.275	0	4982	50	0	1390	0	0
Window Film - Chiller - Existing - GSLD	2.275	0	4982	50	0	1390	0	0
Window Film - DX AC - Existing - GSND	2.61	0	5716	50	0	1390	0	0
Window Film - DX AC - Existing - GSD	2.61	0	5716	50	0	1390	0	0
Window Film - DX AC - Existing - GSLD	2.61	0	5716	50	0	1390	0	0
Light Colored Roof - Air Chiller - GSD	15.89	0	34793	50	0	10000	0	0
Light Colored Roof - Air Chiller - Existing - GSLD	31.77	0	69586	50	0	50000	0	0
Light Colored Roof - Water Chiller - Existing - GSD	12.97	0	28415	50	0	10000	0	0
Light Colored Roof - Water Chiller - Existing - GSLD	21.43	0	46935	50	0	50000	0	0
Light Colored Roof - DX AC - Existing - GSND	1.01	0	2215	50	0	5000	0	0
Light Colored Roof - DX AC - Existing - GSD	4.04	0	8858	50	0	10000	0	0
Light Colored Roof - DX AC - Existing - GSLD	20.22	0	44292	50	0	50000	0	0
High Efficiency DX AC Units - Existing - GSND	2.13	0	4656	50	0	5329	0	0
High Efficiency DX AC Units - GSD	8.5	0	18625	50	0	27364	0	0
High Efficiency DX AC Units - GSLD	44.65	0	97783	50	0	130600	0	0
High Efficiency Room AC Units - Existing - GSND	0.7	0	1531	50	0	870	0	0
2-Speed Motor for Cooling Tower - Existing - GSD	0.9	0	1961	50	0	530	0	0
2-Speed Motor for Cooling Tower - Existing - GSLD	0.9	0	1961	50	0	530	0	0

Table C-4 (continued)
Commercial & Industrial Existing Construction Measure Assumptions

Measure	Customer kW Reduction at the Meter	Customer kWh Increase at the Meter	Customer kWh Reduction at the Meter	Utility Non-Recurring Cost per Customer	Utility Recurring Cost per Customer	Customer Equipment Cost	Utility Non-Recurring Rebate/ Incentive	Utility Recurring Rebate/ Incentive
Speed Control for Cooling Tower Motors - Existing - GSD	1.12	0	2451	50	0	1852	0	0
Speed Control for Cooling Tower Motors - Existing - GSLD	1.12	0	2451	50	0	1852	0	0
Leak Free Ducts - Existing - GSND	0.47	0	1033	50	0	2000	0	0
Leak Free Ducts - Existing - GSD	1.89	0	4134	50	0	8000	0	0
Leak Free Ducts - Existing - GSLD	9.44	0	20670	50	0	40000	0	0
High Efficiency Motors - Chiller - Existing - GSD	6.4	0	14026	50	0	7844	0	0
High Efficiency Motors - Chiller - Existing- GSLD	6.4	0	14026	50	0	7844	0	0
High Efficiency Motors - DX AC - GSND	0.377	0	827	50	0	735	0	0
High Efficiency Motors - DX AC - GSD	1.277	0	2797	50	0	1208	0	0
High Efficiency Motors - DX AC - GSLD	5.294	0	11594	50	0	5209	0	0
Heat Pump Water Heater - Existing - GSND	4.66	0	20398	50	0	5000	0	0
Heat Pump Water Heater - Existing - GSD	18.63	0	81594	50	0	16000	0	0
Heat Pump Water Heater - Existing - GSLD	23.29	0	203984	50	0	18000	0	0
Heat Recovery Water Heater - Existing - GSND	0.702	0	2383.87	50	0	693	0	0
Heat Recovery Water Heater - Existing - GSD	0.702	0	2383.87	50	0	693	0	0
Heat Recovery Water Heater - Existing - GSLD	0.702	0	2383.87	50	0	693	0	0
Domestic Water Heater Insulation - Existing - GSND	0.1	0	477	50	0	16.25	0	0
Domestic Water Heater Insulation - Existing - GSD	0.1	0	477	50	0	16.25	0	0
Domestic Water Heater Insulation - Existing - GSLD	0.1	0	477	50	0	16.25	0	0
DWH Heat Trap - Existing - GSND	0.04	0	954	50	0	7.25	0	0
DWH Heat Trap - Existing - GSD	0.04	0	954	50	0	7.25	0	0
DWH Heat Trap - Existing - GSLD	0.04	0	954	50	0	7.25	0	0
Low or Variable Flow Showerhead - Existing - GSND	0.3	0	1431	50	0	5.74	0	0
Low or Variable Flow Showerhead - Existing - GSD	0.3	0	1431	50	0	5.74	0	0
Low or Variable Flow Showerhead - Existing - GSLD	0.3	0	1431	50	0	5.74	0	0

Appendix D. Existing OUC Measures

Table D-1.
Existing OUC Conservation Program Cost-Effectiveness

Measure	Rate Impact Test	Participant Test	Total Resource Test
Energy Efficiency Rebate -Duct Repair - Residential	0.32	1.37	0.43
Energy Efficiency Rebate -Weatherwise - Residential	0.55	2.62	1.31
Low Income Energy Fix Up - Residential	0.39	1.88	0.49
Efficient Electric Heat Pump - Residential	0.82	0.24	0.20
Energy Survey (On-Line) - Residential	0.33	1.00	2.99
Energy Survey (Video & CD) - Residential	0.37	1.00	12.57
Energy Survey (Walk-Through) - Residential	0.31	1.00	1.77
Gold Ring - Residential	0.32	0.16	0.06
Insulation Billed Solution - Residential	0.31	1.00	2.70
Commercial Energy Survey - GSND	0.77	1.00	299.56
Commercial Lighting - GSD	0.54	1.00	0.79

Appendix E. Cost-Effectiveness Results Summary

Table E-1.
Residential New Construction Cost-Effectiveness Results

Measure	Rate Impact Test	Participant Test	Total Resource Test
Efficient Clothes Washer - New - Residential	0.57	0.85	0.48
Direct Load Control - Pool Pumps - New - Residential	0.54	1.00	0.79
Direct Load Control - Main - New -Residential	0.93	1.00	1.83
Energy Efficient Freezer (Manual) - New - Residential	0.44	1.32	0.57
Compact Fluorescent Lights - New - Residential	0.51	0.00	0.12
High Pressure Sodium (Outdoor) - New - Residential	0.43	0.00	0.03
On-Call Direct Load Control - Residential	0.98	1.00	41.38
Energy Efficient Refrigerator (Frost-Free) - New - Residential	0.43	1.06	0.45
Energy Efficient Refrigerator (Manual) - New - Residential	0.43	0.96	0.42
Light Colored Roof Material - New - Residential	0.51	0.52	0.27
High Efficiency Central AC - New - Residential	0.50	2.66	1.33
High Efficiency Room AC - New - Residential	0.50	3.34	1.64
Direct Load Control of Central AC - New - Residential	0.65	1.00	0.87
Direct Load Control - Electric Furnace - New - Residential	0.96	1.00	1.40
High Efficiency Electric Water Heater - New - Residential	0.60	3.19	1.87
Direct Load Control of Water Heater - New - Residential	0.35	1.00	0.45
Supplemental Solar Water Heater - New - Residential	0.42	0.20	0.08
Heat Recovery Water Heater - New - Residential	0.42	1.12	0.47
Add-On Heat Pump Water Heater - New - Residential	0.41	1.75	0.71
DWH Pipe Insulation - Existing - Residential	0.44	0.10	0.05

Table E-2.
Commercial New Construction Cost-Effectiveness Results

Measure	Rate Impact Test	Participant Test	Total Resource Test
Business On-Call Direct Load Control - New - GSND	0.47	1.00	44.99
Business On-Call Direct Load Control - New - GSD	0.19	1.00	44.99
Business On-Call Direct Load Control - New - GSLD	0.19	1.00	44.99
Energy Efficient Electric Fryer - New - GSD	0.60	0.73	0.44
Energy Efficient Electric Fryer - New - GS	0.64	0.69	0.44
Energy Efficient Electric Fryer - New - GSLD	0.62	0.72	0.44
Cool Thermal Storage - New - GSD	0.74	1.93	1.31
Cool Thermal Storage - New - GSLD	0.74	1.56	1.05
Incandescent Replacement w/ Compact Fluorescent - New - GS	0.52	8.14	4.17
Incandescent Replacement w/ Compact Fluorescent - New - GSD	0.63	6.79	4.17
Incandescent Replacement w/ Compact Fluorescent - New - GSLD	0.65	6.59	4.17
Incandescent Replacement w/ 2 18W Compact Fluorescent - New – GS	0.52	26.97	12.58
Incandescent Replacement w/ 2 18W Compact Fluorescent - New – GSD	0.63	22.47	12.58
Incandescent Replacement w/ 2 18W Compact Fluorescent - New – GSLD	0.64	21.82	12.58
High Efficiency Chiller - New - GSD	0.50	7.55	3.78
High Efficiency Chiller - New - GSLD	0.51	2.04	1.05
High Efficiency Chiller w/ASD - New - GSD	0.50	2.44	1.22
High Efficiency Chiller w/ASD - New - GSLD	0.51	2.54	1.30
High Efficiency DX AC Units - New - GS	0.50	1.13	0.56
High Efficiency DX AC Units - New - GSD	0.50	0.43	0.21
High Efficiency DX AC Units - New - GSLD	0.51	0.81	0.41
High Efficiency Room AC Units - New - GS	0.53	7.89	3.88
Leak Free Ducts - New - GSND	0.52	0.14	0.07
Leak Free Ducts - New - GSD	0.50	0.15	0.07
Leak Free Ducts - New - GSLD	0.51	0.14	0.07
High Efficiency Motors - Chiller - New - GSD	0.50	8.06	4.02
High Efficiency Motors - Chiller - New - GSLD	0.51	7.88	4.02
High Efficiency Motors - DX AC - New - GS	0.52	4.78	2.41
High Efficiency Motors - DX AC - New - GSD	0.50	10.44	5.05
High Efficiency Motors - DX AC - New - GSLD	0.51	9.80	4.96
Heat Pump Water Heater – New - GSND	0.47	2.75	1.28
Heat Pump Water Heater – New - GSD	0.56	2.87	1.61
Heat Pump Water Heater – New - GSLD	0.63	5.31	3.32
Heat Recovery Water Heater - New - GSND	0.48	2.43	1.17
Heat Recovery Water Heater - New - GSD	0.54	2.19	1.17
Heat Recovery Water Heater - New - GSLD	0.55	2.13	1.17

Table E-3.
Residential Existing Construction Cost-Effectiveness Results

Measure	Rate Impact Test	Participant Test	Total Resource Test
Efficient Clothes Washer - Existing - Residential	0.55	0.76	0.42
Direct Load Control - Pool Pumps - Existing - Residential	0.54	1.00	0.79
Direct Load Control - Main - Existing -Residential	0.93	1.00	1.83
Energy Efficient Freezer (Manual) - Freezer - Existing - Residential	0.44	0.54	0.24
Compact Fluorescent Lights - Existing - Residential	0.51	0.00	0.12
High Pressure Sodium (Outdoor) - Existing - Residential	0.43	0.00	0.02
High Efficiency Pool Pump - Existing - Residential	0.47	0.16	0.08
Remove Second Freezer - Residential	0.41	1.00	52.06
Remove Second Refrigerator - Residential	0.41	1.00	56.64
On-Call Direct Load Control - Residential	0.98	1.00	41.38
Energy Efficient Refrigerator (Frost-Free) - Existing - Residential	0.46	0.36	0.17
Energy Efficient Refrigerator (Manual) - Existing - Residential	0.45	0.44	0.20
Ceiling Insulation (R0-R19) - Existing - Residential	0.50	1.44	0.72
Ceiling Insulation (R19-R30) - Existing - Residential	0.50	0.59	0.30
Window Film / Reflective Windows - Existing - Residential	0.50	0.74	0.37
Low Emissivity Glass - Existing - Residential	0.50	1.11	0.56
Window Shade Screens - Existing - Residential	0.53	1.33	0.71
Light Colored Roof Material - Existing - Residential	0.51	0.12	0.06
High Efficiency Central AC - Existing - Residential	0.50	0.24	0.12
High Efficiency Room AC - Existing - Residential	0.50	0.33	0.17
Air Conditioning System Maintenance - Existing - Residential	0.53	3.56	1.87
Direct Load Control of Central AC - Existing - Residential	0.65	1.00	0.87
Direct Load Control - Electric Furnace - Existing - Residential	0.96	1.00	1.40
High Efficiency Electric Water Heater - Existing - Residential	0.62	0.68	0.43
Direct Load Control of Water Heater - Existing - Residential	0.35	1.00	0.45
Supplemental Solar Water Heater - Existing - Residential	0.42	0.20	0.08
Heat Recovery Water Heater - Existing - Residential	0.42	1.12	0.47
Add-On Heat Pump Water Heater - Existing - Residential	0.41	1.32	0.54
DHW Tank Insulation - Existing - Residential	0.39	4.34	1.46
DWH Pipe Insulation - Existing - Residential	0.44	0.35	0.16
DWH Heat Trap - Existing - Residential	0.60	7.19	3.39

Table E-4.
Commercial Existing Construction Cost-Effectiveness Results

Measure	Rate Impact Test	Participant Test	Total Resource Test
Business On-Call Direct Load Control - Existing - GSND	0.46	1.00	44.20
Business On-Call Direct Load Control - Existing - GSD	0.19	1.00	44.20
Business On-Call Direct Load Control - Existing - GSLD	0.19	1.00	44.20
Energy Efficient Electric Fryer - Existing - GSD	0.50	0.19	0.09
Energy Efficient Electric Fryer - Existing - GSND	0.53	0.18	0.09
Energy Efficient Electric Fryer - Existing - GSLD	0.51	0.18	0.09
Cool Thermal Storage - Existing - GSD	0.45	1.76	0.54
Cool Thermal Storage - Existing - GSLD	0.44	1.76	0.54
4' 34W w/ Reflector Replacement - Existing - GSND	0.52	13.76	6.97
4' 34W w/ Reflector Replacement - Existing - GSD	0.63	11.46	6.97
4' 34W w/ Reflector Replacement - Existing - GSLD	0.65	11.13	6.97
8' 75W Delamping w/ Reflector Kit - Existing - GSND	0.52	6.07	3.12
8' 75W Delamping w/ Reflector Kit - Existing - GSD	0.63	5.06	3.12
8' 75W Delamping w/ Reflector Kit - Existing - GSLD	0.65	4.91	3.12
High Pressure Sodium (70W/100W/150W/250W) Replacement - Existing - GSND	0.52	0.40	0.21
High Pressure Sodium (70W/100W/150W/250W) Replacement - Existing - GSD	0.63	0.34	0.21
High Pressure Sodium (70W/100W/150W/250W) Replacement - Existing - GSLD	0.65	0.33	0.21
Outdoor High Pressure Sodium (70W) Replacement - Existing - GSND	0.52	0.38	0.20
Outdoor High Pressure Sodium (70W) Replacement - Existing - GSD	0.62	0.32	0.20
Outdoor High Pressure Sodium (70W) Replacement - Existing - GSLD	0.64	0.31	0.20
Incandescent Replacement w/ Compact Fluorescent - Existing - GSND	0.52	8.14	4.17
Incandescent Replacement w/ Compact Fluorescent - Existing - GSD	0.63	6.79	4.17
Incandescent Replacement w/ Compact Fluorescent - Existing - GSLD	0.65	6.59	4.17
Incandescent Replacement w/ 2 18W Compact Fluorescent - Existing - GS	0.52	6.47	3.29
Incandescent Replacement w/ 2 18W Compact Fluorescent - Existing - GSD	0.63	5.39	3.29
Incandescent Replacement w/ 2 18W Compact Fluorescent - Existing - GSLD	0.64	5.24	3.29
4' Fluorescent w/ Electronic Ballast Replacement - Existing - GSND	0.52	0.46	0.24
4' Fluorescent w/ Electronic Ballast Replacement - Existing - GSD	0.62	0.39	0.24
4' Fluorescent w/ Electronic Ballast Replacement - Existing - GSLD	0.64	0.37	0.24
8' Fluorescent w/ Electronic Ballast Replacement - Existing - GSND	0.52	1.00	117.90
8' Fluorescent w/ Electronic Ballast Replacement - GSD	0.63	1.00	117.90
8' Fluorescent w/ Electronic Ballast Replacement - GSLD	0.64	1.00	117.90
4' T8 Lamp Replacement - Existing - GSND	0.52	1.00	65.94
4' T8 Lamp Replacement - Existing - GSD	0.62	1.00	65.94

Table E-4 (continued).
Commercial Existing Construction Cost-Effectiveness Results

Measure	Rate Impact Test	Participant Test	Total Resource Test
4' T8 Lamp Replacement - Existing - GSLD	0.64	1.00	65.94
4' Fluorescent with Reflector Replacement - Existing - GSND	0.52	12.00	6.08
4' Fluorescent with Reflector Replacement - Existing - GSD	0.63	10.00	6.08
4' Fluorescent with Reflector Replacement - Existing - GSLD	0.65	9.71	6.08
4' Fluorescent with Reflector Replacement - Existing - GSND	0.52	10.68	5.47
4' Fluorescent with Reflector Replacement - Existing - GSD	0.63	8.90	5.47
4' Fluorescent with Reflector Replacement - Existing - GSLD	0.65	8.64	5.47
Off-Peak Battery Charging - Existing - GSD	0.54	2.78	1.41
Off-Peak Battery Charging - Existing - GSLD	0.53	2.78	1.40
Multiplex Refrigeration with No Sub-cooling - Existing - GSD	0.60	0.36	0.22
Multiplex Refrigeration with No Sub-cooling - Existing - GSLD	0.63	0.35	0.22
Multiplex Refrigeration with Ambient Sub-cooling - Existing - GSD	0.60	0.39	0.24
Multiplex Refrigeration with Ambient Sub-cooling - Existing – GSLD	0.63	0.38	0.24
Multiplex Refrigeration with Mechanical Sub-cooling - Existing – GSD	0.30	0.11	0.03
Multiplex Refrigeration with Mechanical Sub-cooling - Existing – GSLD	0.30	0.11	0.03
Multiplex Refrigeration: Ambient and Mechanical Sub-cooling - Existing – GSD	0.61	0.00	0.76
Multiplex Refrigeration: Ambient and Mechanical Sub-cooling - Existing – GSLD	0.63	0.00	0.76
High Efficiency Chiller - Existing - GSD	0.50	1.23	0.61
High Efficiency Chiller - Existing - GSLD	0.51	0.40	0.20
Roof Insulation - Chiller - Existing - GSD	0.50	0.32	0.16
Roof Insulation - Chiller - Existing - GSLD	0.51	0.06	0.03
Roof Insulation - DX AC - Existing - GSND	0.53	0.50	0.27
Roof Insulation - DX AC - Existing - GSD	0.50	0.27	0.13
Roof Insulation - DX AC - Existing - GSLD	0.51	0.05	0.03
High Efficiency Chiller w/ASD - Existing - GSD	0.50	2.44	1.22
High Efficiency Chiller w/ASD - Existing - GSLD	0.51	2.54	1.30
Window Film - Chiller - Existing - GSD	0.50	2.69	1.34
Window Film - Chiller - Existing - GSLD	0.51	2.63	1.34
Window Film - DX AC - Existing - GSND	0.53	2.90	1.53
Window Film - DX AC - Existing - GSD	0.50	3.09	1.53
Window Film - DX AC - Existing - GSLD	0.51	3.02	1.53
Light Colored Roof - Water Chiller - GSD	0.50	2.61	1.30
Light Colored Roof - Air Chiller - Existing - GSLD	0.51	1.02	0.52
Light Colored Roof - Water Chiller - Existing - GSD	0.50	2.13	1.06
Light Colored Roof - Water Chiller - Existing - GSLD	0.51	0.69	0.35
Light Colored Roof - DX AC - Existing - GSND	0.53	0.31	0.17
Light Colored Roof - DX AC - Existing - GSD	0.50	0.66	0.33
Light Colored Roof - DX AC - Existing - GSLD	0.51	0.65	0.33
High Efficiency DX AC Units - Existing - GSND	0.53	0.62	0.33

Table E-4 (continued).
Commercial Existing Construction Cost-Effectiveness Results

Measure	Rate Impact Test	Participant Test	Total Resource Test
High Efficiency DX AC Units - Existing - GSD	0.50	0.51	0.25
High Efficiency DX AC Units - Existing - GSLD	0.51	0.55	0.28
High Efficiency Room AC Units - Existing - GSND	0.53	1.24	0.65
2-Speed Motor for Cooling Tower - Existing - GSD	0.50	2.78	1.37
2-Speed Motor for Cooling Tower - Existing - GSLD	0.51	2.72	1.37
Speed Control for Cooling Tower Motors - Existing - GSD	0.50	0.99	0.49
Speed Control for Cooling Tower Motors - Existing - GSLD	0.51	0.97	0.49
Leak Free Ducts - Existing - GSND	0.53	0.36	0.19
Leak Free Ducts - Existing - GSD	0.50	0.39	0.19
Leak Free Ducts - Existing - GSLD	0.51	0.38	0.19
High Efficiency Motors - Chiller - Existing - GSD	0.50	1.34	0.67
High Efficiency Motors - Chiller - Existing- GSLD	0.51	1.31	0.67
High Efficiency Motors - DX AC - Existing - GSND	0.52	0.79	0.42
High Efficiency Motors - DX AC - Existing - GSD	0.50	1.74	0.86
High Efficiency Motors - DX AC - Existing- GSLD	0.51	1.63	0.83
Heat Pump Water Heater - Existing - GSND	0.47	2.88	1.34
Heat Pump Water Heater - Existing - GSD	0.56	3.00	1.68
Heat Pump Water Heater - Existing - GSLD	0.62	5.56	3.47
Heat Recovery Water Heater - Existing - GSND	0.48	2.43	1.17
Heat Recovery Water Heater - Existing - GSD	0.54	2.19	1.17
Heat Recovery Water Heater - Existing - GSLD	0.55	2.13	1.17
Domestic Water Heater Insulation - Existing - GSND	0.45	20.70	6.82
Domestic Water Heater Insulation - Existing - GSD	0.55	16.88	6.82
Domestic Water Heater Insulation - Existing - GSLD	0.57	16.39	6.82
DWH Heat Trap - Existing - GSND	0.41	92.79	20.23
DWH Heat Trap - Existing - GSD	0.63	60.03	20.23
DWH Heat Trap - Existing - GSLD	0.65	57.79	20.23
Low or Variable Flow Showerhead - Existing - GSND	0.46	175.80	37.99
Low or Variable Flow Showerhead - Existing - GSD	0.56	143.40	37.99
Low or Variable Flow Showerhead - Existing - GSLD	0.58	139.16	37.99