

EXHIBIT NO. \_\_\_\_\_ (CJB-4)  
DOCKET NO. \_\_\_\_\_  
2003 POWER COST ONLY RATE CASE  
WITNESS: CHARLES J. BLACK

BEFORE THE  
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION,

Complainant,

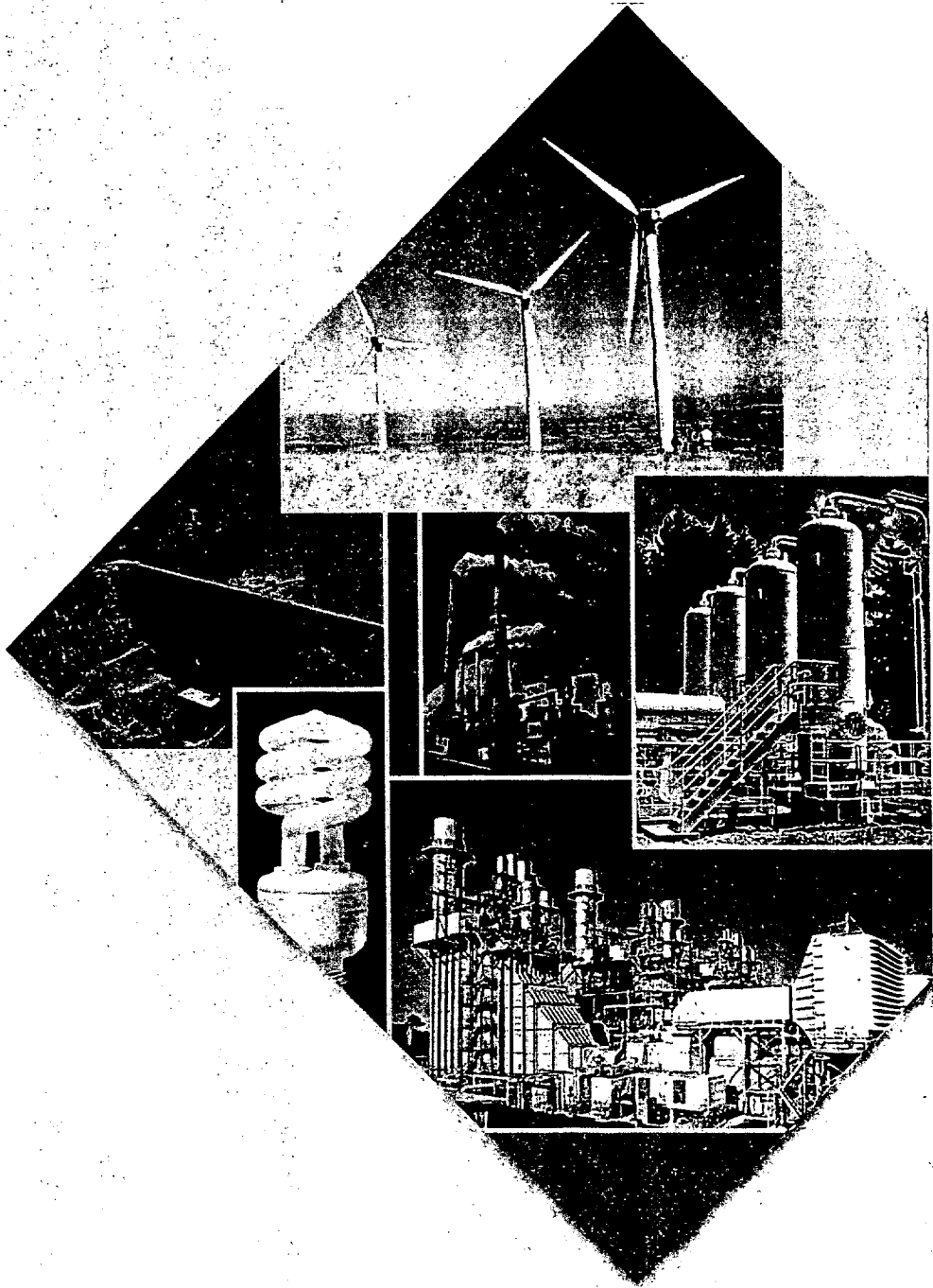
Docket No. \_\_\_\_\_

v.

PUGET SOUND ENERGY, INC.,

Respondent.

DIRECT TESTIMONY OF  
CHARLES J. BLACK  
ON BEHALF OF PUGET SOUND ENERGY, INC.



# Least Cost Plan Update

August 2003





## PREFACE

As part of its long-term resource strategy development, Puget Sound Energy pursues a Least Cost Plan process. The primary purpose of this Least Cost Plan Update is to provide the results of a detailed assessment of the long-term conservation resource potential available to PSE, along with an updated load resource portfolio analysis that incorporates the results of the conservation resource assessment. The August 2003 Least Cost Plan Update, developed in consultation with Commission staff and with public input, is organized into 10 chapters:

### **Chapter I – Executive Summary**

This chapter explains the purpose and goals of the Least Cost Plan Update and presents major findings and conclusions.

### **Chapter II – Conceptual Overview of Electric Resource Analysis**

This chapter provides an overview of the electric resource portfolio analysis approach that PSE has used to prepare the August 2003 Least Cost Plan Update.

### **Chapter III – Forecasts**

This chapter updates the electric-load, gas-price, and AURORA assumptions that were provided in PSE's April 2003 Least Cost Plan.

### **Chapter IV – Electric and Natural Gas Conservation Potential Assessment**

This chapter summarizes the results of an assessment of technical and achievable electricity and natural gas conservation potential in PSE's service area for the 2004-2023 planning horizon.

### **Chapter V – Determination of Need for New Electric Resources**

This chapter provides an update to the levels of need for electric energy and capacity that were identified in the April 30 Least Cost Plan.

### **Chapter VI – Demand Response**

This chapter examines one form of demand-response program to help determine whether peak-oriented demand-response programs could be a more cost-effective alternative than single-cycle combustion turbines.

### **Chapter VII – Electric Portfolio Analysis and Results**

This chapter details the approach, assumptions, and methodology used in the electric portfolio analysis, and summarizes the analysis results.

### **Chapter VIII – Conservation Implementation Issues**

This chapter examines the unique implementation issues associated with acquiring conservation resources as part of a long-term resource strategy.

### **Chapter IX – Long-Term Electric Resource Strategy**

This chapter presents PSE's updated long-term electric resource strategy, based on the integrated load resource portfolio analysis.

**Chapter X – Gas Portfolio Analysis and Strategy**

This chapter describes the approach, assumptions, and methodology used in the gas resource analysis and summarizes the results of the analysis.

**Appendix A – Conservation Resource Assessment Report**

**Appendix B – Detail on Electric Portfolio Screening Model**

## I. Executive Summary

## CHAPTER I. EXECUTIVE SUMMARY

### A. Introduction

This report is an update to the Least Cost Plan that Puget Sound Energy (PSE) issued on April 30, 2003. The April 2003 Least Cost Plan examined PSE's energy resource needs during 2004-2023, addressed key issues that influence resource-planning decisions, and used a new analytical framework to evaluate resource-adequacy standards and develop the Company's long-term energy resource strategy. The electric resource strategy set forth in the April 30 Least Cost Plan identifies a diverse mix of new resources to meet the future needs of PSE's retail customers, including renewable resources, conservation resources and thermal generating resources.

The April 2003 Least Cost Plan included a proxy assumption that PSE would acquire 15 average megawatts (aMW) per year of new electric conservation resources, resulting in a total of 150 aMW of planned new conservation over the next 10 years. This Least Cost Plan Update report provides the results of an in-depth assessment of available conservation resources, along with a fully integrated load resource portfolio analysis that evaluates conservation and supply-side resources on a side-by-side basis. Certain other key assumptions, including projections of customer loads and market prices for natural gas and power, have also been updated and included in the load resource portfolio analysis. As a result of this analysis, PSE has revised its electric resource strategy, including both the amounts and mix of planned new conservation and generation resources.

PSE has continued to work with Washington Utilities and Transportation Commission staff and consult with various stakeholders throughout the process the Company has followed in preparing this Least Cost Plan Update. The Company has held several joint meetings of the Least Cost Plan Advisory Group and the Conservation Resource Advisory Group. In addition, various informal meetings and communications have taken place. As was the case during development of the April 2003 Least Cost Plan, these interactions have continued to provide extremely useful information, ideas, and perspectives for the August 2003 Least Cost Plan Update, making PSE's integrated resource-planning process more effective and its results more useful.

## **B. Scope and Emphasis for this Update**

While amounts and mixes of electric supply-side resource technologies were determined as the result of integrated load resource portfolio analyses for the April 2003 Least Cost Plan, the 15 aMW-per-year amount of electric conservation shown at that time was an assumed decrement to load, rather than an analytically derived result. This assumption was noted in the April 2003 Least Cost Plan report, along with a commitment by PSE to prepare a Least Cost Plan Update by August 31, 2003, to provide a more complete and integrated analysis of conservation resources.

Accordingly, a primary purpose for this Least Cost Plan Update is to provide the results of a detailed assessment of the long-term conservation resource potential available to PSE and an updated electric load resource portfolio analysis that incorporates the results of the conservation resource assessment. For this Least Cost Plan Update, PSE has applied a fully integrated, analytical approach to its electric load resource portfolio analysis that treats conservation resources and supply-side resources on a comparable basis and that has resulted in an updated resource strategy.

PSE is using the results of its conservation resource assessment and the results of the load resource portfolio analysis (i.e., the amounts of conservation identified in the updated resource strategy) as key inputs to its conservation program planning for implementation of specific conservation acquisition efforts during 2004 and 2005. As such, this Least Cost Plan Update provides strategic direction for PSE's conservation program planning, but does not commit the Company to acquiring specific conservation measures or specific amounts of such measures. Similar to supply-side resource acquisitions that are based on specific opportunities and near-term considerations, specific determinations about actual conservation acquisitions are made in PSE's conservation program planning process.

In addition to the conservation resource assessment, several other revisions have been made for this Least Cost Plan Update. Some of the changes are to key analytical inputs such as long-term forecasts of market prices for natural gas and power. Other changes include revisions to the electric load forecast and updated assumptions about certain existing electric resources in PSE's portfolio.



### ***Relationship of this Update to the April 30 Least Cost Plan***

It should be noted that much of the information and analysis presented in the April 2003 Least Cost Plan remains unchanged. This August 2003 Least Cost Plan Update report is not intended to be comprehensive or to entirely supersede the April 2003 Least Cost Plan report. Rather, this Update focuses on development of new information about conservation resources and use of the conservation resource assessment in a fully integrated load resource portfolio analysis that updates the Company's long-term resource strategy.

This Least Cost Plan Update is not intended to address all the items identified in the Two-Year Action Plan provided in the April 30 Least Cost Plan.

### **C. Highlights and Key Findings**

This section provides highlights and key findings that are provided in this Least Cost Plan Update. Summary information is provided, along with references to chapters that provide greater detail.

#### ***Electric Load Forecasts***

PSE has prepared an interim update to its electric energy sales and peak forecasts for use in this Least Cost Plan Update. A detailed description of this update is provided in Chapter III.

The updated electric sales forecast used for this Least Cost Plan Update shows a 1.6 percent annual average rate of growth (before conservation). This compares to the electric sales forecast used for the April 30 Least Cost Plan, which also showed a 1.6 percent annual average rate of growth (before conservation). The updated forecast grows from 2,232 average megawatts (aMW) in 2004 to 2,957 aMW in 2022. These results are slightly lower than the 2,257 aMW amount in 2004 and 3,030 aMW amount in 2022 shown in the April 30 Least Cost Plan.

PSE has also updated its electric peak-load forecast. The new peak-load forecast has been prepared with a re-estimated equation using an expanded estimation period. As a result, the expected peak-load forecast (at 23 degrees Fahrenheit and without conservation) for 2004 is now 4,508 megawatts (MW), compared to the April 30 Least Cost Plan forecast for 2004 of 4,874 MW. Similarly, the new peak-load forecast (at 23 degrees) for 2022 is 5,948 MW, compared to the forecast for the April 30 Least Cost Plan of 6,535 MW. At 16 degrees

Fahrenheit and without conservation, the peak load forecast for this Least Cost Plan Update has been revised to 4,720 MW for 2004 and 6,228 MW for 2022.

### ***Natural Gas Load Forecasts***

The analysis for this Least Cost Plan uses the same natural gas-sales and -peak forecasts that were used for the April 30 Least Cost Plan. PSE is in the process of updating these forecasts. While the updates have not been completed, PSE expects the new results for the natural gas-sales forecast to be lower than were used in the April 30 Least Cost Plan.

### ***Other Forecast Updates***

PSE's long-term base-case forecast of market prices for wholesale natural gas supply has been revised. The new gas-price forecast is higher than the forecast used for the April 30 Least Cost Plan. PSE's long-term base-case forecast of market prices for wholesale power has also been revised to reflect the new gas-price forecast and updates to other assumptions. The new gas- and power-price forecasts and the underlying assumptions are described in Chapter III.

### ***Revised Need for New Electric Resources***

For this Least Cost Plan Update, PSE is continuing to use the "B2" electric resource adequacy standard that was established in the April 30 Least Cost Plan. However, as a result of the electric load forecast revisions and changes to assumptions about existing resources described above, PSE's need for new electric capacity resources, at the B2 Standard, has been revised. The revised need for energy resources has not changed significantly, except that it has decreased by 188 aMW for 2007 and remains somewhat lower through 2011. In addition, the need for new peak-capacity resources has decreased significantly throughout the 20-year planning period, including a 447 MW reduction for 2004: from a 1,403 MW need shown in the April 30 Least Cost Plan to a 956 MW need in 2004 in this Least Cost Plan Update. One major reason for the lower need for peak-capacity resources is a reduction in the peak-load forecast. See Chapter V for details, including a comparison of the need for new electric energy and peak-capacity resources as identified in the Least Cost Plan Update and in the April 30 Least Cost Plan.

### ***Electric Conservation Potential***

Detailed analysis of the long-term electric conservation resource potential in PSE's service area has resulted in identification of a total of 1,016 aMW of cumulative conservation *technical*

potential. Out of this total of technical potential, there is an estimated *achievable* potential of 328 aMW of cumulative electric savings. 266 aMW of the cumulative achievable electric savings is for existing vintage and the remaining 62 aMW is for new construction expected to occur during the 20-year planning period. See Chapter IV and Appendix A for details on the assessment of electric conservation potential.

### ***Natural Gas Conservation Potential***

Detailed analysis of the long-term natural gas conservation resource potential in PSE's service area has resulted in identification of a total of 45,708,939 decatherms of 20<sup>th</sup> year cumulative conservation technical potential. Out of this total, there is an estimated *achievable* potential of 10,788,029 decatherms of cumulative natural gas savings. 7,676,052 decatherms of the cumulative achievable potential is existing vintage and the remaining 3,111,977 decatherms is for new construction expected to occur during the 20-year planning period. See Chapter IV and Appendix A for details on the assessment of natural gas conservation potential.

### ***Results of Integrated Electric Resource Portfolio Analysis***

PSE used its portfolio-screening model to evaluate two scenarios for acquiring new electric conservation resources. The first scenario would acquire conservation at a constant rate over all 20 years of the planning horizon (the "Constant Rate of Acquisition Case"). The second scenario PSE evaluated would accelerate acquisition of conservation resources during the first part of the planning horizon (the "Accelerated Lighting Case"). For each scenario, the portfolio analysis identified how much of the total 328 aMW of achievable electric conservation potential would be cost-effective within PSE's overall electric resource portfolio, including new conservation resources and new generation resources.

The results of the integrated portfolio modeling for the Constant Rate of Acquisition Case indicate that a cumulative amount of 276.84 aMW of conservation would be cost-effective over the 20-year period from 2004 through 2023. This translates to acquisition of 13.84 aMW of new electric conservation during each of the 20 years.

The results of the integrated portfolio modeling for the Accelerated Lighting Case indicate that a cumulative amount of 273.33 aMW of conservation would be cost-effective over the 20-year period from 2004 through 2023. This includes 15.34 aMW during 2004, increasing to

22.02 aMW per year during 2007-2013, and decreasing to 5.32 aMW per year during 2016 through 2023.

Details on the integrated modeling analysis of PSE's electric resource portfolio are provided in Chapter VII.

### ***Conservation Implementation Issues***

PSE has identified several conservation implementation issues for acquiring new conservation resources. Some of these issues are not easily addressed by integrated resource portfolio-modeling analysis. Examples of such issues include uncertainties regarding consumer acceptance and ability to participate in utility-sponsored conservation programs, and practical considerations involved in aggressively ramping conservation-acquisition efforts up and down. These conservation-implementation considerations need to be considered when selecting PSE's long-term resource strategy as part of this Least Cost Plan Update. They also need to be considered in greater depth in PSE's near-term conservation program planning. Chapter VIII provides a more complete discussion of conservation-implementation issues.

### ***Updated Electric Resource Strategy***

For this Least Cost Plan Update, PSE has adopted an integrated electric resource strategy that includes the following major components:

1. Establishment of a long-term goal to acquire conservation at levels consistent with the Accelerated Lighting Case, including a total of 203 aMW of savings during 2004-2013, and a total of 273 aMW of savings over the entire 2004-2023 planning period.
2. Affirmation of PSE's goal, established in the April 30 Least Cost Plan, to acquire renewable resources to meet 10 percent of annual customer energy loads by 2013.
3. A diversified mix of thermal generation resources to meet the remaining need for new electric resources. These resources include combined-cycle gas-fired combustion turbine (CCGT) generation, single-cycle gas-fired combustion turbine (SCGT) generation, and coal-fired generation. Natural gas-fired resources meet a larger proportion of the overall need, particularly during the earlier part of the planning horizon. Starting later in the first half of the 20-year resource-planning horizon, coal-fired generation is also added to meet a portion of the need.
4. New resources, including gas-fired generation, are "shaped" seasonally as needed to reduce the costs related to holding surplus resource capability during summer periods.

PSE's updated electric resource strategy, including new conservation and renewable resources, offers significant environmental benefits. These environmental benefits include reduced air emissions compared to an approach that does not include conservation and renewable resources.

Chapter IX provides further details on PSE's updated electric resource strategy and environmental considerations associated with the updated strategy.

### ***Winter Peak-Shaving Demand Response***

For the April 30 Least Cost Plan, PSE's resource portfolio analysis assumed that new SCGTs would be added to provide additional capacity to meet peak loads on winter days when the minimum-hour temperature at Sea-Tac Airport is as low as 16 degrees Fahrenheit. However, it was also noted in the April 30 Least Cost Plan that other, less costly forms of peak-capacity resources may be available.

For this Least Cost Plan Update, PSE has conducted a preliminary analysis of one possible application of customer demand response as a potential resource to help meet a portion of PSE's need for electric peak-capacity resources during cold winter temperatures. Initial results of this analysis indicate that there may be enough potential for demand response among PSE's electric customers to reduce PSE's overall electric peak loads by several hundred MW during cold winter weather events. It is important to note that demand response programs can provide a number of benefits that are not addressed in this analysis, which focuses only on one possible form of demand response.

PSE has also performed an analysis using its portfolio screening model to estimate the resource portfolio costs that may be avoided if the utility can rely on peak demand response (rather than SCGTs) to meet the increase in winter peak loads that would occur between a 23-degree day and a 16-degree day (i.e., a difference of roughly 200 MW). The results of this analysis indicate potential savings of between \$7 million and \$9 million per year. If a peak load-clipping program can be implemented at lower annual costs than these, such a program would be more cost-effective than relying on SCGTs to meet peak-capacity needs.

Further details on PSE's analysis of opportunities and potential savings from winter peak-clipping demand response is provided in Chapter VI and Chapter VII.

### ***Natural Gas Resource Portfolio Analysis and Updated Natural Gas Resource Strategy***

In its April 2003 Least Cost Plan, PSE utilized an assumed level of approximately 2.1 million therms of new gas-conservation savings that would occur every year during the 20-year planning horizon. With an assumed average conservation measure life of 10 years, the annual decrement to system demand in the April 2003 Least Cost Plan grows to approximately 21 million therms by year 10 and remains at that level for the remaining years of the planning period. In this August 2003 LCP Update, PSE has modified this approach by reflecting the load shapes or "supply curves" and the corresponding costs of the gas-conservation resource options described in Chapter IV's least-cost resource-planning analysis to determine the resulting impact on the total gas-portfolio cost. Chapter X describes the approach, assumptions, and methodology used in the gas-resource analysis in more detail.

Because PSE has sufficient capacity resources to satisfy its requirements for the next several years, the cost-effectiveness of conservation resources will be driven primarily by the market price of natural gas. For this August 2003 LCP Update, PSE analyzed multiple levels of conservation resources and modeled the resulting optimum level to determine whether higher or lower projected gas prices would measurably impact the amount of cost-effective conservation resources. The conservation resources also were evaluated under high and low levels of demand growth to assess both the impact on the amount of cost-effective gas-conservation resources and the timing of new supply-resource decisions.

The results of the gas-resource analysis identified an optimum level of cost-effective gas-conservation resources to be 3.06 million therms per year, growing to an impact 61.3 million therms in the 20th year, for a total of 64.4 MMDth over the 20-year planning horizon. PSE's current gas-resource portfolio, including the optimum level of cost-effective conservation resources, has sufficient supply deliverability resources to meet the expected demand of its firm customers through 2009. Consistent with the conclusions reached in the April 2003 LCP, PSE faces no resource-acquisition decisions related to supply deliverability for several years. In the interim, PSE faces little risk as a consequence of accelerated growth.

Chapter X provides the results of PSE's natural gas resource portfolio analysis and the updated natural gas resource strategy.

**II. Conceptual Overview of  
Electric Resource Analysis**

## **CHAPTER II. CONCEPTUAL OVERVIEW OF ELECTRIC RESOURCE ANALYSIS**

### **A. Introduction**

This chapter provides an overview of the approach that PSE has used to prepare the electric resource analysis and strategy development for the August 2003 Least Cost Plan Update. As noted in the Executive Summary, the primary emphasis for the August 2003 Least Cost Plan Update is to:

- Develop an assessment of the long-term conservation resource potential available to PSE;
- Use the results from the conservation resource assessment in an integrated load resource portfolio analysis; and
- Update PSE's long-term integrated resource strategy for both conservation and generation resources.

### **B. Review of A Traditional Approach**

Before describing the approach that PSE has followed for this August 2003 Least Cost Plan Update, it is useful to review one of the common methods that electric utilities have traditionally used to incorporate conservation resources in their integrated resource plans. A more traditional approach to resource planning was typically conducted as follows:

1. Develop an estimate of the utility's avoided cost for new resources (e.g., based on the cost of power from a new generating resource or a forecast of wholesale market prices for energy supplies).
2. Determine what amount of conservation resources is available at costs up to the avoided cost and deem this the amount of "cost-effective" conservation to be acquired under the utility's long-term resource strategy.
3. Reduce or decrement the utility's load forecast by the amount of "cost-effective" conservation.
4. Plan generation resources to meet the remaining need as indicated by the conservation-decrement load forecast.

At a broad level, this approach is arguably an integrated resource planning methodology. Performing a second iteration through the four steps listed above can ensure further integration



and consistency if marginal costs from the fourth step of the first iteration are used to update the avoided costs in step one of the second iteration, and then to refine the determination of the amount of "cost-effective" conservation in step two of the second iteration.

However, the avoided-cost, load-decrement approach described above has several shortcomings. First, it does not address issues related to the seasonal "shape" of the utility's need for new resources. Second, the method described above does not fully recognize risks that may be created by dividing the analyses of conservation resources and generation resources into separate steps.

For example, if the utility's resource portfolio already has surplus energy resources during the summer and a shortage of energy resources in the winter, the approach described above could lead to a conclusion that the utility still should emphasize acquiring conservation resources that produce more energy savings during the summer rather than during the winter. In addition to pushing the utility's resource portfolio further out of seasonal balance, this strategy would create added volatility and risk as the utility becomes more exposed to fluctuations in market prices because of the increased surplus-power sales needed to dispose of the larger summer surpluses.

Therefore, for the August 2003 Least Cost Plan Update, PSE has implemented an alternative analytical approach that allows a more fully integrated analysis of conservation resources and generation resources on a direct, side-by-side basis within PSE's overall electric resource portfolio. Such an approach also provides a more effective means of addressing seasonal balancing needs and improved analysis of risks.

### **C. Approach for August 2003 Least Cost Plan Update**

For the electric portion of the August 2003 Least Cost Plan Update, PSE has implemented an approach that includes two major analytical components. The first part of the analytical approach focuses on assessing conservation resources, and the second part focuses on integrated resource portfolio analysis.

#### ***Conservation Resource Assessment***

The following four steps summarize how PSE has assessed its electric conservation resource potential, developed conservation supply curves, and created scenarios for conservation

acquisition. Further detail on implementation of the concepts described here is provided in Chapter IV.

1. Developed a detailed assessment of the amount of conservation resource potential that is available to PSE. This assessment first identified the amount of conservation that is technically available and then determined how much of the technical potential is actually achievable.
2. Aggregated the achievable potential for multiple conservation measures that have similar characteristics (e.g., comparable load-shape impacts for the energy savings) into 17 "bundles" of achievable conservation potential.
3. For each "bundle" of achievable conservation potential, created a conservation "supply curve" that identifies how much of the achievable conservation could be acquired at each of four specified cost levels, per unit of conservation. (At lower cost levels, a smaller amount of the achievable potential is available, and at higher cost levels a larger amount of the achievable potential becomes available.)
4. Created three scenario cases for the achievable conservation supply curves. The cases include a "constant rate of acquisition" case that assumes conservation is acquired in equal annual amounts during the 20 years of 2004-2023. In addition, two "accelerated acquisition" cases assume that a larger proportion of the total achievable conservation potential is acquired during the first half of the 20-year resource-planning horizon.

### ***Integrated Resource Portfolio Analysis***

The following four steps summarize the integrated resource portfolio analysis, using results of the conservation resource assessment to determine how much conservation is cost-effective as part of an overall resource strategy that includes both new conservation resources and new generation resources. Further details on implementation of the concepts described here are provided in Chapter VII.

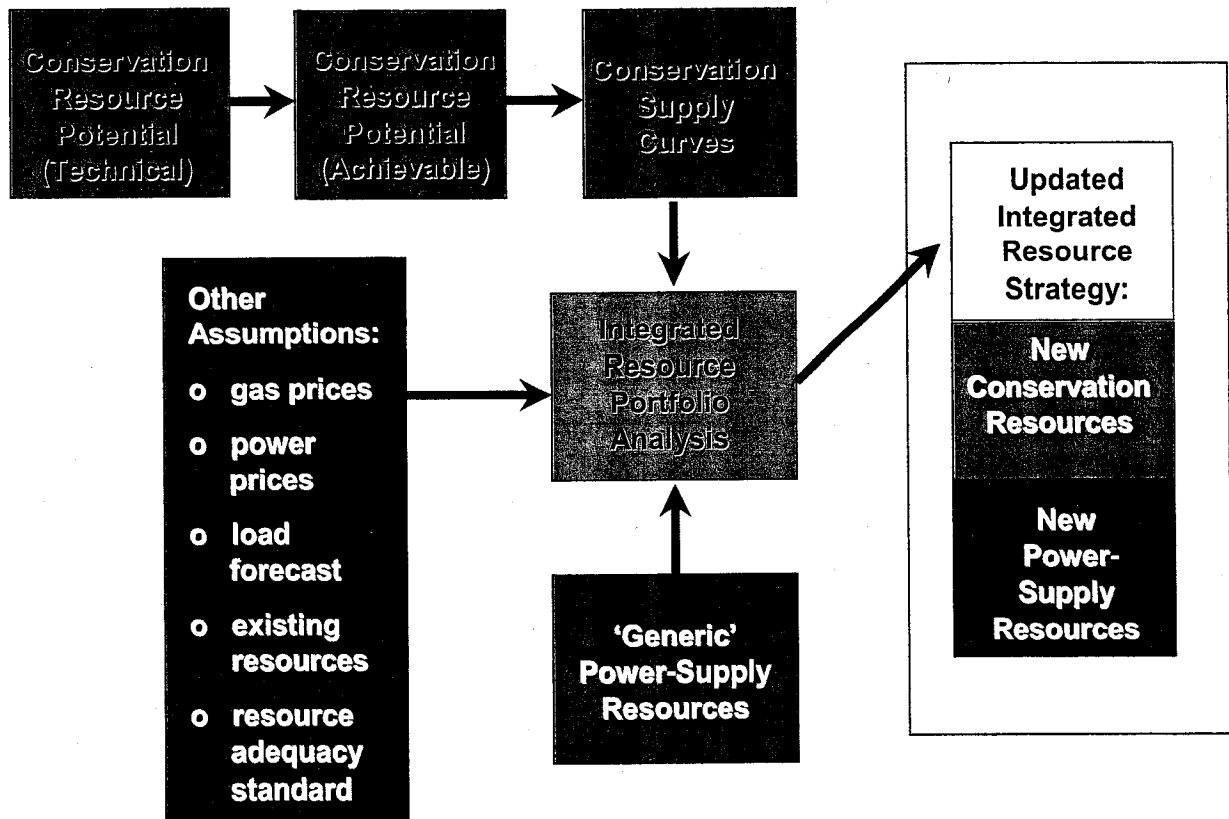
1. For the "constant rate of acquisition" case and one of the two "accelerated acquisition" cases, PSE created a number of alternative portfolios of resources, including portfolios that vary the amount of new conservation resources, using different combinations of cost-quantity points taken from the conservation "supply curves." Depending on the amount of conservation included in each portfolio, the remaining need for new resources was met with new generation resources. In other words, each portfolio includes a combined amount of

new conservation resources and new generation resources to meet the B2 standard for resource adequacy that was adopted in the April 2003 Least Cost Plan.

2. PSE used the portfolio screening model to analyze the large number of alternative portfolios of resources created in step 1, then tabulated the overall cost results for each portfolio.
3. Results from the screening model analyses of the various resource portfolios were compared to identify how the overall portfolio's costs change as increasing amounts (and varying combinations) of conservation are added to the portfolio. The analysis then identified which portfolios of new resources result in the lowest overall cost.
4. PSE updated its long-term resource strategy, including identification of amounts and types of conservation resources, as well as the corresponding amounts of new thermal generating resources that are needed to meet the remaining need for new resources.

The following flow chart illustrates major components in the analytical process.

### Key Elements in the Process



#### **D. Additional Assumptions**

The construction of alternative portfolios of resources for analysis in the August 2003 Least Cost Plan Update was based on the following assumptions:

- PSE's need for new electric energy and capacity resources has been revised to reflect updated forecasts of energy loads and winter-peak loads, as well as changes to assumptions about existing generating resources in PSE's electric resource portfolio. (For additional details, see Chapters III and V)
- All portfolios include renewable resources (represented as wind power) sufficient to serve 10 percent of PSE's retail-customer electric energy loads by 2013, consistent with the April 2003 Least Cost Plan.
- As the amount of conservation resources is increased or decreased from one portfolio to the next, the amount of thermal resources included in the portfolio is adjusted in the opposite direction (i.e., so that each portfolio meets the B2 planning standard).
- A Total Resource Cost approach is used – i.e., total costs for conservation resources are used (rather than addressing how costs might ultimately be divided into a utility-funded portion and a participant-funded portion) – and readily quantifiable non-energy benefits are included.
- A 10 percent environmental benefit for conservation resources is included, along with recognition of savings for avoided transmission and distribution losses, and recognition of savings for deferred investment in new transmission and distribution facilities.

#### **E. Result: Integrated Load Resource Portfolio Analysis**

PSE has designed the analytical approach described above to produce a more dynamic, fully integrated and consistent load resource portfolio analysis. This approach enables PSE to objectively evaluate the costs and risks – from a comprehensive, integrated portfolio perspective – associated with a variety of portfolios having different amounts and types of conservation resources and generation resources. In turn, this analytical approach allows the results for each alternative portfolio of resources to be more directly compared with other portfolios. PSE believes this methodology is preferable to a traditional approach that relies on avoided-cost estimates to determine deemed amounts of “cost-effective” conservation that then become static decrements to load forecasts that feed into generation-only resource portfolio analyses.



## CHAPTER III. FORECASTS

Since the April 2003 Least Cost Plan was submitted, PSE has made numerous and significant changes to its long-term forecasting, discussed below. First, the load forecast has been updated to reflect a reduction in both energy and peak capacity. Second, the gas-price forecast has been improved with the consideration of a range of forecasts and scenarios. Third, the long-run Aurora optimization modeling was updated with these load- and gas-price forecasts, along with new assumptions about new plant-financing costs.

### A. Energy-Load Forecasts

#### Electric-Load Forecasts

PSE's policy is to continually update its forecasts based on the latest available information. To that end, the April 2003 Least Cost Plan's forecasts of energy sales and peak loads for electricity have been revised for the August 2003 LCP Update. Similar revisions and updates will continue until a final forecast is produced in fall 2003. Hence the forecast used for the August 2003 LCP Update should be considered an interim forecast.

For the August 2003 LCP update, the billed-sales forecasts for electricity were revised for the following inputs:

- forecasts of regional population and employment, which call for slower growth and a longer recovery period;
- forecast of retail electric rates to account for expected rate changes stemming from changes in the BPA residential-exchange credit, from anticipated power-cost and purchased-gas adjustments, and from a new, long-term rate projection of retail electric rates for the region; and finally
- Calibration of the billed-sales forecasts to account for actual, weather-adjusted billed sales this year.

#### Economic and Demographic Assumptions

Because the Northwest economy is closely linked to the national economy, PSE forecasts of service-area population and employment are affected by the performance of the national economy. Global Insight (formerly DRI-WEFA) has revised its short- and long-term outlooks of the national economy to account for the most current information. The latest national economic

forecast is based on Global Insight's March 2003 25-Year Macroeconomic Forecasts. Based on the new outlook for the national economy, Dick Conway and Associates also has updated PSE's electric-service-territory forecasts for employment and population. Conway's forecast of regional employment and population reflects Washington state's latest benchmarked employment data (for 2002), as well as revised county-population data from the U.S. Census Bureau. Exhibits III-1 and III-2 provide comparisons of the national and regional economic forecasts used in the April 2003 LCP and the August 2003 LCP Update.

**Exhibit III-1  
National Economic Outlook**

	2004	2005	2010	2015	2020	aarg
<b>April LCP</b>						
GDP (BILS. \$96)	\$ 10,280.1	\$ 10,569.3	\$ 12,300.0	\$ 14,450.8	\$ 16,895.1	3.2%
EMPLOYMENT (MILL.)	136.5	138.4	146.4	154.8	161.9	1.1%
POPULATION (MILL.)	283.6	285.9	297.7	310.1	322.7	0.8%
<b>August LCP Update</b>						
GDP (BILS. \$96)	\$ 10,060.7	\$ 10,390.0	\$ 12,149.8	\$ 14,163.9	\$ 16,239.7	3.0%
EMPLOYMENT (MILL.)	133.0	135.4	144.6	153.3	160.8	1.2%
POPULATION (MILL.)	294.2	296.8	309.3	322.0	334.7	0.8%

Compared to the previous forecast, the new outlook calls for a slightly slower growth rate in national economic output, but a slightly higher growth rate in employment. This is driven by an assumption of a slightly lower growth rate in productivity, and a slightly lower inflation rate coupled with stimulative fiscal and monetary policies. Lower personal and corporate income-tax rates and a monetary policy that ensures stable growth in credit are expected to continue to ensure that the national economy recovers from a slow growth mode.

**Exhibit III-2  
Electric Service-Area Economic Growth Assumptions**

	2004	2005	2010	2015	2020	aarg
<b>April LCP</b>						
EMPLOYMENT (THOUS.)	1,757.9	1,795.8	1,972.9	2,124.2	2,277.2	1.6%
POPULATION (THOUS.)	3,402.2	3,438.7	3,659.1	3,859.5	4,078.9	1.1%
<b>August LCP Update</b>						
EMPLOYMENT (THOUS.)	1,718.3	1,749.9	1,924.8	2,066.8	2,203.6	1.6%
POPULATION (THOUS.)	3,419.3	3,450.2	3,636.3	3,805.9	3,980.4	1.0%

While the expected growth rates in employment and population are the same in both the August 2003 LCP Update and the April 2003 LCP, the actual levels are not the same. Employment is

lower in the August LCP Update, primarily because of a deeper employment reduction in 2002 and a slower recovery in 2003. As a result, the employment peaks experienced by the region in 2000 are not expected to be reached again until late 2005 or early 2006. Population is higher initially, however, because of higher revised final estimates for 2000 from the Census Bureau. In the long run, population growth is expected to be lower than previously forecasted because of slower economic growth. Hence, population totals in the long run are also lower.

### **Retail Energy-Price Assumptions**

This interim forecast also revises PSE's retail electric-price forecast assumptions to account in the near term for an expected reduction in the BPA residential-exchange credit between October 2003 and October 2006, and expected rate adjustments due to increases in power and natural-gas costs. The August 2003 LCP Update also accounts for the long-term changes in Global Insight's forecast of retail electric rates for the entire region. These changes imply an overall increase in retail rates for all customer classes, both in the short and long term.

The retail-rates forecast in the April 2003 LCP assumed no changes in rates in the near term and growth rates of less than 2% per year in the long term. Near term (2004-2005), the August 2003 forecast of residential electric rates is higher by about 5%-10% because of the lower BPA residential-exchange credit, while commercial and industrial electric rates are higher by 1%-5% compared to the near-term forecast of rates in the April 2003 LCP. Longer term (beyond 2006), the new forecast projects PSE electric rates to grow by about 3% per year, while the April LCP forecast predicted a growth rate of about 2.5%. This change arises from a higher forecast of gas prices in the new forecast. The newly updated retail-rate forecasts are preliminary and are based on current information. These forecasts are likely to change again, over time, as the forecasted price of gas changes and as critical decisions are made within the company.

### **Changes in Other Assumptions**

- **New Normal Annual Heating or Cooling Degree Days** – Because the definition of normal heating or cooling degree days is the average of degree days over the most recent 30 years, degree days in 2002 were added to the August 2003 LCP Update calculations while degree days from 1972 were deleted. Since 2002 was slightly warmer than 1972, the new figure for normal annual heating degree-days is slightly lower (4852 vs. 4858). This also implies slightly lower normalized loads.



- **Adjustment in Annual Savings for Ramp-Up and Conversion from Delivered to Billed Savings** – First-year annual savings were adjusted to allow for ramp-up. The effect is that only about half of the targeted savings in the first year is actually realized when a ramp-up based on historical data is imposed. Further, the delivered savings are converted to billed savings by assuming that approximately half of the delivered savings in the current month plus half of the delivered savings in the previous month are billed savings in the current month.
- **Load Losses** from the closure of a Weyerhaeuser lumber mill and the Miller brewery in Tumwater combined for about 4.5 aMW, near term.

As part of the company's ongoing load-forecast updates, more revisions are anticipated in some of the forecasts of inputs discussed above, along with other inputs such as weather-adjustment coefficients and monthly allocation factors.

#### **Electric Sales and Customer Forecasts**

Given the revised inputs, PSE expects billed sales (*without* conservation savings) to grow from 2,233 aMW in 2004 to 2,957 aMW in 2022, a growth rate of approximately 1.6 percent per year over the next 20 years. The billed sales forecast with conservation will use the projected conservation savings identified in Chapter VII. Exhibit III-3 shows the sales forecast by class for the August 2003 LCP Update.

**Exhibit III-3  
Electric-Sales Forecast by Class in aMW**

	2004	2005	2010	2015	2020
August LCP Update without Conservation					
Total	2,232	2,252	2,407	2,628	2,857
Residential	1,113	1,118	1,172	1,289	1,414
Commercial	951	966	1,057	1,155	1,253
Industrial	156	157	163	166	169

The growth pattern is such that the growth rate in the next 10 years is slightly lower than the growth rate in the following 10 years. This is a result of the assumption that retail prices will have slightly higher growth rates in the first 10 years than in the second 10 years. Compared to

the April 2003 LCP, these growth rates are slightly lower. Exhibit III-4 provides a comparisons of the total billed-sales forecasts for the April 2003 LCP and the August 2003 LCP Update.

**Exhibit III-4**  
**Electric Billed-Sales Forecast Comparison**

	2004	2005	2010	2015	2020	2022	aarg
April LCP w/o Conserv	2,257	2,291	2,508	2,713	2,936	3,030	1.6%
August LCP Update w/o Conserv	2,232	2,252	2,407	2,628	2,857	2,957	1.6%

The August 2003 LCP forecasts are about 2.9% lower than in the April 2003 LCP, on average, over the next 20 years. The differences in the next two years are less than 1.5%, however, because the changes in employment are not magnified until a few years later, and because of the lag effect (about a year or more) of price changes on consumption.

**Electric Customer Counts (Year-End)**

Customer-count forecasts also changed as a result of the changes in inputs. The change is consistent with the revisions in population growth, where the population level in the new forecast is slightly higher than the April LCP forecast in the near term but lower in the long term. For the August 2003 LCP Update, PSE's electric-customer count is expected to grow by about 1.7% per year, compared to 1.8% in the April 2003 LCP forecast. Exhibit III-5 shows a comparison of the April LCP and the August LCP Update forecasts of year-end customer counts.

**Exhibit III-5**  
**Electric-Customer Counts (Year-End)**

	2004	2005	2010	2015	2020	2022	aarg
April LCP	990,281	1,006,365	1,100,176	1,199,495	1,308,581	1,354,784	1.8%
August Update LCP	994,312	1,011,067	1,100,658	1,197,158	1,299,160	1,342,730	1.7%

**Electric Peak-Load Forecasts**

Based on further evaluation of the electric peak-load forecast, the peak-load equation was re-calculated using an expanded estimation period. This is expected to make the contribution of non-weather-sensitive loads to peaks more accurate because the data will have more observations where the transportation loads are excluded. The re-calculation further tested for the effects of consecutive cold-snap days, non-linearity in the temperature sensitivity in the

extreme cold events, and whether there is a difference between morning versus afternoon/evening peaks. The final form of the re-calculated peak-load equation is as shown below:

$$\begin{aligned} \text{Peak MW} = & a*(\text{Resid aMW}) + b*(\text{Non-Resid aMW}) \\ & + c*(\text{Normal Temp for Month} - \text{Peak Hour Temp})*(\text{Weather Sensitive aMW}) \\ & \quad * \text{Season Dummy} \\ & + d*(\text{Sched 48 Dummy}) + e*(\text{El Niño Dummy}) + f*(\text{2-Day Consec Cold Snap}) \end{aligned}$$

- a, b, c, d, e, and f are coefficients to be estimated
- Resid aMW – residential delivered sales in the month
- Non-Resid aMW – commercial + industrial delivered sales in the month
- Weather Sensitive aMW – residential + 80% of commercial delivered sales
- Season Dummy – equals 1 if season is winter, zero otherwise; same for summer and shoulder months
- Sched 48 Dummy – equals 1 if year is 2001 and beyond
- El Niño Dummy – equals 1 if month is identified as El Niño month based on NOAA data

The only difference between this equation and the equation used in the April 2003 LCP is the addition of the 2-Day Consecutive Cold-Snap variable. This variable is a binary variable that equals 1 if the month's peak load is preceded by two consecutive cold-snap days in which peak loads exceeded 4,000 MWs. One-day and three-day consecutive cold days also were examined, but only the two-day consecutive cold days showed a statistically significant coefficient. Further, non-linearity in temperature sensitivity in the extreme cold events and introduction of a binary variable that distinguishes morning versus afternoon or early evening peaks were tested, but both tests resulted in non-statistically significant coefficients. Finally, this equation was estimated using data from January 1991 to March 2003, compared to the April 2003 LCP equation, which used data from January 1991 to December 2001. The re-estimation lowered the coefficient associated with non-residential loads, which was expected because there were more observations (from January 2002 to March 2003) in which the non-residential load was free of the transportation loads. There was only a gradual reduction of the transportation loads in 2001.

The table below provides a comparison of the estimated coefficients between the April 2003 LCP forecast and the August 2003 LCP Update forecast for the winter season-only case.

**Exhibit III-6  
Coefficients for Peak-Load Equations, Winter Case**

Estimated Parameter	April LCP Equation	August LCP Equation
a	2.1590	2.2250
b	1.1520	0.9370
c	0.0212	0.0196
d	-0.2370	-0.2240
e	-122.0400	-185.1220
f		229.1160
RSqr	0.962	0.964

All the estimated parameters shown above are also statistically significant. Using the updated equation, the August 2003 LCP Update provides a forecast of normal January peak-hour load based on the following assumptions: 23 degrees Fahrenheit; a new forecast of sales; no El Niño; and a frequency of 2-day consecutive cold snaps matching the historical average of .04. The exhibits below show comparisons of the peak-load forecasts contained in the April 2003 LCP and the August 2003 Update.

**Exhibit III-7  
Electric-Peak Forecasts in MWs**

	2004	2005	2010	2015	2020	2022	aarg
Normal Peak Load Without Conservation							
April LCP	4,874	4,942	5,409	5,853	6,333	6,535	1.6%
August LCP Update	4,508	4,538	4,785	5,250	5,734	5,948	1.6%

The average difference in forecasts between the April 2003 LCP and the August 2003 LCP Update is about 10% over the 20-year forecast period. The reduction in peaks is due to a lower projection of residential and non-residential loads, and a smaller projected contribution of non-residential loads to peaks based on the re-estimated equation.

## **Gas Load Forecasts**

Gas-load forecasts generally are updated each fall and thus are not part of the August 2003 LCP Update. Nevertheless, the next gas-sales forecast, when completed, is expected to be somewhat lower than the April 2003 LCP forecast because of long-term projections for lower employment levels and lower population growth, and for higher retail gas rates stemming from increased gas costs.

### **B. Gas Price Forecast**

#### *Original Forecast – April 2003 Least Cost Plan*

In its April 2003 Least Cost Plan, PSE used the gas-price forecast from the PIRA Energy Group (PIRA), an international energy-consulting firm offering data, analysis, and forecasting on international oil, natural gas, and electricity markets. The PIRA forecast selected was the fall 2002 long-range forecast for individual supply basins in the Western regions of the U.S. and Canada. The PIRA forecast provided annual natural gas prices for selected years through 2015. Because annual price forecasts over a 20-year planning horizon were required for PSE's Least Cost Plan, PSE developed a straight-line curve for interpolating the missing years from the PIRA forecast and projecting annual prices to 2023.

#### *Revised Forecast – August 2003 Update*

In anticipation of the August 2003 Least Cost Plan Update, PSE determined that a review of the PIRA gas-price forecast was warranted in light of the gas market's volatility in early 2003, which resulted in a significant run-up in near-term gas prices. Growing concern in the industry regarding an imbalance in supply and demand suggested that near-term prices would stay relatively high until equilibrium in the markets was re-established. In addition, the PIRA forecast results were low relative to other gas-price forecasts in the region, notably the "Medium" gas-price forecast of the Northwest Power and Conservation Council (NPCC).

Upon reviewing additional PIRA gas-price data (including previously missing years), the underlying assumptions regarding the availability of new resources at certain high gas-price points resulted in a return to lower-equilibrium price levels. These lower price levels reflect the cyclical pricing from boom-and-bust gas-supply development (as opposed to the smooth price

curve previously developed from the data). Revised annual gas-price projections were developed ("PIRA-Revisited" forecast) using the cyclical pattern from new PIRA data, including the outer years of the planning period (2015 to 2023).

PSE then acquired access to Cambridge Energy Research Associates' (CERA) December 2002 long-range gas-price scenarios for North America, provided under CERA's North American Gas and Power Advisory Service. CERA's long-term, regionally specific price scenarios provide average annual market prices by supply basin or trading hub through the year 2020. PSE extended the CERA data from 2020 to 2023 based on the average annual gas-price change from 2006-2020. The four available CERA supply/price scenarios were reviewed for applicability based on the underlying economic and supply-development assumptions of each scenario. CERA's four scenarios are described as follows:

- **Rear-View Mirror** - The economy recovers from the recession in late -2002(3?), but economic uncertainty remains, and a crisis of confidence emerges.
- **Technology Enhanced** - The recession proves to be mild and short-lived, and the North American economies return to a sustained period of economic growth as new technological developments abound.
- **World in Turmoil** - The current recession is not a short detour. Instead, the North American economy mirrors the recent performance of the Japanese economy.
- **Shades of Green** - The economy recovers steadily and the environment becomes an increasing concern. Some international agreements are reached to control greenhouse-gas emissions.

Two scenarios, World in Turmoil and Technology Enhanced (including their associated supply- and infrastructure-development assumptions) were judged the most apt descriptors of the range of economics in the western U.S. markets affecting PSE. [RT: this judgment seems contradictory – one scenario says the economy improves soon, the other says we're in for a prolonged slump] In particular, these two scenarios anticipate more aggressive development of new resources in the Western Canadian Sedimentary Basin of Alberta and British Columbia, and the emergence of gas supplies from the McKenzie Delta prior to the end of the decade.

Rather than relying on a single forecast or scenario to predict long-term gas prices, PSE elected to average four of the known forecasts used in the region, including the two previously mentioned CERA scenarios. The four forecasts are:

- NPCC Medium Gas Price Forecast
- PIRA "Revisited" (including cyclical shaping data)
- CERA - World in Turmoil Scenario
- CERA - Technology Enhanced Scenario

While the average of the four gas-price scenarios provided an adequate representation of long-term regional gas prices based on objective, independent research and analysis, PSE determined that none of the four scenarios (or their average) adequately considered the recent run-up in market prices. Such consideration would have shown a more profound price impact on near-term resource planning. Therefore, the forecasted gas-price results for 2004 were replaced with currently available market-price quotes from June 2003.

In order to consider the impacts of extremes in gas pricing, PSE chose a High Price forecast (defined as the NPCC Medium Price Forecast) and a Low Price forecast (defined as the PIRA straight-line forecast used as the base-case forecast in the April 30, 2003, LCP analyses).

The four forecast scenarios, the resulting average of the four, and the adopted High and Low price strip for the three main trading hubs affecting PSE's supply costs are depicted in Exhibits III-8 to III-10:

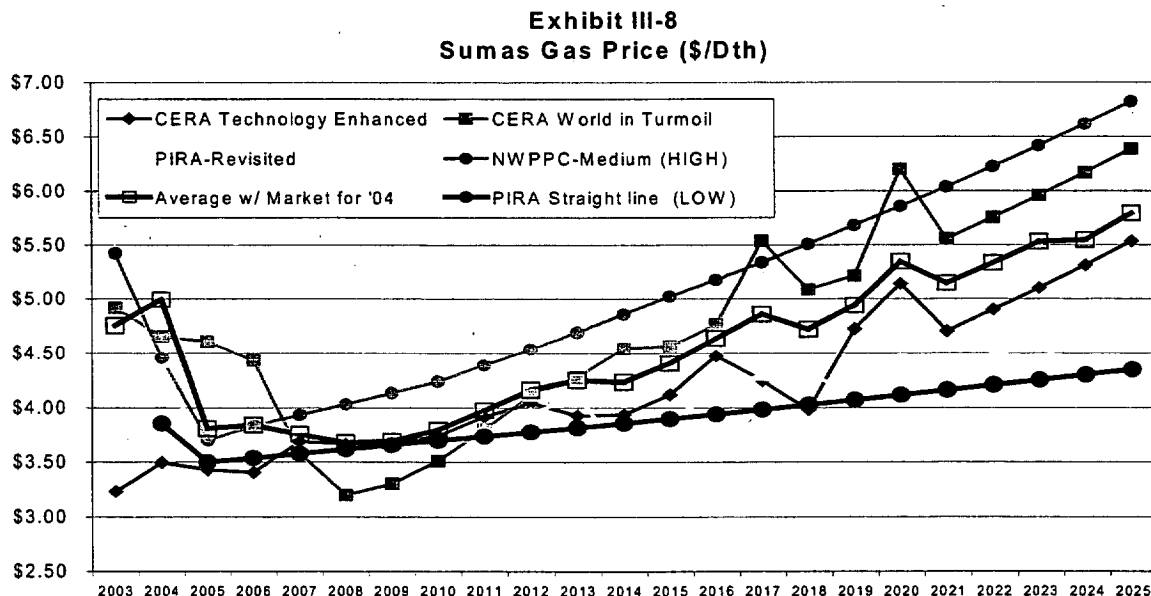


Exhibit III-9

AECO Gas Price (\$/Dth)

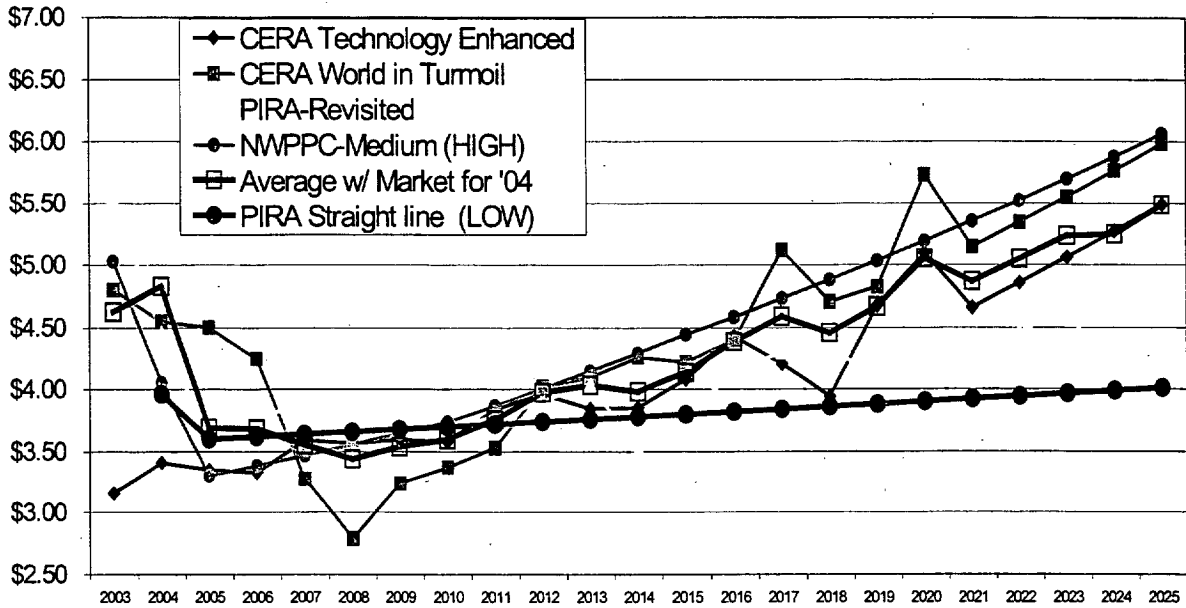
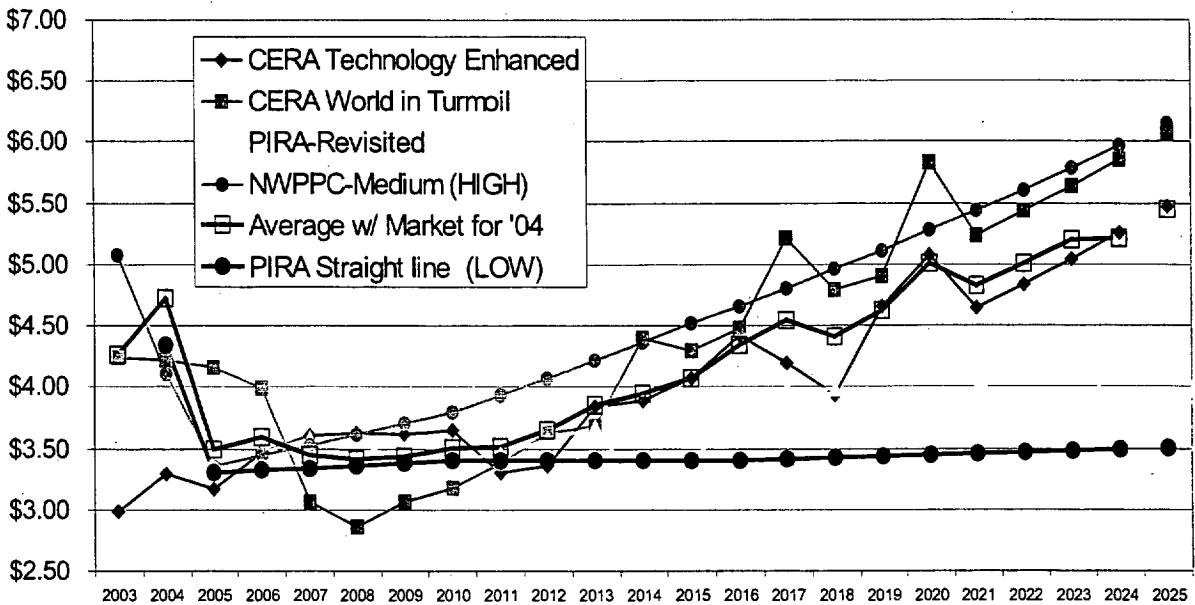


Exhibit III-10

Rockies Gas Price (\$/Dth)





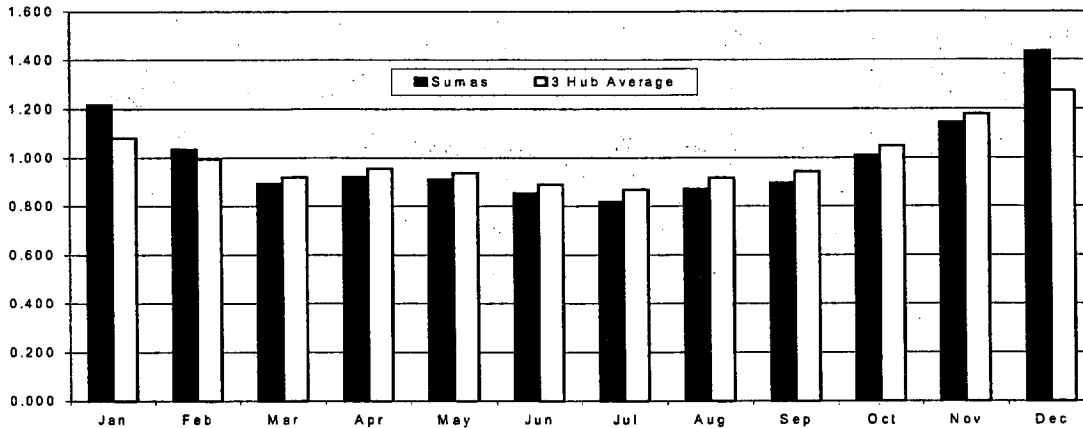
### C. AURORA Assumptions

#### Gas Prices

As discussed previously, PSE considered a number of gas-price forecast scenarios and sources including PIRA, CERA, and the NPCC. Each annual price requires that a monthly shape factor be applied to generate 12 monthly prices. The monthly shape factors are the average of the three Northwest hubs – Sumas, AECO, and Rockies – for the years 1991-1999. More recent data do not have any consistent pattern and the prices show extreme volatility and randomness.

Exhibit III-11 illustrates the traditional pattern of higher prices in the winter and lower prices in the summer. The three-hub average was applied to all eight hubs in the model other than Henry Hub, which has its own monthly shaping.

**Exhibit III-11  
Monthly Shaping**



#### Electricity Demand

AURORA divides the WECC into 13 subregions with individual growth rates. Exhibit III-12 lists the regions along with the long-run regional growth rates. The growth rates were adopted from the NPCC, "Draft Forecast of Electricity Demand of the 5<sup>th</sup> Pacific Northwest Conservation and Electric Power Plan," August 2, 2002. Short-run demand was adjusted downward to take into account the current recession, following the assumptions in the NPCC's 5<sup>th</sup> Draft of Wholesale

Electric Price Forecast. Intermediate-term growth rates were increased so that the long-run growth rate was unchanged.

**Exhibit III-12  
Regional Demand**

<b>Region</b>	<b>Annual Increase (%)</b>
OR / WA / No. ID	1.50
No. California	1.71
So. California	1.87
British Columbia	1.53
Idaho South	1.71
Montana	0.90
Wyoming	0.23
Colorado	1.22
New Mexico	2.43
Arizona / So. Nevada	1.39
Utah	2.32
No. Nevada	1.65
Alberta	1.53

*New Northwest Resources*

In 2002 there were over 8,000 MW of new resources under development. Most of the proposed projects, however, did not make it beyond the planning stage. PSE currently assumes that 2,055 MW of new natural gas-fired resources will be available in the region. Presently four plants have been completed, with two under construction to be on line by mid-2004. Exhibit III-13 lists those plants.

**Exhibit III-13  
New Natural Gas-Fired Resources**

<b>Plant</b>	<b>Owner/Developer</b>	<b>Capacity MW)</b>	<b>Online Date</b>
Coyote Springs II	Avista-Mirant	260	Online
Hermiston	Calpine	530	Online
Goldendale	Calpine	248	Q2/04
Big Hanaford	TransAlta	248	Online
Frederickson I	EPCOR	249	Online
Chéhalis	Tractebel	520	Q3/03

Other well-known gas-fired resources that once were expected to be developed, such as the Duke Grays Harbor plant, have not been assumed into the model. Wind resources that could be built in 2003, or later, were not assumed to be built. The AURORA database includes 473 MW of wind generation, which their developers listed as going on line in 2002.

#### *New California and Arizona Resources*

Demand from California has a significant impact on Northwest energy prices during the summer peak, hence an accurate representation of the resources serving California was included in the model. Significant resources, primarily natural gas combined-cycle and simple-cycle plants, have been completed recently in California and Arizona. The database in AURORA has been updated with information provided by Henwood Consulting, dated 4/29/03. Plants added to the database include those listed as "completed" and those "under construction," with on-line dates in 2003. For California and Arizona together the data set includes 33 new plants of approximately 10,000 MW total capacity.

Known plant retirements were also taken into account. The California ISO published a list of plants which have been recently retired or have a retirement date reported to the California ISO. These plants total approximately 2,500 MW for California and Arizona for the period 2004-2006.

#### *New AURORA Resources*

A key driver in the AURORA model is the expected return on capital invested in new generation assets for the Western Power Market. This expected return is derived through estimates of the future developer mix, the developers' respective capital structures, and their average cost of equity and debt over the forecast period.

AURORA requires an input assumption regarding who will develop future plants in the region. PSE has assumed that these plants will be developed by publicly owned utilities (Public), investor-owned utilities (IOUs), independent power producers (IPPs), or independent power producers with power purchase agreement(s) in place with an IOU (IPP/IOU). PSE's assumption for the relative contribution from each developer type is outlined in Exhibit III-14.

**Exhibit III-14  
Developer Mix**

<b>Asset Type</b>	<b>Public</b>	<b>IOUs</b>	<b>IPPs</b>	<b>IPP/IOU</b>
CCCT	20%	30%	20%	30%
SCCT	20%	30%	20%	30%
Wind	20%	30%	20%	30%
Coal	20%	35%	10%	35%

These allocations are reasonable estimates for future developer mix and assume that in the near-term, continued weakness in the IPP credit market will require IOUs to self-build to meet load-growth demands. Additionally, as credit markets recover, financing will be easier for IPPs that have signed long-term PPAs with credit-worthy counterparties, such as IOUs. Pure merchant IPPs will still be present in the market, but their market share of new projects is expected to be far smaller than previously experienced. This approach is consistent with Navigant Consulting, Inc.'s view of the future development of the Western Power Market.

The capital structure for these four developer types is identified in Exhibit III-15. Capital structure for the IPP/IOU developer has been estimated at 70/30 debt/equity, and reflects the potential for increased leverage on projects with credit-worthy counterparties.

**Exhibit III-15  
Capital Structure**

<b>Asset Type</b>	<b>Public</b>	<b>IOUs</b>	<b>IPPs</b>	<b>IPP/IOU</b>
Debt	100%	55%	50%	70%
Equity	0%	45%	50%	30%

The cost of capital for these four developer types is identified in Exhibit III-16. The expected returns on debt and equity for IPP/IOU developers have been estimated at 7.5 percent and 17 percent respectively, and appear valid given the returns identified for other developers. The cost of debt at 7.5 percent mirrors that of an IOU and is based on the assumption that the ultimate counterparty risk lies with the power purchaser or IOU. However, the equity return for an IPP/IOU would not be expected to match that of an IOU, since the risk profile for an IOU investor will differ from that of an IPP/IOU investor. In addition, IPP/IOU investors are likely to demand a higher rate of return to offset the greater risk associated with a highly leveraged investment.

**Exhibit III-16  
Cost of Capital**

<b>Asset Type</b>	<b>Public</b>	<b>IOUs</b>	<b>IPPs</b>	<b>IPP/IOU</b>
Debt	6.5%	7.5%	8.7%	7.5%
Equity	0%	11.5%	20%	17%

*Timing and Limits of New Resource Development*

In AURORA, new plants are brought online at the optimal time without regard to planning horizons. To replicate realistic planning needs, certain limits need to be placed on the rate of development on the various technologies for the 20-year analysis. Coal plants were excluded from development in the Washington/Oregon area and limited to one plant in the northern and southern California areas. Coal plants require a long development time, so they likely could come online in California in 2010 and in 2007 in other areas. Wind was restricted to one new plant per year in each region, and could be developed immediately. Natural gas-fired combined-cycle and simple-cycle turbines also have quick development times and required no limitations.

*Cost of Various Technologies*

The AURORA model selects new resources for addition from a set of generic resources that will result in lowest overall cost. The cost and performance characteristics were provided by Tenaska for the combined-cycle and simple-cycle gas plants, as well as the coal plant. The wind data were provided by Navigant Consulting, Inc. and confirmed by other sources, while the solar data are from the NPCC.

The capacity of most new generation resources (i.e., the capacity of individual projects in MWs) can be scaled to meet the specific needs of the developer, hence there is not one correct size or correct cost estimate for each technology. Furthermore, with shared ownership, even greater flexibility of capacity can be achieved for a utility. PSE, in collaboration with Tenaska, selected a representative plant for each gas and coal technology based both on economies of scale and on current development practices. Exhibit III-17 provides a list of the primary characteristics.

### Exhibit III-17

#### Cost and Performance Characteristics

Technology	Capacity (mw)	Heat Rate (btu/kwh)	All-In Cost (\$/kw)	Fixed O&M (\$/kw)	Fixed Fuel (\$/kw)	Variable O&M (\$/mwh)
CCCT	516	6,900	710	11.00	15.55	2.00
SCCT	168	11,700	441	3.00	15.74	2.00
Coal	900	9,425	1,500	20.0	0	2.00
Wind	100	0	1,003	26.10	0	0
Solar	20	0	6,000	15.00	0	0.80

The CCCT represents a two-by-one configuration – two turbines with a heat-recovery system. These plants typically are scaled by increments of about 250 MW, with variations around those figures depending on specific configurations. The \$710/KW all-in cost is based on an analysis of PSE's Frederickson site.

The SCCT represents a lower-cost traditional peak using "frame" FA or EA gas turbines in simple cycle. More expensive aero-derivative plants are available that have a better heat rate at a much higher cost. Throughout the industry and its literature, one can find a wide variety of capacities, heat rates, and costs for the numerous simple-cycle options. The least-cost option is site- and application-dependent. The costs provided by Tenaska are based on the same assumptions as the combined-cycle and coal plants, which allows for a fair comparison between the technologies. For example, the listed SCCT starts with an EPC cost (engineering, procurement and construction) of \$327/kw before taking into account "soft" costs such as insurance, contingencies, and costs related to financing, start-up, spares, etc., before arriving at a total installed-capacity cost of \$441/kW.

The coal plant represents a new site with a supercritical boiler design. An alternative would be a plant with 2 percent to 4 percent lower costs but with a 2 percent to 4 percent higher heat rate. Again, the least-cost option depends upon the site and application.

The wind plant is based on the assumption that 100 MW is necessary to achieve economies of scale.

### *Improved Efficiency*

Over time the heat rate of the various thermal plants is expected to improve. Starting with the heat rates listed above, PSE adopted the performance improvements provided by the Energy Information Administration in the "Annual Energy Outlook 2003." Through 2010, coal-plant performance improves by 0.4 percent per year, combined-cycle performance improves by 1.1 percent per year, and simple-cycle performance improves by 0.6 percent per year. After 2010, improvements are assumed to be quite small (0.2 percent) or zero in the later years.

**IV. Electric and Natural Gas  
Conservation Potential  
Assessment**



## CHAPTER IV. ELECTRIC AND NATURAL GAS CONSERVATION POTENTIAL ASSESSMENT

### A. Overview

Developing reliable estimates of the magnitude, timing, and price of alternative energy-efficiency resources is a critical first step in a least-cost, integrated resource planning process. These estimates also help to guide and inform demand-side planning and inform conservation program development efforts.

This chapter summarizes the results of an assessment of technical and achievable electricity and natural gas conservation potentials in Puget Sound Energy's service area for the 2004-2023 planning horizon. The assessment was performed for PSE as a collaborative effort between the consulting firms of KEMA-XENERGY and Quantec LLC. (The consultants' complete report is appended to this document.) The principal goal of this study was three-fold:

1. Developing reasonable and reliable estimates of "technical" and "achievable" electricity and gas conservation potentials among the residential, commercial and industrial customers served by Puget Sound Energy (PSE);
2. Employing a simple, flexible, and transparent analytical approach consistent with the methods used by the Northwest Power and Conservation Council, and relying mainly on available data from secondary regional sources; and
3. Creating discrete "bundles" of conservation potential composed of homogeneous groups of conservation measures, and providing supply curves for each bundle in a manner which would allow energy conservation options to be directly evaluated and compared with supply options in PSE's integrated resource planning process.

Estimates of long-term conservation potentials provided in this report are based on standard analytical practices and methods in the utility industry, using the best available data. Studies such as this rely heavily on assumptions concerning the future. Changes in energy-efficiency technologies, market conditions, and consumer behavior are likely to affect these results. The results are also sensitive to changes in load forecasts. It is, therefore, inevitable that the findings in this report will have to be reconsidered periodically to take into account the impacts of emerging technologies and the changing dynamics of the energy markets.

## B. Methodology

The overall approach in this study was based on the recognition that conservation potential comprises two distinct, yet interrelated, definitions widely used in resource planning: 1) "technical potential", and 2) "achievable potential." Technical potential assumes that all conservation measures are installed regardless of cost or market barriers. In deriving estimates of technical potential, we distinguish between "instantaneous" and "phased-in" definitions of technical potential. *Instantaneous technical potential* assumes immediate retrofit in existing buildings and full installation of efficiency measures at the time of new construction. *Phased-in technical potential* assumes system replacement only upon burnout or normal retirement of existing equipment. This distinction has important implications for the planning and timing of how conservation resources are acquired over time, as described in section E, below. It is important to note that, in the long run (such as with the 20-year plan developed by PSE), the two estimates of "technical potential" energy savings converge. Thus the 2023 technical potential estimates developed in this study can be viewed as either instantaneous or phased-in.

"Achievable potential" is defined as that portion of the potential that is likely to be available over the planning horizon under prevailing market barriers and administrative constraints that hamper delivery or implementation of energy-efficiency measures. In estimating the achievable potential, a 15% conservation program administration and delivery cost adder was applied to each measure/bundle combination, resulting in minor shifts of the price-quantity relationships (supply curves) within the technical potential bundles. This adder is consistent with past PSE program experience. Second, likely penetration rates, derived from industry literature, previous planning efforts conducted by KEMA-XENERGY and Quantec, and PSE's previous programmatic experiences as recorded in the company's tracking system, were used to derive estimates of achievable potential. These estimates take into account the company's ability to ramp up programs and customers' willingness to adopt measures assuming incentives fully cover all incremental conservation measure costs.

Estimates of technical potential for the residential and commercial sectors were derived using a "bottom-up" approach, an industry-standard methodology used widely both by energy utilities in the country and by the Northwest Power and Conservation Council. The "bottom-up" approach begins with compiling a comprehensive list of conservation measures applicable to each sector and end-use, calculating the savings potential for each measure, and aggregating measure-specific savings to derive total savings potential. For each measure, the approach integrates

measure-specific data (per-unit costs, absolute and relative savings, impacts by time period) with baseline building-stock data (base-case fuel saturations, measure-applicability factors, current measure saturations) and baseline energy-use data to produce estimates of levelized costs per unit of energy saved.

Conservation potential in the industrial sector was analyzed using an alternative, "top-down" approach. This was due to the more complex nature of the industrial market, its end-uses, and its equipment, as well as the lack of reliable information on measure-specific saturations. The top-down approach involved two steps. First, total firm industrial loads were disaggregated into standard classes and major end-uses within each class, based on PSE's latest sales data. Second, for each end use, we estimated potential savings and per-unit cost of the potential savings, relying on available data from a large number of industrial energy-efficiency programs in the Northwest and California, and on market information on PSE's customers available from PSE industrial-accounts representatives.

An accurate assessment of conservation potential requires that base conditions closely approximate the historical sales and the load forecast. In this study calibration was achieved by (1) calibrating end-use estimates to PSE's sector-level, weather-normalized, per-customer sales for the 2002 calendar year, and (2) by applying projections of customer counts through 2023, from the customer forecast in PSE's April 30, 2003 Least Cost Plan. To the extent that the long-term forecast changes (e.g., changes in projected number of customers), the estimates of conservation potential will also change.

Appropriate treatment of fuel conversion, particularly with regard to space- and water-heating applications in the residential and commercial sectors, represents an additional consideration in the development of dual-fuel conservation potentials. This study did not explicitly take into account conservation potentials based on fuel conversion.

### **C. Data Sources**

Implementation of the methodology described above required compilation of a large database of measure-specific technical and market data from both primary and secondary sources. Given the accelerated schedule for completion of this study, we relied mainly on data available from secondary regional and national sources. The main sources used in this study included, but were not limited to, the following:

- **Puget Sound Energy:** Loads and load forecasts, load shapes, economic assumptions, residential appliance saturation studies (RASS), 1994 commercial building survey, 2002 commercial building stock assessment.
- **Pacific Northwest Studies** by the Northwest Power and Conservation Council, Regional Technical Forum, Northwest Energy Efficiency Alliance, Tacoma Public Utilities, and the Northwest Energy Coalition; data elements included technical measure information, measure costs, measure savings, measure life, market saturations.
- **California Studies** sponsored by the California Measurement Advisory Council, which includes Pacific Gas and Electric, Southern California Edison, San Diego Gas and Electric, Southern California Gas under the auspices of the California Energy Commission and the California Public Utilities Commission; data elements included measure costs and savings, measure applicability factors, technical feasibility factors, etc.
- **Other Data Sources:** Including previous conservation potential and energy-efficiency market studies by KEMA-XENERGY, Quantec LLC, and others.

#### **D. Summary of the Results**

Technical conservation potentials in the residential and commercial sectors were derived from an analysis of 125 unique electric measures, and 60 unique gas measures. As a preliminary screen, only measures that were judged to be commonly available and based on well-understood technology were included in the analysis. Six residential segments (existing single-family, existing multi-family, existing manufactured homes, new single-family, new multi-family, new manufactured homes) and 20 commercial segments (10 building types within both the existing and the new structure segments) were considered. Since many conservation measures may be applied to multiple segments and building types, a total of 1,630 electric and 610 gas measure/structure combinations were included in the analysis. All major end uses in all 15 major industrial segments in PSE's service area were analyzed.

Based on the results of this study, cumulative 20-year technical conservation potentials in PSE's service area are estimated at 1,016 average megawatts (aMW) of electricity savings and 45,708,939 decatherms of natural gas savings, of which 328.3 aMW (32 percent) and 10,788,029 (24 percent) are expected to be achievable. The estimated achievable savings represent 10.8 percent of PSE's electric load and 9.3 percent of projected gas use over the

20-year planning period. Cumulative, long-run technical and achievable conservation potentials are shown in Exhibit IV-1 and Exhibit IV-2 for electricity and natural gas respectively.

As shown in Exhibit IV-1, the residential sector accounts for the largest share of achievable electricity savings (176 aMW), followed by the commercial sector's achievable savings potential of 143 aMW over 20 years. The industrial sector accounts for 9.2 aMW of achievable electricity savings during the same period.

**Exhibit IV-1  
Long-Run Electric Technical and Achievable Potential**

Sector	Total 2023 Baseline Load <sup>1</sup> (aMW)	20-Year Cumulative Potential (aMW and % of Baseline)	
		Technical	Achievable
Residential	1,538	525.7	176.0
		34.2%	11.4%
Commercial	1,331	471.8	143.1
		35.4%	10.7%
Industrial	179	18.4	9.2
		10.3%	5.1%
Total	3,048	1,016.0	328.3
		33.3%	10.8%

Estimates of natural gas conservation potential by sector are reported in Table IV-2. The largest share of achievable natural gas potential appears to be in the residential sector, which accounts for nearly 76 percent of total achievable natural gas savings. The commercial and industrial sectors respectively account for 22 percent and 2 percent of the achievable potential.

<sup>1</sup>From PSE April 30, 2003 Least Cost Plan load forecast.

**Exhibit IV-2**  
**Long-Run Natural Gas Technical and Achievable Potential**

Sector	Total 2023 Baseline Load <sup>2</sup> (Decatherms)	20-Year Cumulative Potential (Decatherms and % of Baseline)	
		Technical	Achievable
Residential	81,319,163	39,383,771	8,223,569
		48.4%	10.1%
Commercial	29,562,290	5,880,506	2,342,129
		35.4%	10.7%
Industrial	4,789,020	444,662	222,331
		9.3%	4.6%
Total	115,670,473	45,708,939	10,788,029
		39.5%	9.3%

Distributions of achievable electricity savings in the residential and commercial sectors by end use are shown in Exhibits IV-3 and IV-4. As can be seen, in the residential sector, upgrade and replacement of appliances with energy-efficient technologies provide the largest opportunity for acquisition of conservation resources. Savings in this end use represent approximately 42 percent of all achievable electricity savings in the residential sector. The results also show that about 32 percent of achievable savings in the residential sector may be obtained through the application of energy-efficient lighting technologies, primarily compact fluorescent light bulbs and fixtures. The remaining savings can be achieved through the implementation of water-heating measures (16 percent) and HVAC measures (10 percent)

In the commercial sector, lighting represents the largest potential for electricity savings. Nearly 74 percent of potential electricity savings in the commercial sector are attributable to the application of energy-efficient lighting. Retrofit, upgrade, and better operation and maintenance of HVAC equipment are also shown to be effective conservation measures, accounting for over 23 percent of the total electricity savings potential in this sector. Appliances (plug loads) and water heating measures together account for about 3 percent of total commercial-sector electricity savings.

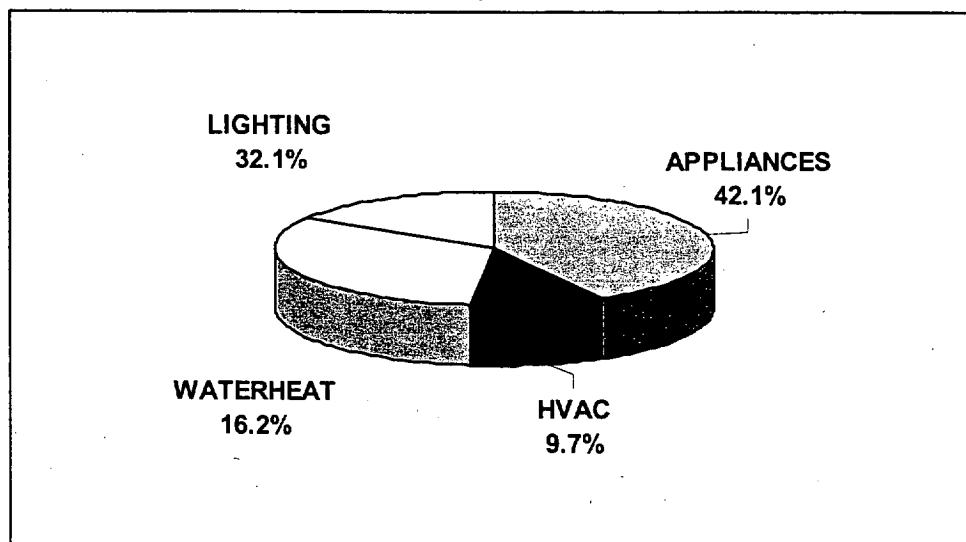
<sup>2</sup>From PSE April 30, 2003 Least Cost Plan load forecast.

As shown in Exhibit IV-5, expected savings in space heating is the largest component of the achievable natural gas conservation potential in the residential sector, accounting for nearly 67 percent of the gas savings potential. Upgrade of heating equipment with alternative, more energy-efficient equipment provides the main source for the potential savings. Study results also show that installation of more efficient water heaters and measures that improve the performance of existing water heaters account for over 39 percent of the gas conservation potential in the residential sector.

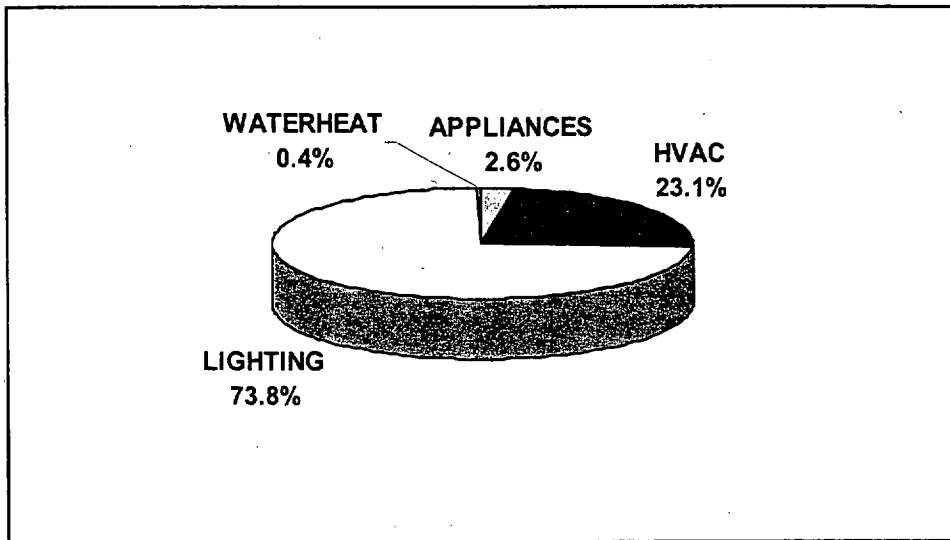
As Exhibit IV-6 illustrates, space heating, water heating and cooking conservation measures provide the largest potentials for gas savings in the commercial sector. These measures respectively represent 39.6 percent (space heating), 34 percent (water heating), and 25.8 percent (cooking) of the total achievable gas conservation potential in the commercial sector. Upgrade to miscellaneous gas appliances accounts for a relatively small share of the total gas savings potential in this sector.

**Exhibit IV-3**

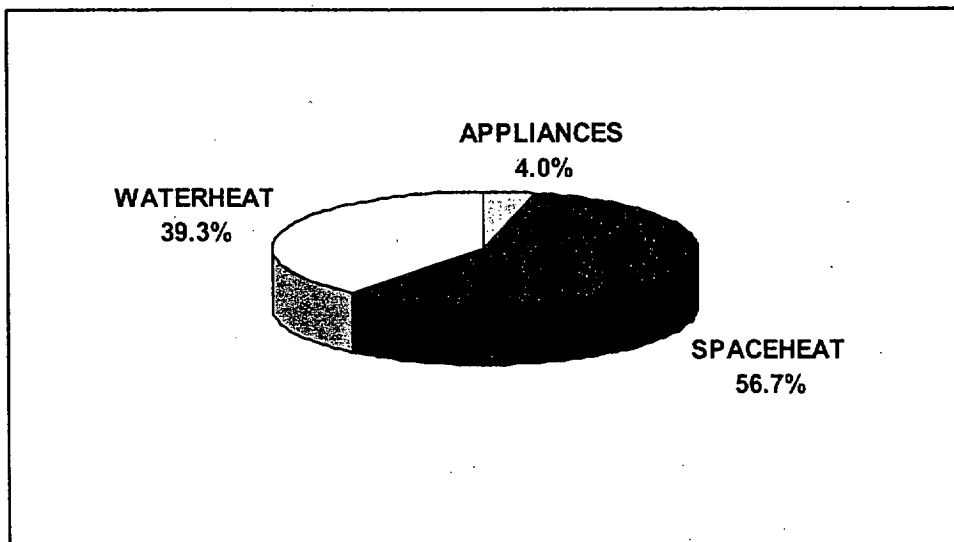
**Distribution of Achievable Electric Conservation Potential by End-Use Residential Sector**



**Exhibit IV-4**  
**Distribution of Achievable Electric Conservation Potential by End Use**  
**Commercial Sector**



**Exhibit IV-5**  
**Distribution of Achievable Natural Gas Conservation Potential by End Use**  
**Residential Sector**



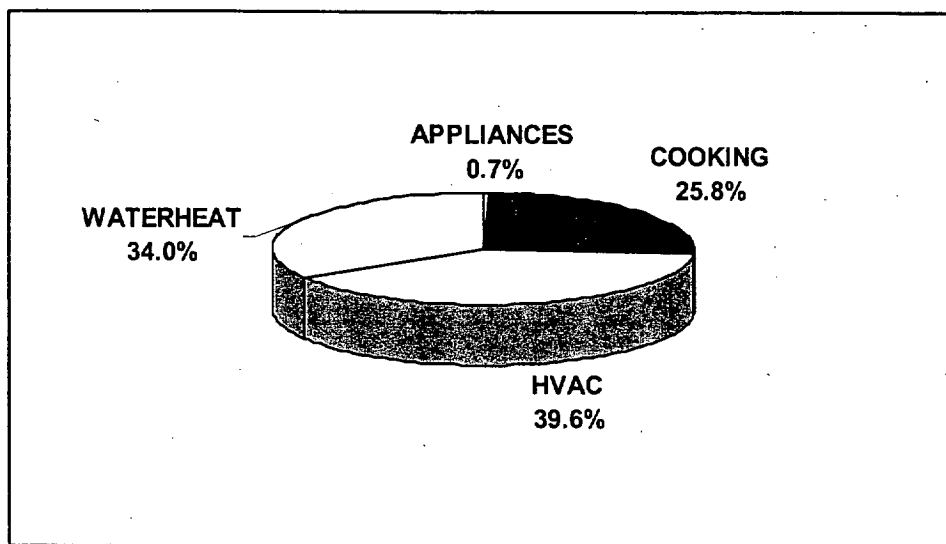
#### **E. Conservation Resource Portfolios**

While an accurate assessment of achievable conservation potential was an important objective of this study, an equally paramount consideration was to construct portfolios of electric and natural gas conservation resource options that could be compared with and evaluated against supply options on a balanced and consistent basis.



To facilitate the incorporation of the results of this study into PSE's least-cost, integrated resource planning process, estimates of electricity and natural gas conservation potential for each sector were disaggregated into distinct cost-based "bundles" of conservation resource. Four "bundles" were created for each fuel by grouping together conservation measures with similar cost and load-shape characteristics. For each fuel and sector, up to five resource cost categories were considered.

**Exhibit IV-6**  
**Distribution of Achievable Natural Gas Conservation Potential**  
**Commercial Sector**



Electric and gas measures with costs above the thresholds of \$0.11/kWh or \$1/therm were not considered economic or achievable. The composition of electric and natural gas resource portfolios and their associated cost ranges are shown in Exhibits IV-7 and IV-8. A more detailed breakdown of the electricity and natural gas conservation resource bundles by market segment is presented in Exhibits IV-9 and IV-10.

As shown in Exhibit IV-7, nearly 56 percent of achievable electricity savings in the residential sector, 33 percent of the achievable savings in the commercial sector, and all potential savings in the industrial sector fall in the lowest cost category, Cost Level A. With respect to natural gas, conservation potentials are more evenly distributed across the four cost categories, particularly in the residential sector (see Exhibit IV-8). Again, a significant portion of potential conservation in the residential (32.6 percent) and commercial (52.4 percent) sectors and all potential savings in the industrial sector fall in the low-cost resource category (Cost Level A).

**Exhibit IV-7**  
**20-Year Cumulative Technical and Achievable Electric Potential by Sector and Cost Groups**

	Residential 20-Year Potential (aMW/Cost Group as % of Total)		Commercial 20-Year Potential (aMW/Cost Group as % of Total)		Industrial 20-Year Potential (aMW/Cost Group as % of Total)		Total 20-Year Potential (aMW/Cost Group as % of Total)	
	Technical	Achievable	Technical	Achievable	Technical	Achievable	Technical	Achievable
Cost Level A (<= \$0.03/kWh)	225.4 53.5%	97.8 55.6%	105.4 34.9%	46.6 32.6%	18.4 100.0%	9.2 100.0%	349.3 47.1%	153.7 46.8%
Cost Level B (\$0.03-0.045/kWh)	33.9 8.1%	2.0 1.1%	89.1 29.5%	39.6 27.7%	- 0.0%	- 0.0%	123.1 16.6%	41.6 12.7%
Cost Level C (\$0.045-0.06/kWh)	21.2 5.0%	24.1 13.7%	61.2 20.3%	33.7 23.6%	- 0.0%	- 0.0%	82.3 11.1%	57.8 17.6%
Cost Level D (\$0.06 - .085/kWh)	70.9 16.8%	40.0 22.8%	25.3 8.4%	15.4 10.7%	- 0.0%	- 0.0%	96.3 13.0%	55.4 16.9%
Cost Level E (\$0.085-0.11/kWh)	69.7 16.5%	12.0 6.8%	20.7 6.9%	7.8 5.5%	- 0.0%	- 0.0%	90.4 12.2%	19.8 6.0%
<b>Total Up to \$0.11/kWh</b>	<b>421.1</b>	<b>176.0</b>	<b>301.7</b>	<b>143.1</b>	<b>18.4</b>	<b>9.2</b>	<b>741.3</b>	<b>328.3</b>

**Exhibit IV-8**  
**20-Year Cumulative Technical and Achievable Natural Gas Potential by Sector and Cost Groups**

	Residential 20-Year Potential (Decatherms/Cost Group as % of Total)		Commercial 20-Year Potential (Decatherms/Cost Group as % of Total)		Industrial 20-Year Potential (Decatherms/Cost Group as % of Total)		Total 20-Year Potential (Decatherms/Cost Group as % of Total)	
	Technical	Achievable	Technical	Achievable	Technical	Achievable	Technical	Achievable
Cost Level A (<= \$0.3/therm)	5,116,161 33.2%	2,681,181 32.6%	2,627,962 54.8%	1,227,305 52.4%	444,662 100.0%	222,331 100.0%	8,188,785 39.6%	4,130,817 38.3%
Cost Level B (\$0.3-.45/therm)	2,341,164 15.2%	1,445,086 17.6%	1,054,087 22.0%	300,781 12.8%	- 0.0%	- 0.0%	3,395,251 16.4%	1,745,867 16.2%
Cost Level C (\$0.45-.65/therm)	2,181,009 14.1%	1,503,636 18.3%	866,307 18.1%	729,379 31.1%	- 0.0%	- 0.0%	3,047,316 14.7%	2,233,015 20.7%
Cost Level D (\$0.65-1.00/therm)	5,794,673 37.5%	2,593,666 31.5%	249,538 5.2%	84,664 3.6%	- 0.0%	- 0.0%	6,044,211 29.2%	2,678,330 24.8%
<b>Total Up to \$1 / therm</b>	<b>15,433,008</b>	<b>8,223,569</b>	<b>4,797,894</b>	<b>2,342,129</b>	<b>444,662</b>	<b>222,331</b>	<b>20,675,564</b>	<b>10,788,029</b>

**Exhibit IV-9**  
**Achievable Electricity Conservation Potentials by Resource Bundle and Segment**  
**(Cumulative aMW 2004-2023)**

<b>Bundle/Segment</b>	<b>Cost Level A (≤\$0.03/kWh)</b>	<b>Cost Level B (\$0.03- 0.045/kWh)</b>	<b>Cost Level C (\$0.045- 0.06/kWh)</b>	<b>Cost Level D (\$0.06- 0.085/kWh)</b>	<b>Cost Level E (\$0.085- 0.11/kWh)</b>	<b>Total Achievable Potential</b>
Res. Ex. Const. – Appliances	29.2	-	18.2	19.9	0.1	67.4
Res. Ex. Const. – HVAC	8.4	1.8	2.0	3.2	0.8	16.2
Res. Ex. Const. – Lighting	32.7	-	-	-	0.3	32.9
Res. Ex. Const. – Water Heat	4.7	-	-	12.5	0.5	17.7
Res. New Const. – Appliances	-	-	1.2	3.5	2.0	6.7
Res. New Const. – HVAC	-	-	0.2	0.6	-	0.8
Res. New Const. – Lighting	23.0	0.2	-	0.3	-	23.5
Res. New Const. – Wtr. Heat	-	-	2.5	-	8.4	10.8
<b>Subtotal Residential</b>	<b>97.8</b>	<b>2.0</b>	<b>24.1</b>	<b>40.0</b>	<b>12.0</b>	<b>176.0</b>
Com. Ex. Const. – HVAC	7.0	2.9	6.0	5.6	2.9	24.4
Com. Ex. Const. – Lighting	28.2	32.3	24.1	6.9	3.2	94.8
Com. Ex. Const. – Plug Loads	1.7	0.2	0.4	0.3	0.3	2.9
Com. Ex. Const. – Water Heat	0.2	0.1	0.1	0.1	0.0	0.4
Com. New Const. – HVAC	2.3	1.1	1.9	2.0	1.4	8.7
Com. New Const. – Lighting	6.7	2.9	1.1	0.3	0.0	10.9
Com. New Const. Plug Loads	0.5	0.1	0.1	0.1	0.0	0.8
Com. New Const. – Wtr. Heat	0.1	0.0	0.0	0.0	0.0	0.2
<b>Subtotal Commercial</b>	<b>46.6</b>	<b>39.6</b>	<b>33.7</b>	<b>15.4</b>	<b>7.8</b>	<b>143.1</b>
Ind. Existing Const. – General	9.2	-	-	-	-	9.2
<b>Total All Sectors</b>	<b>153.7</b>	<b>41.6</b>	<b>57.8</b>	<b>55.4</b>	<b>19.8</b>	<b>328.3</b>

**Exhibit IV-10**  
**Achievable Gas Conservation Potentials by Resource Bundle and Segment**  
**(Cumulative Decatherms 2004-2023)**

<i>Bundle/Segment</i>	<b>Cost Level A</b> (≤\$0.3/ therm)	<b>Cost Level B</b> (\$0.3- 0.45/therm)	<b>Cost Level C</b> (\$0.45- 0.65/therm)	<b>Cost Level D</b> (\$0.65- 1.00/therm)	<b>Total</b> <b>Achievable</b> <b>Potential</b>
Res. Existing Construction - Appliances	-	-	-	199,062	199,062
Res. Existing Construction - HVAC	2,292,015	485,777	17,933	1,319,257	4,114,982
Res. Existing Construction - Water Heat	389,166	402,822	753,004	227,488	1,772,480
Res. New Construction - Appliances	-	-	-	127,193	127,193
Res. New Construction - HVAC	-	-	-	550,215	550,215
Res. New Construction - Water Heat	-	556,487	732,699	170,452	1,459,638
<b>Subtotal Residential</b>	<b>2,681,181</b>	<b>1,445,086</b>	<b>1,503,636</b>	<b>2,593,667</b>	<b>8,223,570</b>
Com. Existing Const. - Appliances	10,310	-	-	3,187	13,497
Com. Existing Construction - Cooking	279,629	-	267,348	11,376	558,353
Com. Existing Construction - HVAC	417,348	228,400	121,530	28,069	795,347
Com. Existing Const. - Water Heat	379,030	22,996	230,898	16,025	648,949
Com. New Construction - Appliances	1,743	-	-	-	1,743
Com. New Construction - Cooking	462	24,138	21,162	426	46,188
Com. New Construction - HVAC	68,300	1,023	41,106	21,212	131,641
Com. New Construction - Water Heat	70,483	24,224	47,335	4,369	146,411
<b>Subtotal Commercial</b>	<b>1,227,305</b>	<b>300,781</b>	<b>729,379</b>	<b>84,664</b>	<b>2,342,129</b>
Ind. Existing Construction – General	222,331	-	-	-	222,331
<b>Total All Sectors</b>	<b>4,130,817</b>	<b>1,745,867</b>	<b>2,233,015</b>	<b>2,678,331</b>	<b>10,788,030</b>

**F. Electric Conservation Resource Acquisition Cases**

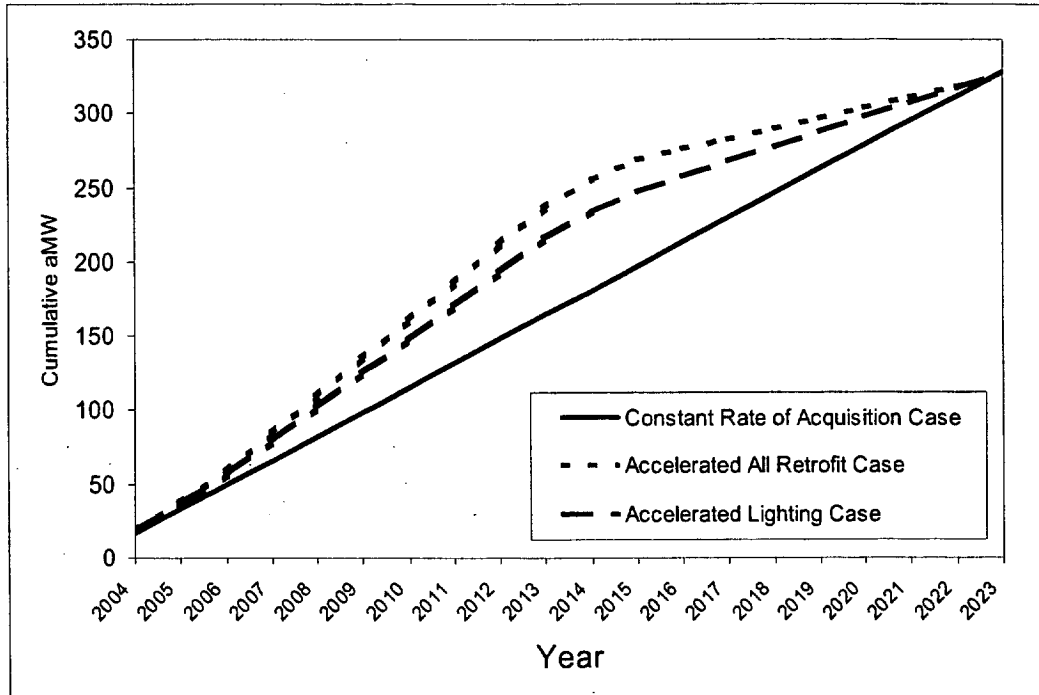
In assessing long-run conservation resource potentials, the timing of how conservation resources are acquired over time has significant ramifications for the integrated resource planning process. Since a large portion of conservation potential – especially savings from retrofit and replacement opportunities – may be considered a finite resource, the amount of conservation available in any given time period depends on how much of the resource was acquired in earlier periods. The timing for the acquisition of conservation resources must also take into account practical administrative and logistical considerations, as well as potential market barriers.

In this analysis, we considered three cases for acquisition of achievable electric conservation resources:

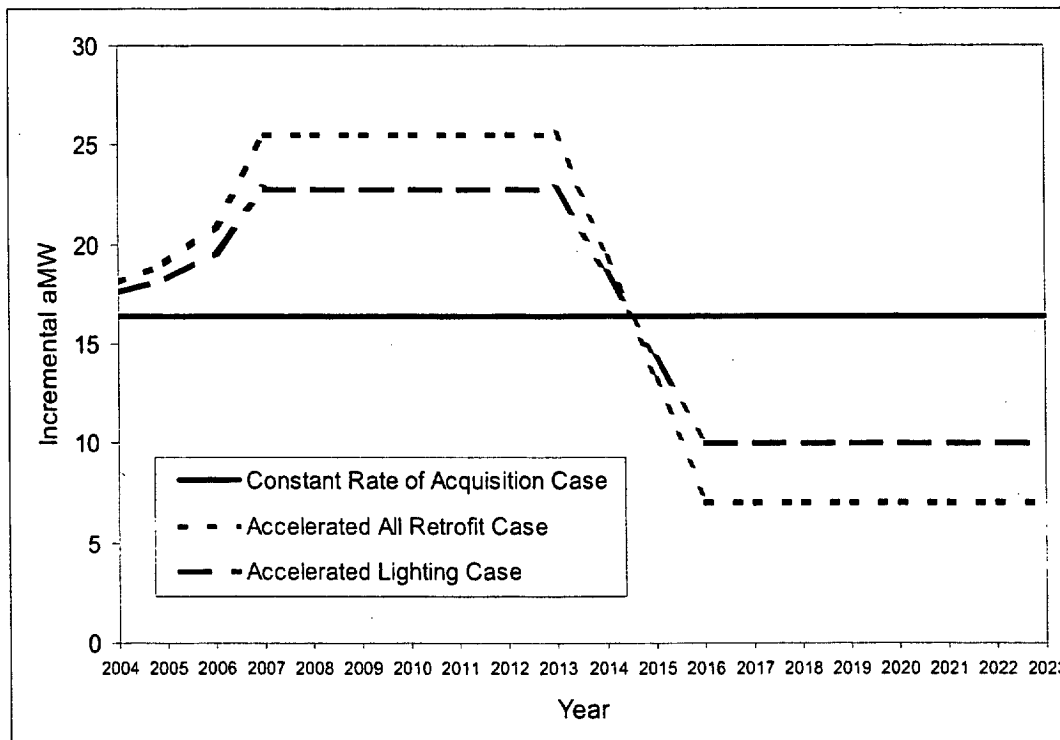
- **Case 1: Constant Rate of Acquisition Case.** This case assumes that electric conservation resources would be acquired in equal annual proportions over the 20-year planning horizon, which for PSE equates to 16.4 aMW per year across all achievable potential cost categories.
- **Case 2: Accelerated Lighting Case.** Under the accelerated lighting case, we assume that conservation resource acquisition for residential and commercial lighting retrofit measures would be accelerated through a two-year ramp-up, continue at 22.8 aMW per year during years three to ten, then gradually ramped down during years eleven and twelve to a level of 10 aMW per year for years thirteen through twenty. All savings associated with applicable measures would be acquired with aggressive marketing during the first twelve years of the plan. It is important to note that only the retrofit portion of the existing customer potential may be subject to accelerated acquisition. In Case 2, the residential administrative-cost adder is increased from 15% to 50%, and the commercial administrative-cost adder is increased from 15% to 30%.
- **Case 3: Accelerated All Retrofit Case.** Under the accelerated all retrofit case, we assume that conservation resource acquisition for all residential and commercial electric retrofit measures – including lighting, HVAC, water heating, and appliances – would be accelerated via the same ramp-up / ramp-down strategy as Case 2, with the same administrative-cost adders. In Case 3, the acquisition of conservation potential ramps up to 25.5 aMW per year for years three to 10, then down to 7.1 aMW per year for years thirteen to twenty.

The results of these three cases are shown graphically in Exhibits IV-11 and IV-12.

**Exhibit IV-11**  
**Conservation Resource Acquisition Cases, Cumulative aMW**



**Exhibit IV-12**  
**Conservation Resource Acquisition Cases, Incremental aMW**



**V. Determination of Need  
for New Electric Resources**

## **CHAPTER V. DETERMINATION OF NEED FOR NEW ELECTRIC RESOURCES**

The purpose of this chapter is to present the August 2003 Least Cost Plan Update's changes in assumptions for the AURORA model and for the determination of need for new electric resources. Changes were made to load and resources for both energy and capacity. First, this chapter reviews the determination of need for new electric resources, followed by the planning standards that were considered in the April 2003 LCP. The third section shows how the changed assumptions impact the determination of need for new electric resources, and also provides a brief discussion of the specific changes.

### **A. Determination of Need for New Electric Resources**

PSE uses the output from the Aurora modeling to identify monthly energy need for new electric resources. PSE starts with its expected load and subtracts its portfolio energy resources. As PSE has numerous resources in its portfolio, some grouping is done for clarity. Resource groups include Hydro, which includes both westside PSE-owned resources and Mid-Columbia contracts; Colstrip, which includes PSE's share of the four plants; Non-Utility Generators, which includes PSE's PURPA contracts from March Point, Sumas, and Tenaska; Encogen, which was a PURPA plant now owned by PSE; and Contracts, which includes large and small contracts from a variety of sources.

Energy resources that are dispatched for economic reasons are not included in the need calculation. For example, the company's simple-cycle combustion turbines are often dispatched in August, September, and October to take advantage of favorable market heat rates. Since the energy produced is not devoted to meeting load, these outputs are not included in the calculation of need for new electric resources.

The need for peak capacity is based on the difference between the planned 16-degree peak-hour load and the sum of all available resources to meet that peak. Resources to meet the peak include all of the simple-cycle combustion turbines that cannot be used to meet daily energy loads. (See Appendix E of the April 2003 Least Cost Plan for greater detail on the problematic operation of peaking CTs to meet baseload requirements.)



## **B. Planning Standards, April 2003 LCP**

Various levels of need for new resources, both for energy and capacity, were considered and evaluated in the April 2003 Least Cost Plan (Chapter XI, pages 1-4). PSE examined the cost and risk impact of four energy levels and four capacity levels. The four energy levels included:

- **Meet Nov-Feb Customer Needs (levels A1 and A2).** This energy-planning level averages the energy deficit on an aMW basis for the months of November through February – generally the highest energy-deficit months.
- **Meet Highest-Deficit Month (levels B1 and B2).** This energy-planning level meets the highest deficit on a monthly basis, with the highest-deficit month generally occurring in the winter.
- **Meet Highest-Deficit Month + 10 percent (level C1).** This energy-planning level first meets the highest deficit on a monthly basis and then adds 10 percent of the highest month's deficit. Again, the highest-deficit month typically occurs in the winter.
- **All Months Meet 110 percent of Load (level C2.)** This energy-planning level ensures that PSE meets all deficits, plus 10 percent of the total customer load on a monthly basis.

In addition to these four planning levels, PSE considered a "Do Nothing" planning level, where PSE allows the current energy and capacity deficit to grow with demand and adds no new resources. PSE also considered a "Status Quo" level that maintains the deficit level for energy and capacity at 2003 levels.

PSE also examined four different capacity-planning levels. These various levels of capacity meet loads based on weather observed at the Seattle-Tacoma International Airport (Sea-Tac). These four levels include:

- 23 Degree F hour at Sea-Tac
- 19 Degree F hour at Sea-Tac
- 16 Degree F hour at Sea-Tac
- 13 Degree F hour at Sea-Tac

PSE's portfolio analysis concluded that the utility should meet a "Level B2" planning standard. **Level B2 meets the need for new electric resources based on the highest-deficit month**

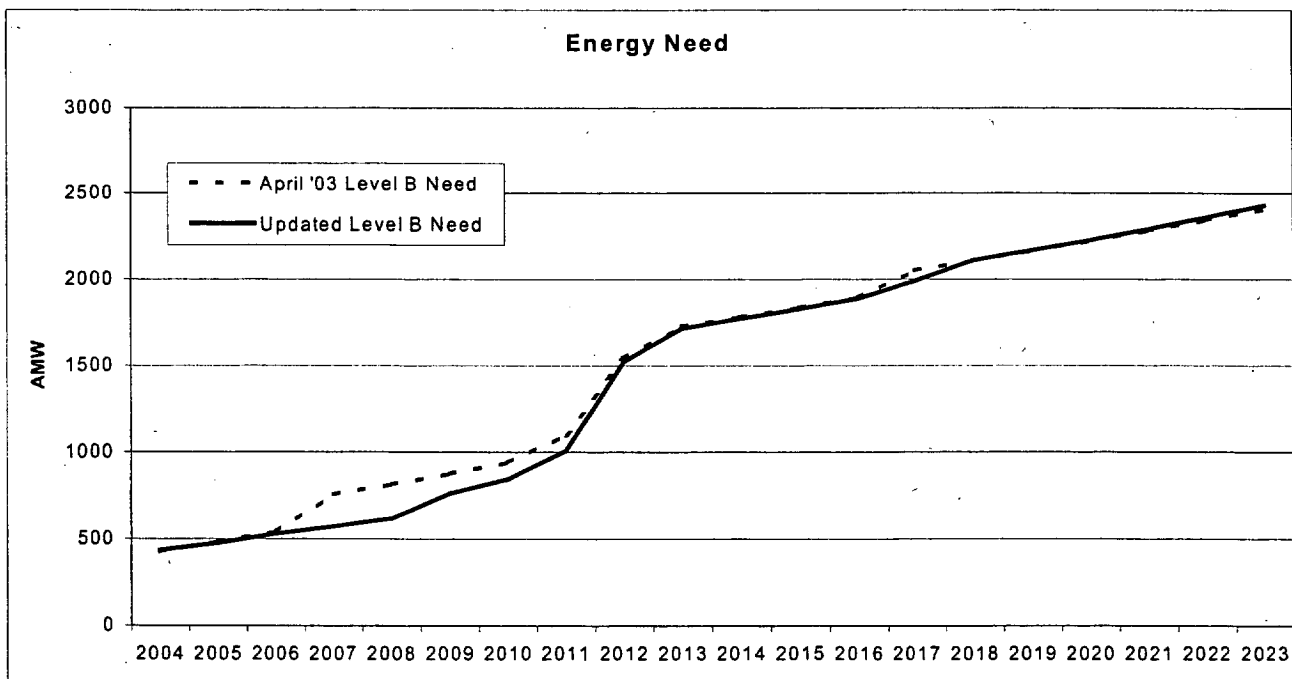
and the need for peak-capacity resources for a 16-degree hour at Sea-Tac. The analysis of the various planning levels is discussed extensively in the April 2003 Least Cost Plan (Chapter XII, pages 10).

### C. Updates, August 2003 LCP Update

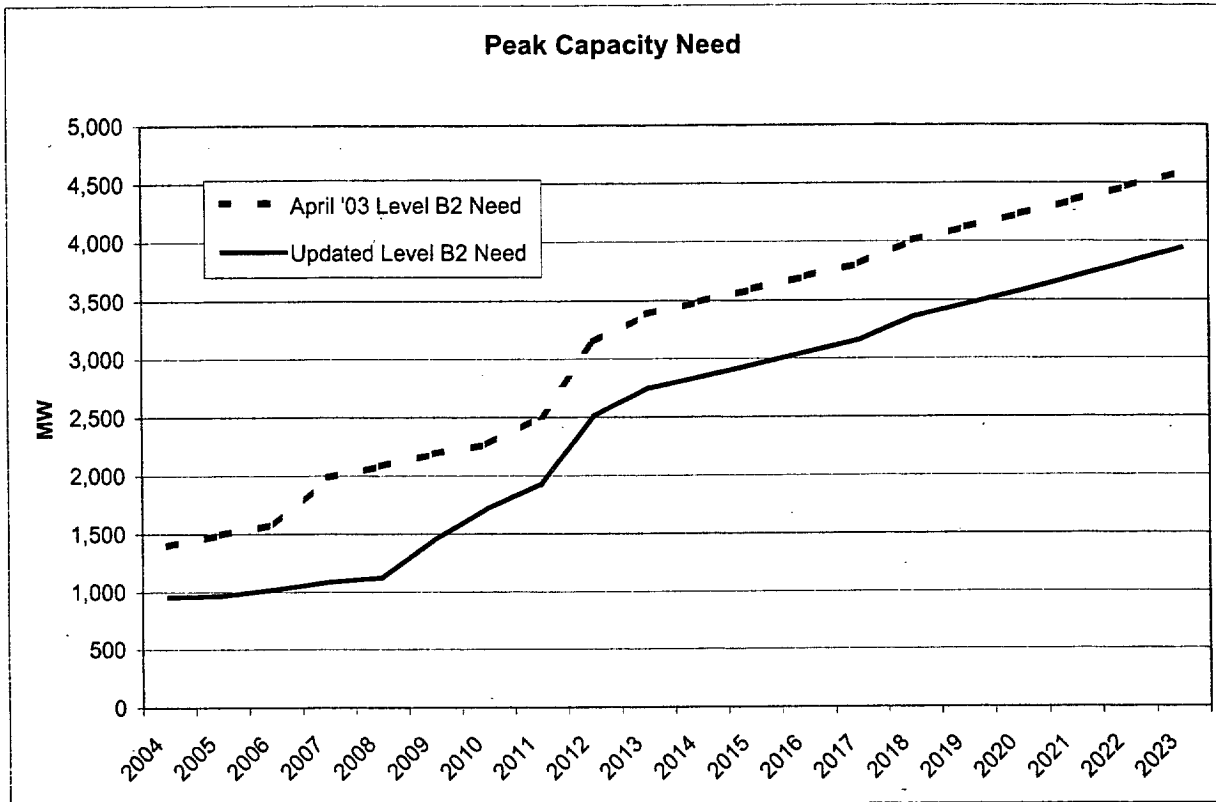
The August 2003 Least Cost Plan Update determines the need for new energy and capacity resources based on new information and analytical techniques. The August 2003 Update does not reconsider the analysis that established the Level B2 planning standard; rather it uses new information regarding energy and peak load, resource contracts, hydro availability and other factors to update the need based on the B2 standard.

As Exhibit V-1 illustrates, the short-run and long-run energy need for new electric resources are little changed, while there is decreased need for new electric resources from 2007 to 2011. The largest contributor to this change is the assumption that the PG&E Exchange would be terminated two years later than previously assumed. Exhibit V-2 shows that the need for peak-capacity resources is lower for every year under all of the changes. The reduction in need for new peak capacity is due in part to the PG&E Exchange assumption and an overall change in forecasting. Following the graphs is a brief discussion of the factors that have changed.

**Exhibit V-1**  
**Comparison of Level B Need for New Electric Resources**



**Exhibit V-2  
Comparison of Level B2 Need for Peak Capacity**



- **Load Forecast:** The changes to the load forecast are discussed fully in Chapter III. Both peak capacity and energy needs are lower in the August 2003 Update.
- **Hydro Availability: Information** from the Northwest Power Pool's "2002-2003 Final Regulations" has been applied to PSE's hydro resources. Hydropower availability has shifted among months but is consistent with the data PSE uses for short-term risk management. Another significant factor is the assumed loss of PSE's White River Project energy as of January 15, 2003. The project has provided about 30 aMW annually and this change has contributed to an overall increased need for new electric resources.
- **PG&E Exchange:** PSE's exchange agreement with Pacific Gas & Electric provides for up to 300 MW of capacity and 437,000 MWH of energy, going to PG&E in the summer and back to PSE in the winter. The agreement was assumed to terminate as of

- December 31, 2006; however, it now appears that the contract may continue through 2008, which results in lower energy and peak need for new electric resources for the extra two years.
- **Contracted Resources:** PSE has many contracts for energy, several of which have been updated since the April 2003 LCP. The overall impact is slight: an annual reduction in resources of about 3 aMW.
- **Colstrip:** The available energy from Colstrip has been reduced because of higher forced-outage rates during recent years. The net result is an increased need for new electric resources for resources of about 15 aMW per year over the next 20 years.

**VI. Demand Response**

## CHAPTER VI. DEMAND RESPONSE

### A. Introduction

This chapter describes the results of PSE's initial evaluation of a specific form of customer demand response in terms of its potential to help meet part of PSE's need for new electric capacity resources. The chapter begins by reviewing the analysis of capacity resource adequacy levels and generation-based sources of peaking capacity that were considered in the April 30 Least Cost Plan. The April 30 Least Cost Plan also noted that winter peak-oriented demand response may be a cost-effective non-generation form of capacity resource. Section C of this chapter describes the analytical approach used in this Least Cost Plan Update to evaluate demand response as a potential source of winter-peaking capacity. The final section summarizes the conclusions reached in this preliminary analysis.

### B. Issue Definition

For the April 2003 Least Cost Plan, PSE examined different levels of resource adequacy, including amounts of firm capacity resources to meet winter peak loads on days that the minimum hour temperature at Sea-Tac Airport falls to the following levels:

- 23 degrees Fahrenheit
- 19 degrees Fahrenheit
- 16 degrees Fahrenheit
- 13 degrees Fahrenheit

The load-resource portfolio analysis of these capacity-planning levels included two primary forms of electric peaking supply resources: single-cycle gas-fired combustion turbines (SCGTs), and the addition of duct firing to increase the peak generating capacity of combined-cycle gas-fired combustion turbines (CCGTs). These two forms of peaking generation were assumed to be the marginal resource technologies available to meet winter peak loads on PSE's electric system.

Based on the assumptions used for the April 2003 Least Cost Plan, PSE's load-resource portfolio analysis indicated that expected costs tend to rise at higher levels of capacity resource adequacy (i.e., at lower temperatures). However, PSE also recognized that it has obligations to plan and acquire sufficient resources to meet the winter peak loads that are reasonably likely to

occur for its retail electric customers. . Further, it was also apparent that SCGTs and duct firing for CCGTs may not necessarily be the most cost-effective form of capacity resource to meet all peaking needs. This is particularly evident when moving to progressively higher levels of capacity resource adequacy, which require the addition of more fixed capacity costs to prepare for cold weather events that become progressively less likely to occur at lower and lower temperature levels.

For example, PSE's forecasted winter peak-hour electric load on a 16-degree day is expected to be about 200 MW higher than the peak-hour electric load on a 23-degree day. However, while there is roughly a 50 percent chance that a 23-degree day will occur during a winter season, the chance of a 16-degree day occurring is much lower. So the fixed costs to acquire and hold 200 MW of additional SCGT capacity to cover the added capacity needs for a 16-degree day appear quite high, especially since there is less than a 50 percent likelihood during a winter season of a colder than 23-degree day occurring. (Note that it might be possible to recoup a portion of the fixed costs for SCGTs by operating them and selling surplus power during periods when the SCGTs are not needed to serve PSE's retail loads and wholesale power prices are higher than variable costs. However, PSE's integrated load-resource portfolio analysis has confirmed that significant risks can be created by depending on net revenues from market sales of surplus power from generating resources that are surplus to retail customer needs.)

In the April 2003 Least Cost Plan, PSE also acknowledged that other forms of winter capacity resources may be available and may be more cost-effective than relying exclusively on SCGTs and duct firing for CCGTs. This, combined with other considerations, including recognition of PSE's responsibility to meet its customers' peaking needs, resulted in selection of a planning standard at the 16-degree level. Further, the April 30 Least Cost Plan identified demand response as a potential source of winter peaking capacity, and included an Action Plan item to investigate whether peak-oriented demand response programs could be a more cost-effective alternative than SCGTs.

### **C. Overview of Approach for this Least Cost Plan Update**

There are many possible forms of demand response programs that could be developed and implemented to serve a variety of purposes. For the August 2003 Least Cost Plan Update, PSE has conducted a preliminary analysis of one specific form of demand response, where the primary emphasis for this analysis is from the long-term resource planning perspective. As

described above, PSE has identified that SCGTs may not represent the most cost-effective form of electric capacity resource, especially to meet winter peak loads at progressively lower temperatures that have a diminishing likelihood of occurring. Therefore, PSE has evaluated demand response as a potential source of winter peaking capacity that could help to meet retail peak-hour loads on cold winter days.

The analysis of demand response for the August 2003 Least Cost Plan Update includes the following steps:

1. Investigate whether there is sufficient demand response potential among PSE's retail electric loads to reduce total peak-hour loads (on a 16-degree day) by the expected difference in peak-hour loads on a 16-degree day versus a 23-degree day. In other words, identify whether there may be enough demand response potential to achieve a peak-hour load reduction of 200 MW or more.
2. Develop estimates of costs to implement several forms of demand response programs that could be used to reduce peak-hour loads on cold winter days.
3. If the results from steps 1 and 2 appear promising, use PSE's portfolio screening model to evaluate costs for two electric resource portfolios that include sufficient capacity to meet the following levels of peak-hour loads:
  - (a) resource portfolio with sufficient capacity resources (excluding demand response) to meet peak-hour loads on a 16-degree day.
  - (b) resource portfolio with sufficient capacity resources (excluding demand response) to meet peak-hour loads on a 23-degree day.
4. Subtract the power costs developed in step 3 for the 23-degree portfolio from the power costs for the 16-degree portfolio. This difference represents the costs that could be avoided by using demand response rather than SCGTs to meet the increase in peak-hour loads that is expected to occur on a 16-degree day relative to a 23-degree day.

#### **D. Results of Preliminary Analysis**

For the August 2003 Least Cost Plan Update, the results of the first two steps described above are presented in a memorandum and tables prepared by Charles River Associates. These results are provided in the attachment that follows the body of this chapter. The results indicate that more than 200 MW of demand response may be available to help meet peak-hour loads on cold winter days, and that the costs for this type of demand response program appear attractive



relative to SCGTs. However, this comparison does not yet reflect the net impacts on PSE's overall electric resource portfolio.

Accordingly, PSE has used the portfolio screening model as described in steps 3 and 4 above to evaluate the potential value of demand response. This analysis is described in Chapter VII. Results of the portfolio analysis indicate that reducing the reliance on SCGTs to meet peak-hour electric loads on cold winter days could save between \$7 million and \$9 million per year. These results indicate that if a demand response program could be developed and implemented to reduce peak-hour loads on cold winter days by about 200 MW at a cost of less than \$7 million to \$9 million per year, such an approach would be more cost-effective than a resource strategy that relies on SCGTs to meet that amount of winter peak load.



**MEMORANDUM**

**To:** Charlie Black, Puget Sound Energy

**CRA No.** D0-3471-00

**From:** Ahmad Faruqui

**Date:** July 9, 2003

**cc:** Joanna Burleson, Eric Englert (PSE), Steve George, Bill Hopkins (PSE)

**Subject:** WINTER PEAK CLIPPING PROGRAMS

CRA has performed a review of winter peak clipping programs, in support of PSE's August 31, 2003 update of the Least-Cost Plan that was filed on April 30, 2003. Unlike summer peak clipping programs, which are widespread in North America, there are comparatively few winter peak-clipping programs in operation. Several of these programs have not been evaluated rigorously, and they have yielded no data on kW impacts per customer. Cost data are even harder to come by.

Nevertheless, by contacting several utilities through the phone and e-mail, and by reviewing the information in CRA's archives, we have identified several programs on which data is available and which are likely to be of interest to PSE.

These programs fall into the following four categories:

- Traditional direct load control programs involving residential end uses such as water heating and space heating. These programs have been the mainstay of utility peak clipping efforts for the past half-century. They involve the payment of a fixed incentive per month or season to customers, in return for their letting the utility cycle their appliances for a certain number of times during the peak season. A communication network has to be set up for sending the signals to customer appliances, and receiver switches need to be installed on customer appliances.
- Traditional curtailable and interruptible rate programs directed at commercial and industrial (C&I) customers. These programs have also been the mainstay of utility peak clipping programs, perhaps for the past quarter-century. In return for getting a lower rate year-round, the customer agrees to curtail service for several hours during the year when poor reliability conditions are encountered.

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- Incentive-based load curtailment programs. These programs were created in the aftermath of the power crisis in the Western states, when utilities discovered they had used up the number of times they could interrupt or curtail customers. Customers are paid \$X per MWh curtailed during emergency conditions that may be triggered by a price spike or reliability conditions. Sometimes, the programs also make a monthly reservation payment to customers and impose a penalty on those customers who do not comply with the agreed on curtailment amounts. A pre-requisite for these programs is an agreed on methodology for measuring customer base load (CBL), against which the curtailed amounts can be measured.<sup>1</sup> The programs are often run by Independent System Operators, but can be offered by utilities as well. In a variant of the program design, customers may bid "negawatts" of load reductions at pre-specified prices. These bidding programs have not proven very popular with customers, and we have not included them in our survey. Hourly load meters are required for these programs.
- Dynamic pricing programs. These include critical peak pricing and extreme day pricing programs, in addition to real-time pricing. Interval metering capability is required for these programs. No cash incentives are paid to customers, and in most cases there is no reason to estimate customer base loads (CBL).<sup>2</sup>

For each program, we sought to identify several features including (a) the nature of the program, its target market and duration, (b) the number of customers on the program and their applicable base load, (c) the load savings from the program in aggregate MWs as well as percent of base load, and (d) program costs, including the fixed cost and recurring one-time (e.g., those associated with the installation of meters on large customers) variable costs.

We then applied the information from this survey of other utility experiences to PSE's load forecasts for January 2004. Our analysis was performed by customer class. We grouped customers into three classes, comprised of residential, commercial and industrial (exclusive of the very largest customers who procure their own power).

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<sup>1</sup> E.g., in the state of New York, the CBL for a given hour is the average use during that hour on the five highest of the ten most recent like days.

<sup>2</sup> The exception is two-part real-time pricing, where the first part of the bill is based on the customer's baseline load.



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Since any application of data from other utilities to PSE's service area is fraught with uncertainty, we categorized two types of uncertainty with an eye toward assessing their impact: (a) uncertainty in unit program impacts (i.e., savings per customer) and (b) uncertainty in the number of customer who are likely to be on the program. We picked low and high values for percent unit impacts to account for the first source of uncertainty. To capture the second source of uncertainty, we created three scenarios of program deployment: (a) universal deployment with a 90% opt-out rate, (b) universal deployment with a 50% opt-out rate and (c) a voluntary deployment with a 10% opt-in rate. We captured the impact of the uncertainties through Monte Carlo simulation with the Crystal Ball software, and used 10,000 iterations to measure the shape of the probability distribution.

We estimated the cost of saved peak-demand by performing a life-cycle analysis of program impacts and costs. By dividing the life-cycle costs by life-cycle impacts, we obtained an estimate of the levelized costs expressed in \$/kW-year. Crystal Ball was used for estimating the uncertainties in the cost estimates as well.

The detailed results of the analysis are contained in Tables 1, 2 and 3, which are included in a separate file that accompanies this memorandum. Table 1 contains the unit impacts and aggregate impacts of winter peak clipping programs, aggregated by sector. This table identifies the sources used to develop the estimates and predicts likely impacts for PSE under alternative scenarios of unit impacts and program deployment. Low, medium and high estimates are reported in this table, representing the 10<sup>th</sup>, 50<sup>th</sup>, and 90<sup>th</sup> percentiles of the simulated probability distributions. Table 2 contains estimates of program fixed and variable costs. Table 3 contains estimates of the cost of saved peak demand, expressed in \$/kW/year.

In aggregate terms, the impacts range from a low value of 261 MW to a high value of 1,058 MW, with a mid-point of 572 MW. More than 75% of the impacts are concentrated in the residential sector and most of them can be obtained at costs that are under \$16/kW/year.

Those who want to review programmatic details can consult Tables 1A, 2A and 3A, which show how the impacts were developed at the level of individual programs within the three sectors.



**Table 1: MW Reductions by Customer Sector**

	<u>Class MW</u>	<u>Customer Count</u>	<u>kW per customer</u>	<u>Aggregate MW Reduction</u> <sup>[Note 4]</sup>		
				<u>Low</u>	<u>Mid</u>	<u>High</u>
Residential <sup>[Note 1]</sup>	3,592	863,863	4.16	215	457	804
Commercial <sup>[Note 2]</sup>	1,053	106,073	9.93	38	92	203
Industrial <sup>[Note 3]</sup>	175	3,855	45.35	8	22	51
<b>System Total</b> <sup>[Note 5]</sup>	<b>4,819</b>	<b>973,791</b>		<b>261</b>	<b>572</b>	<b>1,058</b>

**Notes:**

- [1] Residential winter peak clipping options reviewed include critical peak pricing (CPP), extreme day pricing (EDP), direct load control (space heating), and direct load control (water heating).
- [2] Commercial winter peak clipping options reviewed include CPP, EDP, interruptible and curtailment rates, incentive-based load curtailment, and standby generator control.
- [3] Industrial winter peak clipping options reviewed include CPP, EDP, interruptible and curtailment rates, incentive-based load curtailment, and standby generator control.
- [4] Aggregate MW reduction estimates are generated using Monte Carlo simulation. Low corresponds to the 10th percentile, mid to the 50th percentile, and high to the 90th percentile for the forecast. The following uncertainties are represented in the analysis: fixed and variable costs, customer participation rates, and unit impacts.
- [5] System Total is a summation of the three sector impacts.

**Sources:**

- [1] Comparatively few utilities are winter peaking and there are even fewer utilities with active winter peak clipping programs. The estimates in this table have been gathered through a literature search, supplemented with phone calls and e-mails with several utilities, commissions and other regulatory bodies. Hydro Quebec has a residential Dual-Energy rate option which uses a dual-energy heating system equipped with an automatic switch permitting the transfer from one source to the other when exterior temperature falls below a specific threshold.
- [2] Unit impacts for the residential CPP option are based on Gulf Power's estimated reduction of 2.37 kW reduction per customer during the winter months. General Public Utilities (GPU) in Pennsylvania has reported an impact of 1.24 kW per customer during the summer, a 50% drop in base usage, achieved with enabling technology (smart thermostat).
- [3] EDP impacts are calculated using the ratio of CPP impacts to EDP impacts from Xcel CEM analysis and applying this ratio to CPP impacts estimated for PSE. The ratios vary between Residential and C&I sectors.
- [4] Unit impacts of 54% for direct load control (space heating) calculated from estimated reductions from PSE's Home Comfort Control Thermostat Study.
- [5] Unit impacts of 14% for direct load control (water heating) from the Duke Power program, which indicated a drop of .5 kW on a base use of 3.57 kW. Impacts are based on Summer data.
- [6] Unit Impacts for the commercial and industrial CPP options are from CRA's analysis of PSE data, based on a base price of 6.67 cents/kWh and CPP price of 13.91 cents/kWh (04/18/02), using price elasticities from the literature survey reported in Ahmad Faruqui and Stephen S. George, "The Value of Dynamic Pricing in Mass Markets," The Electricity Journal, July 2002.
- [7] Interruptible and curtailment rate impacts from: Ahmad Faruqui et al., "Customer Responses to Rate Options." EPRI CU-7131, Barakat & Chamberlin. (January 1991).
- [8] Low impact estimate for Incentive-based Load Curtailment option from B.C Hydro's Price Dispatched Curtailment Program.

**Table 1: MW Reductions by Customer Sector**

[9] High impact estimate for Incentive-Based Load Curtailment option from "How and Why Customers Respond to Electricity Price Variability: A Study of NYISO and NYSERDA 2002 PRL Program Performance," Neenan Associates, Ernest Orlando Lawrence Berkeley National Laboratory, and Pacific Northwest National Laboratory, January 2003. The average implicit price elasticity was estimated by Bernie Neenan, Richard Boisvert and Peter Cappers in the April 2002 Electricity Journal to be  $-0.09$ , which implies that program participants would reduce their usage during curtailment periods by about 38 percent, when they were given an incentive of \$500/MWh to cut usage. The implicit price elasticities were found to vary by customer, and displayed an upper limit of  $-0.47$  for some customers.

[10] Saturation rates for electric water (61%) and space heating (13%) from Bill Hopkins at PSE.

[11] Standby generator control impacts are taken from high impacts from incentive-based curtailment programs.

[12] Class MW and customer counts are from the PSE Load Forecast for the month of January 2004.

**Puget Sound Energy  
Winter Peak Clipping Options**

**Table 2: Costs by Customer Sector**

	<u>Low</u>	<u>Mid</u>	<u>High</u>
Residential <sup>[Note 1]</sup>	\$6,772,481	\$11,013,494	\$14,515,839
Commercial <sup>[Note 2]</sup>	\$11,011,799	\$12,707,077	\$14,400,588
Industrial <sup>[Note 3]</sup>	\$10,666,847	\$12,360,208	\$14,044,302
<b>System Total <sup>[Note 4]</sup></b>	<b>\$28,451,127</b>	<b>\$36,080,779</b>	<b>\$42,960,729</b>

**Notes:**

- [1] Residential winter peak clipping options reviewed include CPP, EDP, direct load control (space heating), and direct load control (water heating).
- [2] Commercial winter peak clipping options reviewed include CPP, EDP, interruptible and curtailment rates, incentive-based load curtailment, and standby generator control.
- [3] Industrial winter peak clipping options reviewed include CPP, EDP, interruptible and curtailment rates, incentive-based load curtailment, and standby generator control.
- [4] System Total is a summation of the three sector impacts.
- [5] Variation in the input assumptions is due to the uncertainty of fixed and variable costs, customer participation rates, and unit impacts.
- [6] Industrial winter peak clipping options reviewed include CPP, EDP, interruptible and curtailment rates, incentive-based load curtailment, and standby generator control.
- [7] Incentive payments for demand-response load curtailment programs can range from \$250-500/MWH curtailed.
- [8] Curtailment period for New York is 20 hours/year.

**Sources:**

- [1] Total cost estimates are generated using Monte Carlo simulation. Low corresponds to the 10th percentile, mid to the 50th percentile, and high to the 90th percentile for the forecast.
- [2] Variable and fixed costs for CPP, EDP, and incentive-based load curtailment rates are estimates from PSE.
- [3] Direct load control water heating variable costs are from Duke Power's Residential Water Heater Load Control program. Fixed costs are from CRA estimates of Xcel Energy's Saver Switch Program.
- [4] Incentive-based load curtailment variable costs/customer/year estimate are from PSE. Incentive payments estimates from "How and Why Customers Respond to Electricity Price Variability: A Study of NYISO and NYSERDA 2002 PRL Program Performance," Neenan Associates, Ernest Orlando Lawrence Berkeley National Laboratory, and Pacific Northwest National Laboratory, January 2003.
- [5] Standby generator control costs are based on high scenario costs for Incentive-Based Load Curtailment programs.

**Table 3: Costs per kW Reduction**

	<u>First Year Costs (\$/kW/Year)</u>			<u>Levelized Costs (\$/kW/Year)</u>		
	<b>Low</b>	<b>Mid</b>	<b>High</b>	<b>Low</b>	<b>Mid</b>	<b>High</b>
<b>Residential</b>	\$13	\$23	\$48	\$5	\$9	\$16
<b>Commercial</b>	\$62	\$138	\$337	\$8	\$17	\$41
<b>Industrial</b>	\$239	\$553	\$1,505	\$25	\$57	\$155

**Notes:**

[1] Levelized costs are calculated as total discounted costs for the term of the program divided by total discounted load impacts of the program, as defined by the California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects (October 2001).

[2] Term of all programs is set to 10 years.

[3] Discount rates are set to 0.

[4] Programs identified by the above ranges are not necessarily the same programs identified as low, mid, and high for unit impacts in Table 1 or low, mid, and high for total costs in Table 2.

**Sources:**

[1] Total costs/kW reduction estimates are generated using Monte Carlo simulation. Low corresponds to the 10th percentile, mid to the 50th percentile, and high to the 90th percentile for the forecast.



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**Table 1A: kW Reduction by Customer Class**

Class MW	Existing kW per customer	Post- Curtailment kW per customer	Delta kW per customer	Unit Impacts % Impacts	Customer Count	Aggregate MW Reduction			
						Universal Deployment (10% Opt Out)	50% Opt-Out	10% Opt-In	
<b>Residential</b>									
3,592	4.16	3.12	1.04	-25%	863,863	808.1	449.0	89.8	
3,592	4.16	2.08	2.08	-50%	863,863	1,616.3	897.9	179.6	
3,592	4.16	2.85	1.31	-31%	863,863	1,014.9	563.8	112.8	
467	4.16	1.91	2.25	-54%	112,302	226.9	126.1	25.2	
2,191	4.16	3.57	0.58	-14%	526,956	276.8	153.8	30.8	
<b>Commercial</b>									
1,053	9.93	9.23	0.69	-7%	106,073	66.3	36.8	7.4	
1,053	9.93	9.44	0.48	-5%	106,073	45.9	25.5	5.1	
1,053	9.93	7.44	2.48	-25%	106,073	236.9	131.6	26.3	
1,053	9.93	4.96	4.96	-50%	106,073	473.8	263.2	52.6	
1,053	9.93	9.43	0.50	-5%	106,073	47.4	26.3	5.3	
1,053	9.93	8.04	1.89	-19%	106,073	180.0	100.0	20.0	
105	9.93	8.04	1.89	-19%	10,607	18.0	10.0	2.0	
<b>Industrial</b>									
175	45.35	42.18	3.17	-7%	3,855	11.0	6.1	1.2	
175	45.35	43.16	2.20	-5%	3,855	7.6	4.2	0.8	
175	45.35	22.68	22.68	-50%	3,855	78.7	43.7	8.7	
175	45.35	11.34	34.01	-75%	3,855	118.0	65.6	13.1	
175	45.35	40.82	4.54	-10%	3,855	15.7	8.7	1.7	
175	45.35	28.12	17.23	-38%	3,855	59.8	33.2	6.6	
44	45.35	28.12	17.23	-38%	964	14.9	8.3	1.7	
<b>System Load</b>						4,819			

Sources:

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[1] Unit impacts for the CPP option are based on estimates from Gulf Power, resulting from a magnitude reduction of 2.37 kW reduction per customer during the winter months. General Public Utilities (GPU) in Pennsylvania has reported an impact of 1.24 kW per customer during the summer, a 50% drop in base usage. 50% impacts achieved with enabling technology (smart thermostat). 25% Impacts represent a case without enabling technology.

Residential and C&I sectors.

[3] Unit impacts of 54% calculated from estimated reductions from PSE's Home Comfort Control Thermostat Study.

[4] Unit impacts of 14% from the Duke Power program, which indicated a drop of .5 kW on a base use of 3.57 kW. Impacts are based on Summer data.

[5] Unit impacts for the CPP option are from CRA's analysis of PSE data, based on a base price of 6.67 cents/kWh and CPP price of 13.91 cents/kWh (04/18/02), using price elasticities from the literature survey reported in Ahmad Faruqi and Stephen S. George, "The Value of Dynamic Pricing in Mass Markets," The Electricity Journal, July 2002.

[6] Ahmad Faruqi et al., "Customer Responses to Rate Options." EPRI CU-7131, Barakat & Chamberlin. (January 1991).

[7] Low impact estimate for Incentive-based Load Curtailment option from B.C Hydro's Price Dispatched Curtailment Program. Program Performance," Neenan Associates, Ernest Orlando Lawrence Berkeley National Laboratory, and Pacific Northwest National Laboratory, January 2003. The average implicit price elasticity was estimated by Bernie Neenan, Richard Boisvert and Peter Cappers in the April 2002 Electricity Journal to be -.09, which implies that program participants would reduce their usage during curtailment periods by about 38 percent, when they were given an incentive of \$500/MWh to cut usage. The implicit price elasticities were found to vary by customer, and displayed an upper limit of -.47 for some customers.

[9] Saturation rates for electric water (61%) and space heating (13%) from Bill Hopkins at PSE.

[10] Impacts are taken from high impacts from incentive based curtailment programs.

**Notes:**

[1] Comparatively few utilities are winter peaking and there are even fewer utilities with active winter peak clipping programs. The estimates in this table have been gathered through a literature search, supplemented with phone calls and e-mails with several utilities, commissions and other regulatory bodies.

[2] Hydro Quebec has a residential Dual-Energy rate option which uses a dual-energy heating system equipped with an automatic switch permitting the transfer from one source to the other when

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Table 2A: Costs by Demand-Response Option

	Variable Cost BCL Customer/Year	Customer Count	Variable Cost per MWh Reduced/Year		Total Variable Cost (per year)		Other Variable Program Fixed Costs (one-time)		Total Cost			
			Universal Deployment	50% Opt-Out	10% Opt-In	50% Opt-Out	10% Opt-In	Universal Deployment	50% Opt-Out	10% Opt-In		
<b>Residential</b>												
Critical Peak Pricing <sup>[1]</sup>	\$12.00	863,863	\$0	\$0	\$9,329,717	\$5,183,176	\$1,036,635	\$0	\$12,350,000	\$21,679,717	\$17,533,176	\$13,386,635
Extreme Day Pricing <sup>[1]</sup>	\$12.00	863,863	\$0	\$0	\$9,329,717	\$5,183,176	\$1,036,635	\$0	\$12,350,000	\$21,679,717	\$17,533,176	\$13,386,635
Direct Load Control-Space Heating	N/A	112,302	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Direct Load Control-Water Heating <sup>[2]</sup>	\$24.00	526,956	\$0	\$0	\$11,382,255	\$6,323,475	\$1,264,695	\$0	\$450,000	\$11,832,255	\$6,773,475	\$1,714,695
<b>Commercial</b>												
Critical Peak Pricing <sup>[1]</sup>	\$12.00	106,073	\$0	\$0	\$1,145,592	\$636,440	\$127,288	\$0	\$12,350,000	\$13,495,592	\$12,986,440	\$12,477,288
Extreme Day Pricing <sup>[1]</sup>	\$12.00	106,073	\$0	\$0	\$1,145,592	\$636,440	\$127,288	\$0	\$12,350,000	\$13,495,592	\$12,986,440	\$12,477,288
Interruptible and Curtailment Rates	N/A	106,073	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Incentive-Based Load Curtailment (low variable cost) <sup>[3]</sup>	\$12.00	106,073	\$57,417	\$31,899	\$6,380	\$1,203,009	\$133,668	\$0	\$12,350,000	\$13,553,009	\$13,018,339	\$12,483,668
Incentive-Based Load Curtailment (high variable cost) <sup>[4]</sup>	\$12.00	106,073	\$436,373	\$242,429	\$48,486	\$1,581,965	\$175,774	\$0	\$12,350,000	\$13,931,965	\$13,228,869	\$12,525,774
Standby Generator Control <sup>[4]</sup>	\$12.00	10,607	\$43,637	\$24,243	\$4,849	\$158,196	\$17,577	\$0	\$12,350,000	\$12,508,196	\$12,437,887	\$12,367,577
<b>Industrial</b>												
Critical Peak Pricing <sup>[1]</sup>	\$12.00	3,855	\$0	\$0	\$41,632	\$23,129	\$4,626	\$0	\$12,350,000	\$12,391,632	\$12,373,129	\$12,354,626
Extreme Day Pricing <sup>[1]</sup>	\$12.00	3,855	\$0	\$0	\$41,632	\$23,129	\$4,626	\$0	\$12,350,000	\$12,391,632	\$12,373,129	\$12,354,626
Interruptible and Curtailment Rates	N/A	3,855	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Incentive-Based Load Curtailment (low variable cost) <sup>[3]</sup>	\$12.00	3,855	\$20,741	\$11,523	\$2,305	\$62,373	\$6,930	\$0	\$12,350,000	\$12,412,373	\$12,384,652	\$12,356,930
Incentive-Based Load Curtailment (high variable cost) <sup>[4]</sup>	\$12.00	3,855	\$157,632	\$87,573	\$17,515	\$199,264	\$22,140	\$0	\$12,350,000	\$12,549,264	\$12,460,702	\$12,372,140
Standby Generator Control <sup>[4]</sup>	\$12.00	964	\$39,408	\$21,893	\$4,379	\$49,816	\$5,535	\$0	\$12,350,000	\$12,399,816	\$12,377,676	\$12,355,535

Sources:

- [1] Variable and fixed costs for CPP and EDP rates are estimates from PSE
- [2] Variable costs are from Duke Power's Residential Water Heater Load Control program. Fixed costs are from CRA estimates of Xcel Energy's Saver Switch Program.
- [3] Variable costs/customer/year estimate are from PSE. Incentive payments estimates from "How and Why Customers Respond to Electricity Price Variability: A Study of NYISO and NYISERDA 2002 PRL Program Performance," Neenan Associates, Ernest Orlando Lawrence Berkeley National Laboratory, and Pacific Northwest National Laboratory, January 2003.
- [4] Standby Generator costs are based on high scenario costs for Incentive-Based Load Curtailment programs.
- [5] Incentive based load curtailment programs have the same \$12.35 million fixed cost as CPP and EDP.

Notes:

- [1] Incentive payments for demand-response load curtailment programs can range from \$250-500/MWH curtailed.
- [2] Curtailment period for New York is 20 hours/year.

**Puget Sound Energy  
Winter Peak Clipping Options**

**Table 3A: Costs per kW Reduction**

	First Year Costs (\$/kW/Year)		Levelized Costs (\$/kW/Year)			
	Universal Deployment	50% Opt-Out	10% Opt-In	Universal Deployment	50% Opt-Out	10% Opt-In
<b>Residential</b>						
Critical Peak Pricing (low impacts)	\$26.83	\$39.05	\$149.08	\$13.07	\$14.30	\$25.30
Critical Peak Pricing (high impacts)	\$13.41	\$19.53	\$74.54	\$6.54	\$7.15	\$12.65
Extreme Day Pricing	\$21.36	\$31.10	\$118.71	\$10.41	\$11.38	\$20.15
Direct Load Control-Space Heating	N/A	N/A	N/A	N/A	N/A	N/A
Direct Load Control-Water Heating	\$42.75	\$44.05	\$55.76	\$41.29	\$41.42	\$42.59
<b>Commercial</b>						
Critical Peak Pricing	\$203.48	\$352.44	\$1,693.10	\$35.89	\$50.79	\$184.86
Extreme Day Pricing	\$294.26	\$509.68	\$2,448.49	\$51.91	\$73.45	\$267.33
Interruptible and Curtailment Rates (low impacts)	N/A	N/A	N/A	N/A	N/A	N/A
Interruptible and Curtailment Rates (high impacts)	N/A	N/A	N/A	N/A	N/A	N/A
Incentive-Based Load Curtailment (low impacts and variable cost)	\$286.08	\$494.63	\$2,371.56	\$51.46	\$72.32	\$260.01
Incentive-Based Load Curtailment (high impacts and variable cost)	\$77.39	\$132.27	\$626.20	\$15.65	\$21.14	\$70.53
Standby Generator Control	\$694.80	\$1,243.61	\$6,182.90	\$77.39	\$132.27	\$626.20
<b>Industrial</b>						
Critical Peak Pricing	\$1,125.11	\$2,022.17	\$10,095.73	\$115.91	\$205.62	\$1,012.97
Extreme Day Pricing	\$1,627.08	\$2,924.37	\$14,599.97	\$167.63	\$297.36	\$1,464.92
Interruptible and Curtailment Rates (low impacts)	N/A	N/A	N/A	N/A	N/A	N/A
Interruptible and Curtailment Rates (high impacts)	N/A	N/A	N/A	N/A	N/A	N/A
Incentive-Based Load Curtailment (low impacts and variable cost)	\$788.89	\$1,416.84	\$7,068.33	\$82.46	\$145.25	\$710.40
Incentive-Based Load Curtailment (high impacts and variable cost)	\$209.89	\$375.14	\$1,862.38	\$23.99	\$40.51	\$189.24
Standby Generator Control	\$829.57	\$1,490.57	\$7,439.50	\$85.96	\$152.06	\$746.95

**VII. Electric Portfolio  
Analysis and Results**

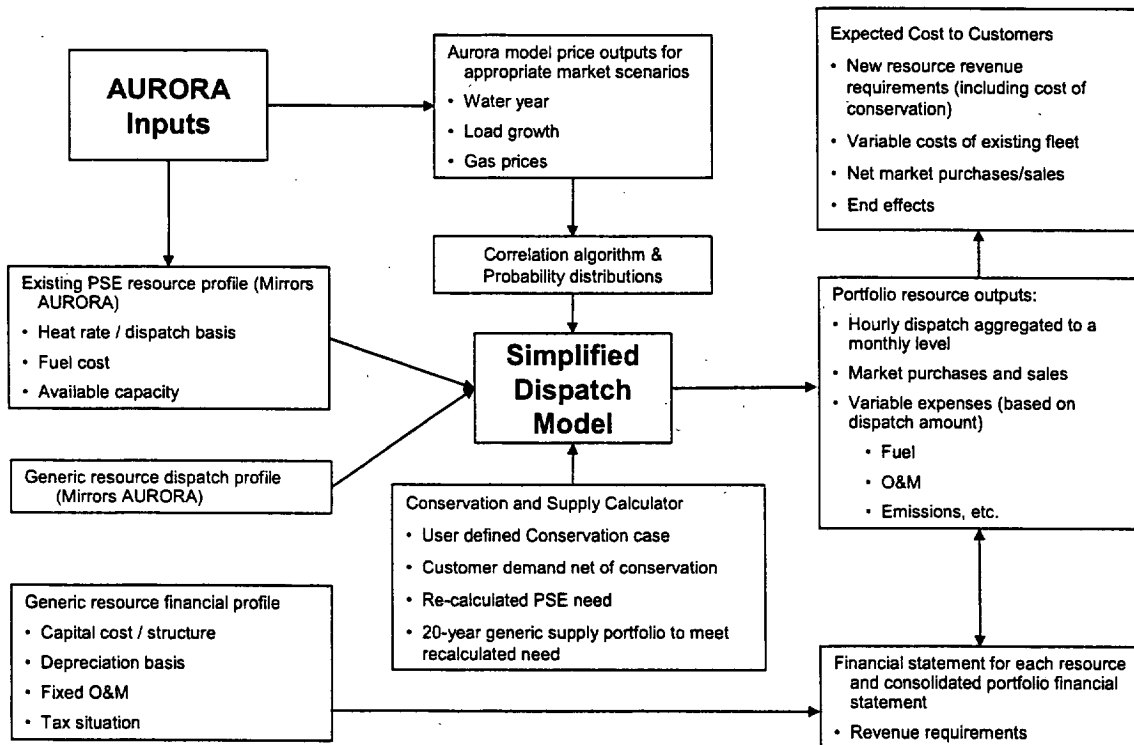
## CHAPTER VII. ELECTRIC PORTFOLIO ANALYSIS AND RESULTS

Historically, conservation has been dealt with as a “plug assumption” in the analysis of supply resources for least-cost planning purposes. PSE’s April 2003 Least Cost Plan utilized this approach. In this update, PSE has integrated conservation analysis with the supply resource analysis presented in the April 2003 LCP submittal. This chapter will detail the approach, assumptions, and methodology used in the updated analysis of PSE’s electric-supply portfolio and will finish with a summary of the results of the analysis. Appendix B provides additional details associated with the assumptions and the analysis logic.

### A. Modeling Approach for Simultaneous Assessment of Conservation and Supply Resources

The integration of the conservation and electric-supply resource utilizes the Portfolio Screening Model from the April 2003 LCP as the analysis platform. Exhibit VII-1 provides an overview of how the conservation analysis is integrated into the Screening Model:

**Exhibit VII-1  
Conservation and Supply Resource Analysis Flow Chart**



This section will detail the approach, assumptions, and methodology used in adapting the Portfolio Screening Model to the analysis of the optimum level of conservation. We will begin with a discussion of the key changes in the assumptions and methodologies used in this update as they differ from the April 2003 LCP. Next will be a description of the process used to develop supply portfolios based on the level of conservation. Finally is a discussion of the way in which the Screening Model treats the level of conservation assumed in particular cases, vis-à-vis supply resources, from both a dispatch and a financial perspective.

***Modeling and Methodology Changes from April 2003 LCP***

The power-price, gas-price, and load forecasts have been updated August 2003 LCP report. For a complete discussion of these new forecasts, please refer to Chapter III. Beyond these forecast updates, there have been several changes to input assumptions and modeling methodologies that warrant discussion. Exhibit VII-2 details some of the simple input assumption changes:

**Exhibit VII-2  
Input Assumption Changes from April 2003 LCP**

<b>Assumption</b>	<b>04/30/2003 LCP</b>	<b>08/31/2003 Update</b>
CCGT Capital Cost (\$/kW)	645	710
CCGT Fuel Basis Differential (\$/MMBtu)	0.5	0.11
SCGT Fuel Basis Differential (\$/MMBtu)	0.5	0.18
Accelerated Depreciation in 2004	30%	50%

The assumption for the capital cost of a CCGT has been updated based on contemporaneous analysis of the cost of greenfield development as well as experience in looking at acquisition opportunities. The fuel basis differential is the amount added to the commodity price of the fuel for non-commodity fuel related costs. The old value of \$0.5/MMBtu was developed using existing PSE gas assets as a proxy. Analysis subsequent to the April 2003 LCP submittal revealed that the fixed gas-cost assumptions for CCGT and SCGT taken from the NPCC (\$15.55 and \$15.74/kW respectively) already included a portion of the costs counted in the \$0.5/MMBtu fuel basis differential assumption. The new values are consistent with the NPCC assessment of the fixed and variable costs associated with natural gas for CCGT and SCGT resources. The change in 2004 accelerated depreciation reflects recent changes in the tax law.

This update of the April 2003 LCP also incorporates assumptions for heat-rate improvements over time for thermal resources. The heat-rate improvements phase in through 2015 and are constant after that. Exhibit VII-3 details these new assumptions:

**Exhibit VII-3**  
**Heat Rate Efficiency Improvements (Source: EIA 2003 Energy Outlook)**

Year	CCGT	SCGT	Coal
2004	6,856	10,817	8,922
2005	6,783	10,756	8,883
2006	6,711	10,695	8,845
2007	6,639	10,633	8,806
2008	6,567	10,572	8,767
2009	6,494	10,511	8,728
2010	6,422	10,450	8,689
2011	6,408	10,450	8,671
2012	6,393	10,450	8,653
2013	6,379	10,450	8,636
2014	6,364	10,450	8,618
2015	6,350	10,450	8,600

The definition of Shaped CCGT ("Joint Ownership" in the April 2003 LCP) Resources has changed since the report's submittal. Because of the changes made to the need determination (see Chapter III for a detailed discussion), May is now a deficit month. Shaped CCGT resources will therefore reflect a split of nine months (September – May) where PSE would control the resource and three months (June – August) were it would be controlled by a third party through equity ownership. The split of the capital and fixed costs for Shaped CCGT resources has been modified accordingly.

The rate-base calculation used in the determination of the revenue requirement for new generic resources has also been changed. The calculations represented in the April 2003 LCP were as follows:

$$\text{Rate Base} = \text{Utility Plant in Service} - \text{Accum. Depreciation} - \text{Accum. Deferred Taxes}$$

The accumulated depreciation assumption used in the April 2003 LCP was for year-end. This has been changed to mid-year accumulated depreciation.



Finally, improvements have been made in the analysis methodology. First, the portfolio of generic supply resources had a 10-year horizon in the April 2003 LCP. The generic supply resource portfolios have a 20-year horizon in this update. The methodology for portfolio construction has also changed but will be discussed in the next section. Next, the "load-spreading" methodology has been changed to more accurately reflect the underlying hourly PSE load used in AURORA to generate the price curves. In the April 2003 LCP, the monthly load for the 20-year evaluation period was spread to hourly load using a 2004 base-year load shape. The hourly adjustment factors associated with the 2004 base-year load shape were then adjusted for the specific day on which January 1st fell in all subsequent years. This methodology maintained the correct sequence of days, but introduced small (much less than 1% on an annual basis) differences when compared to the 20-year hourly load in AURORA. In this update, the load was spread across the load shape produced by AURORA for each of the 20 years in the analysis period, not simply the 2004 base year. Finally, the "hydro-spreading" methodology was modified in a similar fashion as the load spreading. The change in the development of these hourly representations (load and hydro) produces results that exactly mirror the representations used in AURORA to generate the hourly price forecast.

### ***Supply Portfolio Construction***

The supply resource portfolios analyzed in the April 2003 LCP generally were developed "by hand" by adding 25-MW blocks of various resource technologies in amounts necessary to meet the need defined by the various planning standards considered in the analysis. This was the preferred method given that even with the range of technology mixes and portfolio standards assessed, the total number of portfolios assessed in detail was less than 100. For reasons that will be detailed later, the number of conservation scenarios, and associated unique supply portfolios vastly exceeds the capacity of the previous methodology for developing the supply resource portfolios. Practically speaking, literally thousands of conservation scenarios have been analyzed in this update, many of which have only subtle differences in aMW of conservation. In order to address the volume of cases, the supply portfolio construction has been automated and integrated into the Portfolio Screening Model. To address the issue of subtle differences in aMW of conservation between conservation scenarios, the supply resource portfolios are developed to exactly meet the need remaining after the level of conservation in a particular case is taken into account. The following rules are applied in the automated supply resource portfolio construction:

- 10% of PSE's demand will be met with renewable resources by 2013 and maintained thereafter (goal from the April 2003 LCP). The wind resources are added in a staggered fashion beginning in 2005.
- If there is no need greater than 50 MW in the months of June through August and there is need in the other months, then need from the remaining months will be met with Shaped CCGT MW.
- When need arises in the summer months, it will be met with a mix of thermal resources (50% CCGT, and 50% coal).
- Whenever a CCGT resource is added (either full or Shaped CCGT), an additional 13.5% of the CCGT capacity is added in the form of duct firing
- Portfolios will be developed to meet the B2 planning standard; energy is added to meet the highest deficit month and capacity is added to meet the 16-degree-day standard at Sea-Tac.
- SCGT capacity is sold forward from May thru October.

Several steps are involved in accounting for the level of conservation in a particular conservation scenario and in developing the associated supply portfolios. A conservation scenario is defined by including any combination of the 65 bundle/price points. As detailed in Chapter IV, there are 17 bundles: 8 residential, 8 commercial, and one industrial. Generally, there are four price points associated with each of the 8 residential and commercial bundles, with the exception of 12, and only one price point associated with the industrial bundle, totaling 53 unique bundle/price point combinations. The number of potential conservation scenarios is, therefore, practically infinite. This is the source of the scenario-volume issue discussed earlier in this section, and while exhaustive enumeration is clearly impossible, many more scenarios than were considered in the April 2003 LCP will be necessary to explore the optimal level of conservation.

Once a conservation scenario is defined, the 20-year annual MWhs associated with the selected bundle/price points are rolled up to the bundle level and grossed up for 6.5 % line losses. These rolled up annual MWhs are then spread across the appropriate hourly load shape for each particular bundle. The hourly load shapes are for a 2004 base year. The 20-year hourly impact based on the 2004 base year of each bundle is then totaled to form the 20-year total conservation impact. The last step in developing the 20-year total hourly

conservation impact is to adjust each year for the specific day of the week on which January 1 falls.

The 20-year hourly total conservation impact is then subtracted from the PSE 20-year hourly total demand forecast. This net-of-conservation demand forecast is then rolled up to a monthly aMW level and is used to recalculate PSE's 20-year energy need on a monthly basis. This monthly need is the basis upon which the supply resource portfolios are constructed. The capacity need is adjusted for the conservation scenario by taking the average of the maximum hour of conservation in the months of December through February and netting it from the no-conservation peak-demand forecast.

#### ***Conservation Treatment in the Screening Model Dispatch***

Once the supply resource portfolio is constructed, the Screening Model automatically assigns it for use as the dispatch case. In a similar fashion to how the no-conservation total demand is adjusted to facilitate the construction of the supply resource portfolios, the 20-year total conservation impact is subtracted from the net demand (total demand minus current PSE PPAs) in the Screening Model. This is equivalent to treating conservation like any of the other must-run resources (e.g., non-dispatchable portions of the NUGs, hydro resources, and wind resources) in the Screening Model. Regardless of cost, the conservation is "dispatched" simply because it has been included in the conservation scenario. The financial impact of the dispatch of the existing PSE fleet and the portfolio of new supply resources against the AURORA market-price forecast is the same as it was in the April 2003 LCP submittal, and is detailed in Appendix B.

#### ***Financial Treatment of Conservation***

The financial impact of the conservation bundles/price points included in the conservation scenario is consolidated annually and flows directly to the revenue requirement in the expected cost-to-customer calculation, with no return component. For each bundle/price point, there is an associated cost and duration of the benefit. The cost is adjusted down by 10% to reflect the environmental benefit of conservation in lieu of fossil supply resources. The cost is spread or "amortized" over the duration of the benefit rather than "expensed" up front. If the duration of the benefit for a particular bundle/price point is less than 20 years, then there is an assumed 100% "re-up rate" for however many times are necessary to fill the 20-year evaluation period. Exhibit VII-4 details this series of calculations.

## Exhibit VII-4 Conservation Cost Calculation Example

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023				
Bundle 12A	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237			
Renewal MWh/Year	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237	15,237		
Cost (\$/MWh)	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17		
Duration (Years)	6																							
Annual Cost (\$1,000's)	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	262	
2001																								
2005																								
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2023																								
Total	262	787	1,050	1,312	1,575	1,837	2,100	2,362	2,625	2,887	3,150	3,412	3,675	3,937	4,199	4,462	4,724	4,987	5,249	5,512	5,774	6,037	6,300	6,562

The example shown is for the Level A cost point of the Residential Existing Construction lighting bundle. The duration of the benefit is six years, the average cost is \$17/MWh, and the incremental conservation realized per year is 15,237 MWh (this is for the Constant Rate of Acquisition Case). The total cost of the 2004 conservation in this example is \$1,574,803 (six years x \$17/MWh x 15,327 MWh/year). This total cost is amortized over the six-year duration of the bundle for an annual "accrued" cost of approximately \$262,000. The total annual cost, therefore, increases by an equal amount each year reflecting the 100% "re-up" rate and the 0% escalation.

End effects are dealt with in a similar fashion as the end effects of supply resources. In the example shown in Exhibit VII-4, the end effects will take into consideration the residual amount of conservation that extends beyond year 20. Exhibit VII-5 shows the cost associated with the residual conservation from Exhibit VII-4.

**Exhibit VII-5**  
**Residual Conservation Cost from Exhibit VII-2 Example**

Bundle 12A	2023	2024	2025	2026	2027	2028
New MWh/Year	15,237					
Renewal MWh/Year	45,710					
Cost (\$/MWh)	17					
Duration (years)						
Annual Cost (\$1,000's)						
2004	-	-	-	-	-	-
2005	-	-	-	-	-	-
2006	-	-	-	-	-	-
2007	-	-	-	-	-	-
2008	-	-	-	-	-	-
2009	-	-	-	-	-	-
2010	-	-	-	-	-	-
2011	-	-	-	-	-	-
2012	-	-	-	-	-	-
2013	-	-	-	-	-	-
2014	-	-	-	-	-	-
2015	-	-	-	-	-	-
2016	-	-	-	-	-	-
2017	-	-	-	-	-	-
2018	787	-	-	-	-	-
2019	787	787	-	-	-	-
2020	787	787	787	-	-	-
2021	787	787	787	787	-	-
2022	1,050	1,050	1,050	1,050	1,050	-
2023	1,050	1,050	1,050	1,050	1,050	1,050
Total	5,249	4,462	3,675	2,887	2,100	1,050

The market benefit of the residual conservation from year 2024-2050 is calculated by subtracting the total cost of conservation from the market value of the conserved MWhs. The market value of the conserved MWhs is calculated by taking the 2023 average market price generated by AURORA and escalating it by 2.5%. This generates a strip of average annual market prices on a per-MWh basis to apply to the annual residual MWh of conservation. This market value is discounted back to year 1 and raises or lowers the expected cost based on the attractiveness of the conservation scenario.

## **B. Analytical Results**

The analytical results will be presented in three sections. First are details of the results of the Screening Model / conservation integration using the Constant Rate of Acquisition Case and Accelerated Lighting Case. Following is a discussion of the emissions impact of the optimal level of conservation in the Accelerated Lighting Case with the 10% renewable goal. Finally, the potential benefit of cold-weather-event peak clipping will be explored.

### ***Screening Model / Conservation Analysis Results***

The results of the Screening Model / conservation-integration analysis for the Constant Rate of Acquisition Case and Accelerated Lighting Case are presented in Exhibit VII-6:

### Exhibit VII-6

#### Constant Rate of Acquisition Case and Accelerated Lighting Results

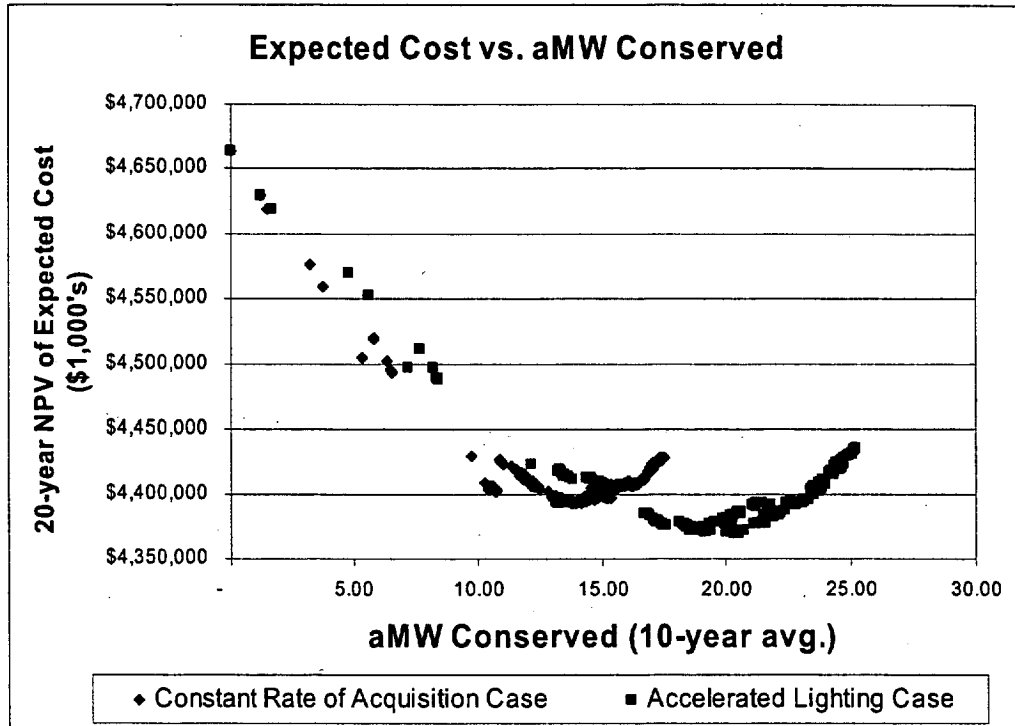


Exhibit VII-6 presents the full range of the results building up to the Achievable Potential. Clearly, there is an "optimal" conservation level from a least-cost perspective that occurs at a level somewhat less than the full Achievable Potential detailed in Chapter IV. In the Constant Rate of Acquisition Case, the minimum-cost scenario occurs at a conservation level of 13.84 aMW on a 10-year average basis. The minimum-cost scenario associated with the Accelerated Lighting Case is 20.35 aMW on a 10-year average basis. The 20-year incremental- and cumulative-conservation levels for both the Constant Rate of Acquisition Case and the Accelerated Lighting Case at the minimum-cost scenario are shown in Exhibit VII-7.

### Exhibit VII-7

#### Incremental and Cumulative Conservation in Base and Accelerated Lighting Cases

Year	Accelerated Lighting Case			Constant Rate of Acquisition Case	
	Yearly	Cumulative		Yearly	Cumulative
2004	15.34	15.34		13.84	13.84
2005	16.17	31.51		13.84	27.68
2006	17.84	49.35		13.84	41.53
2007	22.02	71.37		13.84	55.37
2008	22.02	93.38		13.84	69.21
2009	22.02	115.40		13.84	83.05
2010	22.02	137.42		13.84	96.90
2011	22.02	159.43		13.84	110.74
2012	22.02	181.45		13.84	124.58
2013	22.02	203.47		13.84	138.42
2014	16.45	219.92		13.84	152.26
2015	10.88	230.80		13.84	166.11
2016	5.32	236.12		13.84	179.95
2017	5.32	241.43		13.84	193.79
2018	5.32	246.75		13.84	207.63
2019	5.32	252.07		13.84	221.48
2020	5.32	257.38		13.84	235.32
2021	5.32	262.70		13.84	249.16
2022	5.32	268.02		13.84	263.00
2023	5.32	273.33		13.84	276.84

Notice that the incremental conservation in the Accelerated Lighting Case phases in over the first three years of the evaluation period and has a similar phase-out after year 10 of the evaluation period (a more detailed discussion of this can be found in Chapter IV). It is also important to note that the total cumulative conservation in the Accelerated Lighting Case is slightly less than in the Constant Rate of Acquisition Case. This is due to the increased up-front administrative costs associated with the acceleration of the acquisition of lighting conservation.

While the minimum-cost conservation scenarios shown in Exhibit VII-6 are only an approximation of the "global optimum," it is very unlikely that there is a solution significantly different from the data presented. The minimum-cost conservation scenarios associated with the Constant Rate of Acquisition and Accelerated Lighting cases are shown in Exhibit VII-8 and Exhibit VII-9 respectively.



### Exhibit VII-8

#### Minimum-Cost Conservation Scenario – Constant Rate of Acquisition Case

1=included, 0=not included    < \$45/MWh    \$45 - \$60/MWh    \$60 - \$85/MWh    \$85 - \$110/MWh

Bundle	Cost Level A	Cost Level B	Cost Level C	Cost Level D
COM EC APPLIANCES	1	1	1	0
COM EC HVAC	1	1	1	0
COM EC LIGHTING	1	1	0	0
COM EC WATERHEAT	1	1	0	0
COM NC APPLIANCES	1	1	0	0
COM NC HVAC	1	1	0	0
COM NC LIGHTING	1	1	0	NA
COM NC WATERHEAT	1	1	0	0
IND EC GENERAL	1	NA	NA	NA
RES EC APPLIANCES	1	1	0	0
RES EC HVAC	1	1	0	0
RES EC LIGHTING	1	NA	NA	NA
RES EC WATERHEAT	1	NA	0	0
RES NC APPLIANCES	NA	1	0	0
RES NC HVAC	NA	1	1	NA
RES NC LIGHTING	1	NA	1	NA
RES NC WATERHEAT	NA	1	NA	0

COM: Commercial  
 IND: Industrial  
 RES: Residential  
 EC: Existing Construction  
 NC: New Construction  
 NA: No data

## Exhibit VII-9

### Minimum-Cost Conservation – Accelerated Lighting Case

1=included, 0=not included	< \$45/MWh	\$45 - \$60/MWh	\$60 - \$85/MWh	\$85 - \$110/MWh
Bundle	Cost Level A	Cost Level B	Cost Level C	Cost Level D
COM_EC_APPLIANCES	1	1	1	0
COM_EC_HVAC	1	1	1	0
COM_EC_LIGHTING	1	1	1	0
COM_EC_WATERHEAT	1	1	0	0
COM_NC_APPLIANCES	1	1	0	0
COM_NC_HVAC	1	1	0	0
COM_NC_LIGHTING	1	1	0	NA
COM_NC_WATERHEAT	1	1	0	0
IND_EC_GENERAL	1	NA	NA	NA
RES_EC_APPLIANCES	1	1	0	0
RES_EC_HVAC	1	1	0	0
RES_EC_LIGHTING	1	NA	NA	NA
RES_EC_WATERHEAT	1	NA	0	0
RES_NC_APPLIANCES	NA	1	0	0
RES_NC_HVAC	NA	1	0	NA
RES_NC_LIGHTING	1	NA	1	NA
RES_NC_WATERHEAT	NA	1	NA	0

COM: Commercial  
 IND: Industrial  
 RES: Residential  
 EC: Existing Construction  
 NC: New Construction  
 NA: No data

Analysis of the curves presented in Exhibit VII-6 shows there are several conservation scenarios that are very close to the minimum scenario for both the Constant Rate of Acquisition and the Accelerated Lighting cases. Exhibit VII-10 shows some statistics associated with the top 50 scenarios analyzed from a minimum-cost perspective.

**Exhibit VII-10**  
**Summary of Top 50 Scenarios**

<b>Constant Rate of Acquisition Case</b>	<b>aMW</b>	<b>Expected Cost</b>
Average Cost	14.04	\$4,393,622
Minimum Cost	13.59	\$4,392,483
Maximum Cost	14.34	\$4,394,326

<b>Accelerated Case</b>	<b>aMW</b>	<b>Expected Cost</b>
Average Cost	19.95	\$4,370,151
Minimum Cost	18.76	\$4,369,018
Maximum Cost	20.52	\$4,371,760

Notice the width of the range of aMW vs. the change in Expected Cost. There are several scenarios that are very close to each other in terms of cost. The distribution of bundle / price points included in these top 50 scenarios is shown in Exhibit VII-11.

## Exhibit VII-11

### Summary of Conservation in Top 50 Scenarios

Bundle	< \$45/MWh	\$45 - \$60/MWh	\$60 - \$85/MWh	\$85 - \$110/MWh
	Cost Level A	Cost Level B	Cost Level C	Cost Level D
COM_EC APPLIANCES	100%	100%	58%	0%
COM_EC HVAC	100%	100%	72%	0%
COM_EC LIGHTING	100%	100%	72%	0%
COM_EC WATERHEAT	100%	100%	60%	0%
COM_NC APPLIANCES	100%	100%	48%	0%
COM_NC HVAC	100%	100%	36%	0%
COM_NC LIGHTING	100%	100%	24%	NA
COM_NC WATERHEAT	100%	100%	14%	0%
IND_EC GENERAL	100%	NA	NA	NA
RES_EC APPLIANCES	100%	100%	0%	0%
RES_EC HVAC	100%	100%	0%	0%
RES_EC LIGHTING	100%	NA	NA	NA
RES_EC WATERHEAT	100%	NA	0%	0%
RES_NC APPLIANCES	NA	100%	2%	0%
RES_NC HVAC	NA	100%	16%	NA
RES_NC LIGHTING	100%	NA	30%	NA
RES_NC WATERHEAT	NA	100%	NA	0%

COM: Commercial  
 IND: Industrial  
 RES: Residential  
 EC: Existing Construction  
 NC: New Construction  
 NA: No data

The percentages shown in Exhibit VII-11 are indicative of the percentages of the 50 cases in which the bundle / price point is included. This table also is applicable to both the Constant Rate of Acquisition Case and the Accelerated Lighting Case. Clearly, measures that are less than \$60/MWh are always included, but more importantly, several of the cost Level C bundles are included in a fraction of the cases as well. This should lend a greater degree of flexibility in program development.

The 20-year supply resource portfolios associated with the Constant Rate of Acquisition and Accelerated Lighting cases are shown in Exhibit VII-12 and 13.

**Exhibit VII-12**

**Supply Portfolio Associated with Minimum-Cost Constant Rate of Acquisition Case**

<b>Year</b>	<b>Shaped CCGT</b>	<b>CCGT</b>	<b>Coal</b>	<b>Wind</b>	<b>SCGT</b>	<b>Duct Fired</b>
2004	442	-	-	-	490	57
2005	-	-	-	150	12	-
2006	-	-	-	-	53	-
2007	-	-	-	200	66	-
2008	-	-	-	-	36	-
2009	105	-	-	200	343	14
2010	56	-	-	-	226	8
2011	87	-	-	200	109	12
2012	-	261	266	-	19	34
2013	-	71	73	150	73	9
2014	-	23	24	-	34	3
2015	-	17	17	25	48	2
2016	-	22	22	-	39	3
2017	-	49	50	25	-	6
2018	-	48	49	-	53	6
2019	-	19	19	30	50	2
2020	-	25	26	-	40	3
2021	-	19	19	35	59	2
2022	-	26	27	-	46	3
2023	-	23	24	35	56	3
<b>Total</b>	<b>690</b>	<b>605</b>	<b>616</b>	<b>1,050</b>	<b>1,855</b>	<b>167</b>

**Exhibit VII-13**

**Supply Portfolio Associated with Minimum-Cost Accelerated Lighting Case**

<b>Year</b>	<b>Shaped CCGT</b>	<b>CCGT</b>	<b>Coal</b>	<b>Wind</b>	<b>SCGT</b>	<b>Duct Fired</b>
2004	441	-	-	-	488	57
2005	-	-	-	150	9	-
2006	-	-	-	-	47	-
2007	-	-	-	200	53	-
2008	-	-	-	-	22	-
2009	65	-	-	200	329	9
2010	39	-	-	-	214	5
2011	85	-	-	200	106	11
2012	-	256	261	-	17	33
2013	-	67	68	150	68	9
2014	-	21	21	-	34	3
2015	-	18	18	25	51	2
2016	-	27	28	-	41	4
2017	-	54	55	25	-	7
2018	-	55	56	-	58	7
2019	-	24	25	30	53	3
2020	-	30	31	-	42	4
2021	-	24	25	35	61	3
2022	-	32	32	-	48	4
2023	-	27	28	35	61	4
<b>Total</b>	<b>630</b>	<b>635</b>	<b>647</b>	<b>1,050</b>	<b>1,805</b>	<b>165</b>

It is important to note that the differences between these two portfolios of supply resources are more differences of timing than of total amount. This is due simply to the fact that the total conservation at the end of the evaluation period is virtually the same in both the Constant Rate of Acquisition Case and the Accelerated Lighting Case. Supply resource additions therefore are really just deferred to the extent that the conservation is accelerated.

***Emissions Impact of Conservation and Renewables Goal***

The emission impact of the renewable goal laid out in the April 2003 LCP and that of the optimal conservation scenario in the Accelerated Lighting Case over a 20-year period is shown in Exhibit VII-14.

## Exhibit VII-14

### Emission Impact of Accelerated Conservation and Renewable Goal

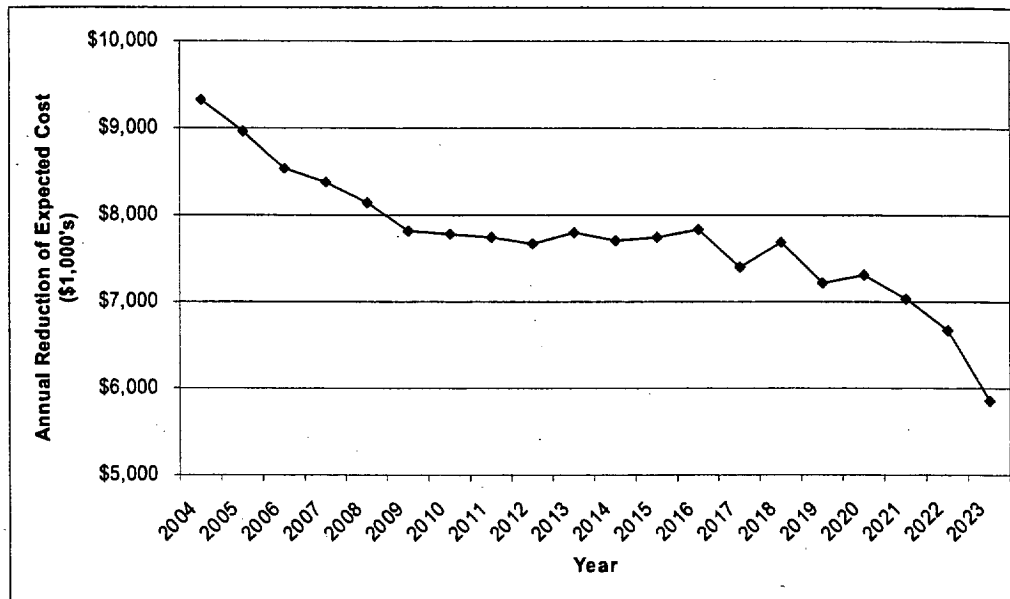
<b>20-Year Cumulative Emissions (Tons)</b>	<b>CO2</b>	<b>NOX</b>	<b>SO2</b>
No Conservation / No Renewables	281,526,755	262,466	167,402
No Conservation / 10% Renewable Goal	252,156,204	253,224	157,658
Optimal Accel. Conservation / 10% Renewable Goal	229,451,371	248,098	153,160
Savings From 10% Renewable Goal	29,370,551	9,242	9,744
Savings from Optimal Accel. Conservation	22,704,833	5,126	4,498
Conservation and Renewable Goal Addition/(Reduction)	(52,075,384)	(14,368)	(14,242)
Percentage Addition/(Reduction)	-18.5%	-5.5%	-8.5%

It is important to note that in the absence of conservation and/or renewables, PSE's need is compensated for with a mixed thermal strategy, as discussed in the portfolio-construction section of this Chapter.

#### ***Impact of Cold Weather Event Peak Clipping***

In this LCP update, PSE has developed an analysis to assess the potential benefit of cold-weather-event peak-clipping programs. The analysis presented in this section represents only the benefit side of the equation in an attempt to give an indication of the bounds within which the cost of potential peak-clipping programs must fall. The approach used in this analysis was to compare the savings associated with building SCGT resources to meet the 23-degree capacity-planning standard and the 16-degree capacity-planning standard, implying that the peak-clipping programs would make up the difference. The optimal level of conservation in the Accelerated Lighting Case is assumed as well. Exhibit VII-15 shows the annual savings associated with the reduced SCGT resources in the 23-degree capacity-planning scenario.

**Exhibit VII-15**  
**Annual Expected Cost Potential Benefit**



A summary of the 20-year NPV and SCGT capacity reduction is shown in Exhibit VII-16.

**Exhibit VII-16**  
**20-Year Expected Cost NPV and Capacity Reduction**

(\$1,000's)	23 Degree Planning Standard	16 Degree Planning Standard	Delta (Potential Benefit)
20-Year Cumulative Installed SCGT (MW)	1,488	1,805	- 317
Gross Revenue Requirement	\$3,982,133	\$4,077,084	\$94,951
Emissions - Fleet	\$14,945	\$14,945	\$0
Variable Costs - Existing Fleet	\$940,576	\$940,576	\$0
Revenue from Power Sales	(\$1,045,364)	(\$1,066,212)	(\$20,848)
Cost of Power Purchase	\$391,910	\$391,609	(\$302)
End Effects	(\$15,692)	\$11,017	\$26,709
<b>Expected Cost</b>	<b>\$4,268,508</b>	<b>\$4,369,018</b>	<b>\$100,510</b>



On an annual basis, the potential savings range from around \$7 million per year to more than \$9 million per year, on a nominal basis. The reduction in SCGT capacity is 317 MW over 20 years, with 235 MW in the first year alone. On an NPV basis, including end effects, the potential benefit exceeds \$100 million. This analysis provides an indication of the range within which peak-clipping programs would have to fall to be a least-cost alternative to SCGT resources in meeting the 16-degree capacity-planning standard.

**VIII. Conservation  
Implementation Issues**

## CHAPTER VIII. CONSERVATION IMPLEMENTATION ISSUES

Chapter VIII examines implementation issues associated with acquiring new conservation resources, including the unique uncertainties of conservation resources, some implementation issues that are not captured in the Least Cost Plan modeling process, and a relevant cost-effectiveness standard for conservation. In addition, this chapter discusses the considerations for an accelerated-conservation scenario.

### **Conservation/Energy Efficiency**

#### ***Unique Uncertainties for Conservation Resources***

The amount of conservation potential identified for the August 2003 Least Cost Plan Update relies on best available information today – about prices, efficiency, consumer behavior and preferences, etc. – and projects that information 20 years into the future. Like other resources, energy efficiency depends heavily on energy-load forecasts and projected growth rates, with all of the associated uncertainty.

Analogous to supply-side resources, assessments of conservation potential are limited by what is currently known to be available in the marketplace in terms of cost-effective technologies for improving energy efficiency. Somewhat unique to energy-efficiency resources, however, is the utility's dependence on large numbers of very small purchases, each tied to the individual consumer's day-to-day purchasing and behavioral decisions. The utility attempts to influence these decisions through its program designs and delivery. Consumers weigh the utility offerings with other influences beyond the utility's sphere, and ultimately each consumer makes his or her own decision about "how much" and "when" to purchase energy-efficiency resources. The utility is not the ultimate purchaser.

The amounts of energy-efficiency resources purchased are not as precisely metered as supply-side resources. Engineering calculations and robust statistical models are used to ultimately estimate and evaluate the size of energy-efficiency resources acquired; no meter is available to precisely measure kilowatt-hours or therms saved through energy-efficiency measures in the same way power-plant output or pipeline through-put can be quantified. This is not to suggest that supply-side resources are more reliable over the life of the resource, but simply that the

output of supply-side resources is more readily quantifiable "after the fact." Nevertheless, the preponderance of evidence from utility energy-efficiency program evaluations over the past 20-plus years in the Pacific Northwest demonstrates that there is a sizable amount of energy efficiency that can cost-effectively contribute to PSE's resource portfolio.

### ***Implementation Considerations that Extend Beyond Resource Portfolio Modeling***

Determining the amount of conservation potential is data-intensive and relies on knowledge of how different types of customers (e.g., residential single-family vs. large commercial office) use energy for various end-uses (lighting, heating, etc.), and knowledge of the various technology and operational opportunities available to improve the end-use efficiencies. A determination of conservation potential also depends on estimates of the numbers of consumers who will – or will not – undertake varying energy-efficiency measures for various economic, lifestyle, or other reasons. Conservation-potential results are a best estimate based on broad, general assumptions regarding the types of decisions that, ultimately, consumers individually make based on their own values.

Many more specific details are required to implement successful energy-efficiency programs. Implementation depends on trained staff with skills in customer service, sales, engineering, database use, marketing, and management. A number of program-support services need to be in place, including tracking systems for customer site-specific information, data collection, monitoring/reporting performance metrics, and evaluation of cost-effectiveness. New measures or expanded programs are continually developed, and as they are, tracking and accounting capabilities need to grow accordingly.

Program implementers responsible for making efficiency recommendations are concerned with product specifications, ensuring availability of eligible products and qualified installers, monitoring activity levels and performance, quality control, and other distribution issues. Participating contractors must be recruited, trained, and selected in accordance with eligibility criteria. Marketing and promotion strategies must be budgeted, developed, tested and delivered. To these ends, care and attention must be given to taking advantage of synergies available as a result of routine customer communications in the utility's bill statement, or that cut across different measures and sectors, or that lend themselves to cooperation with other interested parties (e.g., water utilities). It should not be surprising to find, several years down the road, that the identified conservation-potential assessments do not track particularly well with the actual

delivered program acquisitions. The conservation-potential assessment and resource-modeling scenarios, therefore, provide good, general, overall guidance, but they cannot predict the specific quantities, timing, programs, or even necessarily all measures to be undertaken. These goals or targets rely on more detailed program-planning considerations and marketplace realities.

### ***Conservation Cost-effectiveness***

In the past, the amounts of energy efficiency identified in PSE's least-cost plans were developed by assessing how much conservation could be acquired at costs less than the cost of the next available supply-side resource. For this Least Cost Plan Update, rather than comparing energy efficiency against a one-dimensional, supply-based estimate of avoided costs, PSE's analytical techniques now provide the ability to evaluate a variety of candidate resource portfolios, including portfolios that have varying levels of conservation. The portfolios are then evaluated using the portfolio-screening model and the results are used to identify the least-cost resource strategy. (For additional detail on the analytical approach for this Least Cost Plan Update, see Chapters II, IV, and VII). For Least Cost Plan purposes, energy efficiency now becomes part of the overall long-term, integrated resource strategy – including both conservation resources and supply resources – to meet customer needs, keep rates low, and protect customers against market price risks.

In the Pacific Northwest, energy efficiency (or “demand-side” resources) is defined as cost-effective when the total cost of acquiring energy efficiency can favorably be compared to a least-cost, supply-side resource. The cost-effectiveness (i.e., benefits exceed costs) for energy efficiency is based on the Total Resource Cost test. Total costs, which include the utility's costs and any other costs paid by the customer or others (e.g., water rebates from a water utility) must be less than the value of the total benefits. “Total benefits” include energy-savings benefits together with the value of all other benefits (e.g., reduced water use). This definition of energy-efficiency benefits, while commendable in its efforts to represent the total value to society, presents some difficulties when viewing conservation as a utility resource.

Unlike supply-side resources, many if not most energy-efficiency measures have additional, so-called “non-energy benefits” that go beyond the value of energy savings. The result is that some energy-efficiency measures may be not be cost-effective when energy savings alone are valued, but do become cost-effective when the value of *all* benefits are included. Modeling

attempts to account for non-energy benefits, but is not always successful in doing so. Experience from implementing programs can often help better define these additional benefits and their value to customers. Furthermore, regarding the costs of resources, certain supply-side resources may have characteristics that yield non-quantified societal "costs," such as certain air emissions. Since passage of the Northwest Power Act of 1980, energy-efficiency resources in the region have typically been assigned a "10 percent" credit to offset their cost relative to the potential environmental "costs" attributed to supply-side resources.

The cost-effectiveness test for various energy-efficiency measures becomes an "after the fact" comparison of the cost and savings of measures or bundles of measures installed on a site-specific basis. Actual implementation design, delivery, and market conditions will cause energy-efficiency costs to vary from those assumed for purposes of calculating the conservation potential. A measure's detailed costs (including installation), the administrative costs of marketing, promotion, program management and evaluation, and the customer-acceptance rates are some of the major variables that invariably will differ, measure by measure or program by program, from the broad assumptions able to be captured in the supply curve analyses. Similarly, energy-savings estimates can vary due to the particulars of the installation, end-user operation, changes to operating hours and/or other engineering assumptions. Cost-effective energy-efficiency resource acquisition, no less so than for other resources, is subject to constant management, monitoring, fine-tuning, and mid-course corrections.

### ***Accelerated Scenario for Electric Conservation Resources***

For the August 2003 LCP Update, PSE examined two conservation-acquisition scenarios: a "Constant Rate of Acquisition Case" and an "Accelerated Lighting case." (For further details on these scenarios, refer to the discussion in Chapter VII.) Acceleration is achieved by assuming that additional energy efficiency can be acquired in the next few years by increasing the saturation of retrofit efficiency measures in existing homes and businesses. The results of the modeling suggest that accelerated energy-efficiency acquisition in the early years – rising to 22.02 aMW per year by 2007 and then declining to 5.32 aMW per year by 2016 vs. a steady 13.84 aMW-per-year annual acquisition for the constant-rate case – is, potentially, a lower-cost resource strategy (see Exhibit VII-8). As discussed above, these scenarios provide general guidance but are not precise recommendations. Nor are they able to detail actual delivery of programs to acquire energy efficiency.

While the difference the two scenarios is significant in terms of short-term energy-efficiency program activity, the difference is fairly minor in terms of the magnitude of the resource need PSE will experience in the next several years. The process of determining an optimal level of energy-efficiency acquisition for the short term should consider advantages of steady, consistent levels of annual energy-efficiency acquisition versus a mode that would have the utility ramp-up market-place activity for a few years, and ramp-down in later periods. There are additional costs to ramping up in terms of acquiring the necessary resources, training personnel, implementing promotional activities, etc., to deliver higher levels of efficiency savings in a shorter time frame. The analysis results demonstrate the effect of these accelerated ramp-up costs: The total amount of conservation acquired over the 20-year planning horizon is slightly less – because it is more expensive – under the accelerated-lighting case. Ramping up also depends on sufficient lead times to ensure the proper infrastructure development (product availability, skilled contractor set, etc).





## CHAPTER IX. LONG TERM ELECTRIC RESOURCE STRATEGY

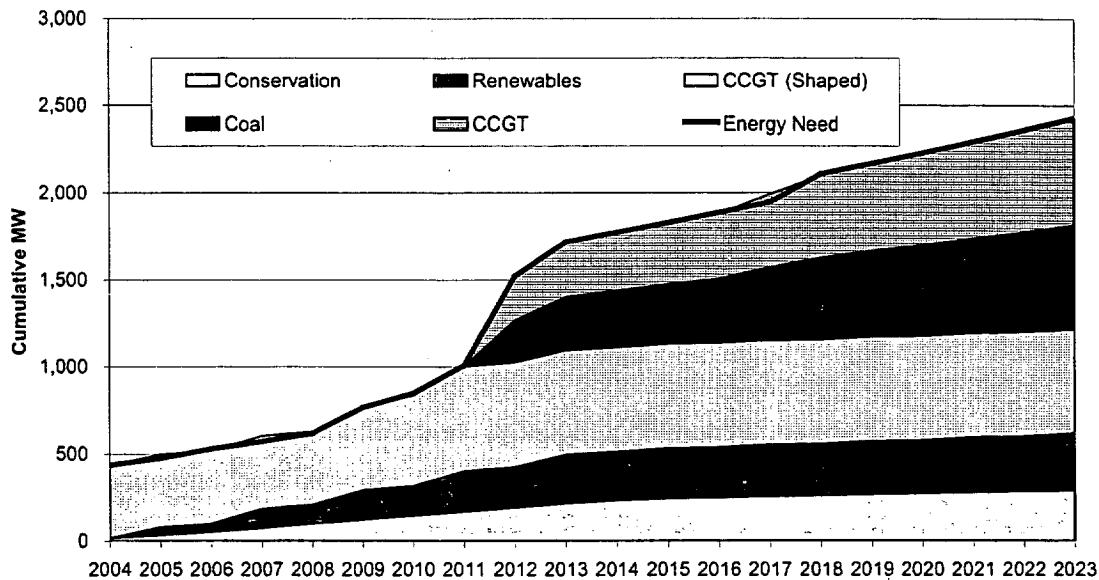
### A. Updated Long Term Electric Resource Strategy

For this Least Cost Plan Update, PSE has adopted an integrated electric resource strategy that includes the following major components:

1. Establishment of a long-term goal to acquire conservation at levels consistent with the Accelerated Lighting Case, including a total of 203 aMW during 2004-2013 and a total of 273 aMW during 2004-2023.
2. Affirmation of PSE's goal, established in the April 30 Least Cost Plan, to acquire renewable resources to meet 10 percent of annual customer energy loads by 2013.
3. A diversified mix of thermal generation resources to meet the remaining need for new electric resources. These resources include combined-cycle gas-fired combustion turbine (CCGT) generation, single-cycle gas-fired combustion turbine (SCGT) generation, and coal-fired generation. Gas-fired resources meet a larger proportion of the overall need, particularly during the earlier part of the planning horizon. Starting later in the first half of the 20-year resource planning horizon, coal-fired generation is also added to meet a portion of the need.
4. New resources, including gas-fired generation are "shaped" seasonally as needed to reduce the costs relating to summer surplus capacity.

The following chart provides a graphical representation of PSE's updated long-term electric resource strategy.

**Exhibit IX-1  
Electric Resource Strategy**



As noted in Chapter VII PSE has used the “B2” resource adequacy standard that it adopted in the April 30 Least Cost Plan. The resource additions shown in the chart above are sufficient to meet the energy portion of the B2 Standard.

**B. Environmental Considerations for the Electric Resource Strategy**

*Avoided Air Emissions Resulting from New Renewable Resources and Conservation*

PSE's integrated electric resource strategy adopted in this Least Cost Plan Update includes both renewable resources and conservation resources. The goal for renewable resources is to meet 10 percent of retail load by 2013 with renewable resources. The goal for conservation is to acquire approximately 203.5 aMW during 2004-2013, and a total of 273 aMW over 20 years. As a result, conservation and renewable resources could meet most or all of PSE's load growth during 2004-2013.

PSE also assessed some of the environmental implications of the integrated resource strategy adopted in this Least Cost Plan Update. The portfolio screening model was used to evaluate air emissions from PSE's electric resource portfolio under two scenarios:

- a no-conservation, no-renewable resources "strategy" that meets PSE's need for new resources entirely with thermal resources (this scenario includes an additional and 371 aMW of natural gas-fired combustion turbine generation and 353 aMW of new coal-fired generation.)
- the integrated resource strategy adopted in this Least Cost Plan Update (discussed in section A. above), including both conservation and renewable resources

The difference in air emissions between the two scenarios quantifies the amount of air emissions from PSE's electric resource portfolio expected to be avoided under the resource strategy adopted in this Least Cost Plan Update.

The table below provides estimates of the air emissions in PSE's electric resource portfolio under both scenarios, along with the estimated net reduction in air emissions as measured by the difference between the two scenarios.

**Exhibit IX-2**

**Avoided Air Emissions with Renewable Resources and Conservation Goals**

20 Year Cumulative Emissions (Tons)	CO2	NOX	SO2
No Conservation/No Renewables	281,526,755	262,466	167,402
Resource Strategy for Least Cost Plan Update (including new conservation and renewable resources)	229,451,371	248,098	153,160
Reduction in Emissions	52,075,384	14,368	14,242
Percent Reduction	18%	5%	9%

(Note that these scenarios do not include avoided air emissions from existing conservation that PSE has acquired prior to 2004.)

***Environmental Impacts of Generating Resources***

An important conclusion in the April 30 Least Cost Plan and this Least Cost Plan Update is that no single electric resource is without drawbacks (cost, risk, etc.). Hence PSE's strategy is to rely on a diversified mix of resources. PSE's resource strategy for this Least Cost Plan Update sets an aggressive long-term goal to acquire conservation resources. However, because conservation alone will not meet all of PSE's need for new electric resources, supply side

resources will also need to be added, both in the near-term and over time. One issue of great importance is the environmental impacts associated with acquisition of new electric generating resources. Each form of electric generation has different environmental impacts, that should be considered and evaluated, including costs and risks. Below are brief discussions on utility-scale energy production technologies that are included in PSE's electric resource strategy.

### **Natural Gas-Fired Generation**

Natural gas refers to methane (CH<sub>4</sub>) which is considered a relatively clean fossil fuel at the point of combustion. Use of natural gas in combined-cycle combustion turbines produces about half as much CO<sub>2</sub> as coal, a third of the NO<sub>2</sub> and one percent of the SO<sub>2</sub>. Nevertheless, methane is a greenhouse gas that can be released into the air during the drilling, production, transportation and combustion processes. Power plants that consume natural gas may also require significant amounts of water for cooling. (Dry cooling is possible, but is less efficient and more costly.) As the demand for natural gas grows there will be growing adverse environmental impacts in potentially sensitive areas. Methane exploration and production requires large areas of land and may lead to opening up lands in the Intermountain West currently excluded from development, as well as off-shore developments on the Atlantic, Pacific and Gulf coasts. Natural gas development in Alaska could lead to another pipeline and the opening up of the Arctic National Wildlife Refuge to development. The introduction of liquefied natural gas (LNG) on a large scale to the U.S. requires the development of new ports, pipelines and other infrastructure along with their attendant environmental costs.

### **Wind Power**

Wind power generation does not have any of the air emission problems of fossil fuel plants. Nevertheless, wind requires large land resources for the placement of the wind turbines. Some communities have also taken issue with the visual impacts. If a wind farm is situated far from an urban center (load) then new high-voltage transmission lines may be required. Because wind power is intermittent and not dispatchable, it may also require backup based on other forms of generation sources, including hydro projects, gas-fired generation and coal-fired generation, with their known environmental impacts.

### **Coal-Fired Generation**

Coal-fired electric generation is associated with its emission of the greenhouse gases, CO<sub>2</sub>, and NO<sub>2</sub>, and for methane released during the coal extraction process. Coal combustion is also a

cause of SO<sub>2</sub> production. In addition to air emissions, water quality needs to be managed in the coal production and combustion processes. Some coal mining techniques can disrupt land resources, creating land reclamation recovery costs.

### **Geothermal**

Mixing water with the heat of the earth creates steam that can be used to turn turbines. If the steam is continually extracted it can eventually deplete the source. The steam may contain heavy metals that need to be extracted and disposal of this condensate has . Alternatively, the steam can be cooled and cycled back into the earth for reheating. A binary system uses a heat exchange mechanism to keep the earth's water cycle separate from the plant's water cycle. The binary method is less efficient and costs more but it can alleviate some of the water quality concerns. Many geothermal sites are located in remote areas and would require substantial investments in transmission facilities, with associated costs and environmental implications.

### **Municipal Solid Waste**

The burning of municipal solid waste (MSW) is sometimes considered a renewable resource since it uses no new fuel and the waste would otherwise go into a landfill. The "quality" of the waste determines the level of various pollutants emitted. When items such as plastics, tires and batteries are burned toxic chemicals are released. Sorting the waste before burning can add to the costs. The typical MSW plant produces more CO<sub>2</sub> and NO<sub>2</sub> than a coal burning plant according to the U.S. Energy Information Agency.

### ***Current Activities on Environmental Issues***

PSE believes that the environmental issues associated with emissions (whatever the source) are important. Accordingly, PSE will continue to collaborate with others as the issues are developed. Currently, the Washington State Energy Facility Site Evaluation Council (EFSEC) is active in a rule making process that will explore opportunities to reduce CO<sub>2</sub> emissions from new generation projects over 350MW that are sited in Washington State. Both the Puget Sound Clean Air Agency (PSCAA) and the Washington State Department of Ecology (WDOE) have also indicated their plans to pursue a comparable rule making effort for new generation projects sited in Washington State that are less than 350MW. PSE believes these discussions serve as a healthy means to weigh a number of considerations including but not limited to public policy concerns, sound scientific analysis, and the energy needs in PSE's service territory.

Since EFSEC announced its exploration of the formal rule making process this summer, PSE has participated in the hearing, submitted comments, and testified. Equally important, PSE has participated in meetings with a variety of interests on the subject to fully understand and explore the environmental issues associated with its Least Cost Plan strategy. PSE continues to explore the appropriate range of technologies to meet its growing need. Renewable resources and conservation alone won't satisfy both the growing demand and the loss of resources PSE will experience over the next two decades. Likewise, a generation strategy that focuses solely on meeting increased demand with a single technology will bear certain price, risk and environmental costs.

### ***Environmental Considerations in Resource Planning***

PSE's analysis of alternative resource portfolios for this Least Cost Plan Update included the regional-standard 10 percent environmental credit for conservation. The April 30 Least Cost Plan also included sensitivity analyses to identify cost tradeoffs between coal-fired generation and natural gas-fired generation under varying potential levels of CO2 costs. PSE will continue to monitor and participate in discussions on environmental topics related to energy resources, including at the national and state level. As further developments occur, PSE will reflect them in its resource planning.

PSE intends to continue enhancing its analytical capabilities to identify and assess environmental costs and tradeoffs for various resource strategies. These will include assessments of air emissions costs and risks from an integrated resource portfolio perspective. Such analyses will require development of cost values for various forms of emissions including CO2, NOX, and SO2. PSE believes that such integrated analytical approaches can provide more useful information than is currently represented by the 10 percent environmental credit methodology. Work on these topics will be included in implementation of the Two-Year Action Plan for PSE's Least Cost Plan.

**X. Gas Portfolio  
Analysis and Strategy**

## CHAPTER X. GAS PORTFOLIO ANALYSIS AND RESOURCE STRATEGY

Similar to the historical treatment of conservation in PSE's electric portfolio analysis, recent gas Least Cost Plan analysis has reflected conservation resources as a decrement to system demand. In its April 2003 Least Cost Plan, PSE utilized this approach by assuming that approximately 2.1 million therms of new conservation savings will occur every year during the 20-year planning horizon. With an assumed average conservation measure life of 10 years, the annual decrement to system demand in the April 2003 Least Cost Plan grows to approximately 21 million therms by year 10 and remains at this level throughout the remaining years of the planning period.

In this August 2003 Update, PSE has modified this approach by reflecting the load shapes or "supply curves" and the corresponding costs of the gas conservation resource options described in Chapter IV in the least-cost resource planning analysis to determine the resulting impact on the total gas-portfolio cost. This section will describe the approach, assumptions, and methodology used in the gas resource analysis and will summarize the results of the analysis.

### A. Modeling Approach for Assessment of Conservation Resources

#### *Modeling Limitations*

The analysis of the gas conservation resources utilizes PSE's Uplan-G Resource Planning Model. Unlike the automated portfolio-construction capability provided by the electric Portfolio Screening Model, Uplan-G is currently unable to model gas conservation as a resource, whereby the model would select a set or "bundle" of conservation resources, in combination with supply-side resources, to meet customers' energy needs at the least cost. Instead, each bundle of conservation resources must be successively introduced to the Uplan-G model by decrementing demand according to the load shape of the conservation resource and simultaneously adding the corresponding conservation resource cost to the portfolio, while optimizing the remaining supply resources to achieve a least-cost result. An assessment can then be made on whether the incremental conservation resource bundle reduces or increases the cost of the total resource portfolio.



In view of the need for a "before-and-after" look at the total resource portfolio costs for purposes of assessing the impact of each conservation resource bundle, a consolidating step was employed to reduce the required number of model runs. All bundles within a particular cost level from across the three customer segments (residential, commercial, and industrial) were aggregated for purposes of introducing their demand impacts and resource costs to the portfolio. This reduced the number of required model runs per cost level from as many as 15 down to one. However, once the next incremental level of conservation resources increased the Net Present Value (NPV) of the total portfolio cost, it became necessary to disaggregate the conservation resource bundles in that category to determine which bundles could remain without increasing the total portfolio cost.

### ***Challenges Provided by a Portfolio with Surplus Capacity***

Because PSE has sufficient capacity resources to satisfy its requirements for the next several years, and recognizing the relatively high near-term cost of gas, conservation resource cost-effectiveness will be driven primarily by the market price of natural gas. Based on this observation, PSE expected that all the bundles of conservation resources in the cost categories A (Low Cost) and B (Medium Low Cost) would be cost-effective. This was verified with two UPlan-G model runs (See Exhibit X - 2). The results of this test are described in Section C, Analytical Results, of this chapter.

## **B. Analytical Process Steps**

For the gas portion of the August 2003 Least Cost Plan Update, PSE implemented an analytical approach that included the following steps:

1. Develop detailed assessments of the amount of conservation resource potential, including *technical* potential and *achievable* potential (see Chapter IV).
2. Aggregate multiple conservation measures with similar characteristics into 15 bundles (see Chapter IV, Exhibit 10).
3. For each bundle of conservation measures, create a supply curve that identifies the amount of achievable conservation that could be acquired at each of four specified cost levels (see Chapter IV).
4. Update Uplan-G optimization model with any new or revised resource input assumptions to create the Revised Base Case.

5. Use the optimization model to determine the optimal resource-acquisition and dispatch plan for each conservation-adjusted level of demand, under Revised Base Case assumptions, over the entire planning horizon.
6. Run the optimization model with the conservation resource bundles under high and low gas-price scenarios.
7. Run the optimization model with the conservation resource bundles under high and low demand-growth scenarios.
8. Update PSE's long-term gas resource strategy for the impact of the conservation resources on the amount and timing of other supply resource additions.

***Update of Modeling Assumptions - Additional Resource: Gig Harbor Satellite LNG Facility***

Beginning in the fall of 2003, PSE will supplement its gas-distribution system in the Gig Harbor area with a new, satellite liquid natural gas (LNG) facility. The facility is being constructed to ensure that a remote but rapidly growing region of the distribution system has sufficient gas supply during peak weather events.

The LNG facility is referred to as a "satellite" because it is designed to receive, store, and vaporize LNG that has been liquefied at other LNG facilities. PSE intends to transport the LNG by tanker truck from third-party providers. Because the source of the LNG is outside the PSE distribution system, the Gig Harbor LNG facility represents an incremental supply and thus will be added to the Peak Day resource stack. Although this LNG facility can benefit only that portion of the distribution system adjacent to the Gig Harbor plant, its operation allows gas supply from pipeline interconnects or other storage to be diverted elsewhere. PSE analyzed several options for providing additional high-pressure gas to the Gig Harbor area, including: a new pipeline lateral; an enlarged underwater distribution lateral; purchase of delivery service from another gas utility; compressed natural gas injection facilities; and the satellite LNG facility in Gig Harbor. The specifications of the Gig Harbor facility are shown in Exhibit X-1.

## Exhibit X-1

### Gig Harbor LNG Facility Capability

On-site Storage capacity	63,000 gallons	or	52,500 therms
(Truck capacity)	9,000 gallons	or	7,500 therms
Sendout - hourly - Max	650,000 cfh	or	6,500 therms/hr
Sendout - hourly - Typical	250,000 cfh	or	2,500 therms/hr
Sendout - daily Max	3,000,000 cfd	or	30,000 therms/dy
Sendout - daily *	1,000,000 cfd	or	10,000 therms/dy
Sendout - annual *	6,000,000 cfy	or	60,000 therms/yr

\* Daily & annual numbers are based on a typical winter weather pattern, not design weather conditions. It will take 7 truck loads to fill the on-site storage each fall.  
A typical winter will only need one or two more truckloads to last throughout the winter.  
The on-site storage is designed to last 1 design peak day + 2 shoulder days.  
Any LNG remaining in storage in the spring will be injected into the distribution system.

#### ***Update of Modeling Assumptions – Jackson Prairie Storage Deliverability***

The availability of additional underground storage deliverability from the Jackson Prairie facility has been updated to the year 2008 for all scenarios from the 2010 (2008 in High Growth case) assumption in the April 2003 Least Cost Plan. The adjustment to this assumption is based on the revised development expectations of the joint Jackson Prairie ownership group and the assumption that the storage services provided by the incremental deliverability will be competitive in the marketplace.

#### ***Update of Modeling Assumptions – Revised Gas Price Forecast***

A revised gas-price forecast, including new high and low gas-price scenarios, was utilized in this August 2003 LCP Update, as described in Chapter III.

#### ***Levels of Demand Analyzed***

The levels of gas demand analyzed in Step 5, above, are the following:

- a) The forecasted level of demand from the April 2003 Least Cost Plan, which reflected reduced load resulting from the assumed annual level of 2.1 million therms of annual conservation savings;
- b) The level of demand in a) reduced by the achievable conservation potential represented by implementation of all "Low Cost" and "Medium Low Cost" bundles across all customer segments;

- c) The level of demand in b) further reduced by the achievable potential from the addition of all "Medium Cost" conservation bundles across all customer segments; and
- d) The level of demand in c) reduced by the achievable potential from combinations of individual bundles within each cost category where the entire cost category has proved not to be cost-effective; that is, it has increased the total resource portfolio cost. This will determine the point at which to cease adding bundles of conservation resources to the portfolio.

The application of the demand decrement in level b) to the already lowered demand in level a) suggests a double-counting of the conservation resource effects. However, preliminary results of an ongoing review and evaluation of the assumptions and parameters in the gas-demand forecast underlying the April 2003 Least Cost Plan suggest that this double-counting would be offset by other factors that will have the same impact on system gas demand. The specific offsetting factors and anticipated impact on the gas demand forecast are discussed in Section D, Analysis of Model Results, of this chapter.

### **C. Analytical Results**

For this August 2003 Least Cost Plan Update, PSE analyzed multiple levels of conservation resources. Further, the conservation resource levels were modeled under both high and low gas-price scenarios to determine their cost sensitivity, that is, whether higher or lower projected gas prices would measurably impact the amount of cost-effective conservation resources. The High Price scenario utilizes prices in the NPCC Medium gas-price forecast and the Low Price scenario is equivalent to the PIRA Straight-line gas-price forecast used in the April 2003 Least Cost Plan. Finally, the conservation resources were evaluated under High Growth and Low Growth levels of expected customer demand to evaluate both the impact on the amount of cost-effective conservation resources and on the timing of new supply resource decisions.

#### ***Conservation Resource Levels***

As indicated in Section A of this chapter, PSE confirmed that all the bundles of conservation resources in the cost categories A (Low Cost) and B (Medium Low Cost) would be cost-effective. This was verified with the two UPlan-G model runs shown in

Exhibit X-2. A comparison was made of the Revised Base Case, the Net Present Value (NPV) of the supply portfolio at full customer-demand levels, with Case AB, which is the sum of the NPV of supply portfolio costs (including conservation resources in categories A and B). The level of customer demand, after reflecting the volume decrement and load shapes of conservation measures in categories A and B, indicates the combined NPV of supply plus conservation (\$5,589.02 million) at this level of demand is less than the NPV of supply-only resources (\$5,682.19 million). However, when the level of demand is further reduced by the achievable potential from the addition of all "Medium Cost" conservation bundles (Case ABC), the NPV of the total portfolio increases to \$5,591.61 million. At this point in the analysis, Medium Cost category C must be disaggregated to determine which combination of the nine bundles of conservation resources will not increase the NPV of the total portfolio cost above the level of categories A and B. The NPV of the total portfolio cost that resulted from this process is shown as Case AB+X in Exhibit X-2 (\$5,588.64 million). The customer segment and conservation bundle combinations that satisfy this requirement are shown in Exhibit X-3. When the next higher cost bundle of conservation resources is added from category C (Case AB+Y), the total portfolio NPV increases to \$5,588.69 million.

### Exhibit X-2

#### Summary of Gas Portfolio Revised Base-Case Analysis Results

Model Run	Total NPV (\$MM)	Supply Portfolio NPV (\$MM)	Conservation NPV (\$MM)	20 Year Firm Sales Dth (MM)	20 Year Conservation Dth (MM)	Annual Conservation Increment (MM therms)
Revised Base Case	\$5,682.19	\$5,682.2	\$0.0	1,995.3	0.0	0.00
Case AB	\$5,589.02	\$5,529.6	\$59.4	1,933.6	61.7	2.94
Case ABC	\$5,591.61	\$5,479.8	\$111.8	1,910.1	85.2	4.05
<b>Case AB+X</b>	<b>\$5,588.64</b>	<b>\$5,524.1</b>	<b>\$64.5</b>	<b>1,930.9</b>	<b>64.4</b>	<b>3.06</b>
Case AB+Y	\$5,588.69	\$5,523.1	\$65.5	1,930.4	64.8	3.09

**Exhibit X-3**

**Cost-Effective Gas Conservation Potentials  
by Resource Bundle and Segment – Case AB-X**

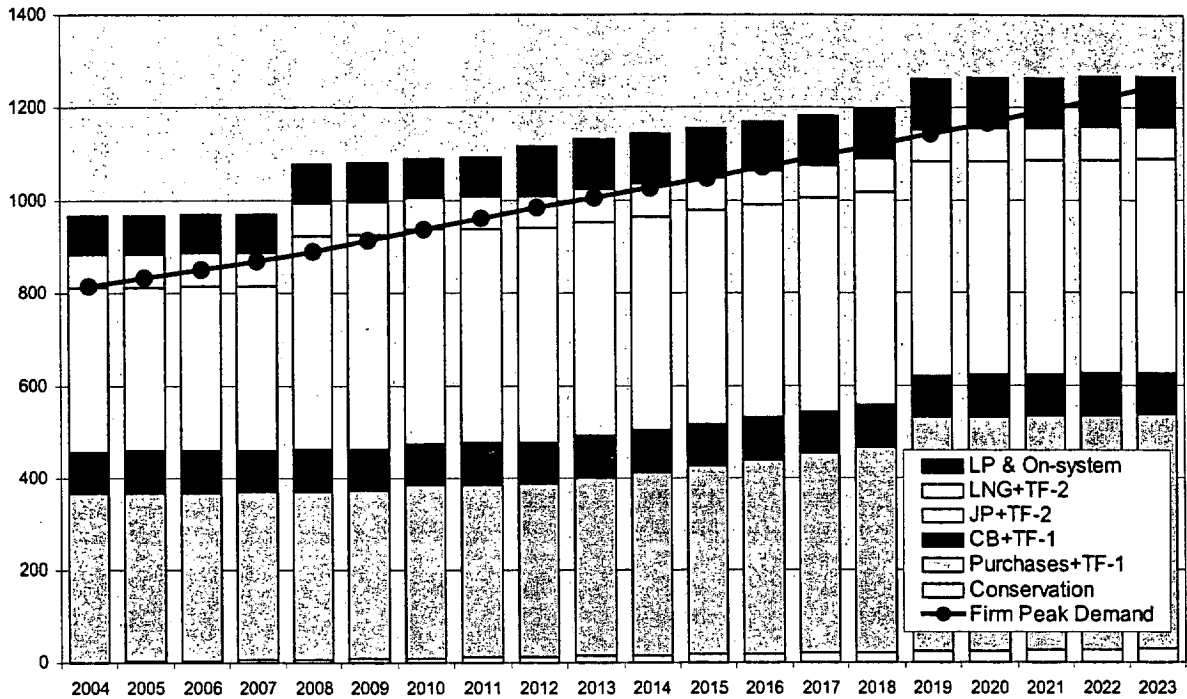
Bundle/Segment	<b>A</b> Low Cost (≤\$0.3/ therm)	<b>B</b> Medium Low Cost (\$0.3- 0.45/therm)	<b>C</b> Medium Cost (\$0.45- 0.65/therm)	<b>D</b> Medium High Cost (\$0.65- 1.00/therm)	Total Cost- Effective Achievable Potential in 20th year (Dth)	Total Cost- Effective Achievable Potential- Annual Increment (therms)
Res. Existing Construction - Appliances	-	-	-	-	-	-
Res. Existing Construction - HVAC	2,292,015	485,777	-	-	2,777,792	1,388,896
Res. Existing Construction - Water Heat	389,166	402,822	-	-	791,988	395,994
Res. New Construction - Appliances	-	-	-	-	-	-
Res. New Construction - HVAC	-	-	-	-	-	-
Res. New Construction - Water Heat	-	556,487	-	-	556,487	278,244
Subtotal Residential	2,681,181	1,445,086	-	-	4,126,267	2,063,134
Com. Existing Const. - Appliances	10,310	-	-	-	10,310	5,155
Com. Existing Construction - Cooking	279,629	-	-	-	279,629	139,815
Com. Existing Construction - HVAC	417,348	228,400	-	-	645,748	322,874
Com. Existing Const. - Water Heat	379,030	22,996	230,898	-	632,924	316,462
Com. New Construction - Appliances	1,743	-	-	-	1,743	872
Com. New Construction - Cooking	462	24,138	21,162	-	45,762	22,881
Com. New Construction - HVAC	68,300	1,023	-	-	69,323	34,662
Com. New Construction - Water Heat	70,483	24,224	-	-	94,707	47,354
Subtotal Commercial	1,227,305	300,781	252,060	-	1,780,146	890,073
Ind. Existing Construction – General	222,331	-	-	-	222,331	111,165
Total All Sectors	4,130,817	1,745,867	252,060	-	6,128,744	3,064,372

**Revised Base Case**

Exhibit X-4 illustrates that the current gas resource portfolio, including the conservation resources discussed above (Case AB+X), has sufficient supply resources to meet the expected demands of PSE's firm-gas customers through 2009. Additional underground storage deliverability is assumed to be available in 2008. After that point in time, pipeline capacity is added in 2010 and from 2013 to 2019, with propane air (LP) added in 2012. As with the April 2003 LCP, the model identifies relatively small increments of pipeline capacity in the years 2013 to 2019. In practice, the required capacity would likely be added in larger, less frequent amounts. The peak-day demand is expected to grow at the same annual rate (2.27 percent) as assumed in the April 2003 LCP and the total firm load served over the 20-year forecast period remains at 2.2 Tcf, including interruptible loads.

## Exhibit X-4

### Revised Base Case with Optimum Conservation (Case-ABX) Peak Day Resource Stack (MDth/day)



### **Low and High Gas Price Scenarios**

The Low Gas Price scenario uses the PIRA Straight-line gas-price forecast from the April 2003 LCP and the High Gas Price scenario is the NPCC Medium gas-price forecast shown in Exhibit III-8 through Exhibit III-10. These two forecast scenarios (for gas purchased at Sumas, AECO Hub, and the Rockies) are used to evaluate the sensitivity of the conservation resource additions in the Revised Base Case portfolio to changes in gas prices. Exhibit X-5 illustrates the difference between these two gas-price scenarios on the total portfolio cost. The Low Gas Price scenario would call for a reduction of conservation resources of 2.7 MMDth to the level represented by category AB. Additional pipeline capacity would be required one year later than the Revised Base Case, beginning in 2011, and would also postpone the addition of propane air (LP) peaking capacity until 2014. Conversely, the High Gas Price scenario would indicate the need for significant additional conservation resources of 20.8 MMDth over the 20-year planning horizon, represented by the addition of the remaining bundles in category C (Case ABC) as shown in Exhibit X-5. In contrast to the Low Price scenario, incremental LP resources were selected by the model in 2012 and pipeline capacity was added in

small increments beginning in 2012 and continuing until 2019. The Peak Day Resource Stacks for the Low and High Gas Price scenarios are shown in Exhibits X-6 and X-7, respectively.

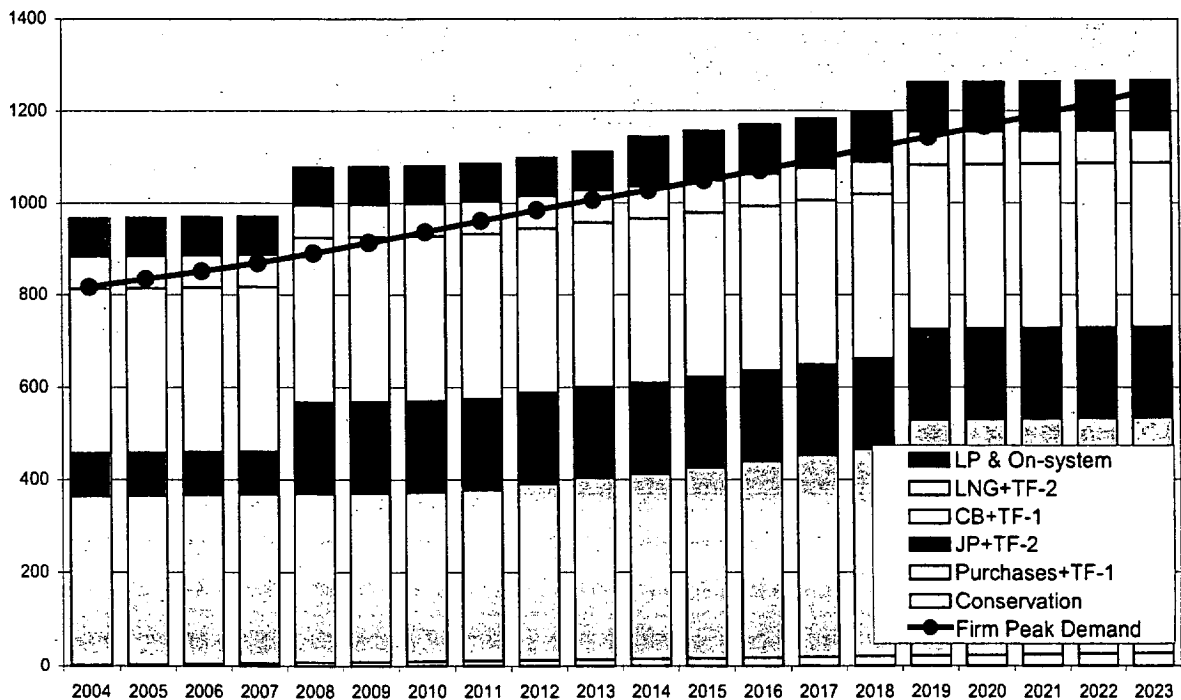
**Exhibit X-5**

**Summary of Gas Portfolio Low and High Gas Price Analysis Results**

Model Run	Total NPV (\$MM)	Supply Portfolio NPV (\$MM)	Conservation NPV (\$MM)	20 Year Firm Sales Dth (MM)	20 Year Conservation Dth (MM)	Annual Conservation Increment (MM therms)
Revised Low Price	\$5,122.53	\$5,122.5	\$0.0	1,995.3	0.0	0.00
<b>Case AB- Low Price</b>	<b>\$5,055.33</b>	<b>\$4,995.9</b>	<b>\$59.4</b>	<b>1,933.6</b>	<b>61.7</b>	<b>2.94</b>
Case AB+X- Low Price	\$5,055.60	\$4,991.1	\$64.5	1,930.9	64.4	3.06
Note: No bundles in Conserv. Cost Categories A&B are higher in cost than marginal avoided supply in Case AB.						
Revised High Price	\$5,942.75	\$5,942.7	\$0.0	1,995.3	0.0	0.00
Case AB- High Price	\$5,848.97	\$5,789.5	\$59.4	1,995.3	61.7	2.94
<b>Case ABC- High Price</b>	<b>\$5,847.27</b>	<b>\$5,735.5</b>	<b>\$111.8</b>	<b>1,995.3</b>	<b>85.2</b>	<b>4.05</b>
Case ABCD- High Price	\$5,871.43	\$5,664.8	\$206.6	1,995.3	113.3	5.39
Note: No bundles in Conservation Cost Category D are lower in cost than marginal avoided supply in Case ABC.						

**Exhibit X-6**

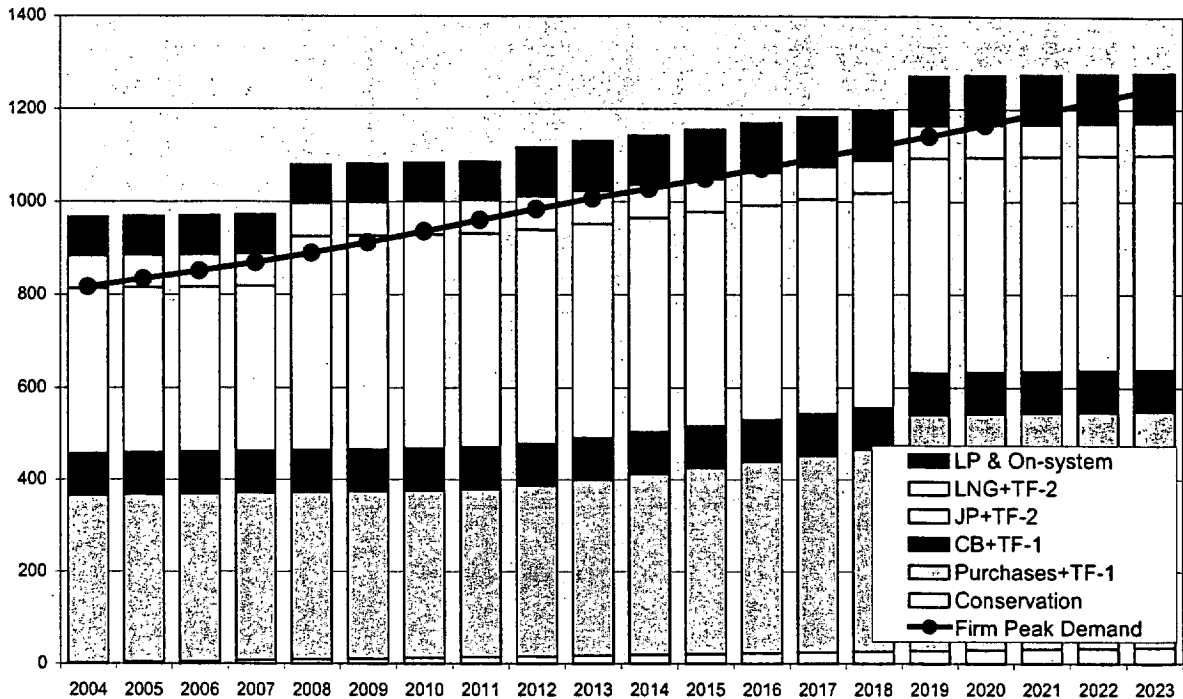
**Low Gas Price Case with Optimum Conservation (Case AB)  
Peak Day Resource Stack (MDth/day)**





## Exhibit X-7

### High Gas Price Case with Optimum Conservation (Case ABC) Peak Day Resource Stack (MDth/day)



### **High Growth and Low Growth Scenarios**

The same High Growth and Low Growth scenarios from the April 2003 LCP were utilized to evaluate the sensitivity of the conservation resources and the timing of new supply resource decisions in the Revised Base Case portfolio relative to changes in demand growth. Exhibit X-8 illustrates the impact on the amount of cost-effective conservation resources under the High Growth scenario. Peak-day demand is expected to grow at an annual rate of 2.89 percent, from 819 MDth/day in 2004 to 1,411 MDth/day in 2023. Despite the higher growth rate, no additional conservation resources were selected over the level of the Revised Base Case (Case AB-X). As shown in Exhibit X-9, the remainder of the current supply portfolio has sufficient resources to meet the increased growth until 2007. Beginning at that time and continuing nearly every year for the balance of the planning horizon, small increments of pipeline capacity are added to the portfolio, followed by the addition of 106 MDth/day to Jackson Prairie deliverability in

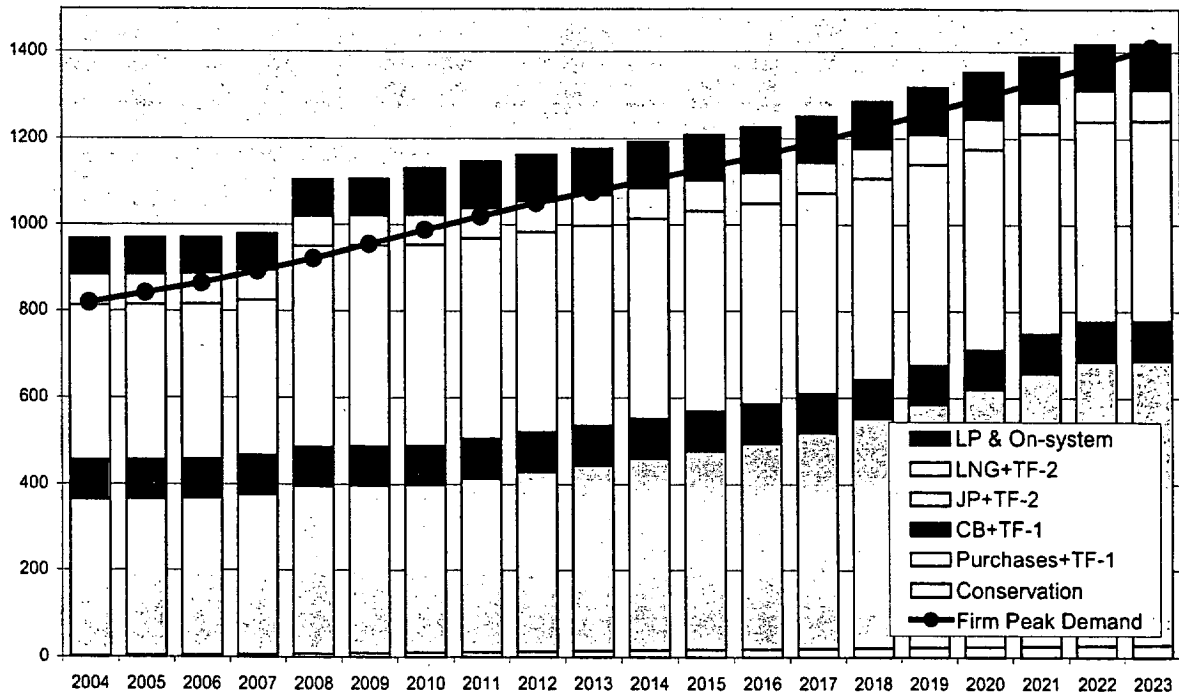
2008, and 24 MDth/day of LP capacity in 2010. The total load served by this portfolio over the forecast period remains at the April 2003 LCP High Growth level of 2.4 Tcf.

**Exhibit X-8**  
**Summary of Gas Portfolio High Growth Analysis Results**

Model Run	Total NPV (\$MM)	Supply Portfolio NPV (\$MM)	Conservation NPV (\$MM)	20 Year Firm Sales Dth (MM)	20 Year Conservation Dth (MM)	Annual Conservation Increment (MM therms)
Revised High Growth	\$6,104.50	\$6,104.5	\$0.0	2,153.3	0.0	0.00
<b>Case AB+X- High Growth</b>	<b>\$6,023.71</b>	<b>\$5,959.2</b>	<b>\$64.5</b>	<b>2,089.0</b>	<b>64.4</b>	<b>3.06</b>
Case AB+Y- High Growth	\$6,023.78	\$5,958.2	\$65.5	2,088.5	64.8	3.09
Case ABC- High Growth	\$6,027.00	\$5,915.2	\$111.8	2,068.2	85.2	4.05

Note: No additional bundles in Conserv.Cost Category C are lower in cost than marginal avoided supply in Case ABX.

**Exhibit X-9**  
**High Demand Growth Case with Optimum Conservation (ABX)**  
**Peak Day Resource Stack (MDth/day)**



The Low Growth scenario models a significantly lower growth in annual and peak-day gas demand. Under this scenario, the peak-day demand is expected to grow at an annual rate of 1.60 percent, from 818 MDth/day in 2004 to 1,132 MDth/day in 2023. Exhibit X-10 illustrates the impact on the amount of cost-effective conservation resources under this Low Growth scenario and Exhibit X-11 shows the related impact on the timing of incremental supply resources. Under the lower growth rate, the same level of conservation resources as in the Revised Base Case (64.4 MMDth) was selected. As modeled, the remainder of the current supply portfolio, following the addition of Jackson Prairie deliverability in 2008, has sufficient resources to meet the reduced growth until 2014. At that time, 24 MDth/day of LP capacity is added, followed by pipeline capacity in 2017-2020, as shown in Exhibit X-11. The total load served by this portfolio over the forecast period remains at the April 2003 LCP Low Growth level of 2.1 Tcf, including interruptible volumes.

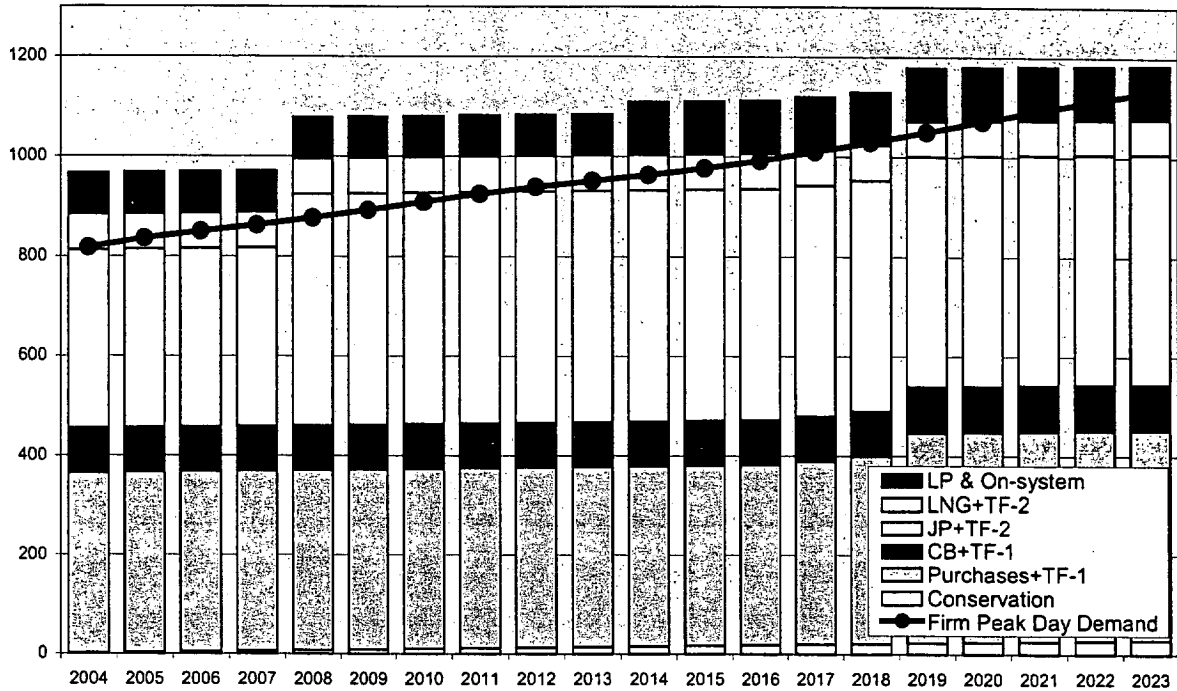
### Exhibit X-10

#### Summary of Gas Portfolio Low Growth Analysis Results

Model Run	Total NPV (\$MM)	Supply Portfolio NPV (\$MM)	Conservation NPV (\$MM)	20 Year Firm Sales Dth (MM)	20 Year Conservation Dth (MM)	Annual Conservation Increment (MM therms)
Revised Low Growth	\$5,299.01	\$5,299.0	\$0.0	1,848.9	0.0	0.00
Case AB- Low Growth	\$5,224.04	\$5,164.6	\$59.4	1,787.1	61.7	2.94
<b>Case AB+X- Low Growth</b>	<b>\$5,223.74</b>	<b>\$5,159.3</b>	<b>\$64.5</b>	<b>1,784.4</b>	<b>64.4</b>	<b>3.06</b>
Case ABC- Low Growth	\$5,228.93	\$5,117.1	\$111.8	1,763.6	85.2	4.05
Note: No additional bundles in Conserv. Cost Category C are lower in cost than marginal avoided supply in Case ABX.						

Exhibit X-11

Low Demand Growth Case with Optimum Conservation (ABX)  
Peak Day Resource Stack (MDth/day)



D. Analysis of Model Results

*Implications from Gas Load Forecast*

As indicated in Chapter III, the gas-load forecast for the August 2003 LCP Update remains unchanged from the version used in the April 2003 LCP. Assumptions underlying this gas-load forecast included an assumed level of 2.1 million therms of new conservation savings (or 0.3 percent of total billed sales) occurring every year. The distribution of the conservation savings among the customer sectors attributed 20 percent of the total savings to the residential sector, with the commercial and industrial sectors accounting for 60 percent and 20 percent, respectively. The application of the demand decrements for conservation resources modeled in the current LCP Update to the already lowered demand levels in the April 2003 LCP suggests a double-counting of the conservation resource effects will result. However, preliminary results of the ongoing review and evaluation of the economic assumptions and pricing parameters underlying

the gas-demand forecast suggest that this double-counting would be more than offset by other factors having the same directional impact on forecasted system gas demand.

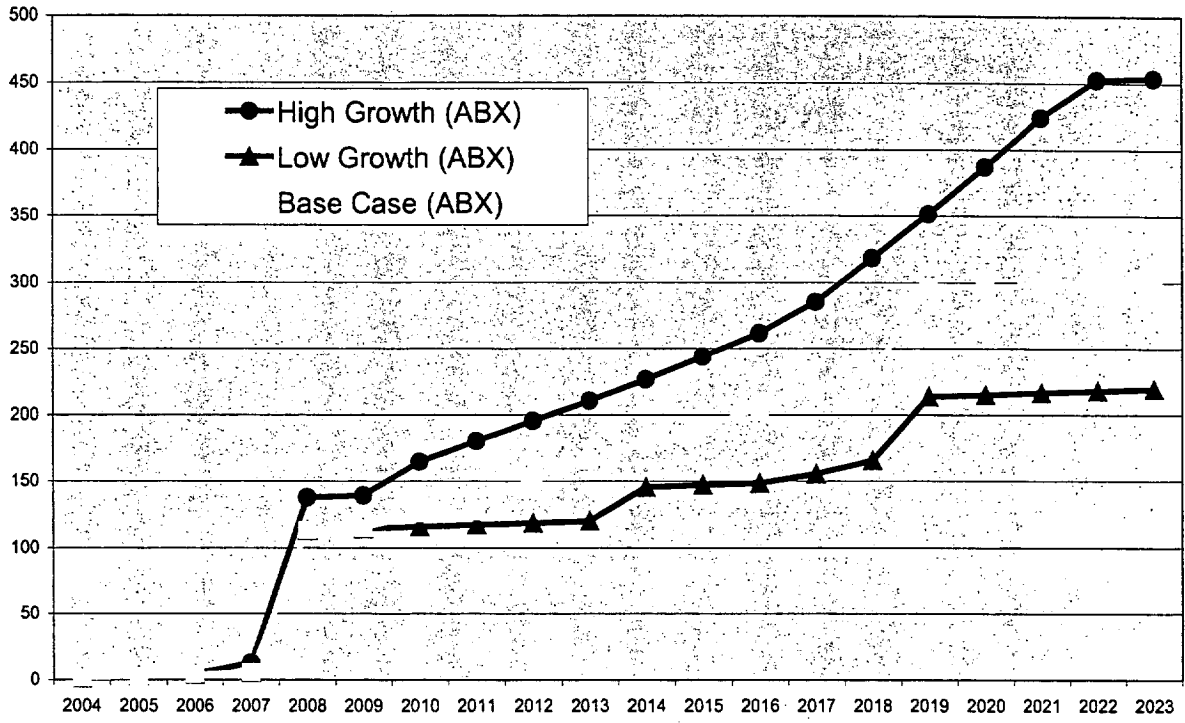
The specific offsetting factors are long-term projections for lower employment levels and lower population growth as well as the impact of higher retail gas rates stemming from increased gas costs. The resulting anticipated impact of the upcoming version of the gas-demand forecast approaches the impact represented by the Low Growth scenario modeled in Section C, above. It should be noted that a reduced long-term demand forecast would likely result in a lower estimate of achievable conservation resource potential as the conservation assessment is based in part on expected new customer growth.

### ***Sensitivity Analysis and Impact of Conservation Resource Additions***

As described in Section C, above, the optimal level of cost-effective conservation resources in the Revised Base Case (Case AB-X) is 64.4 MMDth over the 20-year planning horizon, or an annual increment of 3.06 MDth per year, at a first-year cost of \$4.8 million. The sensitivity of the modeled results to volatility in gas prices is much greater than the impact of variations in customer-demand growth. The spread of optimal conservation potential due to gas-price variability is 23.5 MMDth. Whereas, the level of optimal conservation resources remains unchanged under a lower customer-growth scenario, one not dissimilar from the level of gas demand expected under more current demand forecasting parameters. The sensitivity analysis indicates that only in the case of a significant increase in gas prices, to the level of the NPCC's Medium gas-price forecast, would a dramatic departure from the level of gas conservation resource additions in the Revised Base Case be warranted. The graphs in Exhibits X-12 and -13 depict the impact of load growth and gas-price assumptions on the cumulative peak-day resource additions, including conservation, by year for the Revised Base Case.

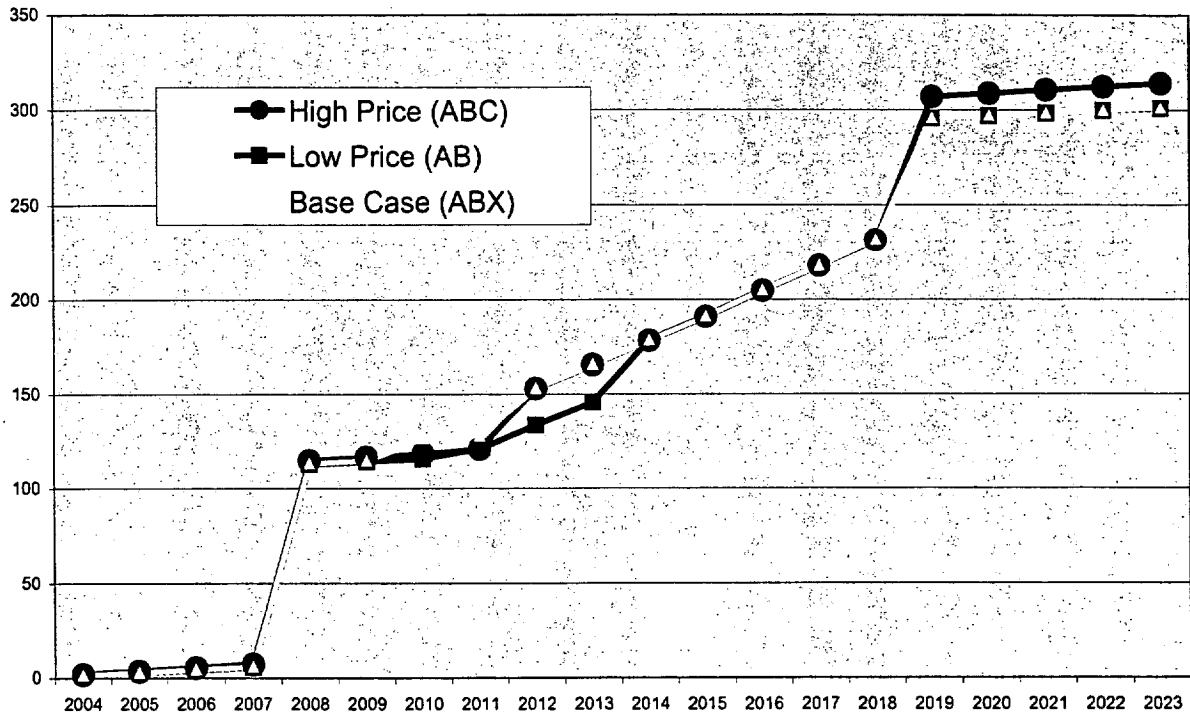
### Exhibit X-12

Cumulative 20 year Peak-day Resource Additions, including Conservation  
- Impact of Load Growth Assumptions (MDth/day)



## Exhibit X-13

Cumulative 20 year Peak-day Resource Additions, including Conservation  
-- Impact of Gas Price Assumptions (MDth/day)



### E. Summary and Conclusions

In this August 2003 LCP Update, PSE expanded its gas resource portfolio analysis to incorporate a robust evaluation of various bundles of conservation resources with similar load shapes, at their corresponding cost levels, to determine an optimal level of annual conservation potential across all three customer segments. The portfolio model results were reported for the various cost levels and compared in terms of the NPV of each resulting supply portfolio. The evaluation included a sensitivity analysis of the optimal level of annual conservation potential to changes in assumptions about future demand growth and gas prices. The optimal level of cost-effective conservation resources determined in this LCP Update is an annual increment of 3.06 million therms, growing to a 61.3 million therm impact in the 20<sup>th</sup> year, for a total 64.4 MMDth over the 20-year planning horizon.

While long-term gas prices may influence the level of cost-effective conservation resources, gas price has little impact on the timing of supply-side resource acquisitions.

Conversely, demand growth has little or no impact on cost-effective conservation levels. However, demand growth has a significant and direct impact on the timing of supply-side resources.

Consistent with the conclusions reached in the April 2003 LCP, no supply-side resource-acquisition decisions are required for several years. In the interim, PSE continues to face little risk as a consequence of higher-than-expected growth. If the high-growth scenario materializes, then required resource additions may be accelerated by two to three years.



**Appendix A-  
Conservation Resource  
Assessment Report**



**ASSESSMENT OF LONG-  
TERM ELECTRICITY AND  
NATURAL GAS  
CONSERVATION POTENTIAL  
IN PUGET SOUND ENERGY  
SERVICE AREA 2003-2024**

**Prepared for**

**Puget Sound Energy  
Bellevue, Washington**

**Prepared by**

**KEMA-XENERGY Inc.  
Oakland, California**

**and**

**Quantec, LLC**

**August 25, 2003**

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Developing reliable estimates of the magnitude, timing, and price for alternative energy-efficiency resources is a critical first step in a least-cost integrated resource planning process. Such studies also help guide demand-side planning and inform conservation program development efforts.

This report summarizes the results of an assessment of technical and achievable electricity and natural gas conservation potentials in Puget Sound Energy's (PSE's) service area for the 2004-2023 planning horizon. The assessment was performed for PSE as a collaborative effort between KEMA-XENERGY and Quantec, LLC. The principal goal of this study was three-fold:

1. Develop reasonable and reliable estimates of "technical" and "achievable" electricity and gas conservation potentials for the residential, commercial and industrial customers served by PSE.
2. Employ a simple, flexible, and transparent approach consistent with the methods used by the Northwest Power and Conservation Council, relying mainly on available data from secondary regional sources.
3. Create discrete "bundles" of conservation potential comprised of groups of homogeneous conservation measures and provide supply curves for each bundle that would allow energy conservation options to be directly evaluated and compared with supply options in PSE's integrated resource planning process.

Estimates of long-term conservation potentials provided in this report are based on standard practices and methods in the utility industry, using the best available data. Studies such as this require compilation of large amounts of data from multiple sources on existing technologies and prevailing market conditions. They also rely heavily on assumptions concerning the future. Changes in energy-efficiency technologies, market conditions, and consumer behavior are likely to affect these results. It is, therefore, inevitable that the findings of this study will have to be revisited periodically to take into account the impacts of emerging technologies and the changing dynamics of the energy markets.

## **1.1 ORGANIZATION OF THIS REPORT**

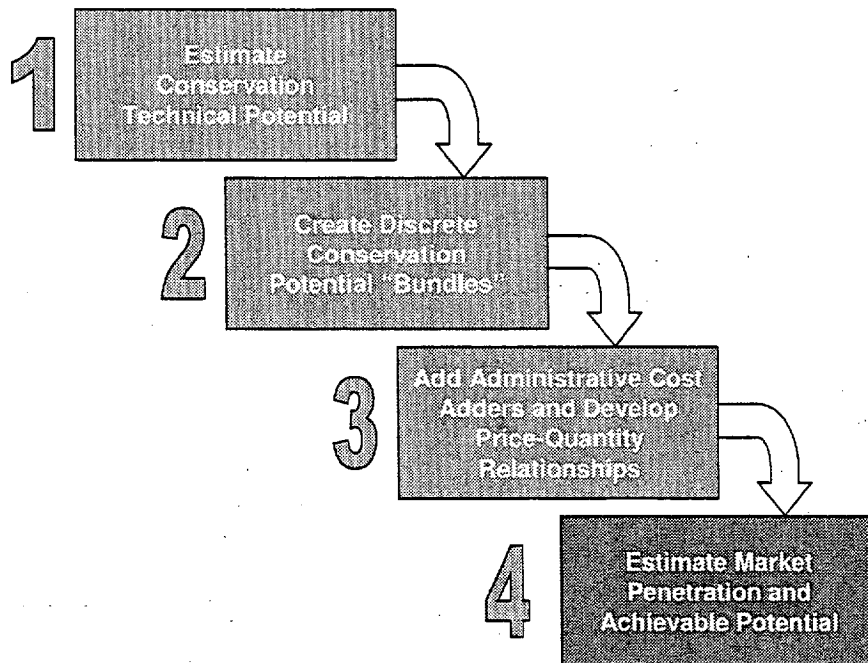
The methodological approach developed by the KEMA-XENERGY/Quantec team is described in Section 2. Section 3 describes and documents the data sources we relied upon from the Pacific Northwest and elsewhere. Conservation potential results are provided in Section 4, and conservation bundle aggregates and acquisition strategies are presented in Section 5. Detailed results and data inputs are provided in Appendices A through F.



## 2.1 OVERVIEW

Our general approach, which is depicted in Figure 2-1, combined four primary activities:

**Figure 2-1  
Methodological Approach**

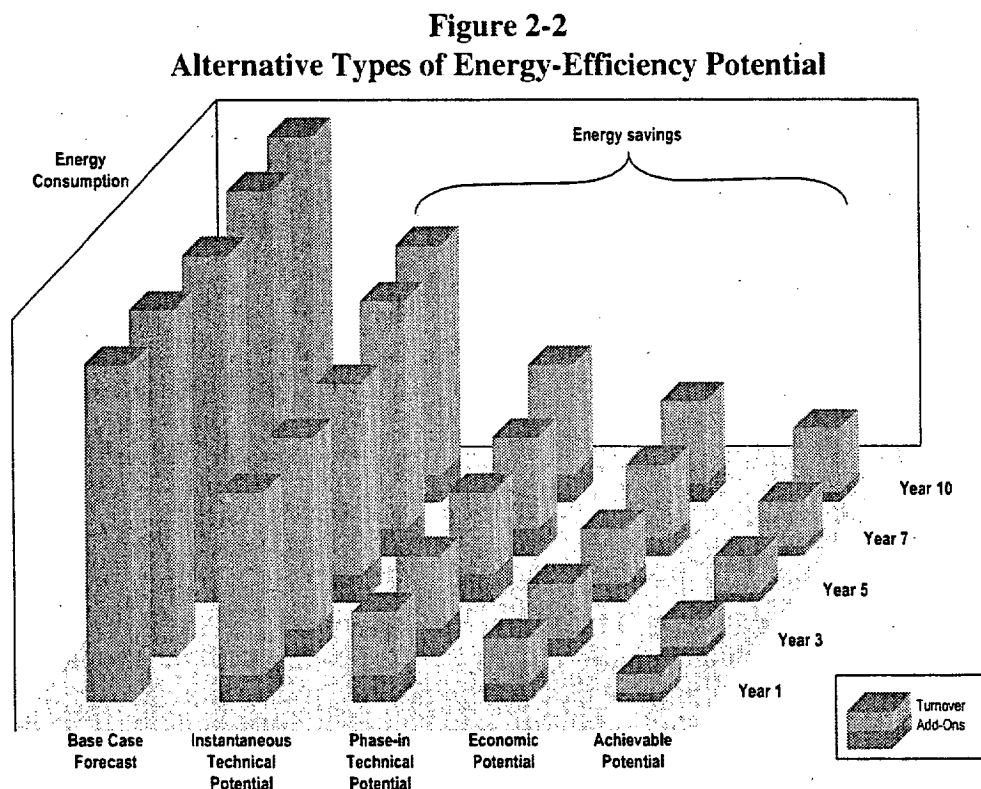


1. **Estimate conservation technical potential.** These estimates are comprised of a combined bottom-up/top-down analysis of electric and gas energy savings in PSE's service area. The bottom-up analysis, which was applied to the residential and commercial sectors, integrated measure-specific data (per-unit costs, absolute and relative savings, impacts by time period) with baseline building stock data (base-case fuel saturations, measure saturations, feasibility factors) and baseline energy-use data to produce estimates of levelized per-unit (kWh, therm) cost and total savings for each measure included in the analysis. This analysis was conducted using the DSM ASSYST model, described later in this section.

The top-down analysis, which was applied to the industrial sector, disaggregates loads into industry types and end uses and applies data on overall percentage savings at the industry/end-use level, as well as costs and measure life, to produce levelized costs and total savings.

2. **Create discrete conservation potential "bundles."** The conservation technical potential is divided into subgroups—which we refer to as bundles—that are homogeneous in terms of sectors, markets segments, and end-use load shape.<sup>1</sup>
3. **Add administrative cost adders and develop price-quantity relationships.** This step involved the addition of an administrative cost/program delivery adder to each measure within the bundles, and sorting and grouping each measure into price-quantity combinations. The resulting "supply curves" provide discrete blocks of conservation potential within each bundle.
4. **Estimate market penetration and achievable potential.** The last step in this approach consisted of estimating market penetration factors from past, similar bundles or programs. These estimates were then applied to the price-quantity combinations to derive estimates of "achievable" potential for each resource bundle within PSE service area.

As shown in Figure 2-2, the technical and achievable potential estimates in this study refer to subsets of the possible definitions of conservation potential used in conservation resource assessment in the utility industry.



- **Instantaneous technical potential.** The energy savings from a total, instantaneous conversion to the most energy-efficient technologies and measures. All equipment is

<sup>1</sup> The industrial sector has one bundle each for electric and gas savings.

converted immediately in this hypothetical case regardless of the age of the equipment.

- **Phase-in technical potential.** The energy savings from conversion to the most energy-efficient technologies and measures when equipment is replaced at the end of its useful life, when new equipment is installed.
- **Economic potential.** As a subset of technical potential, economic potential represents the energy savings from conversion to the most energy-efficient technologies and measures only when such measures are deemed to be cost-effective from a total resource-cost (TRC) perspective.
- **Achievable potential.** The energy savings potential from conservation programs taking into account resource cost effectiveness and practical constraints such as market barriers and program development and administrative costs.
- **Naturally occurring conservation.** Naturally occurring conservation, that is, conservation that occurs as a result of prevailing market forces such as energy prices, is an additional aspect of conservation potential that is typically taken into account. In this study, naturally occurring conservation is implicitly taken into account, since conservation effects were already incorporated in the load forecasts used in establishing the base-case forecasts.

It is important to recognize the differences in the two types of technical potential, instantaneous and phased-in. Instantaneous technical potential assumes immediate retrofit and replacement of equipment in existing buildings and full installation at the time of new construction. Phased-in technical potential assumes replacement only upon burnout of equipment in existing buildings and gradual implementation of retrofit actions. This distinction has important implications for planning and timing of how conservation resources are acquired over time, and is used in developing the alternative conservation acquisition cases described in Section 5.2. In the long run, such as the 20-year plan developed by PSE, the two estimates converge. Thus, the total cumulative 2023 technical potential estimates developed in this study can be viewed as either instantaneous or phased-in.

Economic potential is typically viewed as a subset of technical potential, which includes only those measures that pass a certain cost threshold or economic criterion based on the utility's avoided generation costs. However, the notion of economic potential relates to resource planning efforts where conservation resources are analyzed separately from supply side resources. PSE's integrated resource planning (IRP) effort eliminates the need to apply such a screen. The price-quantity combinations in the bundles provide the information needed to dynamically evaluate conservation resource economics within the IRP process.

Instead, we estimate achievable potential directly from the technical potential estimates. Achievable potential is defined as that portion of the potential that is likely to be available over the planning horizon under prevailing market barriers and administrative constraints that hamper delivery or implementation of energy-efficiency measures.

In estimating the achievable potential, a 15% conservation program administration and delivery cost adder was applied to each measure/bundle combination, resulting in minor shifts of the price-quantity relationships (supply curves) within the technical potential bundles. This adder is consistent with past PSE program experience. Second, likely penetration rates, derived from industry literature, previous planning efforts conducted by KEMA-XENERGY and Quantec, and PSE's previous programmatic experiences as recorded in the company's tracking system, were used to derive estimates of achievable potential. These estimates take into account the company's ability to ramp up programs and customers' willingness to adopt measures assuming incentives fully cover all incremental conservation measure costs. Finally, since very high cost measures were unlikely to be selected by the IRP model, we excluded all measures with a per-unit cost of conserved energy in excess of 11 cents per kWh for electricity, and 1 dollar per therm for gas.

## 2.2 MEASURES CONSIDERED

Technical conservation potentials in the residential and commercial sectors were derived based on an analysis of 125 unique electric measures and 60 unique gas measures. The measures included in this study were drawn from a variety of sources in the Pacific Northwest and nationally.

As a preliminary screening criterion, only measures that are commonly available and are based on well-understood technology were included in the analysis. Six residential segments (existing single-family, existing multi-family, existing manufactured homes, new single-family, new multi-family, new manufactured homes) and 20 commercial segments (10 building types within the existing and new structure segments) were considered.

Since many conservation measures may be applied to multiple segments and building types, a total of 1,630 electric and 610 gas measure/structure combinations were included in the analysis. The industrial savings potentials were estimated by analyzing energy-efficiency potentials for all major end-uses in all 15 major industrial segments in PSE's service area.

## 2.3 RESIDENTIAL AND COMMERCIAL SECTOR BOTTOM-UP APPROACH

DSM ASSYST, the model used for the residential and commercial analyses, is a proprietary Excel model developed by KEMA-XENERGY. It follows a standard bottom-up approach that is consistent with the methods used widely by energy utilities across the country, including the Northwest Power and Conservation Council.

Application of the DSM ASSYST model begins with compiling a comprehensive list of conservation measures applicable to the residential and commercial sectors and their associated end-uses, calculating the savings potential for each measure, and aggregating measure-specific savings to derive total savings potential. For each measure, the approach integrates measure-specific data (per-unit costs, savings, and measure life) with baseline building stock data (base-case fuel saturations, measure applicability factors, current measure saturations) and baseline energy-use data to produce estimates of levelized costs per unit of energy saved.

The basic instantaneous technical potential equation for each conservation measure is as follows:

$$\begin{aligned} & \text{Instantaneous technical potential} = \\ & \text{Units} * \text{base usage} * \text{adjustment factor} * \text{applicability factor} * \\ & \text{feasibility factor} * \text{non complete factor} * \text{savings factor} \end{aligned}$$

Where,

- **Units** are the number of units in the market (e.g., households, square footage).
- **Base usage** is the pre-installation end-use usage per unit (e.g., use per household appliance, square foot).
- **Adjustment factor** represents a proportionate adjustment for standard replacement equipment relative to average stock equipment in existing buildings. This factor ensures that the reduction in consumption associated from replacing stock equipment with minimum federal or local standards is not misrepresented as conservation potential.
- **Applicability factor** is the fraction of the floor space or households that is applicable for conversion to the DSM technology for each market segment or building type. It generally corresponds to the saturation of the base case technology, which is equal to the share of households or floor space that have the end-use times the fuel share.
- **Not complete factor** is the fraction of the applicable floor space or households that has not yet been converted to the particular energy-efficiency technology.
- **Feasibility factor** is the fraction of the applicable floor space or households that is technically feasible for conversion to the energy efficiency technology from an engineering perspective. If multiple measures apply to the same base end-use (e.g., two types of heat pumps), the feasibility factor is used to allocate the potential to each measure such that the sum of the factors is less than or equal to 100%.
- **Savings factor** is the percentage savings of the technology relative to the base usage and takes into account interactions among measures such as lighting and HVAC.

The residential and commercial segments and end-uses analyzed for PSE are shown in Tables 2-1 and 2-2, respectively. DSM ASSYST treats the existing building stock and new construction as separate markets within each segment.

**Table 2-1  
Residential Dwelling Types and End Uses**

Segments	Electric End Uses	Gas End Uses
Single Family	Central AC	Boiler
Multifamily	Clothes Washer	Clothes Washer
Manufactured	Cooking	Cooking
	Dishwasher	Dishwasher
	Freezer	Furnace
	Heat Pump	Water Heating
	Lighting	Other
	Plug Loads	
	Refrigeration	
	Room AC	
	Space Heat	
	Water Heat	
	Other	

**Table 2-2  
Commercial Building Types and End Uses**

Segments	Electric End Uses	Gas End Uses
Office	Cooking	Cooking
Dry Goods Retail	Cooling	Space Heating
Restaurant	Space Heating	Water Heating
Grocery	Lighting	Other
Warehouse	Plug Load	
School	Process	
University	Refrigeration	
Hospital & Health Care	Ventilation	
Hotel	Water Heat	
Miscellaneous	Other	

## 2.4 INDUSTRIAL SECTOR TOP-DOWN APPROACH

Due to the more complex nature of the industrial market, end uses, and equipment, on the one hand, and the lack of reliable information on measure-specific saturations on the other hand, conservation potential in the industrial sector was analyzed using an alternative, top-down approach. The approach involved two steps. First, total firm industrial loads were disaggregated into standard SIC classes and major end uses within each class based on PSE's latest sales data. Table 2-3 shows the SICs and the electric and gas end uses considered in the analysis. Second, for each end use, we estimated potential savings and per-unit cost of the potential savings, relying on available data from a large number of industrial energy-efficiency programs in the Northwest and California and market information on PSE's customers available from industrial accounts representatives.

**Table 2-3  
Industrial Segments and End Uses**

Segments	Electric End Uses	Gas End Uses
Food/kindred products	HVAC	HVAC
Lumber/wood products	Indirect boiler	Process boiler (upgrade/controls/ht recov)
Paper/allied products	Lighting	Process boiler O&M
Printing/publishing	Motors (excluding compressed air O&M)	Process heat
Chemical/allied products	Motors compressed air O&M	Process other
Petroleum related	Process Electro Chemical	Steam distribution systems
Rubber/plastics products	Process heat	Other
Stone/clay/glass/concrete products	Process other	
Primary metal industries	Refrigeration/process cooling	
Fabricated metal products	Other	
Machinery, except electrical		
Electric/electronic equipment		
Transportation equipment		
Instruments/related products		
Miscellaneous		

## 2.5 LOAD FORECAST CALIBRATION

An accurate assessment of conservation potential requires that base conditions closely approximate the historical sales and the load forecast. In this study calibration was achieved by (1) calibrating end-use estimates to PSE's sector-level weather-normalized, per-customer sales for the 2002 calendar year, and (2) by applying projections of customer counts through 2023. The industrial sector top-down estimates are automatically calibrated in the top-down approach.

### 2.5.1 Customer Forecast Calibration

The number of eligible residential and commercial customers for existing and new construction are based on the forecasted customer counts in PSE's April 30, 2003 Least Cost Plan. To the extent that the long-term customer forecast changes due to new population and employment estimates or from energy price changes, the estimates of conservation potential will also change.

The share of residential customers across the single-family, multi-family, and manufactured segments is derived by applying their respective shares from PSE's 1998 Residential Appliance Saturation Survey to the residential sector customer forecast totals. These shares are assumed to remain constant over the forecast horizon. Similarly, applying the appropriate shares for each commercial segment to the commercial customer forecast derives the number of commercial

customers by building segment over the forecast horizon. The commercial building shares are derived from the 1994 and 2002 studies of the commercial building stock in PSE's service area.<sup>2</sup>

### 2.5.2 Energy Use Calibration

The next step in the calibration is to ensure that base energy sales are consistent with PSE load forecasts. For the residential and commercial bottom-up analyses, this is accomplished in one or two steps:

1. Residual energy is attributed to the miscellaneous end use. This value should be greater than or equal to zero, but should not exceed 10% of 2002 energy sales. For the residential electric sector, the miscellaneous allocation was less than one half of one percent, and for residential gas, the miscellaneous allocation was 9%. The commercial electric and gas results overstated sales because the number of customers exceeds buildings.<sup>3</sup> The commercial sector therefore required step 2.
2. When non-calibrated total usage is on the high side, the next step is to proportionately reduce the per-unit (i.e., customer or square foot) energy usage of each segment and end use until the total sector usage in the baseline equals actual 2002 consumption. Since all energy savings are defined in percentage terms, this process has no effect on savings estimates other to ensure that they are consistent with PSE's commercial sector loads.

## 2.6 BUNDLE AGGREGATION

Individual conservation measures are not distinct enough to be useful within PSE's IRP model. The aggregation of conservation measures has to be large enough that they can be directly compared to alternate, supply-side resource options. We refer to the aggregates as bundles. The bundles are relatively homogeneous in terms of end-use load shapes. All industrial measures are aggregated into a single bundle. Table 2-4 shows the bundle breakouts we used for the residential and commercial bottom-up analyses.

**Table 2-4**  
**Residential and Commercial Bundles**

End Use	Market	
	Existing Construction	New Construction
HVAC	Electric, gas	Electric, gas
Lighting	Electric	Electric
Water Heating	Electric, gas	Electric, gas
Cooking	Gas	Gas
Appliances & Plug Loads	Electric, gas	Electric, gas

<sup>2</sup> Commercial End-Use Survey, Customer Services Department, Puget Sound Energy, December 1994; and 2002 Commercial Building Stock Assessment, Northwest Energy Efficiency Alliance (forthcoming report).

<sup>3</sup> This is because, while some commercial accounts aggregate loads from two or more buildings, more often there are multiple accounts within a building.



After dividing the measures into bundles, the next step was to sort and group the residential and commercial measures into price-quantity combinations. Each bundle consists of multiple price-quantity points, with the price component representing the levelized cost of the following:

- Incremental measure cost (material & installation)
- Program administration and implementation costs
- Quantifiable non-energy O&M costs or savings.

The resulting supply curve provides discrete blocks of conservation potential within the homogeneous bundles. These blocks represent price-quantity combinations within a bundle and can be thought of as discrete intervals along a bundle-specific supply curve. Tables 2-5 and 2-6 show the various blocks and the associated break points for electric and gas residential and commercial measures.<sup>4</sup>

**Table 2-5**  
**Electric Price-Quantity Combinations**

Block (Price-Quantity Combination)	Measure Levelized Cost Thresholds
Cost Level A	≤ 3 cents/kWh
Cost Level B	3.0 to 4.5 cents/kWh
Cost Level C	4.5 to 6 cents/kWh
Cost Level D	6 to 8.5 cents/kWh
Cost Level E	8.5 to 11 cents/kWh
Cost Level F	> 11 cents/kWh

**Table 2-6**  
**Gas Price-Quantity Combinations**

Block (Price-Quantity Combination)	Measure Levelized Cost Thresholds
Cost Level A	≤ 30 cents/therm
Cost Level B	30 to 45 cents/therm
Cost Level C	45 to 65 cents/therm
Cost Level D	65 cents to 1 dollar/therm
Cost Level E	> 1 dollar/therm

## 2.7 MARKET PENETRATION AND ACHIEVABLE POTENTIAL

A variety of factors affect market penetration of energy-efficiency measures, including inherent market barriers resulting from the customers' tendency to avoid the potential administrative and financial burdens, program marketing strategies, and delivery mechanisms. This is why even

<sup>4</sup> All industrial electric and gas measures fall into the low cost category

some energy-efficiency programs with full incremental cost incentives can have such a wide range of penetration rates. The available information suggests that, although incentive levels do play a significant role in determining program success, other, non-financial factors may play an equal, if not more important, role.

Estimates of market penetration in this study were based on the expectation of what full incremental cost rebates, consistent with a 15% administrative cost adder, are likely achieve on average. The penetration rates for electric and gas potential across end-use bundles are reported in Tables 2-7 and 2-8, respectively. All of the rates range from 30% to 60%, with the great majority set equal to 50% of technical potential.

**Table 2-7**  
**Penetration Rates for Electric Bundles**

Sector/Vintage	Appliances	HVAC	Lighting	Water Heat
<b>Commercial</b>				
Existing	50%	50%	50%	50%
New Construction	50%	50%	50%	50%
<b>Residential</b>				
Existing	60%	60%	30%	60%
New Construction	50%	50%	50%	50%
<b>Industrial</b>				
All	50%	50%	50%	50%

**Table 2-8**  
**Penetration Rates for Gas Bundles**

Sector/Vintage	Appliances	HVAC	Lighting	Water Heat
<b>Commercial</b>				
Existing	50%	50%	50%	50%
New Construction	50%	50%	50%	50%
<b>Residential</b>				
Existing	-	60%	60%	60%
New Construction	-	50%	50%	50%
<b>Industrial</b>				
All	50%	50%	50%	50%

## 2.8 OTHER METHODOLOGICAL ISSUES

Appropriate treatment of fuel conversion, particularly with regard to space- and water-heating applications in the residential and commercial sectors, represents an additional consideration in the development of dual-fuel conservation potentials. This study did not explicitly take into account conservation potentials based on fuel conversion.

Implementation of the methodology described above required compilation of a large database of measure-specific technical and market data from both primary and secondary sources. Given the accelerated schedule for completion of this study, we relied mainly on data available from secondary regional and national sources.

The main data sources were Puget Sound Energy (PSE), Pacific Northwest utilities and energy organizations, California utilities and energy organizations, and studies for other states conducted by KEMA-XENERGY, Quantec, and others. As shown in the sections below, in some cases we relied on multiple data sources. For example, we used residential load shapes provided by the Northwest Power and Conservation Council (NWPCC) and Tacoma Public Utilities (TPU).

The necessary data on current and forecast industrial loads by SIC categories were provided by PSE. The load data were then disaggregated by major end-uses using industrial energy use data from the Energy Information Administration (EIA) Office of Industrial Technologies. In deriving estimates of conservation measure costs (per-unit cost of conserved energy) and savings (relative savings by end-use), we also relied heavily on the experience and judgment of the engineering staff at KEMA-XENERGY and Quantec, PSE industrial energy-efficiency account representatives, and available information from recent evaluations of industrial-sector energy-efficiency programs at regional utilities.

### **3.1 PUGET SOUND ENERGY**

Primary data from PSE included customer and load forecasts, previous conservation actions, residential appliance saturation studies (RASS), commercial building stock assessment, estimates of end-use loads, and previous conservation potential studies. Details are provided in Table 3-1.

**Table 3-1  
PSE Data Sources**

PSE Data Source	Key Variables	Use in This Study
2003 Load Forecast	Energy and Peak Forecasts, Customer Counts, Employment and Population Forecasts	Conservation Potential Share of Forecast, Per Customer Use for Calibration, New Construction Forecast
Conservation Tracking Database	Conservation Measures Installed Between 1990 and 2003	Incomplete Factors
1999 Residential Energy Study (RASS)	Dwelling Characteristics, Equipment Saturations, and Fuel Shares	Dwelling Type Breakouts, Square Footage per Dwelling, Applicability Factors, Forecast Calibration
1994 Commercial End-Use Survey	Building Characteristics, Equipment Saturations, and Fuel Shares	Building Type Breakouts, Square Footage per Dwelling, Applicability Factors, Forecast Calibration
1995 Washington Natural Gas DSM Study	Residential Gas Usage	End Use Consumption (UEC) Estimates

### 3.2 PACIFIC NORTHWEST STUDIES

Several Pacific Northwest organization provided data critical to this effort, including the NWPCC, the Regional Technical Forum (RTF), the Northwest Energy Efficiency Alliance, and TPU. The information included technical information on measure savings, costs and lives, hourly end-use load shapes, and commercial building and energy characteristics. Details are provided in Table 3-2.

**Table 3-2  
Pacific Northwest Data Sources**

Pacific Northwest Data Source	Key Variables	Use in This Study
NWPCC 2004 Power Plan (in progress)	Measure Data, Conservation Potential Estimates	Measure Savings, Costs and Lives, and Cross-Check of PSE Potential Estimates
NWPPP Hourly Electric Load Model (HELM)	Hourly Load Shapes	Hourly End-Use Load Shapes for Residential, Commercial, and Industrial Sectors
RTF Web Site	Measure Data	Measure Savings, Costs and Lives
TPU Hourly Electric Load Model (HELM)	Hourly Load Shapes	Hourly End-Use Load Shapes for the Residential Sector
2002 NEEA 2004 Commercial buildings Stock Assessment (in progress)	Building Characteristics, Equipment Saturations, and Fuel Shares	Building Type Breakouts, Square Footage per Dwelling, Applicability Factors, Forecast Calibration
2002 Clean Electricity Options for the Pacific Northwest: An Assessment of Efficiency and Renewable Potentials through the Year 2020 (Tellus Institute report prepared for the NW Energy Coalition)	Conservation Program Market Penetration Estimates	Conservation Bundle Market Penetration Estimates

### 3.3 STATE OF CALIFORNIA

Over the last few years the California has been very active in developing energy efficiency measure data. Studies have been jointly funded through the state's public goods charge, and managed by Pacific Gas and Electric Company, Southern California Edison, San Diego Gas and Electric Company, and Southern California Gas Company.

The utilities worked together through the California Measurement Advisory Council, which included representatives of the California Energy Commission and the California Public Utilities Commission. KEMA-XENERGY was the prime contractor on each of the studies referenced in Table 3-3.

**Table 3-3**  
**State of California Data Sources**

California Data Source	Key Variables	Use in This Study
2003 California Statewide Commercial Sector Natural Gas Energy Efficiency Potential Study	Commercial Gas Measure Data, Conservation Potential Estimates	Commercial Gas Measure Savings, Costs and Lives; Applicability, Feasibility Factors
2002 California Statewide Commercial Sector Energy Efficiency Potential Study	Commercial Electric Measure Data, Conservation Potential Estimates	Commercial Electric Measure Savings, Costs and Lives; Applicability, Feasibility Factors
2002 California Statewide Industrial Sector Energy Efficiency Potential Study	Industrial Electric Measure Data, Conservation Potential Estimates	Industrial Electric and Gas Measure Savings, Costs and Lives
2002 California Statewide Residential Sector Energy Efficiency Potential Study	Residential Electric and Gas Measure Data, Conservation Potential Estimates	Residential Electric and Gas Measure Savings, Costs and Lives; Applicability, Feasibility Factors
2001 DEER (Database for Energy Efficiency Resources) Update Study	Residential and Commercial Measure Data	Measure Savings, Costs and Lives

### 3.4 OTHER DATA SOURCES

Other data sources, as listed in Table 3-4, consisted primarily of available information from past energy-efficiency market studies, conservation potential studies and evaluations of energy-efficiency programs performed by the consultants.

**Table 3-4**  
**Other Data Sources**

<b>Other Data Source</b>	<b>Key Variables</b>	<b>Use in This Study</b>
U.S. Department of Energy, Office of Industrial Technologies	Energy Efficiency Technologies, Estimated Savings, Technology Saturations	Estimated Savings, Technology Saturations on Motors and Compressors
2002-03 Assessment of Energy and Capacity Savings Potential in Iowa (Global Energy Partners and Quantec)	Measure Data, Conservation Potential Estimates	Measure Savings, Costs and Lives, and Cross-Check of PSE Potential Estimates
1995 Multi-client Study, Market Penetration of DSM Programs: The Effects of Price and Non-price Program Features (Barakat and Chamberlin, Inc.)	Conservation Program Market Penetration Estimates	Conservation Bundle Market Penetration Estimates

# 4

## CONSERVATION POTENTIAL RESULTS

### 4.1 TECHNICAL AND ACHIEVABLE CONSERVATION POTENTIAL SUMMARY

Based on the results of this study, cumulative 20-year technical conservation potentials in PSE's service area are estimated at 1,016 aMW megawatts of electricity and 45,708,939 decatherms of natural gas savings, of which 328.3 aMW (32%) and 10,788,029 decatherms (24%) are estimated to be achievable. Cumulative, long-run technical and achievable conservation potentials are shown in Tables 4-1 and 4-2, and Figures 4-1 and 4-2 for electricity and natural gas respectively.

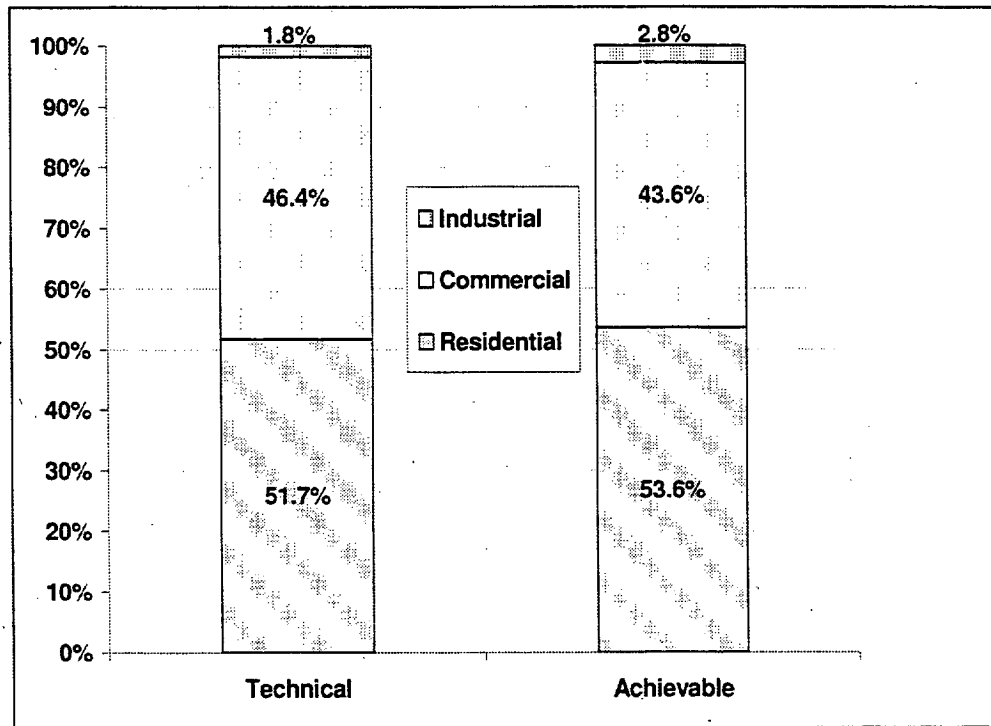
As shown in Table 4-1 and Figure 4-1, the residential sector accounts for the largest share of achievable electricity savings (176 aMW), followed by the commercial sector with an achievable savings potential of 143 aMW over 20 years. The industrial sector accounts for 9 aMW of electricity savings during the same period.

**Table 4-1  
Long-Run Electric Technical and Achievable Potential**

Sector	Total 2023 Baseline Load <sup>1</sup> (aMW)	20-Year Cumulative Potential (aMW and % of Baseline)	
		Technical	Achievable
Residential	1,538	525.7	176.0
		34.2%	11.4%
Commercial	1,331	471.8	143.1
		35.4%	10.7%
Industrial	179	18.4	9.2
		10.3%	5.1%
Total	3,048	1,016.0	328.3
		33.3%	10.8%

<sup>1</sup>From PSE April 30, 2003 Least Cost Plan load forecast.

**Figure 4-1**  
**Distribution of Electric Technical and Achievable Potential by Sector**



The largest share of achievable natural gas potential is in the residential sector, which accounts for nearly 76% of total achievable natural gas savings. The commercial and industrial sectors respectively account for 22% and 2% of the achievable potential.

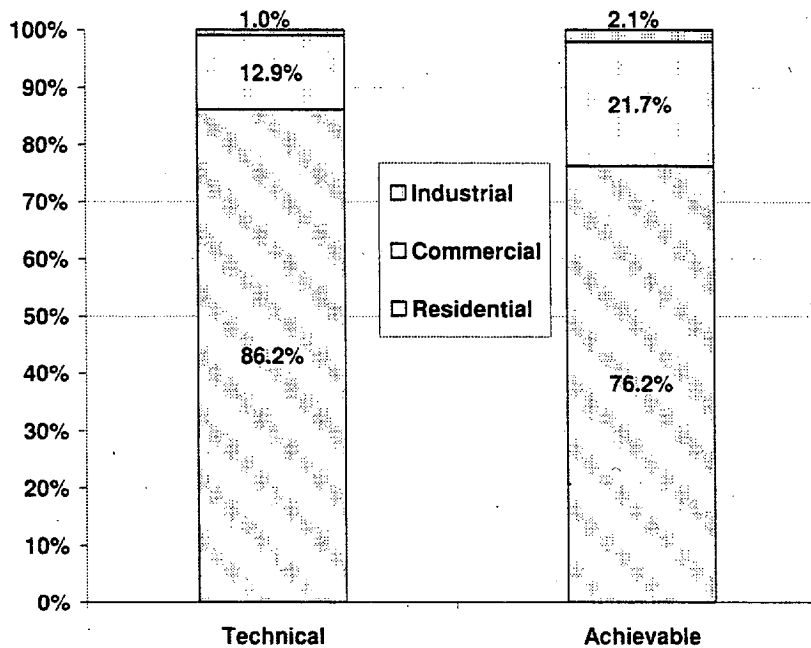
**Table 4-2**  
**Long-Run Natural Gas Technical and Achievable Potential**

Sector	Total 2023 Baseline Load <sup>2</sup> (Decatherms)	20-Year Cumulative Potential (Decatherms and % of Baseline)	
		Technical	Achievable
Residential	81,319,163	39,383,771 48.4%	8,223,569 10.1%
Commercial	29,562,290	5,880,506 35.4%	2,342,129 10.7%
Industrial	4,789,020	444,662 9.3%	222,331 4.6%
Total	115,670,473	45,708,939 39.5%	10,788,029 9.3%

<sup>2</sup>From PSE April 30, 2003 Least Cost Plan load forecast.



Figure 4-2  
Distribution of Gas Technical and Achievable Potential by Sector



To add additional perspective on the scope and magnitude of the estimated achievable conservation potential on various sectors, the resulting impacts are presented on a per-customer basis relative to average consumption. As can be seen in Table 4-3, estimated conservation potentials are likely to have the largest impacts in the residential sector, reducing average electricity and gas use per residential customer by 11.4% and 10.1% respectively. The results also suggest that if all the achievable conservation potential is acquired, per-customer electricity and gas use in the commercial sector would be lowered by nearly 11% and 8%, respectively, in 2023.

Table 4-3  
Per Customer Energy Usage in 2023

Fuel/Sector	Baseline Use Per Customer in 2023 <sup>3</sup>	Use per Customer After Achievable Potential	% of Use per Customer Baseline
<b>Electric (kWh)</b>			
Residential	11,161	9,883	11.4%
Commercial	77,411	69,091	10.7%
Industrial	376,022	356,686	5.1%
<b>Gas (Therms)</b>			
Residential	819	736	10.1%
Commercial	4,956	4,563	7.9%
Industrial	15,911	15,172	4.6%

<sup>3</sup>From PSE April 30, 2003 Least Cost Plan load forecast.

Measure-specific results and data inputs for each sector are provided in Appendices A through F.

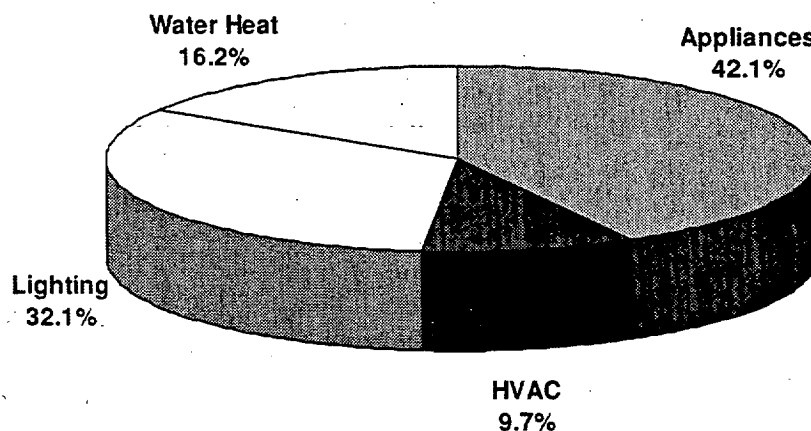
## 4.2 RESIDENTIAL ACHIEVABLE CONSERVATION POTENTIAL

### 4.2.1 Residential Electric Potential

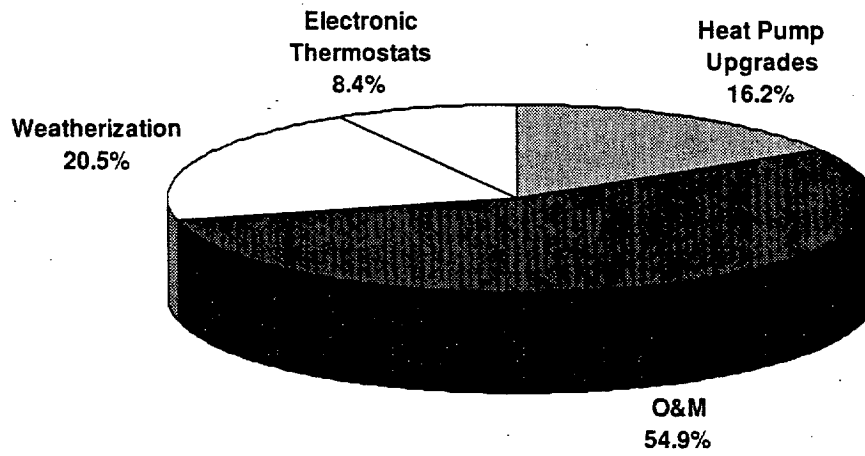
The distribution of achievable electricity savings in the residential sector by end-use is shown in Figure 4-3. As can be seen, the upgrade and replacement of appliances with energy-efficient technologies provide the largest opportunity for acquisition of electric conservation resources. Savings in this end-use represent approximately 42% of all achievable electricity savings in the residential sector.

The results also show that about 32% of achievable electric savings in the residential sector may be obtained through the application of energy-efficient lighting technologies, primarily compact fluorescent light bulbs and fixtures. The remaining savings can be achieved through the implementation of water-heating measures (16%) and HVAC measures (10%). More detailed breakouts of the measure categories within each of the bundles are presented in Figures 4-4 through 4-7.

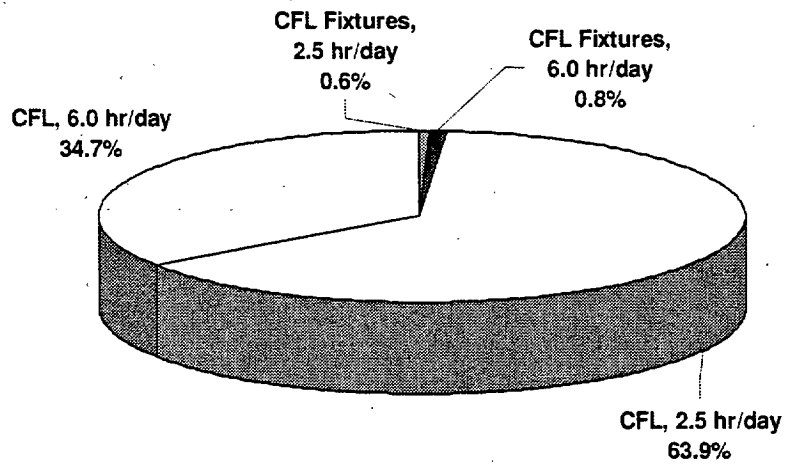
**Figure 4-3**  
**Distribution of Residential Sector Achievable Electric Conservation Potential by End-Use**



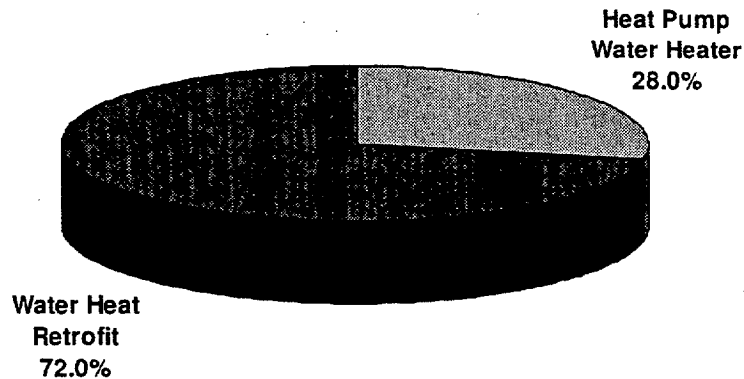
**Figure 4-4**  
**Distribution of Residential Electric HVAC Savings by Measure Category**



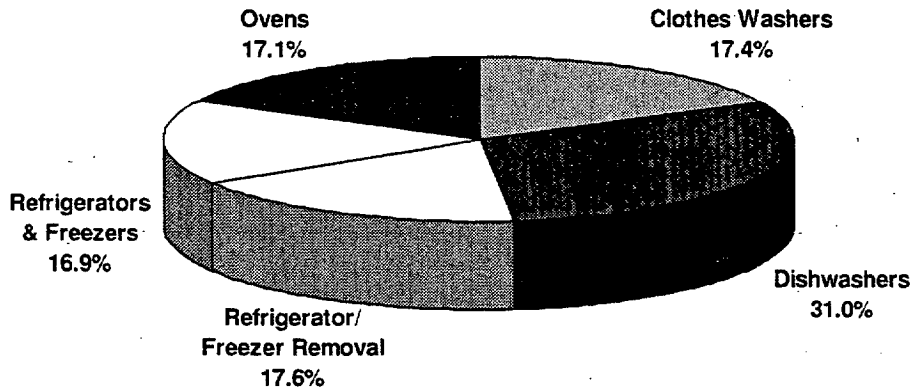
**Figure 4-5**  
**Distribution of Residential Electric Lighting Savings by Measure Category**



**Figure 4-6**  
**Distribution of Residential Electric Water Heating**  
**Savings by Measure Category**



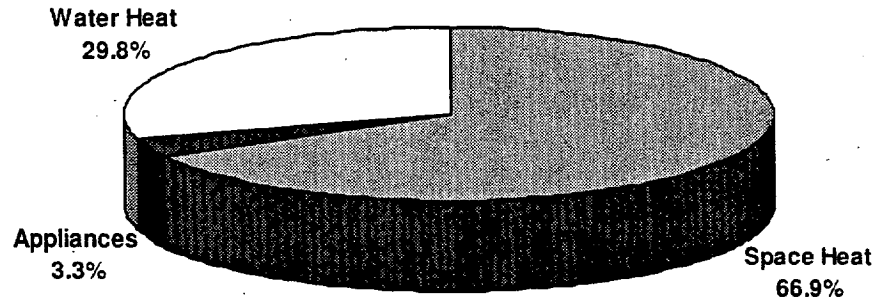
**Figure 4-7**  
**Distribution of Residential Electric Appliance**  
**Savings by Measure Category**



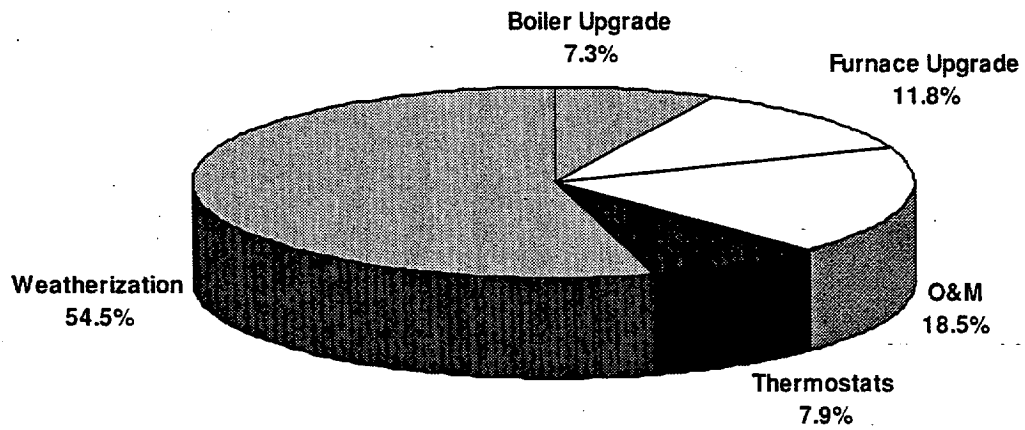
#### **4.2.2 Residential Gas Potential**

As shown in Figure 4-8, expected savings in space heating is the largest component of the achievable natural gas conservation potential in the residential sector and accounts for nearly 67% of the gas savings potential. Upgrade of heating equipment with alternative, more energy-efficient equipment is the main source for the potential savings. The results also show that installation of more efficient water heaters and application of measures that improve performance of existing units account for nearly 30% of the gas conservation potential in the residential sector. Figures 4-9 and 4-10 show the share of savings for various measure categories for space heating and water heating.

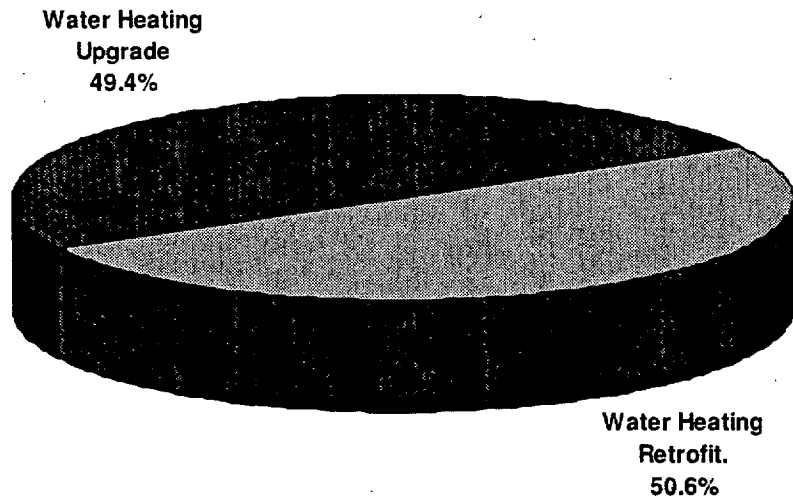
**Figure 4-8**  
**Distribution of Residential Sector Achievable Natural Gas Conservation Potential by End-Use**



**Figure 4-9**  
**Distribution of Residential Gas Space Heat Savings by Measure Category**



**Figure 4-10**  
**Distribution of Residential Gas Water Heat**  
**Savings by Measure Category**

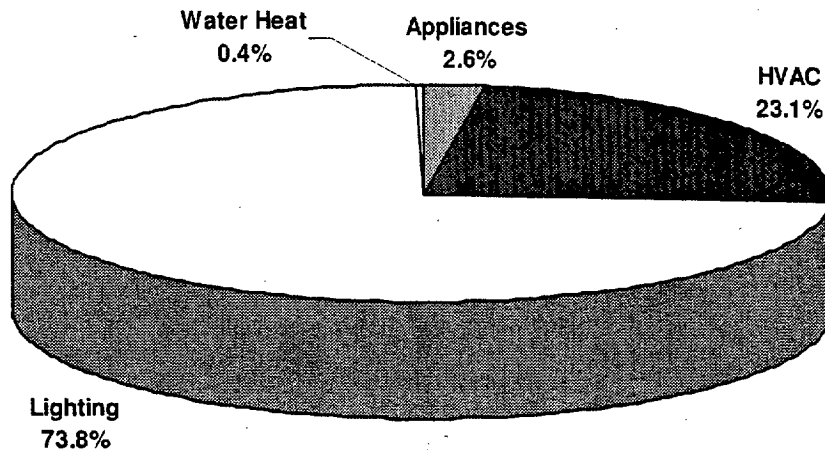


### **4.3 COMMERCIAL ACHIEVABLE CONSERVATION POTENTIAL**

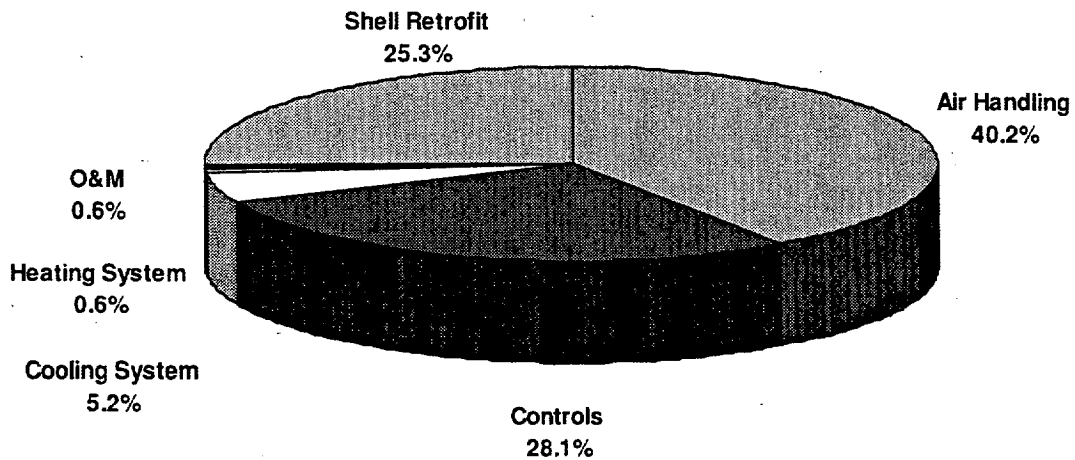
#### **4.3.1 Commercial Electric Potential**

As shown in Figure 4-11, nearly 74% of potential electricity savings in the commercial sector are attributable to the application of energy-efficient lighting. Retrofit, upgrade, and better operation and maintenance of HVAC equipment are also shown to be effective conservation measures, which account for over 23% of the total electricity savings potential in this sector. Appliances (plug loads) and water heating measures together account for about 3% of total commercial-sector electricity savings. Figure 4-12 and 4-13 show the savings by measure category for HVAC and appliances.

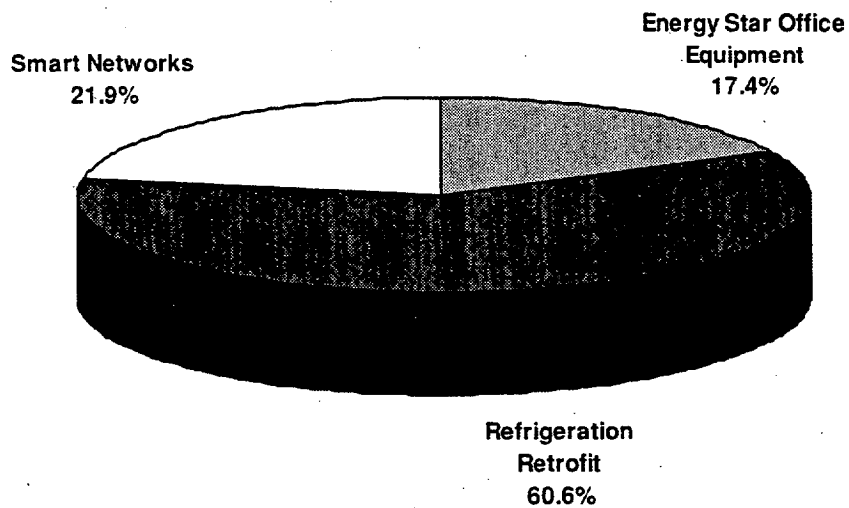
**Figure 4-11**  
**Distribution of Achievable Commercial Sector Electric Conservation Potential by End-Use**



**Figure 4-12**  
**Distribution of Commercial Electric HVAC Savings by Measure Category**



**Figure 4-13**  
**Distribution of Commercial Electric Appliance**  
**Savings by Measure Category**

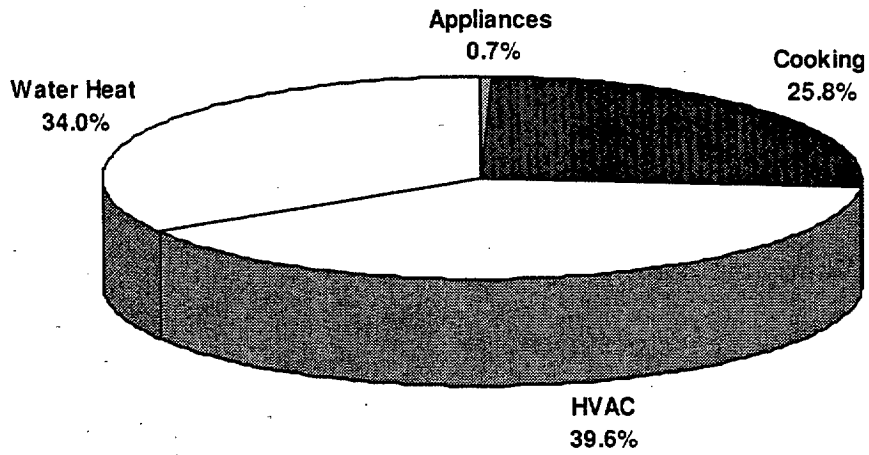


### **4.3.2 Commercial Gas Potential**

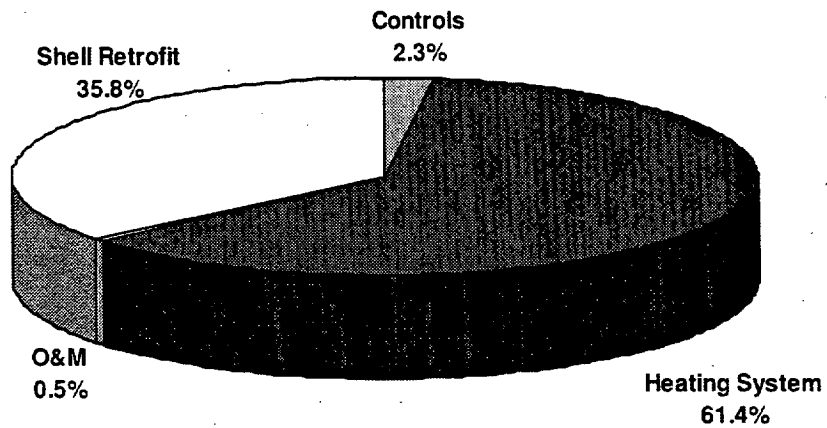
As can be seen in Figure 4-14, space heating, water heating and cooking conservation measures provide the largest potentials for gas savings in the commercial sector. These measures respectively represent 40% (space heating), 34% (water heating), and 26% (cooking) of the total achievable gas conservation potential in the commercial sector. Upgrades to miscellaneous gas appliances account for a relatively small share of the total gas savings potential in this sector. Figures 4-15 and 4-16 show the distribution of savings by measure category for space heat and water heat, respectively.



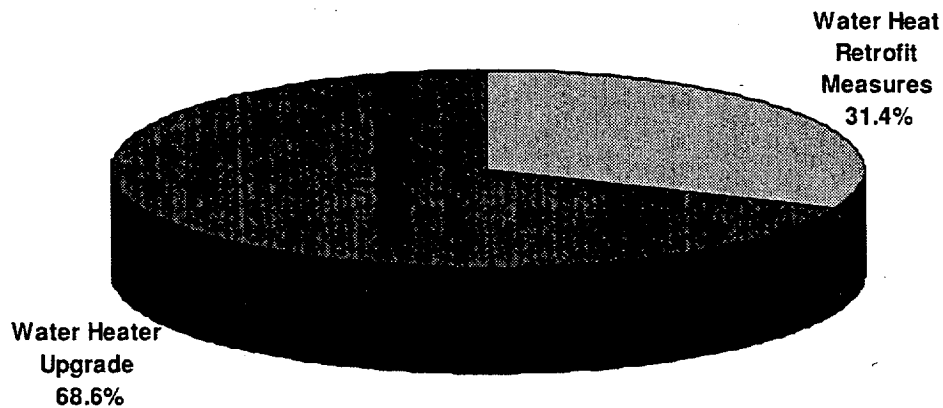
**Figure 4-14**  
**Distribution of Commercial Sector Achievable Natural Gas Conservation Potential**



**Figure 4-15**  
**Distribution of Commercial Gas Space Heat Savings by Measure Category**



**Figure 4-16**  
**Distribution of Commercial Gas Water Heat**  
**Savings by Measure Category**



#### 4.4 INDUSTRIAL ACHIEVABLE CONSERVATION POTENTIAL

Achievable electric and gas conservation potentials were estimated for all major end-uses and within 15 major industrial sectors in PSE's service territory. Long-term achievable savings potentials in the industrial sector savings are estimated at 9.2 aMW of electricity and 222,330 decatherms of gas.

The distribution of achievable electricity potential by major industrial end-uses is shown in Figure 4-17. Motor upgrades present by far the largest source for electricity savings in all industrial segments, accounting for over 55% of potential electricity savings. The remaining 45% of the savings potentials is distributed in similar proportions across compressed air, refrigeration, HVAC, and lighting applications.

As can be seen in Figure 4-18, steam distribution system efficiency improvements account for the largest portion (46.2%) of gas conservation potential in the industrial sector. Process boiler upgrade, boiler controls, and heat recovery measures account for 23.4% of savings; and 15.4% of the gas savings is attributable to improvements in boiler operation and maintenance.

More detailed estimates of industrial achievable potential by end-use and sector are provided in Tables 4-4 through 4-7.

Figure 4-17  
 Distribution of Industrial Sector Achievable Electric Conservation Potential by End-Use

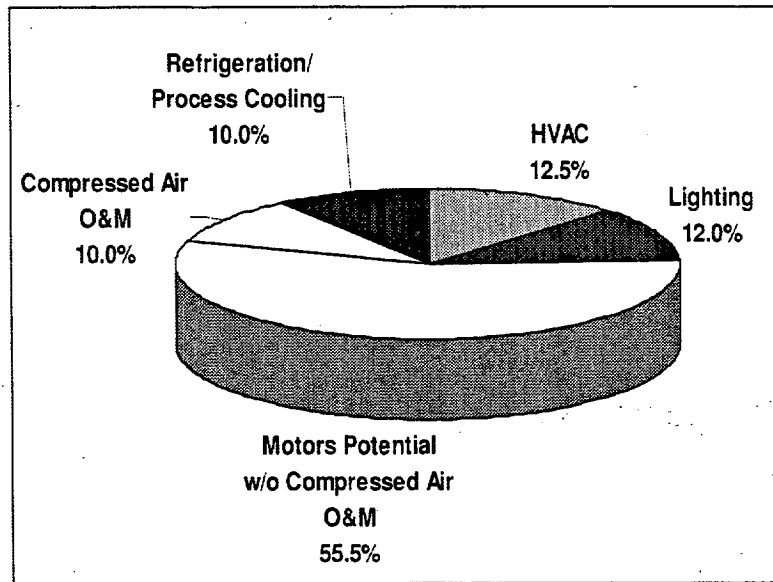


Figure 4-18  
 Distribution of Industrial Sector Achievable Gas Conservation Potential by End-Use

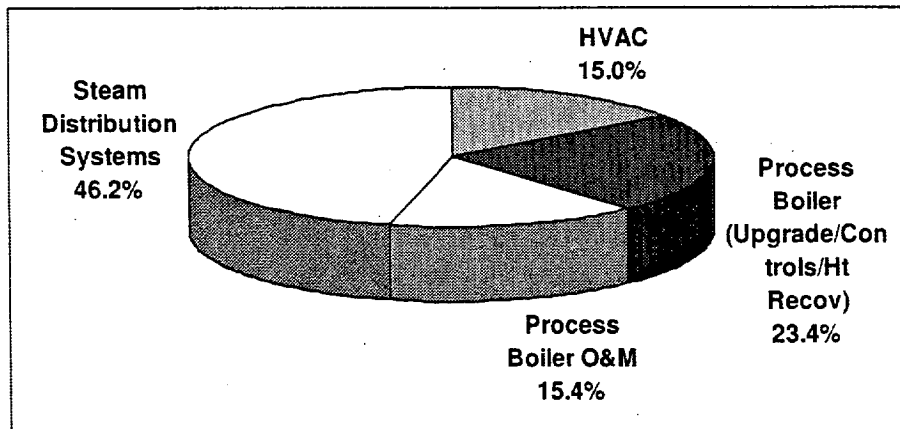


Table 4-4  
Industrial Technical Electric Conservation Potential by End-Use

Electric	1999 Firm Consumption Total (MWh)	Measure Life (Years)	% Industrial Load	% End Use	First Year Savings (MWh)	First Year aMW	Measure Cost \$/kWh Saved	Total Cost (\$)	Simple Payback @ \$0.05/kWh	Cum. Savings (MWh)	Cost of Conserved Energy (\$/kWh)
Total Load	1,571,020	15.9	10.3%	N/A	161,575	18.4	\$0.186	\$30,123,781	3.7	2,565,203	\$0.012
Uncoded	171,553	-	-	-	-	-	-	-	-	-	-
HVAC	179,248	15.0	1.3%	11.3%	20,165	2.3	\$0.450	\$9,074,414	9.0	302,480	\$0.030
Indirect Boiler	15,182	-	-	-	-	-	-	-	-	-	-
Lighting	156,980	10.0	1.2%	12.4%	19,418	2.2	\$0.250	\$4,854,575	5.0	194,183	\$0.025
Other - Not Reported	128,713	-	-	-	-	-	-	-	-	-	-
Process Electro Chemical	17,651	-	-	-	-	-	-	-	-	-	-
Process Heat	132,084	-	-	-	-	-	-	-	-	-	-
Process Other	9,354	-	-	-	-	-	-	-	-	-	-
Motors Technical Potential	654,866	17.3	6.7%	16.2%	105,801	12.1	\$0.130	\$13,766,273	2.6	1,825,688	\$0.008
Motors Potential	N/A	20.0	5.7%	13.7%	89,671	10.2	\$0.148	\$13,282,369	3.0	1,793,428	\$0.007
Compressed Air O&M	N/A	2.0	1.0%	2.5%	16,130	1.8	\$0.030	\$483,904	0.6	32,260	\$0.015
Refrigeration/Process Cooling	105,388	15.0	1.0%	15.4%	16,190	1.8	\$0.150	\$2,428,519	3.0	242,852	\$0.010

Table 4-5  
Industrial Electric Technical Conservation Potential by Sector

Electric	1999 Firm Consumption Total (MWh)	2000 Employment (1000s)	Savings as % of Total Industrial Load	First Year Savings (MWh)	First Year aMW	Measure Cost (\$/kWh Saved)	Total Cost (\$)	Measure Life (Years)	Simple Payback @ \$0.05/kWh	Cum. Savings (MWh)	Cost of Conserved Energy (\$/kWh)
Total Load	1,571,020	193.6	10.3%	161,575	18.4	\$0.186	\$30,123,781	15.9	3.7	2,565,203	\$0.012
Uncoded	171,553	9.1	-	-	-	-	-	-	-	-	-
20 Food/Kindred Products	218,111	19.5	3.2%	50,621	5.8	\$0.165	\$8,339,117	17.1	3.3	866,547	\$0.165
24 Lumber/Wood Products	158,492	12.6	1.3%	21,006	2.4	\$0.160	\$3,353,261	18.3	3.2	384,773	\$0.160
26 Paper/Allied Products	11,266	4.1	0.1%	2,015	0.2	\$0.168	\$338,944	18.8	3.4	37,861	\$0.168
27 Printing/Publishing	60,628	16.9	0.2%	3,171	0.4	\$0.279	\$884,440	14.2	5.6	44,966	\$0.279
28 Chemical/Allied Products	74,275	3.1	1.0%	15,261	1.7	\$0.143	\$2,186,051	16.8	2.9	256,020	\$0.143
29 Petroleum Related	12,669	2.2	0.2%	2,958	0.3	\$0.144	\$427,140	18.2	2.9	53,906	\$0.144
30 Rubber/Misc. Plastics Products	181,192	6.7	0.9%	14,361	1.6	\$0.180	\$2,584,388	15.2	3.6	218,687	\$0.180
32 Stone/Clay/Glass/Concrete Prod.	43,199	6.0	0.3%	4,906	0.6	\$0.140	\$686,563	14.3	2.8	70,321	\$0.140
33 Primary Metal Industries	10,407	1.9	0.1%	1,608	0.2	\$0.153	\$245,273	18.2	3.1	29,303	\$0.153
34 Fabricated Metal Products	138,048	8.4	0.5%	8,516	1.0	\$0.187	\$1,588,856	11.7	3.7	99,638	\$0.187
35 Machinery, except Electrical	117,877	13.2	0.8%	12,009	1.4	\$0.230	\$2,756,809	14.2	4.6	170,643	\$0.230
36 Electric/Electronic Equip.	69,128	8.5	0.5%	7,233	0.8	\$0.234	\$1,691,069	13.8	4.7	100,124	\$0.234
37 Transportation Equipment	127,224	66.7	0.6%	9,303	1.1	\$0.257	\$2,392,709	12.8	5.1	119,187	\$0.257
38 Instruments/Related Products	85,294	8.1	0.4%	5,995	0.7	\$0.293	\$1,755,533	13.5	5.9	81,056	\$0.293
39 Miscellaneous	91,657	6.7	0.2%	2,613	0.3	\$0.342	\$893,627	12.3	6.8	32,172	\$0.342

Table 4-6  
Industrial Technical Gas Conservation Potential by End-Use

Gas	1999 Consumption Total	Measure Life (Years)	% Industrial Load	% End Use	First Year Savings (therms)	Measure Cost (\$/therm Saved)	Total Cost (\$)	Simple Payback @ \$0.67/therm	Cum. Savings (therms)	Cost of Conserved Energy (\$/therms)
Total Sales	47,890,199		9.3%		4,446,617		\$8,044,845		66,014,080	\$0.12
Uncoded	5,316,313									
Miscoded	1,904,499									
HVAC	5,981,028	15	1.4%	11.2%	667,332	\$5.48	\$3,656,979	8.2	10,009,980	\$0.37
Process Boiler	15,554,164		7.9%	24.3%	3,779,285	\$1.16	\$4,387,865	1.7	56,004,101	\$0.08
Boiler	N/A	15	2.2%	6.7%	1,038,582	\$1.52	\$1,578,645	2.3	15,578,732	\$0.10
Boiler O&M	N/A	5	1.4%	4.4%	685,176	\$0.41	\$280,922	0.6	3,425,879	\$0.08
Steam Distribution Systems	N/A	18	4.3%	13.2%	2,055,527	\$1.23	\$2,528,298	1.8	36,999,490	\$0.07
Other - Not Reported	3,209,210									
Process Heat	15,738,121									
Process Other	186,864									

Table 4-7  
Industrial Technical Gas Conservation Potential by Sector

Gas	1999 Consumption Total (therms)	2000 Employment (1000s)	Savings as % of Total Industrial Load	First Year Savings (therms)	Measure Cost (\$/therm Saved)	Total Cost (\$)	Measure Life (Years)	Simple Payback @ \$0.67/therm	Cum. Savings (therms)	Cost of Conserved Energy (\$/therm)
Total Load	47,890,199	193.6	9.3%	4,446,617	\$1.809	\$8,044,845	14.8	2.7	66,014,080	\$0.12
Uncoded	5,316,313	9.1	-	-	-	-	-	-	-	-
Miscoded	1,904,499	N/A	-	-	-	-	-	-	-	-
Food/Kindred Products	10,977,761	19.5	4.0%	1,925,469	\$1.32	\$2,550,596	14.8	2.0	28,546,178	\$0.09
Lumber/Wood Products	2,629,749	12.6	0.7%	322,973	\$1.50	\$484,991	14.8	2.2	4,790,658	\$0.10
Paper/Allied Products	181,156	4.1	0.1%	33,755	\$1.24	\$41,753	14.8	1.8	500,310	\$0.08
Printing/Publishing	721,429	16.9	0.1%	61,403	\$2.46	\$150,957	14.9	3.7	913,264	\$0.17
Chemical/Allied Products	1,758,317	3.1	0.5%	250,081	\$1.25	\$311,879	14.8	1.9	3,706,782	\$0.08
Petroleum Related	515,874	2.2	0.1%	43,767	\$1.19	\$51,905	14.8	1.8	648,612	\$0.08
Rubber/Misc. Plastics Products	351,480	6.7	0.1%	46,342	\$1.98	\$91,862	14.9	3.0	688,320	\$0.13
Stone/Clay/Glass/Concrete Prod.	3,417,557	6.0	0.2%	77,229	\$2.50	\$193,232	14.9	3.7	1,148,783	\$0.17
Primary Metal Industries	2,503,494	1.9	0.2%	102,490	\$2.05	\$210,376	14.9	3.1	1,522,602	\$0.14
Fabricated Metal Products	6,032,092	8.4	0.9%	425,319	\$2.62	\$1,113,012	14.9	3.9	6,328,670	\$0.18
Machinery, except Electrical	3,010,511	13.2	0.2%	110,061	\$5.48	\$603,136	15.0	8.2	1,650,918	\$0.37
Electric/Electronic Equip.	879,715	8.5	0.2%	100,780	\$2.07	\$208,603	14.9	3.1	1,497,270	\$0.14
Transportation Equipment	4,411,532	66.7	1.1%	541,361	\$2.00	\$1,084,332	14.9	3.0	8,041,401	\$0.13
Instruments/Related Products	786,369	8.1	0.3%	131,062	\$2.09	\$273,305	14.9	3.1	1,947,256	\$0.14
Miscellaneous	2,492,351	6.7	0.6%	274,525	\$2.46	\$674,907	14.9	3.7	4,083,057	\$0.17

# 5

## CONSERVATION RESOURCE BUNDLES

### 5.1 COST BUNDLES

To facilitate the incorporation of the results of this study into PSE's least-cost, integrated resource planning process, electricity and natural gas conservation potential estimates for each sector were disaggregated into distinct cost-based "bundles" of conservation resource. The grouping of measures into cost bundles begins with ranking of all measures by their respective cost per energy unit saved to create "measure supply curves" as shown in Figures 5-1 and 5-2, irrespective of sector or end-use. (The horizontal axis in each figure shows cumulative savings and the vertical axis shows the average cost per unit of energy saved.) The measures are then assigned to specific resource bundles based on sector and end use.

Five cost-based bundles (levels A-E) were created for electricity by grouping conservation measures with similar cost and load-shape characteristics. For gas, there are four cost categories (A-D). Originally, there were six categories for electric and five categories for gas, but the highest cost categories (electric measures with costs greater than \$0.11/kWh, natural gas measures with costs greater than \$1/therm) were deemed unlikely to ever be selected as cost-effective resources and were therefore dropped from the analysis prior to the estimation of achievable potential. Levelized-cost thresholds for these electric and gas cost groups are provided in Section 2, Tables 2-5 and 2-6.

Figure 5-1  
Electric Achievable Potential Measure Supply Curve

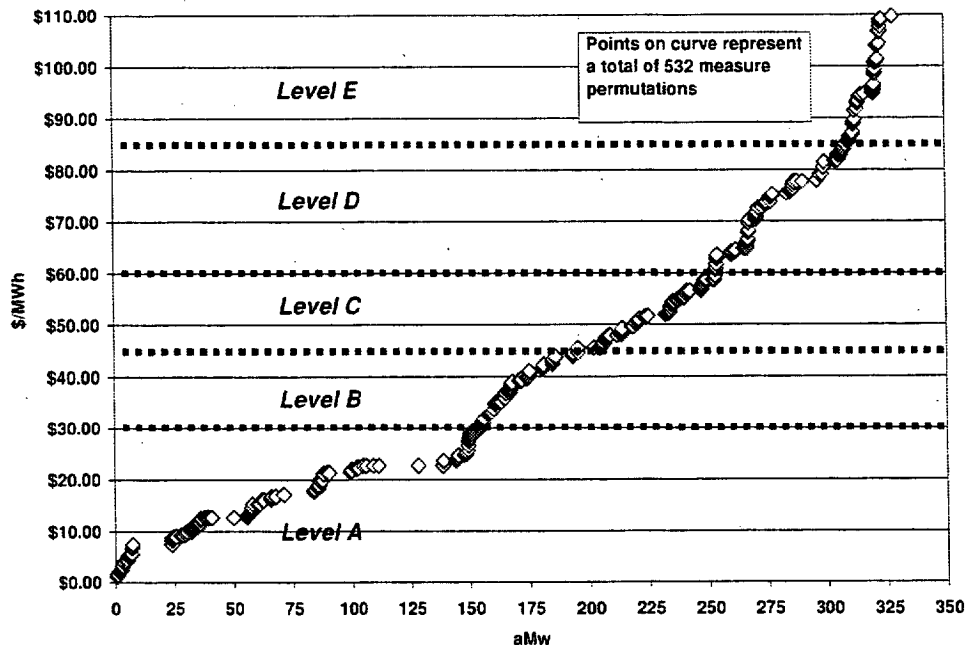
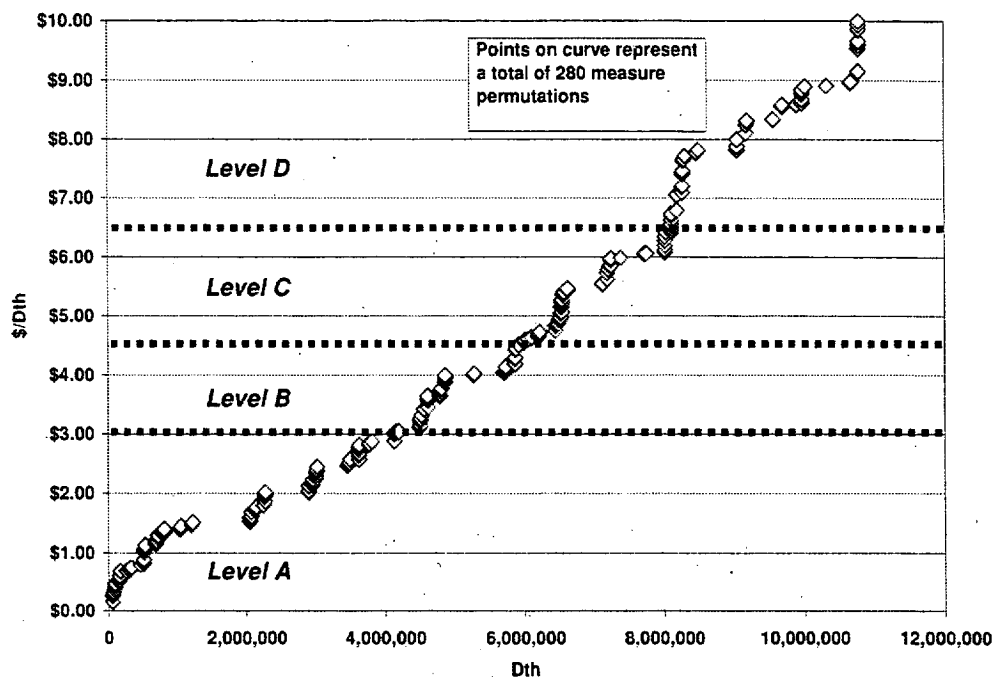




Figure 5-2  
Gas Achievable Potential Measure Supply Curve



The composition of electric and natural gas resource portfolios and their associated costs ranges are shown in Tables 5-1 and 5-2. More detailed breakdown of the electricity and natural gas conservation resource bundles by market segment are presented in Tables 5-3 and 5-4.

As shown in Table 5-1, nearly 56% of achievable electricity savings in the residential sector, 33% of the achievable savings in the commercial sector, and all potential savings in the industrial sector fall in the low-cost category. With respect to natural gas, conservation potentials are more evenly distributed across the four cost categories, particularly in the residential sector (see Table 5-2). Again, a significant portion of potential conservation in the residential (32.6%) and commercial (52.4%) sectors and all potential savings in the industrial sector fall in the low-cost resource category.

**Table 5-1**  
**Technical and Achievable Electric Potential by**  
**Sector and Cost Groups**

	Residential 20-Year Potential (aMW/Cost Group as % of Total)		Commercial 20-Year Potential (aMW/Cost Group as % of Total)		Industrial 20-Year Potential (aMW/Cost Group as % of Total)		Total 20-Year Potential (aMW/Cost Group as % of Total)	
	Technical	Achievable	Technical	Achievable	Technical	Achievable	Technical	Achievable
Cost Level A (<= \$0.03/kWh)	225.4	97.8	105.4	46.6	18.4	9.2	349.3	153.7
	53.5%	55.6%	34.9%	32.6%	100.0%	100.0%	47.1%	46.8%
Cost Level B (\$0.03 - 0.045/kWh)	33.9	2.0	89.1	39.6	-	-	123.1	41.6
	8.1%	1.1%	29.5%	27.7%	0.0%	0.0%	16.6%	12.7%
Cost Level C (\$0.045 - 0.06/kWh)	21.2	24.1	61.2	33.7	-	-	82.3	57.8
	5.0%	13.7%	20.3%	23.6%	0.0%	0.0%	11.1%	17.6%
Cost Level D (\$0.06 - .085/kWh)	70.9	40.0	25.3	15.4			96.3	55.4
	16.8%	22.8%	8.4%	10.7%	0.0%	0.0%	13.0%	16.9%
Cost Level E (\$0.085 - 0.11/kWh)	69.7	12.0	20.7	7.8	-	-	90.4	19.8
	16.5%	6.8%	6.9%	5.5%	0.0%	0.0%	12.2%	6.0%
Total Up to \$0.11/kWh	421.1	176.0	301.7	143.1	18.4	9.2	741.3	328.3

**Table 5-2**  
**Technical and Achievable Natural Gas Potential by**  
**Sector and Cost Groups**

	Residential 20-Year Potential (Decatherms/Cost Group as % of Total)		Commercial 20-Year Potential (Decatherms/Cost Group as % of Total)		Industrial 20-Year Potential (Decatherms/Cost Group as % of Total)		Total 20-Year Potential (Decatherms/Cost Group as % of Total)	
	Technical	Achievable	Technical	Achievable	Technical	Achievable	Technical	Achievable
Cost Level A (<= \$0.3/therm)	5,116,161	2,681,181	2,627,962	1,227,305	444,662	222,331	8,188,785	4,130,817
	33.2%	32.6%	54.8%	52.4%	100.0%	100.0%	39.6%	38.3%
Cost Level B (\$0.3- .45/therm)	2,341,164	1,445,086	1,054,087	300,781	-	-	3,395,251	1,745,867
	15.2%	17.6%	22.0%	12.8%	0.0%	0.0%	16.4%	16.2%
Cost Level C (\$0.45- .65/therm)	2,181,009	1,503,636	866,307	729,379	-	-	3,047,316	2,233,015
	14.1%	18.3%	18.1%	31.1%	0.0%	0.0%	14.7%	20.7%
Cost Level D \$0.65-1.00/therm)	5,794,673	2,593,666	249,538	84,664	-	-	6,044,211	2,678,330
	37.5%	31.5%	5.2%	3.6%	0.0%	0.0%	29.2%	24.8%
Total Up to \$1/ therm	15,433,008	8,223,569	4,797,894	2,342,129	444,662	222,331	20,675,564	10,788,029

**Table 5-3**  
**Achievable Electricity Conservation Potentials by**  
**Resource Bundle and Segment (Cumulative 2004-2023)**

Bundle/Segment	Cost Level A ( $\leq \$0.03/\text{kWh}$ )	Cost Level B (\$0.03- 0.045/kWh)	Cost Level C (\$0.045- 0.06/kWh)	Cost Level D (\$0.06- 0.085/kWh)	Cost Level E (\$0.085- 0.11/kWh)	Total Achievable Potential
Res. Ex. Const. – Appliances	29.2	-	18.2	19.9	0.1	67.4
Res. Ex. Const. – HVAC	8.4	1.8	2.0	3.2	0.8	16.2
Res. Ex. Const. – Lighting	32.7	-	-	-	0.3	32.9
Res. Ex. Const. – Water Heat	4.7	-	-	12.5	0.5	17.7
Res. New Const. – Appliances	-	-	1.2	3.5	2.0	6.7
Res. New Const. – HVAC	-	-	0.2	0.6	-	0.8
Res. New Const. – Lighting	23.0	0.2	-	0.3	-	23.5
Res. New Const. – Wtr. Heat	-	-	2.5	-	8.4	10.8
Subtotal Residential	97.8	2.0	24.1	40.0	12.0	176.0
<hr/>						
Com. Ex. Const. – HVAC	7.0	2.9	6.0	5.6	2.9	24.4
Com. Ex. Const. - Lighting	28.2	32.3	24.1	6.9	3.2	94.8
Com. Ex. Const. – Plug Loads	1.7	0.2	0.4	0.3	0.3	2.9
Com. Ex. Const. – Water Heat	0.2	0.1	0.1	0.1	0.0	0.4
Com. New Const. – HVAC	2.3	1.1	1.9	2.0	1.4	8.7
Com. New Const. – Lighting	6.7	2.9	1.1	0.3	0.0	10.9
Com. New Const. Plug Loads	0.5	0.1	0.1	0.1	0.0	0.8
Com. New Const. – Wtr. Heat	0.1	0.0	0.0	0.0	0.0	0.2
Subtotal Commercial	46.6	39.6	33.7	15.4	7.8	143.1
<hr/>						
Ind. Existing Const. – General	9.2	-	-	-	-	9.2
<hr/>						
Total All Sectors	153.7	41.6	57.8	55.4	19.8	328.3

**Table 5-4**  
**Achievable Gas Conservation Potentials by**  
**Resource Bundle and Segment (Cumulative 2004-2023)**

Bundle/Segment	Cost				Total Achievable Potential
	Level A ( $\leq$ \$0.3/ therm)	Level B (\$0.3- 0.45/therm)	Level C (\$0.45- 0.65/therm)	Level D (\$0.65- 1.00/therm)	
Res. Existing Construction – Appliances	-	-	-	199,062	199,062
Res. Existing Construction – HVAC	2,292,015	485,777	17,933	1,319,257	4,114,982
Res. Existing Construction – Water Heat	389,166	402,822	753,004	227,488	1,772,480
Res. New Construction – Appliances	-	-	-	127,193	127,193
Res. New Construction – HVAC	-	-	-	550,215	550,215
Res. New Construction – Water Heat	-	556,487	732,699	170,452	1,459,638
Subtotal Residential	2,681,181	1,445,086	1,503,636	2,593,667	8,223,570
Com. Existing Const. – Appliances	10,310	-	-	3,187	13,497
Com. Existing Construction – Cooking	279,629	-	267,348	11,376	558,353
Com. Existing Construction – HVAC	417,348	228,400	121,530	28,069	795,347
Com. Existing Const. – Water Heat	379,030	22,996	230,898	16,025	648,949
Com. New Construction – Appliances	1,743	-	-	-	1,743
Com. New Construction – Cooking	462	24,138	21,162	426	46,188
Com. New Construction – HVAC	68,300	1,023	41,106	21,212	131,641
Com. New Construction – Water Heat	70,483	24,224	47,335	4,369	146,411
Subtotal Commercial	1,227,305	300,781	729,379	84,664	2,342,129
Industrial Existing Construction – General	222,331	-	-	-	222,331
Total All Sectors	4,130,817	1,745,867	2,233,015	2,678,331	10,788,030

## 5.2 ELECTRIC CONSERVATION RESOURCE ACQUISITION CASES

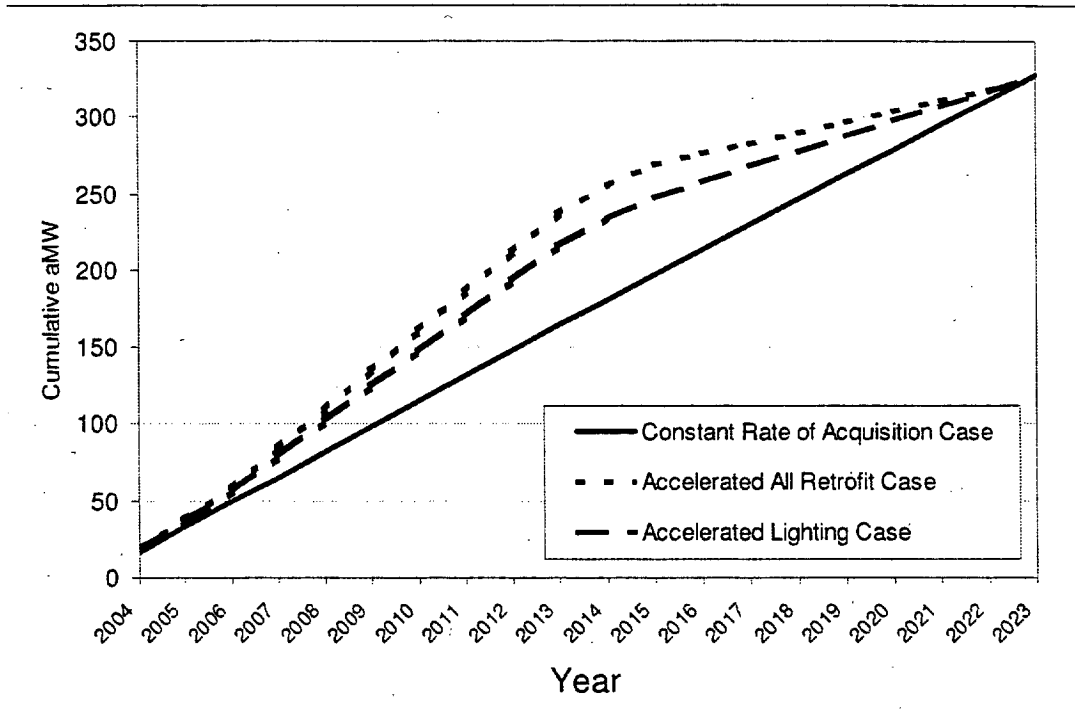
In assessing long-run conservation resource potentials, timing of how conservation resources are acquired over time has significant ramifications for the integrated resource planning process. Since a large portion of conservation potentials, especially savings from retrofit and replacement opportunities, may be considered a finite resource, the amount of conservation available at any given time depends on how much of the resource is acquired earlier. The timing for the acquisition of conservation resources must also take into account practical administrative and logistical considerations as well as potential market barriers.

In our analysis, we considered three alternative cases for acquisition of achievable electric conservation resources:

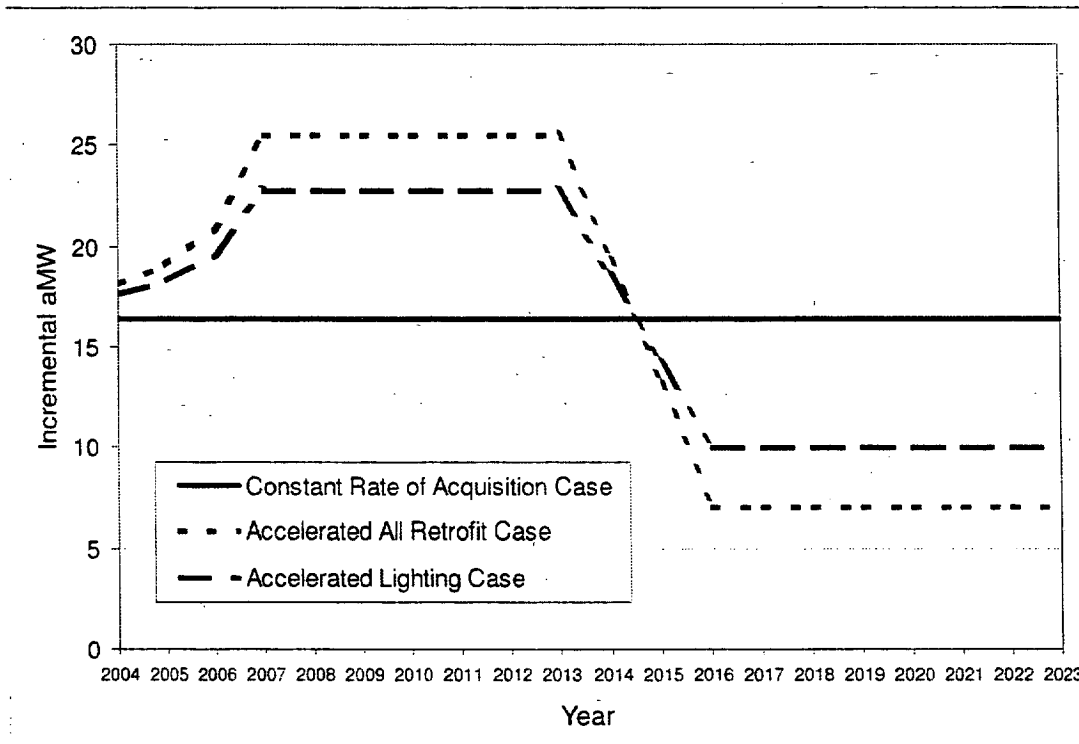
- **Case 1: Constant Rate of Acquisition Case.** This case assumes that electric conservation resources would be acquired in equal annual proportions over the 20-year planning horizon, which for PSE equates to 16.4 aMW per year across all achievable potential cost categories.
- **Case 2: Accelerated Lighting Case.** Under the accelerated lighting case, we assume that conservation resource acquisition for residential and commercial lighting retrofit measures would be accelerated through a two-year ramp-up, continue at 22.8 aMW per year during years three to ten, then gradually ramped down during years eleven and twelve to a level of 10 aMW per year for years thirteen through twenty. All savings associated with applicable measures would be acquired with aggressive marketing during the first twelve years of the plan. It is important to note that only the retrofit portion of the existing customer potential may be subject to accelerated acquisition. In Case 2, the residential administrative-cost adder is increased from 15% to 50%, and the commercial administrative-cost adder is increased from 15% to 30%.
- **Case 3: Accelerated All Retrofit Case.** Under the accelerated all retrofit case, we assume that conservation resource acquisition for all residential and commercial electric retrofit measures – including lighting, HVAC, water heating, and appliances – would be accelerated via the same ramp-up / ramp-down strategy as Case 2, with the same administrative-cost adders. In Case 3, the acquisition of conservation potential ramps up to 25.5 aMW per year for years three to 10, then down to 7.1 aMW per year for years thirteen to twenty.

The results of these three cases are shown graphically in Figures 5-3 and 5-4. Figure 5-3 shows the cumulative savings each year over PSE's 20-year horizon, and Figure 5-4 shows the incremental savings each year.

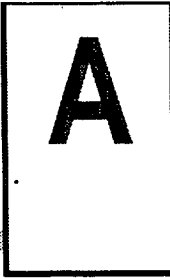
**Figure 5-3**  
**Electric Conservation Resource Acquisition Cases, Cumulative aMW**



**Figure 5-4**  
**Electric Conservation Resource Acquisition Cases, Incremental aMW**







# RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

## Building Stock

Segment	Description	Dwellings	Type
1	SF Existing	563,752	Total
2	MF Existing	214,612	Total
3	MH Existing	61,743	Total
4	SF New	10,632	Annual
5	MF New	5,105	Annual
6	MH New	2,658	Annual

## Measure Costs

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
1	120	Base Heat Pump, 3 ton	home	unit	\$0.00		18	\$0.00	1
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$341.00	\$0.00	18	\$341.00	1
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$420.00	\$0.00	18	\$420.00	1
1	123	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	home	unit	\$79.00	\$0.00	12	\$79.00	1
1	124	Ceiling R-0 to R-19 Insulation	home	sq.ft.	\$0.86	\$0.00	30	\$0.86	1
1	125	Ceiling R-19 to R-38 Insulation	home	sq.ft.	\$0.33	\$0.53	30	\$0.86	1
1	126	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	30	\$0.80	1
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$0.96	\$0.00	30	\$0.96	1
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$650.00	\$0.00	10	\$650.00	1
1	129	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
1	130	Duct Insulation (R-3 to R-6)	home	home	\$27.00	\$300.00	30	\$327.00	1
1	131	HVAC Diagnostic Testing, Repair and Maintenance	unit	unit	\$123.00	\$0.00	10	\$123.00	1



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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
1	132	Windows (high efficiency / ENERGY STAR+)	home	sq.ft.	\$20.81	\$0.00	30	\$20.81	1
1	133	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	30	\$141.00	1
1	160	Base Room Air Conditioner, 12 kBtu, 9 EER	unit	unit	\$0.00	\$0.00	15	\$0.00	1
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	unit	unit	\$406.00	\$0.00	18	\$406.00	1
1	180	Base Resistance Space Heating	home	unit	\$0.00	\$0.00	18	\$0.00	1
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$841.00	\$0.00	18	\$841.00	1
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$920.00	\$0.00	18	\$920.00	1
1	183	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	home	unit	\$79.00	\$0.00	12	\$79.00	1
1	184	Ceiling R-0 to R-19 Insulation	home	sq.ft.	\$0.86	\$0.00	30	\$0.86	1
1	185	Ceiling R-19 to R-38 Insulation	home	sq.ft.	\$0.33	\$0.53	30	\$0.86	1
1	186	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	30	\$0.80	1
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$0.96	\$0.00	30	\$0.96	1
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$650.00	\$0.00	10	\$650.00	1
1	189	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
1	190	Duct Insulation (R-3 to R-6)	home	home	\$27.00	\$300.00	30	\$327.00	1
1	191	HVAC Diagnostic Testing, Repair and Maintenance	unit	unit	\$123.00	\$0.00	10	\$123.00	1
1	192	Windows (high efficiency / ENERGY STAR+)	home	sq.ft.	\$20.81	\$0.00	30	\$20.81	1
1	193	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	30	\$141.00	1
1	200	Base Lighting, 0.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
1	201	CFL, 0.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
1	202	CFL Fixtures, 0.5 hr/day	lamp	lamp	\$13.33	\$10.00	10	\$23.33	2
1	203	Fluorescent Torchieries, 0.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
1	210	Base Lighting, 2.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
1	211	CFL, 2.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1 = Time, 2=ROB)
1	212	CFL Fixtures, 2.5 hr/day	lamp	lamp	\$13.33	\$10.00	10	\$23.33	2
1	213	Fluorescent Torchieries, 2.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
1	220	Base Lighting, 6.0 hr/hday	lamp	lamp	\$0.00		1	\$0.00	1
1	221	CFL, 6.0 hr/day	lamp	lamp	\$4.50	\$0.00	5	\$4.50	2
1	222	CFL Fixtures, 6.0 hr/day	lamp	lamp	\$13.33	\$10.00	8	\$23.33	2
1	223	Fluorescent Torchieries, 6.0 hr/day	lamp	lamp	\$23.00	\$0.00	5	\$23.00	2
1	300	Base Refrigerator, 20 cu.ft.	unit	unit	\$0.00		15	\$0.00	1
1	301	ENERGY STAR or better Refrigerator	unit	unit	\$79.00	\$0.00	15	\$79.00	2
1	310	Base Secondary Refrigerator	unit	unit	\$0.00		15	\$0.00	1
1	311	Removal of Secondary Refrigerator	unit	unit	\$0.00	\$200.00	7	\$200.00	1
1	400	Base Freezer	unit	unit	\$0.00		15	\$0.00	1
1	401	ENERGY STAR or better Freezer	unit	unit	\$50.00	\$0.00	15	\$50.00	1
1	410	Base Secondary Freezer	unit	unit	\$0.00		15	\$0.00	1
1	411	Removal of Secondary Freezer	unit	unit	\$0.00	\$200.00	7	\$200.00	1
1	500	Base 40 gal. Water Heating (EF=0.90)	unit	unit	\$0.00		15	\$0.00	1
1	501	Heat Pump Water Heater (EF=2.9)	unit	unit	\$1,750.00	\$0.00	15	\$1,750.00	1
1	502	High Efficiency Electric Water Heater (EF=0.95)	unit	unit	\$230.00	\$0.00	15	\$230.00	1
1	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	1
1	504	Low-Flow Showerheads	unit	unit	\$20.00	\$0.00	10	\$20.00	1
1	505	Hot Water Pipe Insulation	unit	unit	\$1.00	\$4.80	15	\$5.80	1
1	506	Water Heater Thermostat Setback	unit	unit	\$70.00	\$0.00	15	\$70.00	1
1	507	Tankless Water Heater (EF=0.98)	unit	unit	\$579.00	\$324.00	15	\$903.00	1
1	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
1	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	1
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	unit	unit	\$280.00	\$0.00	14	\$280.00	1
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	unit	unit	\$350.00	\$0.00	14	\$350.00	1
1	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	1
1	801	Energy Star DW (EF=0.58)	unit	unit	\$70.00	\$0.00	13	\$70.00	1
1	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	1
1	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	1
1	950	Base Plug Loads	unit	unit	\$0.00		20	\$0.00	1
1	951	Powerstrip with Occupancy Sensor	unit	unit	\$90.00	\$0.00	20	\$90.00	1
2	120	Base Exhaust Air Heat Pump, 2 ton	home	unit	\$0.00		18	\$0.00	1

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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
2	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$228.00	\$0.00	18	\$228.00	1
2	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$280.00	\$0.00	18	\$280.00	1
2	123	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	home	unit	\$79.00	\$0.00	12	\$79.00	1
2	124	Ceiling R-0 to R-19 Insulation	home	sq.ft.	\$0.86	\$0.00	30	\$0.86	1
2	125	Ceiling R-19 to R-38 Insulation	home	sq.ft.	\$0.33	\$0.53	30	\$0.86	1
2	126	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	30	\$0.80	1
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$0.96	\$0.00	30	\$0.96	1
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$650.00	\$0.00	10	\$650.00	1
2	129	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
2	130	Duct Insulation (R-3 to R-6)	home	home	\$27.00	\$300.00	30	\$327.00	1
2	131	HVAC Diagnostic Testing, Repair and Maintenance	unit	unit	\$123.00	\$0.00	10	\$123.00	1
2	132	Windows (high efficiency / ENERGY STAR+)	home	home	\$20.81	\$0.00	30	\$20.81	1
2	133	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	30	\$141.00	1
2	160	Base Room Air Conditioner, 8 kBtu	unit	unit	\$0.00		15	\$0.00	1
2	161	ENERGY STAR or better Room AC, 8 kBtu	unit	unit	\$270.00	\$0.00	18	\$270.00	1
2	180	Base Resistance Space Heating	home	unit	\$0.00		18	\$0.00	1
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$728.00		18	\$728.00	1
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$780.00		18	\$780.00	1
2	183	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	home	unit	\$79.00	\$0.00	12	\$79.00	1
2	184	Ceiling R-0 to R-19 Insulation	home	sq.ft.	\$0.86	\$0.00	30	\$0.86	1
2	185	Ceiling R-19 to R-38 Insulation	home	sq.ft.	\$0.33	\$0.53	30	\$0.86	1
2	186	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	30	\$0.80	1
2	187	Wall 2x4 R-0 to Blow-In R-13	home	sq.ft.	\$0.96	\$0.00	30	\$0.96	1

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1 = Time, 2=ROB)
		Insulation (.86)							
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$650.00	\$0.00	10	\$650.00	1
2	189	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
2	190	Duct Insulation (R-3 to R-6)	home	home	\$27.00	\$300.00	30	\$327.00	1
2	191	HVAC Diagnostic Testing, Repair and Maintenance	home	unit	\$123.00	\$0.00	10	\$123.00	1
2	192	Windows (high efficiency / ENERGY STAR+)	home	home	\$20.81	\$0.00	30	\$20.81	1
2	193	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	30	\$141.00	1
2	200	Base Lighting, 0.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
2	201	CFL, 0.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
2	202	CFL Fixtures, 0.5 hr/day	lamp	lamp	\$13.33	\$10.00	10	\$23.33	2
2	203	Fluorescent Torcheries, 0.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
2	210	Base Lighting, 2.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
2	211	CFL, 2.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
2	212	CFL Fixtures, 2.5 hr/day	lamp	lamp	\$13.33	\$10.00	10	\$23.33	2
2	213	Fluorescent Torcheries, 2.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
2	220	Base Lighting, 6.0 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
2	221	CFL, 6.0 hr/day	lamp	lamp	\$4.50	\$0.00	5	\$4.50	2
2	222	CFL Fixtures, 6.0 hr/day	lamp	lamp	\$13.33	\$10.00	8	\$23.33	2
2	223	Fluorescent Torcheries, 6.0 hr/day	lamp	lamp	\$23.00	\$0.00	5	\$23.00	2
2	300	Base Refrigerator, 15 cu.ft.	unit	unit	\$0.00		15	\$0.00	1
2	301	ENERGY STAR or better Refrigerator	unit	unit	\$59.00	\$0.00	15	\$59.00	1
2	310	Base Secondary Refrigerator	unit	unit	\$0.00		15	\$0.00	1
2	311	Removal of Secondary Refrigerator	unit	unit	\$0.00	\$200.00	7	\$200.00	1
2	400	Base Freezer	unit	unit	\$0.00		15	\$0.00	1
2	401	ENERGY STAR or better Freezer	unit	unit	\$50.00	\$0.00	15	\$50.00	1
2	410	Base Secondary Freezer	unit	unit	\$0.00		15	\$0.00	1
2	411	Removal of Secondary Freezer	unit	unit	\$0.00	\$200.00	7	\$200.00	1
2	500	Base 40 gal. Water Heating (EF=0.90)	unit	unit			15	\$0.00	1
2	501	Heat Pump Water Heater (EF=2.9)	unit	unit	\$1,750.00	\$0.00	15	\$1,750.00	1
2	502	High Efficiency Electric Water Heater (EF=0.95)	unit	unit	\$230.00	\$0.00	15	\$230.00	1
2	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	1

APPENDIX A

RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
2	504	Low-Flow Showerheads	unit	unit	\$20.00	\$0.00	10	\$20.00	1
2	505	Hot Water Pipe Insulation	unit	unit	\$1.00	\$4.80	15	\$5.80	1
2	506	Water Heater Thermostat Setback	unit	unit	\$70.00	\$0.00	15	\$70.00	1
2	507	Tankless Water Heater (EF=0.98)	unit	unit	\$579.00	\$324.00	15	\$903.00	1
2	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
2	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	1
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	unit	unit	\$280.00	\$0.00	14	\$280.00	1
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	unit	unit	\$350.00	\$0.00	14	\$350.00	1
2	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	1
2	801	Energy Star DW (EF=0.58)	unit	unit	\$70.00	\$0.00	13	\$70.00	1
2	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	1
2	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	1
2	950	Base Plug Loads	unit	unit	\$0.00		20	\$0.00	1
2	951	Powerstrip with Occupancy Sensor	unit	unit	\$90.00	\$0.00	20	\$90.00	1
3	120	Base Heat Pump, 2 ton	home	unit	\$0.00		18	\$0.00	1
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$228.00	\$0.00	18	\$228.00	1
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$280.00	\$0.00	18	\$280.00	1
3	123	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	home	unit	\$79.00	\$0.00	12	\$79.00	1
3	124	Ceiling R-0 to R-19 Insulation	home	sq.ft.	\$0.94	\$0.00	25	\$0.94	1
3	125	Ceiling R-19 to R-38 Insulation	home	sq.ft.	\$0.41	\$0.53	25	\$0.94	1
3	126	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	25	\$0.80	1
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$1.43	\$0.00	25	\$1.43	1
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$100.00	\$0.00	10	\$100.00	1
3	129	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
3	130	Duct Insulation (R-3 to R-6)	home	home	\$13.00	\$200.00	25	\$213.00	1
3	131	HVAC Diagnostic Testing, Repair and Maintenance	home	home	\$123.00	\$0.00	10	\$123.00	1
3	132	Windows (high efficiency / ENERGY STAR+)	home	sq.ft.	\$16.01	\$0.00	25	\$16.01	1

APPENDIX A

RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
3	133	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	25	\$141.00	1
3	160	Base Room Air Conditioner, 10 kBtu	unit	unit	\$0.00		15	\$0.00	1
3	161	ENERGY STAR or better Room AC, 10 kBtu	unit	unit	\$338.00	\$0.00	18	\$338.00	1
3	180	Base Resistance Space Heating	home	unit			18	\$0.00	1
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$728.00	\$0.00	18	\$728.00	1
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$780.00	\$0.00	18	\$780.00	1
3	183	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	home	unit	\$79.00	\$0.00	12	\$79.00	1
3	184	Ceiling R-0 to R-19 Insulation	home	sq.ft.	\$0.94	\$0.00	25	\$0.94	1
3	185	Ceiling R-19 to R-38 Insulation	home	sq.ft.	\$0.41	\$0.53	25	\$0.94	1
3	186	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	25	\$0.80	1
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$1.43	\$0.00	25	\$1.43	1
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$100.00	\$0.00	10	\$100.00	1
3	189	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
3	190	Duct Insulation (R-3 to R-6)	home	home	\$13.00	\$200.00	25	\$213.00	1
3	191	HVAC Diagnostic Testing, Repair and Maintenance	home	unit	\$123.00	\$0.00	10	\$123.00	1
3	192	Windows (high efficiency / ENERGY STAR+)	home	sq.ft.	\$16.01	\$0.00	25	\$16.01	1
3	193	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	25	\$141.00	1
3	200	Base Lighting, 0.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
3	201	CFL, 0.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
3	202	CFL Fixtures, 0.5 hr/day	lamp	lamp	\$13.33	\$10.00	10	\$23.33	2
3	203	Fluorescent Torchieries, 0.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
3	210	Base Lighting, 2.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
3	211	CFL, 2.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
3	212	CFL Fixtures, 2.5 hr/day	lamp	lamp	\$13.33	\$10.00	10	\$23.33	2
3	213	Fluorescent Torchieries, 2.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
3	220	Base Lighting, 6.0 hr/day	lamp	lamp	\$0.00		1	\$0.00	1

**APPENDIX A**

**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1= Time, 2=ROB)
3	221	CFL, 6.0 hr/day	lamp	lamp	\$4.50	\$0.00	5	\$4.50	2
3	222	CFL Fixtures, 6.0 hr/day	lamp	lamp	\$13.33	\$10.00	8	\$23.33	2
3	223	Fluorescent Torchieries, 6.0 hr/day	lamp	lamp	\$23.00	\$0.00	5	\$23.00	2
3	300	Base Refrigerator, 15 cu.ft.	unit	unit	\$0.00		15	\$0.00	1
3	301	ENERGY STAR or better Refrigerator	unit	unit	\$59.00	\$0.00	15	\$59.00	1
3	310	Base Secondary Refrigerator	unit	unit	\$0.00		15	\$0.00	1
3	311	Removal of Secondary Refrigerator	unit	unit	\$0.00	\$200.00	7	\$200.00	1
3	400	Base Freezer	unit	unit	\$0.00		15	\$0.00	1
3	401	ENERGY STAR or better Freezer	unit	unit	\$50.00	\$0.00	15	\$50.00	1
3	410	Base Secondary Freezer	unit	unit	\$0.00		15	\$0.00	1
3	411	Removal of Secondary Freezer	unit	unit	\$0.00	\$200.00	7	\$200.00	1
3	500	Base 40 gal. Water Heating (EF=0.90)	unit	unit			15	\$0.00	1
3	501	Heat Pump Water Heater (EF=2.9)	unit	unit	\$1,750.00	\$0.00	15	\$1,750.00	1
3	502	High Efficiency Electric Water Heater (EF=0.95)	unit	unit	\$230.00	\$0.00	15	\$230.00	1
3	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	1
3	504	Low-Flow Showerheads	unit	unit	\$20.00	\$0.00	10	\$20.00	1
3	505	Hot Water Pipe Insulation	unit	unit	\$1.00	\$4.80	15	\$5.80	1
3	506	Water Heater Thermostat Setback	unit	unit	\$70.00	\$0.00	15	\$70.00	1
3	507	Tankless Water Heater (EF=0.98)	unit	unit	\$579.00	\$324.00	15	\$903.00	1
3	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
3	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	1
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	unit	unit	\$280.00	\$0.00	14	\$280.00	1
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	unit	unit	\$350.00	\$0.00	14	\$350.00	1
3	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	1
3	801	Energy Star DW (EF=0.58)	unit	unit	\$70.00	\$0.00	13	\$70.00	1
3	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	1
3	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	1
3	950	Base Plug Loads	unit	unit	\$0.00		20	\$0.00	1
3	951	Powerstrip with Occupancy Sensor	unit	unit	\$90.00	\$0.00	20	\$90.00	1
4	120	Base Heat Pump, 4 ton	home	unit	\$0.00		18	\$0.00	1
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$384.00	\$0.00	18	\$384.00	1
4	122	ENERGY STAR or better Air Source	home	unit	\$820.00	\$0.00	18	\$820.00	1

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
		Heat Pump (HSPF=8.0; SEER=13)							
4	137	Geothermal Heat Pump	home	unit	\$3,635.00	\$2,837.00	18	\$6,472.00	1
4	138	ENERGY STAR New Construction	home	home	\$3,000.00	\$0.00	30	\$3,000.00	1
4	139	ENERGY STAR New Construction Plus	home	home	\$5,000.00	\$0.00	30	\$5,000.00	1
4	160	Base Room Air Conditioner, 14 kBtu	unit	unit	\$0.00		15	\$0.00	1
4	161	ENERGY STAR or better Room AC, 14 kBtu	unit	unit	\$473.00	\$0.00	25	\$473.00	1
4	200	Base Lighting, 0.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
4	201	CFL, 0.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
4	202	CFL Fixtures, 0.5 hr/day	lamp	lamp	\$8.67	\$0.00	10	\$8.67	2
4	203	Fluorescent Torcheries, 0.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
4	210	Base Lighting, 2.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
4	211	CFL, 2.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
4	212	CFL Fixtures, 2.5 hr/day	lamp	lamp	\$8.67	\$0.00	10	\$8.67	2
4	213	Fluorescent Torcheries, 2.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
4	220	Base Lighting, 6.0 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
4	221	CFL, 6.0 hr/day	lamp	lamp	\$4.50	\$0.00	5	\$4.50	2
4	222	CFL Fixtures, 6.0 hr/day	lamp	lamp	\$8.67	\$0.00	8	\$8.67	2
4	223	Fluorescent Torcheries, 6.0 hr/day	lamp	lamp	\$23.00	\$0.00	5	\$23.00	2
4	300	Base Refrigerator, 20 cu.ft.	unit	unit	\$0.00		15	\$0.00	1
4	301	ENERGY STAR or better Refrigerator	unit	unit	\$79.00	\$0.00	15	\$79.00	1
4	400	Base Freezer	unit	unit	\$0.00		15	\$0.00	1
4	401	ENERGY STAR or better Freezer	unit	unit	\$50.00	\$0.00	15	\$50.00	1
4	500	Base 40 gal. Water Heating (EF=0.88)	unit	unit			15	\$0.00	1
4	501	Heat Pump Water Heater (EF=2.9)	unit	unit	\$1,750.00	\$0.00	15	\$1,750.00	1
4	502	High Efficiency Electric Water Heater (EF=0.95)	unit	unit	\$230.00	\$0.00	15	\$230.00	1
4	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	1
4	507	Tankless Water Heater (EF=0.98)	unit	unit	\$579.00	\$324.00	15	\$903.00	1
4	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
4	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	1
4	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	unit	unit	\$280.00	\$0.00	14	\$280.00	1
4	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	unit	unit	\$350.00	\$0.00	14	\$350.00	1



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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
4	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	1
4	801	Energy Star DW (EF=0.58)	unit	unit	\$70.00	\$0.00	13	\$70.00	1
4	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	1
4	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	1
4	950	Base Plug Loads	unit	unit	\$0.00		20	\$0.00	1
4	951	Powerstrip with Occupancy Sensor	unit	unit	\$90.00	\$0.00	20	\$90.00	1
5	120	Base Exhaust Air Heat Pump, 2 ton	home	unit			18	\$0.00	1
5	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$228.00	\$0.00	18	\$228.00	1
5	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$280.00	\$0.00	18	\$280.00	1
5	137	Geothermal Heat Pump	home	unit	\$1,241.22		18	\$1,241.22	1
5	138	ENERGY STAR New Construction	home	home	\$2,000.00	\$0.00	30	\$2,000.00	1
5	139	ENERGY STAR New Construction Plus	home	home	\$3,500.00	\$0.00	30	\$3,500.00	1
5	160	Base Room Air Conditioner, 10 kBtu	unit	unit	\$0.00		15	\$0.00	1
5	161	ENERGY STAR or better Room AC, 10 kBtu	unit	unit	\$338.00	\$0.00	25	\$338.00	1
5	200	Base Lighting, 0.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
5	201	CFL, 0.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
5	202	CFL Fixtures, 0.5 hr/day	lamp	lamp	\$8.67	\$0.00	10	\$8.67	2
5	203	Fluorescent Torchieries, 0.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
5	210	Base Lighting, 2.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
5	211	CFL, 2.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
5	212	CFL Fixtures, 2.5 hr/day	lamp	lamp	\$8.67	\$0.00	10	\$8.67	2
5	213	Fluorescent Torchieries, 2.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
5	220	Base Lighting, 6.0 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
5	221	CFL, 6.0 hr/day	lamp	lamp	\$4.50	\$0.00	5	\$4.50	2
5	222	CFL Fixtures, 6.0 hr/day	lamp	lamp	\$8.67	\$0.00	8	\$8.67	2
5	223	Fluorescent Torchieries, 6.0 hr/day	lamp	lamp	\$23.00	\$0.00	5	\$23.00	2
5	300	Base Refrigerator, 15 cu.ft.	unit	unit	\$0.00		15	\$0.00	1
5	301	ENERGY STAR or better Refrigerator	unit	unit	\$59.00	\$0.00	15	\$59.00	1
5	400	Base Freezer	unit	unit	\$0.00		15	\$0.00	1
5	401	ENERGY STAR or better Freezer	unit	unit	\$50.00	\$0.00	15	\$50.00	1
5	500	Base 40 gal. Water Heating (EF=0.90)	unit	unit			15	\$0.00	1
5	501	Heat Pump Water Heater (EF=2.9)	unit	unit	\$1,750.00	\$0.00	15	\$1,750.00	1

APPENDIX A

RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1 = Time, 2=ROB)
5	502	High Efficiency Electric Water Heater (EF=0.95)	unit	unit	\$230.00	\$0.00	15	\$230.00	1
5	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	1
5	507	Tankless Water Heater (EF=0.98)	unit	unit	\$579.00	\$324.00	15	\$903.00	1
5	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
5	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	1
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	unit	unit	\$280.00	\$0.00	14	\$280.00	1
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	unit	unit	\$350.00	\$0.00	14	\$350.00	1
5	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	1
5	801	Energy Star DW (EF=0.58)	unit	unit	\$70.00	\$0.00	13	\$70.00	1
5	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	1
5	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	1
5	950	Base Plug Loads	unit	unit	\$0.00		20	\$0.00	1
5	951	Powerstrip with Occupancy Sensor	unit	unit	\$90.00	\$0.00	20	\$90.00	1
6	120	Base Heat Pump, 3 ton	home	unit	\$0.00		18	\$0.00	1
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	home	unit	\$341.00	\$0.00	18	\$341.00	1
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	home	unit	\$420.00	\$0.00	18	\$420.00	1
6	138	Super Good Cents / ENERGY STAR New Man. Housing	home	home	\$1,500.00	\$0.00	25	\$1,500.00	1
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	home	home	\$3,000.00	\$0.00	25	\$3,000.00	1
6	160	Base Room Air Conditioner, 10 kBtu	unit	unit	\$0.00		15	\$0.00	1
6	161	ENERGY STAR or better Room AC, 10 kBtu	unit	unit	\$338.00	\$0.00	25	\$338.00	1
6	200	Base Lighting, 0.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
6	201	CFL, 0.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
6	202	CFL Fixtures, 0.5 hr/day	lamp	lamp	\$8.67	\$0.00	10	\$8.67	2
6	203	Fluorescent Torchieries, 0.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2
6	210	Base Lighting, 2.5 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
6	211	CFL, 2.5 hr/day	lamp	lamp	\$4.50	\$0.00	7	\$4.50	2
6	212	CFL Fixtures, 2.5 hr/day	lamp	lamp	\$8.67	\$0.00	10	\$8.67	2
6	213	Fluorescent Torchieries, 2.5 hr/day	lamp	lamp	\$23.00	\$0.00	7	\$23.00	2

**APPENDIX A**

**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	A.1.1 Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
6	220	Base Lighting, 6.0 hr/day	lamp	lamp	\$0.00		1	\$0.00	1
6	221	CFL, 6.0 hr/day	lamp	lamp	\$4.50	\$0.00	5	\$4.50	2
6	222	CFL Fixtures, 6.0 hr/day	lamp	lamp	\$8.67	\$0.00	8	\$8.67	2
6	223	Fluorescent Torchieries, 6.0 hr/day	lamp	lamp	\$23.00	\$0.00	5	\$23.00	2
6	300	Base Refrigerator, 15 cu.ft.	unit	unit	\$0.00		15	\$0.00	1
6	301	ENERGY STAR or better Refrigerator	unit	unit	\$59.00	\$0.00	15	\$59.00	1
6	400	Base Freezer	unit	unit	\$0.00		15	\$0.00	1
6	401	ENERGY STAR or better Freezer	unit	unit	\$50.00	\$0.00	15	\$50.00	1
6	500	Base 40 gal. Water Heating (EF=0.90)	unit	unit	\$0.00		15	\$0.00	1
6	501	Heat Pump Water Heater (EF=2.9)	unit	unit	\$1,750	\$0	15	\$1,750.00	1
6	502	High Efficiency Electric Water Heater (EF=0.95)	unit	unit	\$230.00	\$0.00	15	\$230.00	1
6	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	1
6	507	Tankless Water Heater (EF=0.98)	unit	unit	\$579.00	\$324.00	15	\$903.00	1
6	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
6	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	1
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	unit	unit	\$280.00	\$0.00	14	\$280.00	1
6	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	unit	unit	\$350.00	\$0.00	14	\$350.00	1
6	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	1
6	801	Energy Star DW (EF=0.58)	unit	unit	\$70.00	\$0.00	13	\$70.00	1
6	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	1
6	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	1
6	950	Base Plug Loads	unit	unit	\$0.00		20	\$0.00	1
6	951	Powerstrip with Occupancy Sensor	unit	unit	\$90.00	\$0.00	20	\$90.00	1

**Applicability Factor (Percent)**

Seg	Measure #	Measure Description	Applicability Factor
1	120	Base Heat Pump, 3 ton	11.02%
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	11.02%
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	11.02%

Seg	Measure #	Measure Description	Applicability Factor
1	123	ENERGY STAR Programmable Thermostat	11.02%
1	124	Ceiling R-0 to R-19 Insulation	11.02%
1	125	Ceiling R-19 to R-38 Insulation	11.02%
1	126	Floor R-0 to R-19 Insulation-Batts	11.02%
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	11.02%
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	11.02%
1	129	Duct Testing and Sealing	11.02%
1	130	Duct Insulation (R-3 to R-6)	11.02%
1	131	HVAC Diagnostic Testing, Repair and Maintenance	11.02%
1	132	Windows (high efficiency / ENERGY STAR+)	11.02%
1	133	Addition of Attic and Crawlspace Ventilation	11.02%
1	160	Room Air Conditioner, 12 kBtu, 9 EER	3.88%
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	3.88%
1	180	Resistance Space Heating	29.50%
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	29.50%
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	29.50%
1	183	ENERGY STAR Programmable Thermostat	29.50%
1	184	Ceiling R-0 to R-19 Insulation	29.50%
1	185	Ceiling R-19 to R-38 Insulation	29.50%
1	186	Floor R-0 to R-19 Insulation-Batts	29.50%
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	29.50%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	29.50%
1	189	Duct Testing and Sealing	29.50%
1	190	Duct Insulation (R-3 to R-6)	29.50%
1	191	HVAC Diagnostic Testing, Repair and Maintenance	29.50%

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Seg	Measure #	Measure Description	Applicability Factor
1	192	Windows (high efficiency / ENERGY STAR+)	29.50%
1	193	Addition of Attic and Crawlspace Ventilation	29.50%
1	200	Base Lighting, 0.5 hr/day	100.00%
1	201	CFL, 0.5 hr/day	100.00%
1	202	CFL Fixtures, 0.5 hr/day	100.00%
1	203	Fluorescent Torchieries, 0.5 hr/day	100.00%
1	210	Base Lighting, 2.5 hr/day	100.00%
1	211	CFL, 2.5 hr/day	100.00%
1	212	CFL Fixtures, 2.5 hr/day	100.00%
1	213	Fluorescent Torchieries, 2.5 hr/day	100.00%
1	220	Base Lighting, 6.0 hr/day	100.00%
1	221	CFL, 6.0 hr/day	100.00%
1	222	CFL Fixtures, 6.0 hr/day	100.00%
1	223	Fluorescent Torchieries, 6.0 hr/day	100.00%
1	300	Base Refrigerator, 20 cu.ft.	109.65%
1	301	ENERGY STAR or better Refrigerator	109.65%
1	310	Base Secondary Refrigerator	109.65%
1	311	Removal of Secondary Refrigerator	109.65%
1	400	Base Freezer	48.37%
1	401	ENERGY STAR or better Freezer	48.37%
1	410	Base Secondary Freezer	109.65%
1	411	Removal of Secondary Freezer	48.37%
1	500	Base 40 gal. Water Heating (EF=0.90)	54.09%
1	501	Heat Pump Water Heater (EF=2.9)	54.09%
1	502	High Efficiency Electric Water Heater (EF=0.95)	54.09%
1	503	Solar Water Heater	54.09%
1	504	Low-Flow Showerheads	54.09%
1	505	Hot Water Pipe Insulation	54.09%
1	506	Water Heater Thermostat Setback	54.09%
1	507	Tankless Water Heater (EF=0.98)	54.09%
1	508	Drain Water Heat Recovery (GFX)	54.09%
1	600	Base Clotheswasher (EF=1.18)	54.09%
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	54.09%

Seg	Measure #	Measure Description	Applicability Factor
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	54.09%
1	800	Base Dishwasher (EF=0.46)	54.09%
1	801	Energy Star DW (EF=0.58)	54.09%
1	900	Conventional Oven	86.38%
1	901	Convection Oven	86.38%
1	950	Plug Loads	100.00%
1	951	Powerstrip with Occupancy Sensor	100.00%
2	120	Base Exhaust Air Heat Pump, 2 ton	1.04%
2	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.04%
2	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.04%
2	123	ENERGY STAR Programmable Thermostat	1.04%
2	124	Ceiling R-0 to R-19 Insulation	1.04%
2	125	Ceiling R-19 to R-38 Insulation	1.04%
2	126	Floor R-0 to R-19 Insulation-Batts	1.04%
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	1.04%
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	1.04%
2	129	Duct Testing and Sealing	1.04%
2	130	Duct Insulation (R-3 to R-6)	1.04%
2	131	HVAC Diagnostic Testing, Repair and Maintenance	1.04%
2	132	Windows (high efficiency / ENERGY STAR+)	1.04%
2	133	Addition of Attic and Crawlspace Ventilation	1.04%
2	160	Room Air Conditioner, 8 kBtu	4.16%
2	161	ENERGY STAR or better Room AC, 8 kBtu	4.16%
2	180	Resistance Space Heating	89.59%
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	89.59%
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	89.59%

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Seg	Measure #	Measure Description	Applicability Factor
2	183	ENERGY STAR Programmable Thermostat	89.59%
2	184	Ceiling R-0 to R-19 Insulation	89.59%
2	185	Ceiling R-19 to R-38 Insulation	89.59%
2	186	Floor R-0 to R-19 Insulation-Batts	89.59%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	89.59%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	89.59%
2	189	Duct Testing and Sealing	89.59%
2	190	Duct Insulation (R-3 to R-6)	89.59%
2	191	HVAC Diagnostic Testing, Repair and Maintenance	89.59%
2	192	Windows (high efficiency / ENERGY STAR+)	89.59%
2	193	Addition of Attic and Crawlspace Ventilation	89.59%
2	200	Base Lighting, 0.5 hr/hday	100.00%
2	201	CFL, 0.5 hr/day	100.00%
2	202	CFL Fixtures, 0.5 hr/day	100.00%
2	203	Fluorescent Torchieries, 0.5 hr/day	100.00%
2	210	Base Lighting, 2.5 hr/hday	100.00%
2	211	CFL, 2.5 hr/day	100.00%
2	212	CFL Fixtures, 2.5 hr/day	100.00%
2	213	Fluorescent Torchieries, 2.5 hr/day	100.00%
2	220	Base Lighting, 6.0 hr/hday	100.00%
2	221	CFL, 6.0 hr/day	100.00%
2	222	CFL Fixtures, 6.0 hr/day	100.00%
2	223	Fluorescent Torchieries, 6.0 hr/day	100.00%
2	300	Base Refrigerator, 15 cu.ft.	91.13%
2	301	ENERGY STAR or better Refrigerator	91.13%
2	310	Base Secondary Refrigerator	109.65%
2	311	Removal of Secondary Refrigerator	91.13%
2	400	Base Freezer	11.30%
2	401	ENERGY STAR or better Freezer	11.30%
2	410	Base Secondary Freezer	109.65%
2	411	Removal of Secondary Freezer	11.30%
2	500	Base 40 gal. Water Heating (EF=0.90)	89.96%

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Seg	Measure #	Measure Description	Applicability Factor
2	501	Heat Pump Water Heater (EF=2.9)	89.96%
2	502	High Efficiency Electric Water Heater (EF=0.95)	89.96%
2	503	Solar Water Heater	89.96%
2	504	Low-Flow Showerheads	89.96%
2	505	Hot Water Pipe Insulation	89.96%
2	506	Water Heater Thermostat Setback	89.96%
2	507	Tankless Water Heater (EF=0.98)	89.96%
2	508	Drain Water Heat Recovery (GFX)	89.96%
2	600	Base Clotheswasher (EF=1.18)	89.96%
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	89.96%
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	89.96%
2	800	Base Dishwasher (EF=0.46)	89.96%
2	801	Energy Star DW (EF=0.58)	89.96%
2	900	Conventional Oven	97.15%
2	901	Convection Oven	97.15%
2	950	Plug Loads	100.00%
2	951	Powerstrip with Occupancy Sensor	100.00%
3	120	Base Heat Pump, 2 ton	10.49%
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	10.49%
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	10.49%
3	123	ENERGY STAR Programmable Thermostat	10.49%
3	124	Ceiling R-0 to R-19 Insulation	10.49%
3	125	Ceiling R-19 to R-38 Insulation	10.49%
3	126	Floor R-0 to R-19 Insulation-Batts	10.49%
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	10.49%
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	10.49%
3	129	Duct Testing and Sealing	10.49%
3	130	Duct Insulation (R-3 to R-6)	10.49%
3	131	HVAC Diagnostic Testing, Repair and Maintenance	10.49%



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Seg	Measure #	Measure Description	Applicability Factor
3	132	Windows (high efficiency / ENERGY STAR+)	10.49%
3	133	Addition of Attic and Crawlspace Ventilation	10.49%
3	160	Room Air Conditioner, 10 kBtu	8.97%
3	161	ENERGY STAR or better Room AC, 10 kBtu	8.97%
3	180	Resistance Space Heating	72.67%
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	72.67%
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	72.67%
3	183	ENERGY STAR Programmable Thermostat	72.67%
3	184	Ceiling R-0 to R-19 Insulation	72.67%
3	185	Ceiling R-19 to R-38 Insulation	72.67%
3	186	Floor R-0 to R-19 Insulation-Batts	72.67%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	72.67%
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	72.67%
3	189	Duct Testing and Sealing	72.67%
3	190	Duct Insulation (R-3 to R-6)	72.67%
3	191	HVAC Diagnostic Testing, Repair and Maintenance	72.67%
3	192	Windows (high efficiency / ENERGY STAR+)	72.67%
3	193	Addition of Attic and Crawlspace Ventilation	72.67%
3	200	Base Lighting, 0.5 hr/day	100.00%
3	201	CFL, 0.5 hr/day	100.00%
3	202	CFL Fixtures, 0.5 hr/day	100.00%
3	203	Fluorescent Torchieries, 0.5 hr/day	100.00%
3	210	Base Lighting, 2.5 hr/day	100.00%
3	211	CFL, 2.5 hr/day	100.00%
3	212	CFL Fixtures, 2.5 hr/day	100.00%
3	213	Fluorescent Torchieries, 2.5 hr/day	100.00%
3	220	Base Lighting, 6.0 hr/day	100.00%

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Seg	Measure #	Measure Description	Applicability Factor
3	221	CFL, 6.0 hr/day	100.00%
3	222	CFL Fixtures, 6.0 hr/day	100.00%
3	223	Fluorescent Torcheries, 6.0 hr/day	100.00%
3	300	Base Refrigerator, 15 cu.ft.	97.95%
3	301	ENERGY STAR or better Refrigerator	97.95%
3	310	Base Secondary Refrigerator	109.65%
3	311	Removal of Secondary Refrigerator	97.95%
3	400	Base Freezer	46.82%
3	401	ENERGY STAR or better Freezer	46.82%
3	410	Base Secondary Freezer	109.65%
3	411	Removal of Secondary Freezer	46.82%
3	500	Base 40 gal. Water Heating (EF=0.90)	90.49%
3	501	Heat Pump Water Heater (EF=2.9)	90.49%
3	502	High Efficiency Electric Water Heater (EF=0.95)	90.49%
3	503	Solar Water Heater	90.49%
3	504	Low-Flow Showerheads	90.49%
3	505	Hot Water Pipe Insulation	90.49%
3	506	Water Heater Thermostat Setback	90.49%
3	507	Tankless Water Heater (EF=0.98)	90.49%
3	508	Drain Water Heat Recovery (GFX)	90.49%
3	600	Base Clotheswasher (EF=1.18)	90.49%
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	90.49%
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	90.49%
3	800	Base Dishwasher (EF=0.46)	90.49%
3	801	Energy Star DW (EF=0.58)	90.49%
3	900	Conventional Oven	89.43%
3	901	Convection Oven	89.43%
3	950	Plug Loads	100.00%
3	951	Powerstrip with Occupancy Sensor	100.00%
4	120	Base Heat Pump, 4 ton	11.02%
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	11.02%
4	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	11.02%
4	137	Geothermal Heat Pump	11.02%

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Seg	Measure #	Measure Description	Applicability Factor
4	138	ENERGY STAR New Construction	11.02%
4	139	ENERGY STAR New Construction Plus	11.02%
4	160	Room Air Conditioner, 14 kBtu	3.88%
4	161	ENERGY STAR or better Room AC, 14 kBtu	3.88%
4	200	Base Lighting, 0.5 hr/hday	100.00%
4	201	CFL, 0.5 hr/day	100.00%
4	202	CFL Fixtures, 0.5 hr/day	100.00%
4	203	Fluorescent Torchieries, 0.5 hr/day	100.00%
4	210	Base Lighting, 2.5 hr/hday	100.00%
4	211	CFL, 2.5 hr/day	100.00%
4	212	CFL Fixtures, 2.5 hr/day	100.00%
4	213	Fluorescent Torchieries, 2.5 hr/day	100.00%
4	220	Base Lighting, 6.0 hr/hday	100.00%
4	221	CFL, 6.0 hr/day	100.00%
4	222	CFL Fixtures, 6.0 hr/day	100.00%
4	223	Fluorescent Torchieries, 6.0 hr/day	100.00%
4	300	Base Refrigerator, 20 cu.ft.	109.65%
4	301	ENERGY STAR or better Refrigerator	109.65%
4	400	Base Freezer	48.37%
4	401	ENERGY STAR or better Freezer	48.37%
4	500	Base 40 gal. Water Heating (EF=0.87)	31.22%
4	501	Heat Pump Water Heater (EF=2.9)	31.22%
4	502	High Efficiency Electric Water Heater (EF=0.95)	31.22%
4	503	Solar Water Heater	31.22%
4	507	Tankless Water Heater (EF=0.98)	31.22%
4	508	Drain Water Heat Recovery (GFX)	31.22%
4	600	Base Clotheswasher (EF=1.18)	31.22%
4	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	31.22%
4	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	31.22%
4	800	Base Dishwasher (EF=0.46)	31.22%
4	801	Energy Star DW (EF=0.58)	31.22%
4	900	Conventional Oven	62.71%
4	901	Convection Oven	62.71%

Seg	Measure #	Measure Description	Applicability Factor
4	950	Plug Loads	100.00%
4	951	Powerstrip with Occupancy Sensor	100.00%
5	120	Base Exhaust Air Heat Pump, 2 ton	1.04%
5	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.04%
5	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.04%
5	137	Geothermal Heat Pump	1.04%
5	138	ENERGY STAR New Construction	1.04%
5	139	ENERGY STAR New Construction Plus	1.04%
5	160	Room Air Conditioner, 10 kBtu	4.16%
5	161	ENERGY STAR or better Room AC, 10 kBtu	4.16%
5	200	Base Lighting, 0.5 hr/hday	100.00%
5	201	CFL, 0.5 hr/day	100.00%
5	202	CFL Fixtures, 0.5 hr/day	100.00%
5	203	Fluorescent Torchieries, 0.5 hr/day	100.00%
5	210	Base Lighting, 2.5 hr/hday	100.00%
5	211	CFL, 2.5 hr/day	100.00%
5	212	CFL Fixtures, 2.5 hr/day	100.00%
5	213	Fluorescent Torchieries, 2.5 hr/day	100.00%
5	220	Base Lighting, 6.0 hr/hday	100.00%
5	221	CFL, 6.0 hr/day	100.00%
5	222	CFL Fixtures, 6.0 hr/day	100.00%
5	223	Fluorescent Torchieries, 6.0 hr/day	100.00%
5	300	Base Refrigerator, 15 cu.ft.	91.13%
5	301	ENERGY STAR or better Refrigerator	91.13%
5	400	Base Freezer	11.30%
5	401	ENERGY STAR or better Freezer	11.30%
5	500	Base 40 gal. Water Heating (EF=0.90)	89.96%
5	501	Heat Pump Water Heater (EF=2.9)	89.96%
5	502	High Efficiency Electric Water Heater (EF=0.95)	89.96%
5	503	Solar Water Heater	89.96%
5	507	Tankless Water Heater (EF=0.98)	89.96%
5	508	Drain Water Heat Recovery (GFX)	89.96%
5	600	Base Clotheswasher (EF=1.18)	89.96%

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Seg	Measure #	Measure Description	Applicability Factor
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	89.96%
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	89.96%
5	800	Base Dishwasher (EF=0.46)	89.96%
5	801	Energy Star DW (EF=0.58)	89.96%
5	900	Conventional Oven	97.15%
5	901	Convection Oven	97.15%
5	950	Plug Loads	100.00%
5	951	Powerstrip with Occupancy Sensor	100.00%
6	120	Base Heat Pump, 3 ton	10.49%
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	10.49%
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	10.49%
6	138	Super Good Cents / ENERGY STAR New Man. Housing	10.49%
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	10.49%
6	160	Room Air Conditioner, 10 kBtu	8.97%
6	161	ENERGY STAR or better Room AC, 10 kBtu	8.97%
6	200	Base Lighting, 0.5 hr/hday	100.00%
6	201	CFL, 0.5 hr/day	100.00%
6	202	CFL Fixtures, 0.5 hr/day	100.00%
6	203	Fluorescent Torchieries, 0.5 hr/day	100.00%
6	210	Base Lighting, 2.5 hr/hday	100.00%
6	211	CFL, 2.5 hr/day	100.00%
6	212	CFL Fixtures, 2.5 hr/day	100.00%
6	213	Fluorescent Torchieries, 2.5 hr/day	100.00%
6	220	Base Lighting, 6.0 hr/hday	100.00%
6	221	CFL, 6.0 hr/day	100.00%
6	222	CFL Fixtures, 6.0 hr/day	100.00%
6	223	Fluorescent Torchieries, 6.0 hr/day	100.00%
6	300	Base Refrigerator, 15 cu.ft.	97.95%
6	301	ENERGY STAR or better Refrigerator	97.95%
6	400	Base Freezer	46.82%
6	401	ENERGY STAR or better Freezer	46.82%

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Seg	Measure #	Measure Description	Applicability Factor
6	500	Base 40 gal. Water Heating (EF=0.90)	90.49%
6	501	Heat Pump Water Heater (EF=2.9)	90.49%
6	502	High Efficiency Electric Water Heater (EF=0.95)	90.49%
6	503	Solar Water Heater	90.49%
6	507	Tankless Water Heater (EF=0.98)	90.49%
6	508	Drain Water Heat Recovery (GFX)	90.49%
6	600	Base Clotheswasher (EF=1.18)	90.49%
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	90.49%
6	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	90.49%
6	800	Base Dishwasher (EF=0.46)	90.49%
6	801	Energy Star DW (EF=0.58)	90.49%
6	900	Conventional Oven	89.43%
6	901	Convection Oven	89.43%
6	950	Plug Loads	100.00%
6	951	Powerstrip with Occupancy Sensor	100.00%

Base Tech EUI

Seg	Measure #	Measure Description	kWh/Year
1	100	Base, 10 SEER Split-System Air Conditioner	985
1	120	Base Heat Pump, 3 ton	4,990
1	160	Base Room Air Conditioner, 12 kBtu, 9 EER	739
1	180	Base Resistance Space Heating	8008
1	200	Base Lighting, 0.5 hr/hday	158
1	210	Base Lighting, 2.5 hr/hday	1407
1	220	Base Lighting, 6.0 hr/hday	763
1	300	Base Refrigerator, 20 cu.ft.	848
1	310	Base Secondary Refrigerator	1000
1	400	Base Freezer	823
1	410	Base Secondary Freezer	950
1	500	Base 40 gal. Water Heating (EF=0.90)	3798
1	600	Base Clotheswasher (EF=1.18)	3798

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## RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	kWh/Year
1	800	Base Dishwasher (EF=0.46)	3798
1	900	Base Conventional Oven	574
1	950	Base Plug Loads	3389
2	100	Base, 10 SEER Split-System Air Conditioner	546
2	120	Base Exhaust Air Heat Pump, 2 ton	1,985
2	160	Base Room Air Conditioner, 8 kBtu	409
2	180	Base Resistance Space Heating	2773
2	200	Base Lighting, 0.5 hr/hday	74
2	210	Base Lighting, 2.5 hr/hday	657
2	220	Base Lighting, 6.0 hr/hday	357
2	300	Base Refrigerator, 15 cu.ft.	654
2	310	Base Secondary Refrigerator	1000
2	400	Base Freezer	599
2	410	Base Secondary Freezer	950
2	500	Base 40 gal. Water Heating (EF=0.90)	3230
2	600	Base Clotheswasher (EF=1.18)	3230
2	800	Base Dishwasher (EF=0.46)	3230
2	900	Base Conventional Oven	465
2	950	Base Plug Loads	1534
3	100	Base, 10 SEER Split-System Air Conditioner	774
3	120	Base Heat Pump, 2 ton	5,320
3	160	Base Room Air Conditioner, 10 kBtu	580
3	180	Base Resistance Space Heating	9184
3	200	Base Lighting, 0.5 hr/hday	115
3	210	Base Lighting, 2.5 hr/hday	1021
3	220	Base Lighting, 6.0 hr/hday	554
3	300	Base Refrigerator, 15 cu.ft.	854
3	310	Base Secondary Refrigerator	1000
3	400	Base Freezer	808
3	410	Base Secondary Freezer	950
3	500	Base 40 gal. Water Heating (EF=0.90)	2281
3	600	Base Clotheswasher (EF=1.18)	2281
3	800	Base Dishwasher (EF=0.46)	2281
3	900	Base Conventional Oven	514
3	950	Base Plug Loads	1266
4	100	Base, 10 SEER Split-System Air Conditioner	972
4	120	Base Heat Pump, 4 ton	3,968

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	kWh/Year
4	160	Base Room Air Conditioner, 14 kBtu	739
4	180	Base Resistance Space Heating	2074
4	200	Base Lighting, 0.5 hr/hday	158
4	210	Base Lighting, 2.5 hr/hday	1407
4	220	Base Lighting, 6.0 hr/hday	763
4	300	Base Refrigerator, 20 cu.ft.	676
4	400	Base Freezer	656
4	500	Base 40 gal. Water Heating (EF=0.88)	3527
4	600	Base Clotheswasher (EF=1.18)	3527
4	800	Base Dishwasher (EF=0.46)	3527
4	900	Base Conventional Oven	574
4	950	Base Plug Loads	3389
5	100	Base, 10 SEER Split-System Air Conditioner	519
5	120	Base Exhaust Air Heat Pump, 2 ton	1,248
5	160	Base Room Air Conditioner, 10 kBtu	389
5	180	Base Resistance Space Heating	4394
5	200	Base Lighting, 0.5 hr/hday	74
5	210	Base Lighting, 2.5 hr/hday	657
5	220	Base Lighting, 6.0 hr/hday	357
5	300	Base Refrigerator, 15 cu.ft.	638
5	400	Base Freezer	584
5	500	Base 40 gal. Water Heating (EF=0.90)	2998
5	600	Base Clotheswasher (EF=1.18)	2998
5	800	Base Dishwasher (EF=0.46)	2998
5	900	Base Conventional Oven	465
5	950	Base Plug Loads	1534
6	100	Base, 10 SEER Split-System Air Conditioner	774
6	120	Base Heat Pump, 3 ton	4,973
6	160	Base Room Air Conditioner, 10 kBtu	580
6	180	Base Resistance Space Heating	1917
6	200	Base Lighting, 0.5 hr/hday	115
6	210	Base Lighting, 2.5 hr/hday	1021
6	220	Base Lighting, 6.0 hr/hday	554
6	300	Base Refrigerator, 15 cu.ft.	680
6	400	Base Freezer	643
6	500	Base 40 gal. Water Heating (EF=0.90)	2169
6	600	Base Clotheswasher (EF=1.18)	2169
6	800	Base Dishwasher (EF=0.46)	2169



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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	kWh/Year
6	900	Base Conventional Oven	514
6	950	Base Plug Loads	1266

**Energy Savings (Percent)**

Seg	Measure #	Measure Description	Annual % Savings
1	120	Base Heat Pump, 3 ton	
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
1	123	ENERGY STAR Programmable Thermostat	6.0%
1	124	Ceiling R-0 to R-19 Insulation	24.3%
1	125	Ceiling R-19 to R-38 Insulation	8.4%
1	126	Floor R-0 to R-19 Insulation-Batts	20.1%
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	17.6%
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	6.3%
1	129	Duct Testing and Sealing	8.0%
1	130	Duct Insulation (R-3 to R-6)	8.6%
1	131	HVAC Diagnostic Testing, Repair and Maintenance	27.9%
1	132	Windows (high efficiency / ENERGY STAR+)	16.9%
1	133	Addition of Attic and Crawlspace Ventilation	10.0%
1	160	Room Air Conditioner, 12 kBtu, 9 EER	
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	10.0%
1	180	Resistance Space Heating	
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
1	183	ENERGY STAR Programmable Thermostat	6.0%

Seg	Measure #	Measure Description	Annual % Savings
1	184	Ceiling R-0 to R-19 Insulation	24.3%
1	185	Ceiling R-19 to R-38 Insulation	8.4%
1	186	Floor R-0 to R-19 Insulation-Batts	20.1%
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	17.6%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	6.3%
1	189	Duct Testing and Sealing	8.0%
1	190	Duct Insulation (R-3 to R-6)	8.6%
1	191	HVAC Diagnostic Testing, Repair and Maintenance	27.9%
1	192	Windows (high efficiency / ENERGY STAR+)	16.9%
1	193	Addition of Attic and Crawlspace Ventilation	10.0%
1	200	Base Lighting, 0.5 hr/hday	
1	201	CFL, 0.5 hr/day	65.0%
1	202	CFL Fixtures, 0.5 hr/day	65.0%
1	203	Fluorescent Torchieries, 0.5 hr/day	65.0%
1	210	Base Lighting, 2.5 hr/hday	
1	211	CFL, 2.5 hr/day	65.0%
1	212	CFL Fixtures, 2.5 hr/day	65.0%
1	213	Fluorescent Torchieries, 2.5 hr/day	65.0%
1	220	Base Lighting, 6.0 hr/hday	
1	221	CFL, 6.0 hr/day	65.0%
1	222	CFL Fixtures, 6.0 hr/day	65.0%
1	223	Fluorescent Torchieries, 6.0 hr/day	65.0%
1	300	Base Refrigerator, 20 cu.ft.	
1	301	ENERGY STAR or better Refrigerator	15.0%
1	310	Base Secondary Refrigerator	
1	311	Removal of Secondary Refrigerator	100.0%
1	400	Base Freezer	
1	401	ENERGY STAR or better Freezer	10.0%
1	410	Base Secondary Freezer	
1	411	Removal of Secondary Freezer	100.0%
1	500	Base 40 gal. Water Heating (EF=0.90)	
1	501	Heat Pump Water Heater (EF=2.9)	69.7%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
1	502	High Efficiency Electric Water Heater (EF=0.95)	5.4%
1	503	Solar Water Heater	90.0%
1	504	Low-Flow Showerheads	10.6%
1	505	Hot Water Pipe Insulation	1.1%
1	506	Water Heater Thermostat Setback	4.3%
1	507	Tankless Water Heater (EF=0.98)	10.2%
1	508	Drain Water Heat Recovery (GFX)	24.6%
1	600	Base Clotheswasher (EF=1.18)	
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	12.4%
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	15.0%
1	800	Base Dishwasher (EF=0.46)	
1	801	Energy Star DW (EF=0.58)	5.0%
1	900	Conventional Oven	
1	901	Convection Oven	14.5%
1	950	Plug Loads	
1	951	Powerstrip with Occupancy Sensor	0.8%
2	120	Base Exhaust Air Heat Pump, 2 ton	
2	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
2	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
2	123	ENERGY STAR Programmable Thermostat	6.0%
2	124	Ceiling R-0 to R-19 Insulation	14.2%
2	125	Ceiling R-19 to R-38 Insulation	2.2%
2	126	Floor R-0 to R-19 Insulation-Batts	8.8%
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	23.1%
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	14.4%
2	129	Duct Testing and Sealing	6.0%
2	130	Duct Insulation (R-3 to R-6)	0.7%
2	131	HVAC Diagnostic Testing, Repair and Maintenance	0.7%

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## RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
2	132	Windows (high efficiency / ENERGY STAR+)	26.8%
2	133	Addition of Attic and Crawlspace Ventilation	4.4%
2	160	Room Air Conditioner, 8 kBtu	
2	161	ENERGY STAR or better Room AC, 8 kBtu	10.0%
2	180	Resistance Space Heating	
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
2	183	ENERGY STAR Programmable Thermostat	6.0%
2	184	Ceiling R-0 to R-19 Insulation	14.2%
2	185	Ceiling R-19 to R-38 Insulation	2.2%
2	186	Floor R-0 to R-19 Insulation-Batts	8.8%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	23.1%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	14.4%
2	189	Duct Testing and Sealing	6.0%
2	190	Duct Insulation (R-3 to R-6)	0.7%
2	191	HVAC Diagnostic Testing, Repair and Maintenance	0.7%
2	192	Windows (high efficiency / ENERGY STAR+)	26.8%
2	193	Addition of Attic and Crawlspace Ventilation	4.4%
2	200	Base Lighting, 0.5 hr/day	
2	201	CFL, 0.5 hr/day	65.0%
2	202	CFL Fixtures, 0.5 hr/day	65.0%
2	203	Fluorescent Torchieries, 0.5 hr/day	65.0%
2	210	Base Lighting, 2.5 hr/day	
2	211	CFL, 2.5 hr/day	65.0%
2	212	CFL Fixtures, 2.5 hr/day	65.0%
2	213	Fluorescent Torchieries, 2.5 hr/day	65.0%
2	220	Base Lighting, 6.0 hr/day	

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
2	221	CFL, 6.0 hr/day	65.0%
2	222	CFL Fixtures, 6.0 hr/day	65.0%
2	223	Fluorescent Torchieries, 6.0 hr/day	65.0%
2	300	Base Refrigerator, 15 cu.ft.	
2	301	ENERGY STAR or better Refrigerator	15.0%
2	310	Base Secondary Refrigerator	
2	311	Removal of Secondary Refrigerator	100.0%
2	400	Base Freezer	
2	401	ENERGY STAR or better Freezer	10.0%
2	410	Base Secondary Freezer	
2	411	Removal of Secondary Freezer	100.0%
2	500	Base 40 gal. Water Heating (EF=0.90)	
2	501	Heat Pump Water Heater (EF=2.9)	69.7%
2	502	High Efficiency Electric Water Heater (EF=0.95)	5.4%
2	503	Solar Water Heater	90.0%
2	504	Low-Flow Showerheads	10.6%
2	505	Hot Water Pipe Insulation	1.2%
2	506	Water Heater Thermostat Setback	4.3%
2	507	Tankless Water Heater (EF=0.98)	10.2%
2	508	Drain Water Heat Recovery (GFX)	24.7%
2	600	Base Clotheswasher (EF=1.18)	
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	9.9%
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	12.1%
2	800	Base Dishwasher (EF=0.46)	
2	801	Energy Star DW (EF=0.58)	4.0%
2	900	Conventional Oven	
2	901	Convection Oven	18.3%
2	950	Plug Loads	
2	951	Powerstrip with Occupancy Sensor	1.8%
3	120	Base Heat Pump, 2 ton	
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%

Seg	Measure #	Measure Description	Annual % Savings
3	123	ENERGY STAR Programmable Thermostat	6.0%
3	124	Ceiling R-0 to R-19 Insulation	10.3%
3	125	Ceiling R-19 to R-38 Insulation	7.3%
3	126	Floor R-0 to R-19 Insulation-Batts	12.9%
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	3.2%
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	5.2%
3	129	Duct Testing and Sealing	8.0%
3	130	Duct Insulation (R-3 to R-6)	9.1%
3	131	HVAC Diagnostic Testing, Repair and Maintenance	14.9%
3	132	Windows (high efficiency / ENERGY STAR+)	24.8%
3	133	Addition of Attic and Crawlspace Ventilation	10.0%
3	160	Room Air Conditioner, 10 kBtu	
3	161	ENERGY STAR or better Room AC, 10 kBtu	10.0%
3	180	Resistance Space Heating	
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
3	183	ENERGY STAR Programmable Thermostat	6.0%
3	184	Ceiling R-0 to R-19 Insulation	10.3%
3	185	Ceiling R-19 to R-38 Insulation	7.3%
3	186	Floor R-0 to R-19 Insulation-Batts	12.9%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	3.2%
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	5.2%
3	189	Duct Testing and Sealing	8.0%
3	190	Duct Insulation (R-3 to R-6)	9.1%
3	191	HVAC Diagnostic Testing, Repair and Maintenance	14.9%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
3	192	Windows (high efficiency / ENERGY STAR+)	24.8%
3	193	Addition of Attic and Crawlspace Ventilation	10.0%
3	200	Base Lighting, 0.5 hr/day	
3	201	CFL, 0.5 hr/day	65.0%
3	202	CFL Fixtures, 0.5 hr/day	65.0%
3	203	Fluorescent Torcheries, 0.5 hr/day	65.0%
3	210	Base Lighting, 2.5 hr/day	
3	211	CFL, 2.5 hr/day	65.0%
3	212	CFL Fixtures, 2.5 hr/day	65.0%
3	213	Fluorescent Torcheries, 2.5 hr/day	65.0%
3	220	Base Lighting, 6.0 hr/day	
3	221	CFL, 6.0 hr/day	65.0%
3	222	CFL Fixtures, 6.0 hr/day	65.0%
3	223	Fluorescent Torcheries, 6.0 hr/day	65.0%
3	300	Base Refrigerator, 15 cu.ft.	0.0%
3	301	ENERGY STAR or better Refrigerator	15.0%
3	310	Base Secondary Refrigerator	
3	311	Removal of Secondary Refrigerator	100.0%
3	400	Base Freezer	
3	401	ENERGY STAR or better Freezer	10.0%
3	410	Base Secondary Freezer	
3	411	Removal of Secondary Freezer	100.0%
3	500	Base 40 gal. Water Heating (EF=0.90)	
3	501	Heat Pump Water Heater (EF=2.9)	69.7%
3	502	High Efficiency Electric Water Heater (EF=0.95)	5.4%
3	503	Solar Water Heater	90.0%
3	504	Low-Flow Showerheads	10.6%
3	505	Hot Water Pipe Insulation	1.8%
3	506	Water Heater Thermostat Setback	4.3%
3	507	Tankless Water Heater (EF=0.98)	10.2%
3	508	Drain Water Heat Recovery (GFX)	25.0%
3	600	Base Clotheswasher (EF=1.18)	
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	14.5%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	17.5%
3	800	Base Dishwasher (EF=0.46)	
3	801	Energy Star DW (EF=0.58)	7.9%
3	900	Conventional Oven	
3	901	Convection Oven	14.8%
3	950	Plug Loads	
3	951	Powerstrip with Occupancy Sensor	1.4%
4	120	Base Heat Pump, 4 ton	
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
4	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
4	137	Geothermal Heat Pump	51.9%
4	138	ENERGY STAR New Construction	56.7%
4	139	ENERGY STAR New Construction Plus	75.6%
4	160	Room Air Conditioner, 14 kBtu	
4	161	ENERGY STAR or better Room AC, 14 kBtu	10.0%
4	200	Base Lighting, 0.5 hr/day	
4	201	CFL, 0.5 hr/day	65.0%
4	202	CFL Fixtures, 0.5 hr/day	65.0%
4	203	Fluorescent Torchieries, 0.5 hr/day	65.0%
4	210	Base Lighting, 2.5 hr/day	
4	211	CFL, 2.5 hr/day	65.0%
4	212	CFL Fixtures, 2.5 hr/day	65.0%
4	213	Fluorescent Torchieries, 2.5 hr/day	65.0%
4	220	Base Lighting, 6.0 hr/day	
4	221	CFL, 6.0 hr/day	65.0%
4	222	CFL Fixtures, 6.0 hr/day	65.0%
4	223	Fluorescent Torchieries, 6.0 hr/day	65.0%
4	300	Base Refrigerator, 20 cu.ft.	
4	301	ENERGY STAR or better Refrigerator	15.0%
4	400	Base Freezer	
4	401	ENERGY STAR or better Freezer	10.0%
4	500	Base 40 gal. Water Heating (EF=0.88)	
4	501	Heat Pump Water Heater (EF=2.9)	69.7%



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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
4	502	High Efficiency Electric Water Heater (EF=0.95)	5.4%
4	503	Solar Water Heater	90.0%
4	507	Tankless Water Heater (EF=0.98)	10.2%
4	508	Drain Water Heat Recovery (GFX)	25.0%
4	600	Base Clotheswasher (EF=1.18)	
4	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	13.3%
4	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	16.2%
4	800	Base Dishwasher (EF=0.46)	
4	801	Energy Star DW (EF=0.58)	5.4%
4	900	Conventional Oven	
4	901	Convection Oven	11.7%
4	950	Plug Loads	
4	951	Powerstrip with Occupancy Sensor	0.4%
5	120	Base Exhaust Air Heat Pump, 2 ton	
5	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
5	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
5	137	Geothermal Heat Pump	51.9%
5	138	ENERGY STAR New Construction	102.1%
5	139	ENERGY STAR New Construction Plus	136.1%
5	160	Room Air Conditioner, 10 kBtu	
5	161	ENERGY STAR or better Room AC, 10 kBtu	10.0%
5	200	Base Lighting, 0.5 hr/day	
5	201	CFL, 0.5 hr/day	65.0%
5	202	CFL Fixtures, 0.5 hr/day	65.0%
5	203	Fluorescent Torchieries, 0.5 hr/day	65.0%
5	210	Base Lighting, 2.5 hr/day	
5	211	CFL, 2.5 hr/day	65.0%
5	212	CFL Fixtures, 2.5 hr/day	65.0%
5	213	Fluorescent Torchieries, 2.5 hr/day	65.0%
5	220	Base Lighting, 6.0 hr/day	
5	221	CFL, 6.0 hr/day	65.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
5	222	CFL Fixtures, 6.0 hr/day	65.0%
5	223	Fluorescent Torchieries, 6.0 hr/day	65.0%
5	300	Base Refrigerator, 15 cu.ft.	
5	301	ENERGY STAR or better Refrigerator	15.0%
5	400	Base Freezer	
5	401	ENERGY STAR or better Freezer	10.0%
5	500	Base 40 gal. Water Heating (EF=0.90)	
5	501	Heat Pump Water Heater (EF=2.9)	69.7%
5	502	High Efficiency Electric Water Heater (EF=0.95)	5.4%
5	503	Solar Water Heater	90.0%
5	507	Tankless Water Heater (EF=0.98)	10.2%
5	508	Drain Water Heat Recovery (GFX)	28.7%
5	600	Base Clotheswasher (EF=1.18)	
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	10.7%
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	13.0%
5	800	Base Dishwasher (EF=0.46)	
5	801	Energy Star DW (EF=0.58)	4.3%
5	900	Conventional Oven	
5	901	Convection Oven	19.1%
5	950	Plug Loads	
5	951	Powerstrip with Occupancy Sensor	2.0%
6	120	Base Heat Pump, 3 ton	
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	14.0%
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	19.0%
6	138	Super Good Cents / ENERGY STAR New Man. Housing	43.1%
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	57.4%
6	160	Room Air Conditioner, 10 kBtu	
6	161	ENERGY STAR or better Room AC, 10 kBtu	10.0%
6	200	Base Lighting, 0.5 hr/hday	
6	201	CFL, 0.5 hr/day	65.0%

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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Annual % Savings
6	202	CFL Fixtures, 0.5 hr/day	65.0%
6	203	Fluorescent Torchieries, 0.5 hr/day	65.0%
6	210	Base Lighting, 2.5 hr/hday	
6	211	CFL, 2.5 hr/day	65.0%
6	212	CFL Fixtures, 2.5 hr/day	65.0%
6	213	Fluorescent Torchieries, 2.5 hr/day	65.0%
6	220	Base Lighting, 6.0 hr/hday	
6	221	CFL, 6.0 hr/day	65.0%
6	222	CFL Fixtures, 6.0 hr/day	65.0%
6	223	Fluorescent Torchieries, 6.0 hr/day	65.0%
6	300	Base Refrigerator, 15 cu.ft.	
6	301	ENERGY STAR or better Refrigerator	15.0%
6	400	Base Freezer	
6	401	ENERGY STAR or better Freezer	10.0%
6	500	Base 40 gal. Water Heating (EF=0.90)	
6	501	Heat Pump Water Heater (EF=2.9)	69.7%
6	502	High Efficiency Electric Water Heater (EF=0.95)	5.4%
6	503	Solar Water Heater	90.0%
6	507	Tankless Water Heater (EF=0.98)	0.0%
6	508	Drain Water Heat Recovery (GFX)	25.0%
6	600	Base Clotheswasher (EF=1.18)	
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	15.2%
6	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	18.4%
6	800	Base Dishwasher (EF=0.46)	
6	801	Energy Star DW (EF=0.58)	8.3%
6	900	Conventional Oven	
6	901	Convection Oven	17.5%
6	950	Plug Loads	
6	951	Powerstrip with Occupancy Sensor	1.7%

**Standards Adjustment Factor (Percent)**

Seg	Measure #	Measure Description	EUI Adjustment
1	120	Base Heat Pump, 3 ton	80.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	EUI Adjustment
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	80.0%
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	80.0%
1	123	ENERGY STAR Programmable Thermostat	100.0%
1	124	Ceiling R-0 to R-19 Insulation	100.0%
1	125	Ceiling R-19 to R-38 Insulation	100.0%
1	126	Floor R-0 to R-19 Insulation-Batts	100.0%
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
1	129	Duct Testing and Sealing	100.0%
1	130	Duct Insulation (R-3 to R-6)	100.0%
1	131	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
1	132	Windows (high efficiency / ENERGY STAR+)	100.0%
1	133	Addition of Attic and Crawlspace Ventilation	100.0%
1	160	Room Air Conditioner, 12 kBtu, 9 EER	77.8%
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	77.8%
1	180	Resistance Space Heating	34.1%
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	34.1%
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	34.1%
1	183	ENERGY STAR Programmable Thermostat	100.0%
1	184	Ceiling R-0 to R-19 Insulation	100.0%
1	185	Ceiling R-19 to R-38 Insulation	100.0%
1	186	Floor R-0 to R-19 Insulation-Batts	100.0%
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
1	189	Duct Testing and Sealing	100.0%
1	190	Duct Insulation (R-3 to R-6)	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	EUI Adjustment
1	191	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
1	192	Windows (high efficiency / ENERGY STAR+)	100.0%
1	193	Addition of Attic and Crawlspace Ventilation	100.0%
1	200	Base Lighting, 0.5 hr/day	100.0%
1	201	CFL, 0.5 hr/day	100.0%
1	202	CFL Fixtures, 0.5 hr/day	100.0%
1	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
1	210	Base Lighting, 2.5 hr/day	100.0%
1	211	CFL, 2.5 hr/day	100.0%
1	212	CFL Fixtures, 2.5 hr/day	100.0%
1	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
1	220	Base Lighting, 6.0 hr/day	100.0%
1	221	CFL, 6.0 hr/day	100.0%
1	222	CFL Fixtures, 6.0 hr/day	100.0%
1	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
1	300	Base Refrigerator, 20 cu.ft.	100.0%
1	301	ENERGY STAR or better Refrigerator	80.0%
1	310	Base Secondary Refrigerator	100.0%
1	311	Removal of Secondary Refrigerator	100.0%
1	400	Base Freezer	100.0%
1	401	ENERGY STAR or better Freezer	80.0%
1	410	Base Secondary Freezer	100.0%
1	411	Removal of Secondary Freezer	100.0%
1	500	Base 40 gal. Water Heating (EF=0.90)	85.2%
1	501	Heat Pump Water Heater (EF=2.9)	85.2%
1	502	High Efficiency Electric Water Heater (EF=0.95)	85.2%
1	503	Solar Water Heater	85.2%
1	504	Low-Flow Showerheads	100.0%
1	505	Hot Water Pipe Insulation	100.0%
1	506	Water Heater Thermostat Setback	100.0%
1	507	Tankless Water Heater (EF=0.98)	85.2%
1	508	Drain Water Heat Recovery (GFX)	100.0%
1	600	Base Clotheswasher (EF=1.18)	100.0%
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	100.0%

Seg	Measure #	Measure Description	EUI Adjustment
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	100.0%
1	800	Base Dishwasher (EF=0.46)	100.0%
1	801	Energy Star DW (EF=0.58)	100.0%
1	900	Conventional Oven	100.0%
1	901	Convection Oven	100.0%
1	950	Plug Loads	100.0%
1	951	Powerstrip with Occupancy Sensor	100.0%
2	120	Base Exhaust Air Heat Pump, 2 ton	80.0%
2	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	80.0%
2	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	80.0%
2	123	ENERGY STAR Programmable Thermostat	100.0%
2	124	Ceiling R-0 to R-19 Insulation	100.0%
2	125	Ceiling R-19 to R-38 Insulation	100.0%
2	126	Floor R-0 to R-19 Insulation-Batts	100.0%
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
2	129	Duct Testing and Sealing	100.0%
2	130	Duct Insulation (R-3 to R-6)	100.0%
2	131	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
2	132	Windows (high efficiency / ENERGY STAR+)	100.0%
2	133	Addition of Attic and Crawlspace Ventilation	100.0%
2	160	Room Air Conditioner, 8 kBtu	77.8%
2	161	ENERGY STAR or better Room AC, 8 kBtu	77.8%
2	180	Resistance Space Heating	34.1%
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	34.1%
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	34.1%
2	183	ENERGY STAR Programmable Thermostat	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	EUI Adjustment
2	184	Ceiling R-0 to R-19 Insulation	100.0%
2	185	Ceiling R-19 to R-38 Insulation	100.0%
2	186	Floor R-0 to R-19 Insulation-Batts	100.0%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
2	189	Duct Testing and Sealing	100.0%
2	190	Duct Insulation (R-3 to R-6)	100.0%
2	191	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
2	192	Windows (high efficiency / ENERGY STAR+)	100.0%
2	193	Addition of Attic and Crawlspace Ventilation	100.0%
2	200	Base Lighting, 0.5 hr/hday	100.0%
2	201	CFL, 0.5 hr/day	100.0%
2	202	CFL Fixtures, 0.5 hr/day	100.0%
2	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
2	210	Base Lighting, 2.5 hr/hday	100.0%
2	211	CFL, 2.5 hr/day	100.0%
2	212	CFL Fixtures, 2.5 hr/day	100.0%
2	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
2	220	Base Lighting, 6.0 hr/hday	100.0%
2	221	CFL, 6.0 hr/day	100.0%
2	222	CFL Fixtures, 6.0 hr/day	100.0%
2	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
2	300	Base Refrigerator, 15 cu.ft.	100.0%
2	301	ENERGY STAR or better Refrigerator	80.0%
2	310	Base Secondary Refrigerator	100.0%
2	311	Removal of Secondary Refrigerator	100.0%
2	400	Base Freezer	100.0%
2	401	ENERGY STAR or better Freezer	80.0%
2	410	Base Secondary Freezer	100.0%
2	411	Removal of Secondary Freezer	100.0%
2	500	Base 40 gal. Water Heating (EF=0.90)	85.2%
2	501	Heat Pump Water Heater (EF=2.9)	85.2%
2	502	High Efficiency Electric Water Heater (EF=0.95)	85.2%
2	503	Solar Water Heater	85.2%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	EUI Adjustment
2	504	Low-Flow Showerheads	100.0%
2	505	Hot Water Pipe Insulation	100.0%
2	506	Water Heater Thermostat Setback	100.0%
2	507	Tankless Water Heater (EF=0.98)	85.2%
2	508	Drain Water Heat Recovery (GFX)	100.0%
2	600	Base Clotheswasher (EF=1.18)	100.0%
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	100.0%
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	100.0%
2	800	Base Dishwasher (EF=0.46)	975.0%
2	801	Energy Star DW (EF=0.58)	100.0%
2	900	Conventional Oven	975.0%
2	901	Convection Oven	975.0%
2	950	Plug Loads	100.0%
2	951	Powerstrip with Occupancy Sensor	100.0%
3	120	Base Heat Pump, 2 ton	80.0%
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	80.0%
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	80.0%
3	123	ENERGY STAR Programmable Thermostat	100.0%
3	124	Ceiling R-0 to R-19 Insulation	100.0%
3	125	Ceiling R-19 to R-38 Insulation	100.0%
3	126	Floor R-0 to R-19 Insulation-Batts	100.0%
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
3	129	Duct Testing and Sealing	100.0%
3	130	Duct Insulation (R-3 to R-6)	100.0%
3	131	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
3	132	Windows (high efficiency / ENERGY STAR+)	100.0%
3	133	Addition of Attic and Crawlspace Ventilation	100.0%
3	160	Room Air Conditioner, 10 kBtu	77.8%



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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	EUI Adjustment
3	161	ENERGY STAR or better Room AC, 10 kBtu	77.8%
3	180	Resistance Space Heating	34.1%
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	34.1%
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	34.1%
3	183	ENERGY STAR Programmable Thermostat	100.0%
3	184	Ceiling R-0 to R-19 Insulation	100.0%
3	185	Ceiling R-19 to R-38 Insulation	100.0%
3	186	Floor R-0 to R-19 Insulation-Batts	100.0%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
3	189	Duct Testing and Sealing	100.0%
3	190	Duct Insulation (R-3 to R-6)	100.0%
3	191	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
3	192	Windows (high efficiency / ENERGY STAR+)	100.0%
3	193	Addition of Attic and Crawlspace Ventilation	100.0%
3	200	Base Lighting, 0.5 hr/day	100.0%
3	201	CFL, 0.5 hr/day	100.0%
3	202	CFL Fixtures, 0.5 hr/day	100.0%
3	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
3	210	Base Lighting, 2.5 hr/day	100.0%
3	211	CFL, 2.5 hr/day	100.0%
3	212	CFL Fixtures, 2.5 hr/day	100.0%
3	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
3	220	Base Lighting, 6.0 hr/day	100.0%
3	221	CFL, 6.0 hr/day	100.0%
3	222	CFL Fixtures, 6.0 hr/day	100.0%
3	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
3	300	Base Refrigerator, 15 cu.ft.	100.0%
3	301	ENERGY STAR or better Refrigerator	80.0%
3	310	Base Secondary Refrigerator	100.0%
3	311	Removal of Secondary Refrigerator	100.0%

Seg	Measure #	Measure Description	EUI Adjustment
3	400	Base Freezer	100.0%
3	401	ENERGY STAR or better Freezer	80.0%
3	410	Base Secondary Freezer	100.0%
3	411	Removal of Secondary Freezer	100.0%
3	500	Base 40 gal. Water Heating (EF=0.90)	85.2%
3	501	Heat Pump Water Heater (EF=2.9)	85.2%
3	502	High Efficiency Electric Water Heater (EF=0.95)	85.2%
3	503	Solar Water Heater	85.2%
3	504	Low-Flow Showerheads	100.0%
3	505	Hot Water Pipe Insulation	100.0%
3	506	Water Heater Thermostat Setback	100.0%
3	507	Tankless Water Heater (EF=0.98)	85.2%
3	508	Drain Water Heat Recovery (GFX)	100.0%
3	600	Base Clotheswasher (EF=1.18)	100.0%
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	100.0%
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	100.0%
3	800	Base Dishwasher (EF=0.46)	100.0%
3	801	Energy Star DW (EF=0.58)	100.0%
3	900	Conventional Oven	100.0%
3	901	Convection Oven	100.0%
3	950	Plug Loads	100.0%
3	951	Powerstrip with Occupancy Sensor	100.0%
4	120	Base Heat Pump, 4 ton	100.0%
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	100.0%
4	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	100.0%
4	137	Geothermal Heat Pump	100.0%
4	138	ENERGY STAR New Construction	100.0%
4	139	ENERGY STAR New Construction Plus	100.0%
4	160	Room Air Conditioner, 14 kBtu	100.0%
4	161	ENERGY STAR or better Room AC, 14 kBtu	100.0%
4	200	Base Lighting, 0.5 hr/day	100.0%
4	201	CFL, 0.5 hr/day	100.0%
4	202	CFL Fixtures, 0.5 hr/day	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	EUI Adjustment
4	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
4	210	Base Lighting, 2.5 hr/hday	100.0%
4	211	CFL, 2.5 hr/day	100.0%
4	212	CFL Fixtures, 2.5 hr/day	100.0%
4	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
4	220	Base Lighting, 6.0 hr/hday	100.0%
4	221	CFL, 6.0 hr/day	100.0%
4	222	CFL Fixtures, 6.0 hr/day	100.0%
4	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
4	300	Base Refrigerator, 20 cu.ft.	100.0%
4	301	ENERGY STAR or better Refrigerator	100.0%
4	400	Base Freezer	100.0%
4	401	ENERGY STAR or better Freezer	100.0%
4	500	Base 40 gal. Water Heating (EF=0.87)	100.0%
4	501	Heat Pump Water Heater (EF=2.9)	100.0%
4	502	High Efficiency Electric Water Heater (EF=0.95)	100.0%
4	503	Solar Water Heater	100.0%
4	507	Tankless Water Heater (EF=0.98)	100.0%
4	508	Drain Water Heat Recovery (GFX)	100.0%
4	600	Base Clotheswasher (EF=1.18)	100.0%
4	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	100.0%
4	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	100.0%
4	800	Base Dishwasher (EF=0.46)	100.0%
4	801	Energy Star DW (EF=0.58)	100.0%
4	900	Conventional Oven	100.0%
4	901	Convection Oven	100.0%
4	950	Plug Loads	100.0%
4	951	Powerstrip with Occupancy Sensor	100.0%
5	120	Base Exhaust Air Heat Pump, 2 ton	100.0%
5	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	100.0%
5	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	100.0%
5	137	Geothermal Heat Pump	100.0%
5	138	ENERGY STAR New Construction	100.0%
5	139	ENERGY STAR New Construction Plus	100.0%

Seg	Measure #	Measure Description	EUI Adjustment
5	160	Room Air Conditioner, 10 kBtu	100.0%
5	161	ENERGY STAR or better Room AC, 10 kBtu	100.0%
5	200	Base Lighting, 0.5 hr/day	100.0%
5	201	CFL, 0.5 hr/day	100.0%
5	202	CFL Fixtures, 0.5 hr/day	100.0%
5	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
5	210	Base Lighting, 2.5 hr/day	100.0%
5	211	CFL, 2.5 hr/day	100.0%
5	212	CFL Fixtures, 2.5 hr/day	100.0%
5	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
5	220	Base Lighting, 6.0 hr/day	100.0%
5	221	CFL, 6.0 hr/day	100.0%
5	222	CFL Fixtures, 6.0 hr/day	100.0%
5	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
5	300	Base Refrigerator, 15 cu.ft.	100.0%
5	301	ENERGY STAR or better Refrigerator	100.0%
5	400	Base Freezer	100.0%
5	401	ENERGY STAR or better Freezer	100.0%
5	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
5	501	Heat Pump Water Heater (EF=2.9)	100.0%
5	502	High Efficiency Electric Water Heater (EF=0.95)	100.0%
5	503	Solar Water Heater	100.0%
5	507	Tankless Water Heater (EF=0.98)	100.0%
5	508	Drain Water Heat Recovery (GFX)	100.0%
5	600	Base Clotheswasher (EF=1.18)	100.0%
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	100.0%
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	100.0%
5	800	Base Dishwasher (EF=0.46)	100.0%
5	801	Energy Star DW (EF=0.58)	100.0%
5	900	Conventional Oven	100.0%
5	901	Convection Oven	100.0%
5	950	Plug Loads	100.0%
5	951	Powerstrip with Occupancy Sensor	100.0%
6	120	Base Heat Pump, 3 ton	100.0%
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	EUI Adjustment
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	100.0%
6	138	Super Good Cents / ENERGY STAR New Man. Housing	100.0%
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	100.0%
6	160	Room Air Conditioner, 10 kBtu	100.0%
6	161	ENERGY STAR or better Room AC, 10 kBtu	100.0%
6	200	Base Lighting, 0.5 hr/day	100.0%
6	201	CFL, 0.5 hr/day	100.0%
6	202	CFL Fixtures, 0.5 hr/day	100.0%
6	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
6	210	Base Lighting, 2.5 hr/day	100.0%
6	211	CFL, 2.5 hr/day	100.0%
6	212	CFL Fixtures, 2.5 hr/day	100.0%
6	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
6	220	Base Lighting, 6.0 hr/day	100.0%
6	221	CFL, 6.0 hr/day	100.0%
6	222	CFL Fixtures, 6.0 hr/day	100.0%
6	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
6	300	Base Refrigerator, 15 cu.ft.	100.0%
6	301	ENERGY STAR or better Refrigerator	100.0%
6	400	Base Freezer	100.0%
6	401	ENERGY STAR or better Freezer	100.0%
6	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
6	501	Heat Pump Water Heater (EF=2.9)	100.0%
6	502	High Efficiency Electric Water Heater (EF=0.95)	100.0%
6	503	Solar Water Heater	100.0%
6	507	Tankless Water Heater (EF=0.98)	100.0%
6	508	Drain Water Heat Recovery (GFX)	100.0%
6	600	Base Clotheswasher (EF=1.18)	100.0%
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	100.0%
6	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	100.0%
6	800	Base Dishwasher (EF=0.46)	100.0%
6	801	Energy Star DW (EF=0.58)	100.0%
6	900	Conventional Oven	100.0%

Seg	Measure #	Measure Description	EUI Adjustment
6	901	Convection Oven	100.0%
6	950	Plug Loads	100.0%
6	951	Powerstrip with Occupancy Sensor	100.0%

## Feasibility Factor (Percent)

Seg	Measure #	Measure Description	Feasibility Factor
1	120	Base Heat Pump, 3 ton	100.0%
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	50.0%
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	50.0%
1	123	ENERGY STAR Programmable Thermostat	80.0%
1	124	Ceiling R-0 to R-19 Insulation	67.0%
1	125	Ceiling R-19 to R-38 Insulation	33.0%
1	126	Floor R-0 to R-19 Insulation-Batts	33.0%
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	90.0%
1	129	Duct Testing and Sealing	50.0%
1	130	Duct Insulation (R-3 to R-6)	50.0%
1	131	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
1	132	Windows (high efficiency / ENERGY STAR+)	75.0%
1	133	Addition of Attic and Crawlspace Ventilation	50.0%
1	160	Room Air Conditioner, 12 kBtu, 9 EER	100.0%
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	100.0%
1	180	Resistance Space Heating	100.0%
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	50.0%
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	50.0%
1	183	ENERGY STAR Programmable Thermostat	80.0%
1	184	Ceiling R-0 to R-19 Insulation	67.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
1	185	Ceiling R-19 to R-38 Insulation	33.0%
1	186	Floor R-0 to R-19 Insulation-Batts	33.0%
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	90.0%
1	189	Duct Testing and Sealing	50.0%
1	190	Duct Insulation (R-3 to R-6)	50.0%
1	191	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
1	192	Windows (high efficiency / ENERGY STAR+)	75.0%
1	193	Addition of Attic and Crawlspace Ventilation	50.0%
1	200	Base Lighting, 0.5 hr/hday	100.0%
1	201	CFL, 0.5 hr/day	90.0%
1	202	CFL Fixtures, 0.5 hr/day	5.0%
1	203	Fluorescent Torchieries, 0.5 hr/day	5.0%
1	210	Base Lighting, 2.5 hr/hday	100.0%
1	211	CFL, 2.5 hr/day	90.0%
1	212	CFL Fixtures, 2.5 hr/day	5.0%
1	213	Fluorescent Torchieries, 2.5 hr/day	5.0%
1	220	Base Lighting, 6.0 hr/hday	100.0%
1	221	CFL, 6.0 hr/day	90.0%
1	222	CFL Fixtures, 6.0 hr/day	5.0%
1	223	Fluorescent Torchieries, 6.0 hr/day	5.0%
1	300	Base Refrigerator, 20 cu.ft.	100.0%
1	301	ENERGY STAR or better Refrigerator	100.0%
1	310	Base Secondary Refrigerator	100.0%
1	311	Removal of Secondary Refrigerator	15.0%
1	400	Base Freezer	100.0%
1	401	ENERGY STAR or better Freezer	100.0%
1	410	Base Secondary Freezer	100.0%
1	411	Removal of Secondary Freezer	15.0%
1	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
1	501	Heat Pump Water Heater (EF=2.9)	40.0%
1	502	High Efficiency Electric Water Heater (EF=0.95)	40.0%
1	503	Solar Water Heater	10.0%
1	504	Low-Flow Showerheads	95.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
1	505	Hot Water Pipe Insulation	75.0%
1	506	Water Heater Thermosat Setback	100.0%
1	507	Tankless Water Heater (EF=0.98)	10.0%
1	508	Drain Water Heat Recovery (GFX)	35.0%
1	600	Base Clotheswasher (EF=1.18)	100.0%
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	50.0%
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	50.0%
1	800	Base Dishwasher (EF=0.46)	100.0%
1	801	Energy Star DW (EF=0.58)	100.0%
1	900	Conventional Oven	100.0%
1	901	Convection Oven	100.0%
1	950	Plug Loads	100.0%
1	951	Powerstrip with Occupancy Sensor	100.0%
2	120	Base Exhaust Air Heat Pump, 2 ton	100.0%
2	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	50.0%
2	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	50.0%
2	123	ENERGY STAR Programmable Thermostat	80.0%
2	124	Ceiling R-0 to R-19 Insulation	67.0%
2	125	Ceiling R-19 to R-38 Insulation	33.0%
2	126	Floor R-0 to R-19 Insulation-Batts	33.0%
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	90.0%
2	129	Duct Testing and Sealing	50.0%
2	130	Duct Insulation (R-3 to R-6)	50.0%
2	131	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
2	132	Windows (high efficiency / ENERGY STAR+)	75.0%
2	133	Addition of Attic and Crawlspace Ventilation	50.0%
2	160	Room Air Conditioner, 8 kBtu	100.0%
2	161	ENERGY STAR or better Room AC, 8 kBtu	100.0%



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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
2	180	Resistance Space Heating	100.0%
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	50.0%
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	50.0%
2	183	ENERGY STAR Programmable Thermostat	80.0%
2	184	Ceiling R-0 to R-19 Insulation	67.0%
2	185	Ceiling R-19 to R-38 Insulation	33.0%
2	186	Floor R-0 to R-19 Insulation-Batts	33.0%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	90.0%
2	189	Duct Testing and Sealing	50.0%
2	190	Duct Insulation (R-3 to R-6)	50.0%
2	191	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
2	192	Windows (high efficiency / ENERGY STAR+)	75.0%
2	193	Addition of Attic and Crawlspace Ventilation	50.0%
2	200	Base Lighting, 0.5 hr/hday	100.0%
2	201	CFL, 0.5 hr/day	90.0%
2	202	CFL Fixtures, 0.5 hr/day	5.0%
2	203	Fluorescent Torchieries, 0.5 hr/day	5.0%
2	210	Base Lighting, 2.5 hr/hday	100.0%
2	211	CFL, 2.5 hr/day	90.0%
2	212	CFL Fixtures, 2.5 hr/day	5.0%
2	213	Fluorescent Torchieries, 2.5 hr/day	5.0%
2	220	Base Lighting, 6.0 hr/hday	100.0%
2	221	CFL, 6.0 hr/day	90.0%
2	222	CFL Fixtures, 6.0 hr/day	5.0%
2	223	Fluorescent Torchieries, 6.0 hr/day	5.0%
2	300	Base Refrigerator, 15 cu.ft.	100.0%
2	301	ENERGY STAR or better Refrigerator	100.0%
2	310	Base Secondary Refrigerator	100.0%
2	311	Removal of Secondary Refrigerator	15.0%
2	400	Base Freezer	100.0%
2	401	ENERGY STAR or better Freezer	100.0%

Seg	Measure #	Measure Description	Feasibility Factor
2	410	Base Secondary Freezer	100.0%
2	411	Removal of Secondary Freezer	15.0%
2	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
2	501	Heat Pump Water Heater (EF=2.9)	40.0%
2	502	High Efficiency Electric Water Heater (EF=0.95)	40.0%
2	503	Solar Water Heater	10.0%
2	504	Low-Flow Showerheads	95.0%
2	505	Hot Water Pipe Insulation	75.0%
2	506	Water Heater Thermostat Setback	100.0%
2	507	Tankless Water Heater (EF=0.98)	10.0%
2	508	Drain Water Heat Recovery (GFX)	25.0%
2	600	Base Clotheswasher (EF=1.18)	100.0%
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	50.0%
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	50.0%
2	800	Base Dishwasher (EF=0.46)	100.0%
2	801	Energy Star DW (EF=0.58)	100.0%
2	900	Conventional Oven	100.0%
2	901	Convection Oven	100.0%
2	950	Plug Loads	100.0%
2	951	Powerstrip with Occupancy Sensor	100.0%
3	120	Base Heat Pump, 2 ton	100.0%
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	50.0%
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	50.0%
3	123	ENERGY STAR Programmable Thermostat	80.0%
3	124	Ceiling R-0 to R-19 Insulation	67.0%
3	125	Ceiling R-19 to R-38 Insulation	33.0%
3	126	Floor R-0 to R-19 Insulation-Batts	33.0%
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	90.0%
3	129	Duct Testing and Sealing	50.0%
3	130	Duct Insulation (R-3 to R-6)	50.0%

Seg	Measure #	Measure Description	Feasibility Factor
3	131	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
3	132	Windows (high efficiency / ENERGY STAR+)	75.0%
3	133	Addition of Attic and Crawlspace Ventilation	50.0%
3	160	Room Air Conditioner, 10 kBtu	100.0%
3	161	ENERGY STAR or better Room AC, 10 kBtu	100.0%
3	180	Resistance Space Heating	100.0%
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	50.0%
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	50.0%
3	183	ENERGY STAR Programmable Thermostat	80.0%
3	184	Ceiling R-0 to R-19 Insulation	67.0%
3	185	Ceiling R-19 to R-38 Insulation	33.0%
3	186	Floor R-0 to R-19 Insulation-Batts	33.0%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	90.0%
3	189	Duct Testing and Sealing	50.0%
3	190	Duct Insulation (R-3 to R-6)	50.0%
3	191	HVAC Diagnostic Testing, Repair and Maintenance	100.0%
3	192	Windows (high efficiency / ENERGY STAR+)	75.0%
3	193	Addition of Attic and Crawlspace Ventilation	50.0%
3	200	Base Lighting, 0.5 hr/hday	100.0%
3	201	CFL, 0.5 hr/day	90.0%
3	202	CFL Fixtures, 0.5 hr/day	5.0%
3	203	Fluorescent Torchieries, 0.5 hr/day	5.0%
3	210	Base Lighting, 2.5 hr/hday	100.0%
3	211	CFL, 2.5 hr/day	90.0%
3	212	CFL Fixtures, 2.5 hr/day	5.0%
3	213	Fluorescent Torchieries, 2.5 hr/day	5.0%
3	220	Base Lighting, 6.0 hr/hday	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
3	221	CFL, 6.0 hr/day	90.0%
3	222	CFL Fixtures, 6.0 hr/day	5.0%
3	223	Fluorescent Torchierees, 6.0 hr/day	5.0%
3	300	Base Refrigerator, 15 cu.ft.	100.0%
3	301	ENERGY STAR or better Refrigerator	100.0%
3	310	Base Secondary Refrigerator	100.0%
3	311	Removal of Secondary Refrigerator	15.0%
3	400	Base Freezer	100.0%
3	401	ENERGY STAR or better Freezer	100.0%
3	410	Base Secondary Freezer	100.0%
3	411	Removal of Secondary Freezer	15.0%
3	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
3	501	Heat Pump Water Heater (EF=2.9)	40.0%
3	502	High Efficiency Electric Water Heater (EF=0.95)	40.0%
3	503	Solar Water Heater	10.0%
3	504	Low-Flow Showerheads	95.0%
3	505	Hot Water Pipe Insulation	75.0%
3	506	Water Heater Thermostat Setback	100.0%
3	507	Tankless Water Heater (EF=0.98)	10.0%
3	508	Drain Water Heat Recovery (GFX)	25.0%
3	600	Base Clotheswasher (EF=1.18)	100.0%
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	50.0%
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	50.0%
3	800	Base Dishwasher (EF=0.46)	100.0%
3	801	Energy Star DW (EF=0.58)	100.0%
3	900	Conventional Oven	100.0%
3	901	Convection Oven	100.0%
3	950	Plug Loads	100.0%
3	951	Powerstrip with Occupancy Sensor	100.0%
4	120	Base Heat Pump, 4 ton	100.0%
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	40.0%
4	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	40.0%
4	137	Geothermal Heat Pump	20.0%
4	138	ENERGY STAR New Construction	50.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
4	139	ENERGY STAR New Construction Plus	50.0%
4	160	Room Air Conditioner, 14 kBtu	100.0%
4	161	ENERGY STAR or better Room AC, 14 kBtu	100.0%
4	200	Base Lighting, 0.5 hr/hday	100.0%
4	201	CFL, 0.5 hr/day	90.0%
4	202	CFL Fixtures, 0.5 hr/day	5.0%
4	203	Fluorescent Torchieries, 0.5 hr/day	5.0%
4	210	Base Lighting, 2.5 hr/hday	100.0%
4	211	CFL, 2.5 hr/day	90.0%
4	212	CFL Fixtures, 2.5 hr/day	5.0%
4	213	Fluorescent Torchieries, 2.5 hr/day	5.0%
4	220	Base Lighting, 6.0 hr/hday	100.0%
4	221	CFL, 6.0 hr/day	90.0%
4	222	CFL Fixtures, 6.0 hr/day	5.0%
4	223	Fluorescent Torchieries, 6.0 hr/day	5.0%
4	300	Base Refrigerator, 20 cu.ft.	100.0%
4	301	ENERGY STAR or better Refrigerator	100.0%
4	400	Base Freezer	100.0%
4	401	ENERGY STAR or better Freezer	100.0%
4	500	Base 40 gal. Water Heating (EF=0.87)	100.0%
4	501	Heat Pump Water Heater (EF=2.9)	40.0%
4	502	High Efficiency Electric Water Heater (EF=0.95)	40.0%
4	503	Solar Water Heater	10.0%
4	507	Tankless Water Heater (EF=0.98)	10.0%
4	508	Drain Water Heat Recovery (GFX)	35.0%
4	600	Base Clotheswasher (EF=1.18)	100.0%
4	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	50.0%
4	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	50.0%
4	800	Base Dishwasher (EF=0.46)	100.0%
4	801	Energy Star DW (EF=0.58)	100.0%
4	900	Conventional Oven	100.0%
4	901	Convection Oven	100.0%
4	950	Plug Loads	100.0%
4	951	Powerstrip with Occupancy Sensor	100.0%
5	120	Base Exhaust Air Heat Pump, 2 ton	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
5	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	40.0%
5	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	40.0%
5	137	Geothermal Heat Pump	20.0%
5	138	ENERGY STAR New Construction	50.0%
5	139	ENERGY STAR New Construction Plus	50.0%
5	160	Room Air Conditioner, 10 kBtu	100.0%
5	161	ENERGY STAR or better Room AC, 10 kBtu	100.0%
5	200	Base Lighting, 0.5 hr/day	100.0%
5	201	CFL, 0.5 hr/day	90.0%
5	202	CFL Fixtures, 0.5 hr/day	5.0%
5	203	Fluorescent Torchieries, 0.5 hr/day	5.0%
5	210	Base Lighting, 2.5 hr/day	100.0%
5	211	CFL, 2.5 hr/day	90.0%
5	212	CFL Fixtures, 2.5 hr/day	5.0%
5	213	Fluorescent Torchieries, 2.5 hr/day	5.0%
5	220	Base Lighting, 6.0 hr/day	100.0%
5	221	CFL, 6.0 hr/day	90.0%
5	222	CFL Fixtures, 6.0 hr/day	5.0%
5	223	Fluorescent Torchieries, 6.0 hr/day	5.0%
5	300	Base Refrigerator, 15 cu.ft.	100.0%
5	301	ENERGY STAR or better Refrigerator	100.0%
5	400	Base Freezer	100.0%
5	401	ENERGY STAR or better Freezer	100.0%
5	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
5	501	Heat Pump Water Heater (EF=2.9)	40.0%
5	502	High Efficiency Electric Water Heater (EF=0.95)	40.0%
5	503	Solar Water Heater	10.0%
5	507	Tankless Water Heater (EF=0.98)	10.0%
5	508	Drain Water Heat Recovery (GFX)	25.0%
5	600	Base Clotheswasher (EF=1.18)	100.0%
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	50.0%
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	50.0%
5	800	Base Dishwasher (EF=0.46)	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
5	801	Energy Star DW (EF=0.58)	100.0%
5	900	Conventional Oven	100.0%
5	901	Convection Oven	100.0%
5	950	Plug Loads	100.0%
5	951	Powerstrip with Occupancy Sensor	100.0%
6	120	Base Heat Pump, 3 ton	100.0%
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	50.0%
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	50.0%
6	138	Super Good Cents / ENERGY STAR New Man. Housing	50.0%
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	50.0%
6	160	Room Air Conditioner, 10 kBtu	100.0%
6	161	ENERGY STAR or better Room AC, 10 kBtu	100.0%
6	200	Base Lighting, 0.5 hr/hday	100.0%
6	201	CFL, 0.5 hr/day	90.0%
6	202	CFL Fixtures, 0.5 hr/day	5.0%
6	203	Fluorescent Torchieries, 0.5 hr/day	5.0%
6	210	Base Lighting, 2.5 hr/hday	100.0%
6	211	CFL, 2.5 hr/day	90.0%
6	212	CFL Fixtures, 2.5 hr/day	5.0%
6	213	Fluorescent Torchieries, 2.5 hr/day	5.0%
6	220	Base Lighting, 6.0 hr/hday	100.0%
6	221	CFL, 6.0 hr/day	90.0%
6	222	CFL Fixtures, 6.0 hr/day	5.0%
6	223	Fluorescent Torchieries, 6.0 hr/day	5.0%
6	300	Base Refrigerator, 15 cu.ft.	100.0%
6	301	ENERGY STAR or better Refrigerator	100.0%
6	400	Base Freezer	100.0%
6	401	ENERGY STAR or better Freezer	100.0%
6	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
6	501	Heat Pump Water Heater (EF=2.9)	40.0%
6	502	High Efficiency Electric Water Heater (EF=0.95)	40.0%
6	503	Solar Water Heater	10.0%
6	507	Tankless Water Heater (EF=0.98)	10.0%
6	508	Drain Water Heat Recovery (GFX)	25.0%

Seg	Measure #	Measure Description	Feasibility Factor
6	600	Base Clotheswasher (EF=1.18)	100.0%
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	50.0%
6	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	50.0%
6	800	Base Dishwasher (EF=0.46)	100.0%
6	801	Energy Star DW (EF=0.58)	100.0%
6	900	Conventional Oven	100.0%
6	901	Convection Oven	100.0%
6	950	Plug Loads	100.0%
6	951	Powerstrip with Occupancy Sensor	100.0%

## Incomplete Factor (Percent)

Seg	Measure #	Measure Description	Incomplete Factor
1	120	Base Heat Pump, 3 ton	100.0%
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	82.0%
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	95.0%
1	123	ENERGY STAR Programmable Thermostat	50.0%
1	124	Ceiling R-0 to R-19 Insulation	18.0%
1	125	Ceiling R-19 to R-38 Insulation	87.0%
1	126	Floor R-0 to R-19 Insulation-Batts	80.0%
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	40.0%
1	129	Duct Testing and Sealing	72.0%
1	130	Duct Insulation (R-3 to R-6)	25.0%
1	131	HVAC Diagnostic Testing, Repair and Maintenance	50.0%
1	132	Windows (high efficiency / ENERGY STAR+)	90.0%
1	133	Addition of Attic and Crawlspace Ventilation	75.0%
1	160	Room Air Conditioner, 12 kBtu, 9 EER	100.0%



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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Incomplete Factor
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	90.0%
1	180	Resistance Space Heating	100.0%
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	82.0%
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	95.0%
1	183	ENERGY STAR Programmable Thermostat	50.0%
1	184	Ceiling R-0 to R-19 Insulation	18.0%
1	185	Ceiling R-19 to R-38 Insulation	87.0%
1	186	Floor R-0 to R-19 Insulation-Batts	80.0%
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	50.0%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	40.0%
1	189	Duct Testing and Sealing	72.0%
1	190	Duct Insulation (R-3 to R-6)	25.0%
1	191	HVAC Diagnostic Testing, Repair and Maintenance	50.0%
1	192	Windows (high efficiency / ENERGY STAR+)	90.0%
1	193	Addition of Attic and Crawlspace Ventilation	75.0%
1	200	Base Lighting, 0.5 hr/hday	100.0%
1	201	CFL, 0.5 hr/day	97.5%
1	202	CFL Fixtures, 0.5 hr/day	97.5%
1	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
1	210	Base Lighting, 2.5 hr/hday	100.0%
1	211	CFL, 2.5 hr/day	97.5%
1	212	CFL Fixtures, 2.5 hr/day	97.5%
1	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
1	220	Base Lighting, 6.0 hr/hday	100.0%
1	221	CFL, 6.0 hr/day	97.5%
1	222	CFL Fixtures, 6.0 hr/day	97.5%
1	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
1	300	Base Refrigerator, 20 cu.ft.	100.0%
1	301	ENERGY STAR or better Refrigerator	99.9%
1	310	Base Secondary Refrigerator	100.0%
1	311	Removal of Secondary Refrigerator	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
1	400	Base Freezer	100.0%
1	401	ENERGY STAR or better Freezer	99.9%
1	410	Base Secondary Freezer	100.0%
1	411	Removal of Secondary Freezer	100.0%
1	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
1	501	Heat Pump Water Heater (EF=2.9)	99.9%
1	502	High Efficiency Electric Water Heater (EF=0.95)	93.7%
1	503	Solar Water Heater	99.0%
1	504	Low-Flow Showerheads	30.0%
1	505	Hot Water Pipe Insulation	80.0%
1	506	Water Heater Thermostat Setback	100.0%
1	507	Tankless Water Heater (EF=0.98)	100.0%
1	508	Drain Water Heat Recovery (GFX)	100.0%
1	600	Base Clotheswasher (EF=1.18)	100.0%
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	97.0%
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	97.0%
1	800	Base Dishwasher (EF=0.46)	100.0%
1	801	Energy Star DW (EF=0.58)	91.8%
1	900	Conventional Oven	100.0%
1	901	Convection Oven	100.0%
1	950	Plug Loads	100.0%
1	951	Powerstrip with Occupancy Sensor	100.0%
2	120	Base Exhaust Air Heat Pump, 2 ton	100.0%
2	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	100.0%
2	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	100.0%
2	123	ENERGY STAR Programmable Thermostat	10.0%
2	124	Ceiling R-0 to R-19 Insulation	100.0%
2	125	Ceiling R-19 to R-38 Insulation	68.0%
2	126	Floor R-0 to R-19 Insulation-Batts	100.0%
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	20.0%
2	129	Duct Testing and Sealing	36.0%

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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Incomplete Factor
2	130	Duct Insulation (R-3 to R-6)	100.0%
2	131	HVAC Diagnostic Testing, Repair and Maintenance	50.0%
2	132	Windows (high efficiency / ENERGY STAR+)	90.0%
2	133	Addition of Attic and Crawlspace Ventilation	75.0%
2	160	Room Air Conditioner, 8 kBtu	100.0%
2	161	ENERGY STAR or better Room AC, 8 kBtu	90.0%
2	180	Resistance Space Heating	100.0%
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	82.0%
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	95.0%
2	183	ENERGY STAR Programmable Thermostat	10.0%
2	184	Ceiling R-0 to R-19 Insulation	100.0%
2	185	Ceiling R-19 to R-38 Insulation	68.0%
2	186	Floor R-0 to R-19 Insulation-Batts	100.0%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	20.0%
2	189	Duct Testing and Sealing	36.0%
2	190	Duct Insulation (R-3 to R-6)	100.0%
2	191	HVAC Diagnostic Testing, Repair and Maintenance	50.0%
2	192	Windows (high efficiency / ENERGY STAR+)	90.0%
2	193	Addition of Attic and Crawlspace Ventilation	75.0%
2	200	Base Lighting, 0.5 hr/hday	100.0%
2	201	CFL, 0.5 hr/day	97.5%
2	202	CFL Fixtures, 0.5 hr/day	97.5%
2	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
2	210	Base Lighting, 2.5 hr/hday	100.0%
2	211	CFL, 2.5 hr/day	97.5%
2	212	CFL Fixtures, 2.5 hr/day	97.5%
2	213	Fluorescent Torchieries, 2.5 hr/day	100.0%

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## RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
2	220	Base Lighting, 6.0 hr/day	100.0%
2	221	CFL, 6.0 hr/day	97.5%
2	222	CFL Fixtures, 6.0 hr/day	97.5%
2	223	Fluorescent Torchiere's, 6.0 hr/day	100.0%
2	300	Base Refrigerator, 15 cu.ft.	100.0%
2	301	ENERGY STAR or better Refrigerator	99.9%
2	310	Base Secondary Refrigerator	100.0%
2	311	Removal of Secondary Refrigerator	100.0%
2	400	Base Freezer	100.0%
2	401	ENERGY STAR or better Freezer	99.9%
2	410	Base Secondary Freezer	100.0%
2	411	Removal of Secondary Freezer	100.0%
2	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
2	501	Heat Pump Water Heater (EF=2.9)	99.9%
2	502	High Efficiency Electric Water Heater (EF=0.95)	93.7%
2	503	Solar Water Heater	99.0%
2	504	Low-Flow Showerheads	30.0%
2	505	Hot Water Pipe Insulation	80.0%
2	506	Water Heater Thermostat Setback	100.0%
2	507	Tankless Water Heater (EF=0.98)	100.0%
2	508	Drain Water Heat Recovery (GFX)	100.0%
2	600	Base Clotheswasher (EF=1.18)	100.0%
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	97.0%
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	97.0%
2	800	Base Dishwasher (EF=0.46)	100.0%
2	801	Energy Star DW (EF=0.58)	91.8%
2	900	Conventional Oven	100.0%
2	901	Convection Oven	100.0%
2	950	Plug Loads	100.0%
2	951	Powerstrip with Occupancy Sensor	100.0%
3	120	Base Heat Pump, 2 ton	100.0%
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	82.0%
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	95.0%
3	123	ENERGY STAR Programmable Thermostat	65.0%

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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Incomplete Factor
3	124	Ceiling R-0 to R-19 Insulation	18.0%
3	125	Ceiling R-19 to R-38 Insulation	87.0%
3	126	Floor R-0 to R-19 Insulation-Batts	100.0%
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	60.0%
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	40.0%
3	129	Duct Testing and Sealing	72.0%
3	130	Duct Insulation (R-3 to R-6)	100.0%
3	131	HVAC Diagnostic Testing, Repair and Maintenance	50.0%
3	132	Windows (high efficiency / ENERGY STAR+)	90.0%
3	133	Addition of Attic and Crawlspace Ventilation	95.0%
3	160	Room Air Conditioner, 10 kBtu	100.0%
3	161	ENERGY STAR or better Room AC, 10 kBtu	90.0%
3	180	Resistance Space Heating	100.0%
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	82.0%
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	95.0%
3	183	ENERGY STAR Programmable Thermostat	65.0%
3	184	Ceiling R-0 to R-19 Insulation	18.0%
3	185	Ceiling R-19 to R-38 Insulation	87.0%
3	186	Floor R-0 to R-19 Insulation-Batts	100.0%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	60.0%
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	40.0%
3	189	Duct Testing and Sealing	72.0%
3	190	Duct Insulation (R-3 to R-6)	100.0%
3	191	HVAC Diagnostic Testing, Repair and Maintenance	50.0%
3	192	Windows (high efficiency / ENERGY STAR+)	90.0%
3	193	Addition of Attic and Crawlspace Ventilation	95.0%

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## RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
3	200	Base Lighting, 0.5 hr/hday	100.0%
3	201	CFL, 0.5 hr/day	97.5%
3	202	CFL Fixtures, 0.5 hr/day	97.5%
3	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
3	210	Base Lighting, 2.5 hr/hday	100.0%
3	211	CFL, 2.5 hr/day	97.5%
3	212	CFL Fixtures, 2.5 hr/day	97.5%
3	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
3	220	Base Lighting, 6.0 hr/hday	100.0%
3	221	CFL, 6.0 hr/day	97.5%
3	222	CFL Fixtures, 6.0 hr/day	97.5%
3	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
3	300	Base Refrigerator, 15 cu.ft.	100.0%
3	301	ENERGY STAR or better Refrigerator	99.9%
3	310	Base Secondary Refrigerator	100.0%
3	311	Removal of Secondary Refrigerator	100.0%
3	400	Base Freezer	100.0%
3	401	ENERGY STAR or better Freezer	99.9%
3	410	Base Secondary Freezer	100.0%
3	411	Removal of Secondary Freezer	100.0%
3	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
3	501	Heat Pump Water Heater (EF=2.9)	99.9%
3	502	High Efficiency Electric Water Heater (EF=0.95)	93.7%
3	503	Solar Water Heater	99.0%
3	504	Low-Flow Showerheads	30.0%
3	505	Hot Water Pipe Insulation	75.0%
3	506	Water Heater Thermostat Setback	100.0%
3	507	Tankless Water Heater (EF=0.98)	100.0%
3	508	Drain Water Heat Recovery (GFX)	100.0%
3	600	Base Clotheswasher (EF=1.18)	100.0%
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	97.0%
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	97.0%
3	800	Base Dishwasher (EF=0.46)	100.0%
3	801	Energy Star DW (EF=0.58)	91.8%
3	900	Conventional Oven	100.0%
3	901	Convection Oven	100.0%
3	950	Plug Loads	100.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
3	951	Powerstrip with Occupancy Sensor	100.0%
4	120	Base Heat Pump, 4 ton	100.0%
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	82.0%
4	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	95.0%
4	137	Geothermal Heat Pump	100.0%
4	138	ENERGY STAR New Construction	100.0%
4	139	ENERGY STAR New Construction Plus	100.0%
4	160	Room Air Conditioner, 14 kBtu	100.0%
4	161	ENERGY STAR or better Room AC, 14 kBtu	90.0%
4	200	Base Lighting, 0.5 hr/day	100.0%
4	201	CFL, 0.5 hr/day	97.5%
4	202	CFL Fixtures, 0.5 hr/day	97.5%
4	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
4	210	Base Lighting, 2.5 hr/day	100.0%
4	211	CFL, 2.5 hr/day	97.5%
4	212	CFL Fixtures, 2.5 hr/day	97.5%
4	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
4	220	Base Lighting, 6.0 hr/day	100.0%
4	221	CFL, 6.0 hr/day	97.5%
4	222	CFL Fixtures, 6.0 hr/day	97.5%
4	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
4	300	Base Refrigerator, 20 cu.ft.	100.0%
4	301	ENERGY STAR or better Refrigerator	99.9%
4	400	Base Freezer	100.0%
4	401	ENERGY STAR or better Freezer	100.0%
4	500	Base 40 gal. Water Heating (EF=0.87)	100.0%
4	501	Heat Pump Water Heater (EF=2.9)	99.9%
4	502	High Efficiency Electric Water Heater (EF=0.95)	93.7%
4	503	Solar Water Heater	99.0%
4	507	Tankless Water Heater (EF=0.98)	100.0%
4	508	Drain Water Heat Recovery (GFX)	100.0%
4	600	Base Clotheswasher (EF=1.18)	100.0%
4	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	95.0%

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
4	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	95.0%
4	800	Base Dishwasher (EF=0.46)	100.0%
4	801	Energy Star DW (EF=0.58)	95.0%
4	900	Conventional Oven	100.0%
4	901	Convection Oven	100.0%
4	950	Plug Loads	100.0%
4	951	Powerstrip with Occupancy Sensor	100.0%
5	120	Base Exhaust Air Heat Pump, 2 ton	100.0%
5	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	100.0%
5	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	100.0%
5	137	Geothermal Heat Pump	100.0%
5	138	ENERGY STAR New Construction	100.0%
5	139	ENERGY STAR New Construction Plus	100.0%
5	160	Room Air Conditioner, 10 kBtu	100.0%
5	161	ENERGY STAR or better Room AC, 10 kBtu	90.0%
5	200	Base Lighting, 0.5 hr/day	100.0%
5	201	CFL, 0.5 hr/day	97.5%
5	202	CFL Fixtures, 0.5 hr/day	97.5%
5	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
5	210	Base Lighting, 2.5 hr/day	100.0%
5	211	CFL, 2.5 hr/day	97.5%
5	212	CFL Fixtures, 2.5 hr/day	97.5%
5	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
5	220	Base Lighting, 6.0 hr/day	100.0%
5	221	CFL, 6.0 hr/day	97.5%
5	222	CFL Fixtures, 6.0 hr/day	97.5%
5	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
5	300	Base Refrigerator, 15 cu.ft.	100.0%
5	301	ENERGY STAR or better Refrigerator	99.9%
5	400	Base Freezer	100.0%
5	401	ENERGY STAR or better Freezer	100.0%
5	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
5	501	Heat Pump Water Heater (EF=2.9)	99.9%
5	502	High Efficiency Electric Water Heater (EF=0.95)	93.7%



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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
5	503	Solar Water Heater	99.0%
5	507	Tankless Water Heater (EF=0.98)	100.0%
5	508	Drain Water Heat Recovery (GFX)	100.0%
5	600	Base Clotheswasher (EF=1.18)	100.0%
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	97.0%
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	97.0%
5	800	Base Dishwasher (EF=0.46)	100.0%
5	801	Energy Star DW (EF=0.58)	91.8%
5	900	Conventional Oven	100.0%
5	901	Convection Oven	100.0%
5	950	Plug Loads	100.0%
5	951	Powerstrip with Occupancy Sensor	100.0%
6	120	Base Heat Pump, 3 ton	100.0%
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	82.0%
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	95.0%
6	138	Super Good Cents / ENERGY STAR New Man. Housing	100.0%
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	100.0%
6	160	Room Air Conditioner, 10 kBtu	100.0%
6	161	ENERGY STAR or better Room AC, 10 kBtu	90.0%
6	200	Base Lighting, 0.5 hr/hday	100.0%
6	201	CFL, 0.5 hr/day	97.5%
6	202	CFL Fixtures, 0.5 hr/day	97.5%
6	203	Fluorescent Torchieries, 0.5 hr/day	100.0%
6	210	Base Lighting, 2.5 hr/hday	100.0%
6	211	CFL, 2.5 hr/day	97.5%
6	212	CFL Fixtures, 2.5 hr/day	97.5%
6	213	Fluorescent Torchieries, 2.5 hr/day	100.0%
6	220	Base Lighting, 6.0 hr/hday	100.0%
6	221	CFL, 6.0 hr/day	97.5%
6	222	CFL Fixtures, 6.0 hr/day	97.5%
6	223	Fluorescent Torchieries, 6.0 hr/day	100.0%
6	300	Base Refrigerator, 15 cu.ft.	100.0%
6	301	ENERGY STAR or better Refrigerator	99.9%

Seg	Measure #	Measure Description	Incomplete Factor
6	400	Base Freezer	100.0%
6	401	ENERGY STAR or better Freezer	100.0%
6	500	Base 40 gal. Water Heating (EF=0.90)	100.0%
6	501	Heat Pump Water Heater (EF=2.9)	99.9%
6	502	High Efficiency Electric Water Heater (EF=0.95)	93.7%
6	503	Solar Water Heater	99.0%
6	507	Tankless Water Heater (EF=0.98)	100.0%
6	508	Drain Water Heat Recovery (GFX)	100.0%
6	600	Base Clotheswasher (EF=1.18)	100.0%
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	97.0%
6	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	97.0%
6	800	Base Dishwasher (EF=0.46)	100.0%
6	801	Energy Star DW (EF=0.58)	91.8%
6	900	Conventional Oven	100.0%
6	901	Convection Oven	100.0%
6	950	Plug Loads	100.0%
6	951	Powerstrip with Occupancy Sensor	100.0%

Technology Saturation (units/dwelling)

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
1	120	Base Heat Pump, 3 ton	1.0
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
1	123	ENERGY STAR Programmable Thermostat	1.0
1	124	Ceiling R-0 to R-19 Insulation	945.0
1	125	Ceiling R-19 to R-38 Insulation	945.0
1	126	Floor R-0 to R-19 Insulation-Batts	1,350.0
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	1,011.0
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	1.0

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Seg	Measure #	A.1.2 Measure Description	Tech Saturation
1	129	Duct Testing and Sealing	1.0
1	130	Duct Insulation (R-3 to R-6)	1.0
1	131	HVAC Diagnostic Testing, Repair and Maintenance	1.0
1	132	Windows (high efficiency / ENERGY STAR+)	149.0
1	133	Addition of Attic and Crawlspace Ventilation	1.0
1	160	Room Air Conditioner, 12 kBtu, 9 EER	1.0
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	1.0
1	180	Resistance Space Heating	1.0
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
1	183	ENERGY STAR Programmable Thermostat	1.0
1	184	Ceiling R-0 to R-19 Insulation	945.0
1	185	Ceiling R-19 to R-38 Insulation	945.0
1	186	Floor R-0 to R-19 Insulation-Batts	1,350.0
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	1,011.0
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	1.0
1	189	Duct Testing and Sealing	1.0
1	190	Duct Insulation (R-3 to R-6)	1.0
1	191	HVAC Diagnostic Testing, Repair and Maintenance	1.0
1	192	Windows (high efficiency / ENERGY STAR+)	149.0
1	193	Addition of Attic and Crawlspace Ventilation	1.0
1	200	Base Lighting, 0.5 hr/day	11.6
1	201	CFL, 0.5 hr/day	11.6
1	202	CFL Fixtures, 0.5 hr/day	11.6
1	203	Fluorescent Torchieries, 0.5 hr/day	11.6
1	210	Base Lighting, 2.5 hr/day	20.6

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
1	211	CFL, 2.5 hr/day	20.6
1	212	CFL Fixtures, 2.5 hr/day	20.6
1	213	Fluorescent Torchieries, 2.5 hr/day	20.6
1	220	Base Lighting, 6.0 hr/hday	4.6
1	221	CFL, 6.0 hr/day	4.6
1	222	CFL Fixtures, 6.0 hr/day	4.6
1	223	Fluorescent Torchieries, 6.0 hr/day	4.6
1	300	Base Refrigerator, 20 cu.ft.	1.0
1	301	ENERGY STAR or better Refrigerator	1.0
1	310	Base Secondary Refrigerator	1.0
1	311	Removal of Secondary Refrigerator	1.0
1	400	Base Freezer	1.0
1	401	ENERGY STAR or better Freezer	1.0
1	410	Base Secondary Freezer	1.0
1	411	Removal of Secondary Freezer	1.0
1	500	Base 40 gal. Water Heating (EF=0.90)	1.0
1	501	Heat Pump Water Heater (EF=2.9)	1.0
1	502	High Efficiency Electric Water Heater (EF=0.95)	1.0
1	503	Solar Water Heater	1.0
1	504	Low-Flow Showerheads	1.0
1	505	Hot Water Pipe Insulation	1.0
1	506	Water Heater Thermosat Setback	1.0
1	507	Tankless Water Heater (EF=0.98)	1.0
1	508	Drain Water Heat Recovery (GFX)	1.0
1	600	Base Clotheswasher (EF=1.18)	1.0
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	1.0
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	1.0
1	800	Base Dishwasher (EF=0.46)	1.0
1	801	Energy Star DW (EF=0.58)	1.0
1	900	Conventional Oven	1.0
1	901	Convection Oven	1.0
1	950	Plug Loads	1.0
1	951	Powerstrip with Occupancy Sensor	1.0
2	120	Base Exhaust Air Heat Pump, 2 ton	1.0

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
2	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
2	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
2	123	ENERGY STAR Programmable Thermostat	1.0
2	124	Ceiling R-0 to R-19 Insulation	520.0
2	125	Ceiling R-19 to R-38 Insulation	520.0
2	126	Floor R-0 to R-19 Insulation-Batts	520.0
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	465.6
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	1.0
2	129	Duct Testing and Sealing	1.0
2	130	Duct Insulation (R-3 to R-6)	1.0
2	131	HVAC Diagnostic Testing, Repair and Maintenance	1.0
2	132	Windows (high efficiency / ENERGY STAR+)	54.3
2	133	Addition of Attic and Crawlspace Ventilation	1.0
2	160	Room Air Conditioner, 8 kBtu	1.0
2	161	ENERGY STAR or better Room AC, 8 kBtu	1.0
2	180	Resistance Space Heating	1.0
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
2	183	ENERGY STAR Programmable Thermostat	1.0
2	184	Ceiling R-0 to R-19 Insulation	520.0
2	185	Ceiling R-19 to R-38 Insulation	520.0
2	186	Floor R-0 to R-19 Insulation-Batts	520.0
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	465.6
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	1.0

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
2	189	Duct Testing and Sealing	1.0
2	190	Duct Insulation (R-3 to R-6)	1.0
2	191	HVAC Diagnostic Testing, Repair and Maintenance	1.0
2	192	Windows (high efficiency / ENERGY STAR+)	54.3
2	193	Addition of Attic and Crawlspace Ventilation	1.0
2	200	Base Lighting, 0.5 hr/day	5.4
2	201	CFL, 0.5 hr/day	5.4
2	202	CFL Fixtures, 0.5 hr/day	5.4
2	203	Fluorescent Torchieries, 0.5 hr/day	5.4
2	210	Base Lighting, 2.5 hr/day	9.6
2	211	CFL, 2.5 hr/day	9.6
2	212	CFL Fixtures, 2.5 hr/day	9.6
2	213	Fluorescent Torchieries, 2.5 hr/day	9.6
2	220	Base Lighting, 6.0 hr/day	2.2
2	221	CFL, 6.0 hr/day	2.2
2	222	CFL Fixtures, 6.0 hr/day	2.2
2	223	Fluorescent Torchieries, 6.0 hr/day	2.2
2	300	Base Refrigerator, 15 cu.ft.	1.0
2	301	ENERGY STAR or better Refrigerator	1.0
2	310	Base Secondary Refrigerator	1.0
2	311	Removal of Secondary Refrigerator	1.0
2	400	Base Freezer	1.0
2	401	ENERGY STAR or better Freezer	1.0
2	410	Base Secondary Freezer	1.0
2	411	Removal of Secondary Freezer	1.0
2	500	Base 40 gal. Water Heating (EF=0.90)	1.0
2	501	Heat Pump Water Heater (EF=2.9)	1.0
2	502	High Efficiency Electric Water Heater (EF=0.95)	1.0
2	503	Solar Water Heater	1.0
2	504	Low-Flow Showerheads	1.0
2	505	Hot Water Pipe Insulation	1.0
2	506	Water Heater Thermostat Setback	1.0
2	507	Tankless Water Heater (EF=0.98)	1.0

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
2	508	Drain Water Heat Recovery (GFX)	1.0
2	600	Base Clotheswasher (EF=1.18)	1.0
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	1.0
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	1.0
2	800	Base Dishwasher (EF=0.46)	1.0
2	801	Energy Star DW (EF=0.58)	1.0
2	900	Conventional Oven	1.0
2	901	Convection Oven	1.0
2	950	Plug Loads	1.0
2	951	Powerstrip with Occupancy Sensor	1.0
3	120	Base Heat Pump, 2 ton	1.0
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
3	123	ENERGY STAR Programmable Thermostat	1.0
3	124	Ceiling R-0 to R-19 Insulation	730.0
3	125	Ceiling R-19 to R-38 Insulation	730.0
3	126	Floor R-0 to R-19 Insulation-Batts	730.0
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	828.0
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	1.0
3	129	Duct Testing and Sealing	1.0
3	130	Duct Insulation (R-3 to R-6)	1.0
3	131	HVAC Diagnostic Testing, Repair and Maintenance	1.0
3	132	Windows (high efficiency / ENERGY STAR+)	91.6
3	133	Addition of Attic and Crawlspace Ventilation	1.0
3	160	Room Air Conditioner, 10 kBtu	1.0
3	161	ENERGY STAR or better Room AC, 10 kBtu	1.0
3	180	Resistance Space Heating	1.0

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## RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
3	183	ENERGY STAR Programmable Thermostat	1.0
3	184	Ceiling R-0 to R-19 Insulation	730.0
3	185	Ceiling R-19 to R-38 Insulation	730.0
3	186	Floor R-0 to R-19 Insulation-Batts	730.0
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	828.0
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	1.0
3	189	Duct Testing and Sealing	1.0
3	190	Duct Insulation (R-3 to R-6)	1.0
3	191	HVAC Diagnostic Testing, Repair and Maintenance	1.0
3	192	Windows (high efficiency / ENERGY STAR+)	91.6
3	193	Addition of Attic and Crawlspace Ventilation	1.0
3	200	Base Lighting, 0.5 hr/day	8.4
3	201	CFL, 0.5 hr/day	8.4
3	202	CFL Fixtures, 0.5 hr/day	8.4
3	203	Fluorescent Torchieries, 0.5 hr/day	8.4
3	210	Base Lighting, 2.5 hr/day	14.9
3	211	CFL, 2.5 hr/day	14.9
3	212	CFL Fixtures, 2.5 hr/day	14.9
3	213	Fluorescent Torchieries, 2.5 hr/day	14.9
3	220	Base Lighting, 6.0 hr/day	3.4
3	221	CFL, 6.0 hr/day	3.4
3	222	CFL Fixtures, 6.0 hr/day	3.4
3	223	Fluorescent Torchieries, 6.0 hr/day	3.4
3	300	Base Refrigerator, 15 cu.ft.	1.0
3	301	ENERGY STAR or better Refrigerator	1.0
3	310	Base Secondary Refrigerator	1.0
3	311	Removal of Secondary Refrigerator	1.0



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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
3	400	Base Freezer	1.0
3	401	ENERGY STAR or better Freezer	1.0
3	410	Base Secondary Freezer	1.0
3	411	Removal of Secondary Freezer	1.0
3	500	Base 40 gal. Water Heating (EF=0.90)	1.0
3	501	Heat Pump Water Heater (EF=2.9)	1.0
3	502	High Efficiency Electric Water Heater (EF=0.95)	1.0
3	503	Solar Water Heater	1.0
3	504	Low-Flow Showerheads	1.0
3	505	Hot Water Pipe Insulation	1.0
3	506	Water Heater Thermostat Setback	1.0
3	507	Tankless Water Heater (EF=0.98)	1.0
3	508	Drain Water Heat Recovery (GFX)	1.0
3	600	Base Clotheswasher (EF=1.18)	1.0
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	1.0
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	1.0
3	800	Base Dishwasher (EF=0.46)	1.0
3	801	Energy Star DW (EF=0.58)	1.0
3	900	Conventional Oven	1.0
3	901	Convection Oven	1.0
3	950	Plug Loads	1.0
3	951	Powerstrip with Occupancy Sensor	1.0
4	120	Base Heat Pump, 4 ton	1.0
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
4	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
4	137	Geothermal Heat Pump	1.0
4	138	ENERGY STAR New Construction	1.0
4	139	ENERGY STAR New Construction Plus	1.0
4	160	Room Air Conditioner, 14 kBtu	1.0
4	161	ENERGY STAR or better Room AC, 14 kBtu	1.0

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
4	200	Base Lighting, 0.5 hr/hday	11.6
4	201	CFL, 0.5 hr/day	11.6
4	202	CFL Fixtures, 0.5 hr/day	11.6
4	203	Fluorescent Torchieries, 0.5 hr/day	11.6
4	210	Base Lighting, 2.5 hr/hday	20.6
4	211	CFL, 2.5 hr/day	20.6
4	212	CFL Fixtures, 2.5 hr/day	20.6
4	213	Fluorescent Torchieries, 2.5 hr/day	20.6
4	220	Base Lighting, 6.0 hr/hday	4.6
4	221	CFL, 6.0 hr/day	4.6
4	222	CFL Fixtures, 6.0 hr/day	4.6
4	223	Fluorescent Torchieries, 6.0 hr/day	4.6
4	300	Base Refrigerator, 20 cu.ft.	1.0
4	301	ENERGY STAR or better Refrigerator	1.0
4	400	Base Freezer	1.0
4	401	ENERGY STAR or better Freezer	1.0
4	500	Base 40 gal. Water Heating (EF=0.88)	1.0
4	501	Heat Pump Water Heater (EF=2.9)	1.0
4	502	High Efficiency Electric Water Heater (EF=0.95)	1.0
4	503	Solar Water Heater	1.0
4	507	Tankless Water Heater (EF=0.98)	1.0
4	508	Drain Water Heat Recovery (GFX)	1.0
4	600	Base Clotheswasher (EF=1.18)	1.0
4	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	1.0
4	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	1.0
4	800	Base Dishwasher (EF=0.46)	1.0
4	801	Energy Star DW (EF=0.58)	1.0
4	900	Conventional Oven	1.0
4	901	Convection Oven	1.0
4	950	Plug Loads	1.0
4	951	Powerstrip with Occupancy Sensor	1.0
5	120	Base Exhaust Air Heat Pump, 2 ton	1.0
5	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
5	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
5	137	Geothermal Heat Pump	1.0
5	138	ENERGY STAR New Construction	1.0
5	139	ENERGY STAR New Construction Plus	1.0
5	160	Room Air Conditioner, 10 kBtu	1.0
5	161	ENERGY STAR or better Room AC, 10 kBtu	1.0
5	200	Base Lighting, 0.5 hr/day	5.4
5	201	CFL, 0.5 hr/day	5.4
5	202	CFL Fixtures, 0.5 hr/day	5.4
5	203	Fluorescent Torchieries, 0.5 hr/day	5.4
5	210	Base Lighting, 2.5 hr/day	9.6
5	211	CFL, 2.5 hr/day	9.6
5	212	CFL Fixtures, 2.5 hr/day	9.6
5	213	Fluorescent Torchieries, 2.5 hr/day	9.6
5	220	Base Lighting, 6.0 hr/day	2.2
5	221	CFL, 6.0 hr/day	2.2
5	222	CFL Fixtures, 6.0 hr/day	2.2
5	223	Fluorescent Torchieries, 6.0 hr/day	2.2
5	300	Base Refrigerator, 15 cu.ft.	1.0
5	301	ENERGY STAR or better Refrigerator	1.0
5	400	Base Freezer	1.0
5	401	ENERGY STAR or better Freezer	1.0
5	500	Base 40 gal. Water Heating (EF=0.90)	1.0
5	501	Heat Pump Water Heater (EF=2.9)	1.0
5	502	High Efficiency Electric Water Heater (EF=0.95)	1.0
5	503	Solar Water Heater	1.0
5	507	Tankless Water Heater (EF=0.98)	1.0
5	508	Drain Water Heat Recovery (GFX)	1.0
5	600	Base Clotheswasher (EF=1.18)	1.0
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	1.0
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	1.0

Seg	Measure #	A.1.2 Measure Description	Tech Saturation
5	800	Base Dishwasher (EF=0.46)	1.0
5	801	Energy Star DW (EF=0.58)	1.0
5	900	Conventional Oven	1.0
5	901	Convection Oven	1.0
5	950	Plug Loads	1.0
5	951	Powerstrip with Occupancy Sensor	1.0
6	120	Base Heat Pump, 3 ton	1.0
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	1.0
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	1.0
6	138	Super Good Cents / ENERGY STAR New Man. Housing	1.0
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	1.0
6	160	Room Air Conditioner, 10 kBtu	1.0
6	161	ENERGY STAR or better Room AC, 10 kBtu	1.0
6	200	Base Lighting, 0.5 hr/day	8.4
6	201	CFL, 0.5 hr/day	8.4
6	202	CFL Fixtures, 0.5 hr/day	8.4
6	203	Fluorescent Torcheries, 0.5 hr/day	8.4
6	210	Base Lighting, 2.5 hr/day	14.9
6	211	CFL, 2.5 hr/day	14.9
6	212	CFL Fixtures, 2.5 hr/day	14.9
6	213	Fluorescent Torcheries, 2.5 hr/day	14.9
6	220	Base Lighting, 6.0 hr/day	3.4
6	221	CFL, 6.0 hr/day	3.4
6	222	CFL Fixtures, 6.0 hr/day	3.4
6	223	Fluorescent Torcheries, 6.0 hr/day	3.4
6	300	Base Refrigerator, 15 cu.ft.	1.0
6	301	ENERGY STAR or better Refrigerator	1.0
6	400	Base Freezer	1.0
6	401	ENERGY STAR or better Freezer	1.0
6	500	Base 40 gal. Water Heating (EF=0.90)	1.0
6	501	Heat Pump Water Heater (EF=2.9)	1.0

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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	<b>A.1.2 Measure Description</b>	Tech Saturation
6	502	High Efficiency Electric Water Heater (EF=0.95)	1.0
6	503	Solar Water Heater	1.0
6	507	Tankless Water Heater (EF=0.98)	1.0
6	508	Drain Water Heat Recovery (GFX)	1.0
6	600	Base Clotheswasher (EF=1.18)	1.0
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	1.0
6	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	1.0
6	800	Base Dishwasher (EF=0.46)	1.0
6	801	Energy Star DW (EF=0.58)	1.0
6	900	Conventional Oven	1.0
6	901	Convection Oven	1.0
6	950	Plug Loads	1.0
6	951	Powerstrip with Occupancy Sensor	1.0

**Lighting (Hours/Year)**

Seg	Measure #	Measure Description	Hrs./Year
1	120	Base Heat Pump, 3 ton	
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=7.6; SEER=12)	
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=8.0; SEER=13)	
1	123	ENERGY STAR Programmable Thermostat	
1	124	Ceiling R-0 to R-19 Insulation	
1	125	Ceiling R-19 to R-38 Insulation	
1	126	Floor R-0 to R-19 Insulation-Batts	
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	
1	129	Duct Testing and Sealing	
1	130	Duct Insulation (R-3 to R-6)	

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RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Hrs./Year
1	131	HVAC Diagnostic Testing, Repair and Maintenance	
1	132	Windows (high efficiency / ENERGY STAR+)	
1	133	Addition of Attic and Crawlspace Ventilation	
1	160	Room Air Conditioner, 12 kBtu, 9 EER	
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	
1	180	Resistance Space Heating	
1	200	Base Lighting, 0.5 hr/day	183
1	201	CFL, 0.5 hr/day	183
1	202	CFL Fixtures, 0.5 hr/day	183
1	203	Fluorescent Torchieries, 0.5 hr/day	183
1	210	Base Lighting, 2.5 hr/day	913
1	211	CFL, 2.5 hr/day	913
1	212	CFL Fixtures, 2.5 hr/day	913
1	213	Fluorescent Torchieries, 2.5 hr/day	913
1	220	Base Lighting, 6.0 hr/day	2,190
1	221	CFL, 6.0 hr/day	2,190
1	222	CFL Fixtures, 6.0 hr/day	2,190
1	223	Fluorescent Torchieries, 6.0 hr/day	2,190
2	200	Base Lighting, 0.5 hr/day	183
2	201	CFL, 0.5 hr/day	183
2	202	CFL Fixtures, 0.5 hr/day	183
2	203	Fluorescent Torchieries, 0.5 hr/day	183
2	210	Base Lighting, 2.5 hr/day	913
2	211	CFL, 2.5 hr/day	913
2	212	CFL Fixtures, 2.5 hr/day	913
2	213	Fluorescent Torchieries, 2.5 hr/day	913
2	220	Base Lighting, 6.0 hr/day	2,190
2	221	CFL, 6.0 hr/day	2,190
2	222	CFL Fixtures, 6.0 hr/day	2,190
2	223	Fluorescent Torchieries, 6.0 hr/day	2,190
3	200	Base Lighting, 0.5 hr/day	183
3	201	CFL, 0.5 hr/day	183
3	202	CFL Fixtures, 0.5 hr/day	183
3	203	Fluorescent Torchieries, 0.5 hr/day	183

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**RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Hrs./Year
3	210	Base Lighting, 2.5 hr/day	913
3	211	CFL, 2.5 hr/day	913
3	212	CFL Fixtures, 2.5 hr/day	913
3	213	Fluorescent Torchieries, 2.5 hr/day	913
3	220	Base Lighting, 6.0 hr/day	2,190
3	221	CFL, 6.0 hr/day	2,190
3	222	CFL Fixtures, 6.0 hr/day	2,190
3	223	Fluorescent Torchieries, 6.0 hr/day	2,190
4	200	Base Lighting, 0.5 hr/day	183
4	201	CFL, 0.5 hr/day	183
4	202	CFL Fixtures, 0.5 hr/day	183
4	203	Fluorescent Torchieries, 0.5 hr/day	183
4	210	Base Lighting, 2.5 hr/day	913
4	211	CFL, 2.5 hr/day	913
4	212	CFL Fixtures, 2.5 hr/day	913
4	213	Fluorescent Torchieries, 2.5 hr/day	913
4	220	Base Lighting, 6.0 hr/day	2,190
4	221	CFL, 6.0 hr/day	2,190
4	222	CFL Fixtures, 6.0 hr/day	2,190
4	223	Fluorescent Torchieries, 6.0 hr/day	2,190
5	200	Base Lighting, 0.5 hr/day	183
5	201	CFL, 0.5 hr/day	183
5	202	CFL Fixtures, 0.5 hr/day	183
5	203	Fluorescent Torchieries, 0.5 hr/day	183
5	210	Base Lighting, 2.5 hr/day	913
5	211	CFL, 2.5 hr/day	913
5	212	CFL Fixtures, 2.5 hr/day	913
5	213	Fluorescent Torchieries, 2.5 hr/day	913
5	220	Base Lighting, 6.0 hr/day	2,190
5	221	CFL, 6.0 hr/day	2,190
5	222	CFL Fixtures, 6.0 hr/day	2,190
5	223	Fluorescent Torchieries, 6.0 hr/day	2,190
6	200	Base Lighting, 0.5 hr/day	183
6	201	CFL, 0.5 hr/day	183
6	202	CFL Fixtures, 0.5 hr/day	183
6	203	Fluorescent Torchieries, 0.5 hr/day	183
6	210	Base Lighting, 2.5 hr/day	913

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## RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Hrs./Year
6	211	CFL, 2.5 hr/day	913
6	212	CFL Fixtures, 2.5 hr/day	913
6	213	Fluorescent Torchieries, 2.5 hr/day	913
6	220	Base Lighting, 6.0 hr/day	2,190
6	221	CFL, 6.0 hr/day	2,190
6	222	CFL Fixtures, 6.0 hr/day	2,190
6	223	Fluorescent Torchieries, 6.0 hr/day	2,190



Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWH Technical Potential	Marginal Energy Cost \$/kWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
1	120	Base Heat Pump, 3 ton	PSE Electric Existing	265.32	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
1	131	HVAC Diagnostic Testing, Repair and Maintenance	PSE Electric Existing	222.25	43.08	43.08	16%	\$0.014	\$0.016	HVAC	Level A	Level A
1	123	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	PSE Electric Existing	216.75	5.50	48.58	18%	\$0.048	\$0.055	HVAC	Level C	Level C
1	133	Addition of Attic and Crawlspace Ventilation	PSE Electric Existing	208.41	8.34	56.91	21%	\$0.033	\$0.038	HVAC	Level B	Level B
1	124	Ceiling R-0 to R-19 Insulation	PSE Electric Existing	200.79	7.63	64.54	24%	\$0.066	\$0.076	HVAC	Level D	Level D
1	122	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=13)	PSE Electric Existing	182.49	18.29	82.83	31%	\$0.069	\$0.079	HVAC	Level D	Level D
1	121	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=12)	PSE Electric Existing	171.74	10.75	93.58	35%	\$0.082	\$0.094	HVAC	Level D	Level E
1	130	Duct Insulation (R-3 to R-6)	PSE Electric Existing	169.77	1.97	95.55	36%	\$0.107	\$0.123	HVAC	Level E	Level F
1	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Electric Existing	161.57	8.21	103.76	39%	\$0.152	\$0.175	HVAC	Level F	Level F
1	126	Floor R-0 to R-19 Insulation-Batts	PSE Electric Existing	152.63	8.93	112.69	42%	\$0.165	\$0.189	HVAC	Level F	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
1	129	Duct Testing and Sealing	PSE Electric Existing	148.14	4.50	117.19	44%	\$0.303	\$0.348	HVAC	Level F	Level F
1	125	Ceiling R-19 to R-38 Insulation	PSE Electric Existing	144.53	3.61	120.80	46%	\$0.333	\$0.384	HVAC	Level F	Level F
1	128	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Electric Existing	141.10	3.43	124.22	47%	\$0.672	\$0.773	HVAC	Level F	Level F
1	132	Windows (high efficiency / ENERGY STAR+)	PSE Electric Existing	124.73	16.37	140.60	53%	\$0.660	\$0.758	HVAC	Level F	Level F
1	160	Base Room Air Conditioner, 12 kBtu, 9 EER	PSE Electric Existing	13.43	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
1	161	ENERGY STAR or better Room AC, 12 kBtu, 11+ EER	PSE Electric Existing	12.21	1.22	1.22	9%	\$0.663	\$0.763	HVAC	Level F	Level F
1	180	Base Resistance Space Heating	PSE Electric Existing	486.12	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
1	191	HVAC Diagnostic Testing, Repair and Maintenance	PSE Electric Existing	407.19	78.93	78.93	16%	\$0.021	\$0.024	HVAC	Level A	Level A
1	183	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	PSE Electric Existing	397.12	10.07	89.00	18%	\$0.070	\$0.081	HVAC	Level D	Level D
1	193	Addition of Attic and Crawlspace Ventilation	PSE Electric Existing	381.84	15.27	104.28	21%	\$0.048	\$0.055	HVAC	Level C	Level C
1	184	Ceiling R-0 to R-19 Insulation	PSE Electric Existing	367.87	13.97	118.25	24%	\$0.097	\$0.111	HVAC	Level E	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgnt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWH Technical Potential	Marginal Energy Cost \$/kWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
1	190	Duct Insulation (R-3 to R-6)	PSE Electric Existing	363.65	4.22	122.47	25%	\$0.133	\$0.153	HVAC	Level F	Level F
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Electric Existing	346.07	17.58	140.05	29%	\$0.190	\$0.219	HVAC	Level F	Level F
1	186	Floor R-0 to R-19 Insulation-Batts	PSE Electric Existing	326.94	19.13	159.18	33%	\$0.206	\$0.237	HVAC	Level F	Level F
1	189	Duct Testing and Sealing	PSE Electric Existing	317.31	9.63	168.81	35%	\$0.378	\$0.435	HVAC	Level F	Level F
1	185	Ceiling R-19 to R-38 Insulation	PSE Electric Existing	309.57	7.73	176.54	36%	\$0.417	\$0.479	HVAC	Level F	Level F
1	182	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=13)	PSE Electric Existing	281.37	28.21	204.75	42%	\$0.261	\$0.300	HVAC	Level F	Level F
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Electric Existing	274.70	6.67	211.42	43%	\$0.924	\$1.062	HVAC	Level F	Level F
1	181	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=12)	PSE Electric Existing	258.52	16.18	227.60	47%	\$0.359	\$0.413	HVAC	Level F	Level F
1	192	Windows (high efficiency / ENERGY STAR+)	PSE Electric Existing	228.52	30.00	257.60	53%	\$0.963	\$1.108	HVAC	Level F	Level F
1	200	Base Lighting, 0.5 hr/day	PSE Electric Existing	95.40	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
1	201	CFL, 0.5 hr/day	PSE Electric Existing	40.09	55.31	55.31	58%	\$0.098	\$0.113	Lighting	Level E	Level F
1	203	Fluorescent Torcheries, 0.5 hr/day	PSE Electric Existing	38.78	1.30	56.61	59%	\$1.216	\$1.399	Lighting	Level F	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWH Technical Potential	Marginal Energy Cost \$/kWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
1	202	CFL Fixtures, 0.5 hr/day	PSE Electric Existing	37.53	1.25	57.86	61%	\$0.939	\$1.080	Lighting	Level F	Level F
1	210	Base Lighting, 2.5 hr/day	PSE Electric Existing	848.14	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
1	211	CFL, 2.5 hr/day	PSE Electric Existing	356.39	491.75	491.75	58%	\$0.020	\$0.023	Lighting	Level A	Level A
1	213	Fluorescent Torchiere's, 2.5 hr/day	PSE Electric Existing	344.81	11.58	503.33	59%	\$0.243	\$0.280	Lighting	Level F	Level F
1	212	CFL Fixtures, 2.5 hr/day	PSE Electric Existing	333.70	11.11	514.44	61%	\$0.188	\$0.216	Lighting	Level F	Level F
1	220	Base Lighting, 6.0 hr/day	PSE Electric Existing	460.11	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
1	221	CFL, 6.0 hr/day	PSE Electric Existing	193.34	266.77	266.77	58%	\$0.011	\$0.013	Lighting	Level A	Level A
1	223	Fluorescent Torchiere's, 6.0 hr/day	PSE Electric Existing	187.06	6.28	273.06	59%	\$0.137	\$0.157	Lighting	Level F	Level F
1	222	CFL Fixtures, 6.0 hr/day	PSE Electric Existing	181.03	6.03	279.08	61%	\$0.093	\$0.107	Lighting	Level E	Level E
1	300	Base Refrigerator, 20 cu.ft.	PSE Electric Existing	560.94	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
1	301	ENERGY STAR or better Refrigerator	PSE Electric Existing	476.87	84.07	84.07	15%	\$0.066	\$0.075	Appliances	Level D	Level D
1	310	Base Secondary Refrigerator	PSE Electric Existing	661.14	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
1	311	Removal of Secondary Refrigerator	PSE Electric Existing	561.97	99.17	99.17	15%	\$0.040	\$0.045	Appliances	Level B	Level C
1	400	Base Freezer	PSE Electric Existing	240.17	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
1	401	ENERGY STAR or better Freezer	PSE Electric Existing	216.17	24.00	24.00	10%	\$0.064	\$0.074	Appliances	Level D	Level D
1	410	Base Secondary Freezer	PSE Electric Existing	628.09	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
1	411	Removal of Secondary Freezer	PSE Electric Existing	586.53	41.56	41.56	7%	\$0.042	\$0.048	Appliances	Level B	Level C
1	500	Base 40 gal. Water Heating (EF=0.88)	PSE Electric Existing	1,055.75	0.00	0.00	0%	N/A	\$0.000	Water Heat	N/A	N/A
1	504	Low-Flow Showerheads	PSE Electric Existing	1,021.16	34.58	34.58	3%	\$0.008	\$0.009	Water Heat	Level A	Level A
1	505	Hot Water Pipe Insulation	PSE Electric Existing	1,014.70	6.47	41.05	4%	\$0.019	\$0.021	Water Heat	Level A	Level A
1	508	Drain Water Heat Recovery (GFX)	PSE Electric Existing	927.33	87.37	128.42	12%	\$0.055	\$0.064	Water Heat	Level C	Level D
1	506	Water Heater Thermostat Setback	PSE Electric Existing	887.87	39.46	167.88	16%	\$0.061	\$0.070	Water Heat	Level D	Level D
1	501	Heat Pump Water Heater (EF=2.9)	PSE Electric Existing	640.57	247.30	415.18	39%	\$0.097	\$0.112	Water Heat	Level E	Level F
1	503	Solar Water Heater	PSE Electric Existing	582.97	57.59	472.77	45%	\$0.166	\$0.191	Water Heat	Level F	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
1	502	HE Water Heater (EF=0.93)	PSE Electric Existing	571.19	11.79	484.56	46%	\$0.252	\$0.290	Water Heat	Level F	Level F
1	507	Tankless Water Heater (EF=0.98)	PSE Electric Existing	565.36	5.83	490.39	46%	\$0.534	\$0.614	Water Heat	Level F	Level F
1	600	Base Clotheswasher (EF=1.18)	PSE Electric Existing	1,238.75	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
1	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	PSE Electric Existing	1,148.17	90.57	90.57	7%	\$0.068	\$0.078	Appliances	Level D	Level D
1	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	PSE Electric Existing	1,079.00	69.17	159.74	13%	\$0.071	\$0.082	Appliances	Level D	Level D
1	800	Base Dishwasher (EF=0.46)	PSE Electric Existing	1,238.75	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
1	801	Energy Star DW (EF=0.58)	PSE Electric Existing	1,181.65	57.10	57.10	5%	\$0.043	\$0.050	Appliances	Level B	Level C
1	900	Base Conventional Oven	PSE Electric Existing	298.92	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
1	901	Convection Oven	PSE Electric Existing	255.69	43.23	43.23	14%	\$0.153	\$0.176	Appliances	Level F	Level F
1	950	Base Plug Loads	PSE Electric Existing	2,043.68	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
1	951	Powerstrip with Occupancy Sensor	PSE Electric Existing	2,027.36	16.32	16.32	1%	\$0.300	\$0.345	Appliances	Level F	Level F
2	120	Base Exhaust Air Heat Pump, 2 ton	PSE Electric Existing	3.79	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
2	123	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	PSE Electric Existing	3.77	0.02	0.02	1%	\$0.098	\$0.113	HVAC	Level E	Level F
2	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Electric Existing	3.34	0.44	0.46	12%	\$0.095	\$0.109	HVAC	Level E	Level E
2	122	ENERGY STAR or better Exhaust Air Heat Pump (HSPF=xxx; SEER=13)	PSE Electric Existing	3.02	0.32	0.77	20%	\$0.100	\$0.115	HVAC	Level E	Level F
2	121	ENERGY STAR or better Exhaust Air Heat Pump (HSPF=xxx; SEER=12)	PSE Electric Existing	2.81	0.21	0.98	26%	\$0.122	\$0.140	HVAC	Level F	Level F
2	124	Ceiling R-0 to R-19 Insulation	PSE Electric Existing	2.54	0.27	1.25	33%	\$0.208	\$0.239	HVAC	Level F	Level F
2	133	Addition of Attic and Crawlspace Ventilation	PSE Electric Existing	2.50	0.04	1.29	34%	\$0.231	\$0.266	HVAC	Level F	Level F
2	132	Windows (high efficiency / ENERGY STAR+)	PSE Electric Existing	2.04	0.46	1.76	46%	\$0.304	\$0.350	HVAC	Level F	Level F
2	126	Floor R-0 to R-19 Insulation-Batts	PSE Electric Existing	1.98	0.06	1.82	48%	\$0.431	\$0.495	HVAC	Level F	Level F
2	128	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Electric Existing	1.92	0.06	1.88	49%	\$0.715	\$0.822	HVAC	Level F	Level F
2	129	Duct Testing and Sealing	PSE Electric Existing	1.90	0.02	1.90	50%	\$1.136	\$1.306	HVAC	Level F	Level F
2	125	Ceiling R-19 to R-38 Insulation	PSE Electric Existing	1.89	0.01	1.91	50%	\$1.973	\$2.269	HVAC	Level F	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWH Technical Potential	Marginal Energy Cost \$/kWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
2	131	HVAC Diagnostic Testing, Repair and Maintenance	PSE Electric Existing	1.88	0.01	1.91	50%	\$3.508	\$4.034	HVAC	Level F	Level F
2	130	Duct Insulation (R-3 to R-6)	PSE Electric Existing	1.87	0.01	1.92	51%	\$4.922	\$5.661	HVAC	Level F	Level F
2	160	Base Room Air Conditioner, 8 kBtu	PSE Electric Existing	3.04	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
2	161	ENERGY STAR or better Room AC, 8 kBtu	PSE Electric Existing	2.76	0.28	0.28	9%	\$0.796	\$0.916	HVAC	Level F	Level F
2	180	Base Resistance Space Heating	PSE Electric Existing	194.61	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
2	183	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	PSE Electric Existing	193.62	0.99	0.99	1%	\$0.165	\$0.190	HVAC	Level F	Level F
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Electric Existing	171.26	22.36	23.35	12%	\$0.159	\$0.183	HVAC	Level F	Level F
2	184	Ceiling R-0 to R-19 Insulation	PSE Electric Existing	154.96	16.29	39.64	20%	\$0.294	\$0.338	HVAC	Level F	Level F
2	193	Addition of Attic and Crawlspace Ventilation	PSE Electric Existing	152.38	2.59	42.23	22%	\$0.326	\$0.375	HVAC	Level F	Level F
2	192	Windows (high efficiency / ENERGY STAR+)	PSE Electric Existing	124.05	28.32	70.55	36%	\$0.430	\$0.494	HVAC	Level F	Level F
2	186	Floor R-0 to R-19 Insulation-Batts	PSE Electric Existing	120.45	3.60	74.16	38%	\$0.608	\$0.700	HVAC	Level F	Level F



APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Electric Existing	116.92	3.53	77.68	40%	\$1.009	\$1.161	HVAC	Level F	Level F
2	189	Duct Testing and Sealing	PSE Electric Existing	115.61	1.31	79.00	41%	\$1.604	\$1.845	HVAC	Level F	Level F
2	182	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=13)	PSE Electric Existing	105.08	10.53	89.53	46%	\$0.686	\$0.789	HVAC	Level F	Level F
2	181	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=12)	PSE Electric Existing	98.89	6.19	95.72	49%	\$0.940	\$1.082	HVAC	Level F	Level F
2	185	Ceiling R-19 to R-38 Insulation	PSE Electric Existing	98.40	0.49	96.21	49%	\$3.258	\$3.747	HVAC	Level F	Level F
2	191	HVAC Diagnostic Testing, Repair and Maintenance	PSE Electric Existing	98.07	0.32	96.53	50%	\$5.792	\$6.661	HVAC	Level F	Level F
2	190	Duct Insulation (R-3 to R-6)	PSE Electric Existing	97.75	0.32	96.85	50%	\$8.129	\$9.348	HVAC	Level F	Level F
2	200	Base Lighting, 0.5 hr/day	PSE Electric Existing	16.97	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
2	201	CFL, 0.5 hr/day	PSE Electric Existing	7.13	9.84	9.84	58%	\$0.098	\$0.113	Lighting	Level E	Level F
2	203	Fluorescent Torchieries, 0.5 hr/day	PSE Electric Existing	6.90	0.23	10.07	59%	\$1.216	\$1.399	Lighting	Level F	Level F
2	202	CFL Fixtures, 0.5 hr/day	PSE Electric Existing	6.68	0.22	10.29	61%	\$0.939	\$1.080	Lighting	Level F	Level F
2	210	Base Lighting, 2.5 hr/day	PSE Electric Existing	150.90	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
2	211	CFL, 2.5 hr/day	PSE Electric Existing	63.41	87.49	87.49	58%	\$0.020	\$0.023	Lighting	Level A	Level A
2	213	Fluorescent Torcheries, 2.5 hr/day	PSE Electric Existing	61.35	2.06	89.55	59%	\$0.243	\$0.280	Lighting	Level F	Level F
2	212	CFL Fixtures, 2.5 hr/day	PSE Electric Existing	59.37	1.98	91.53	61%	\$0.188	\$0.216	Lighting	Level F	Level F
2	220	Base Lighting, 6.0 hr/day	PSE Electric Existing	81.86	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
2	221	CFL, 6.0 hr/day	PSE Electric Existing	34.40	47.46	47.46	58%	\$0.011	\$0.013	Lighting	Level A	Level A
2	223	Fluorescent Torcheries, 6.0 hr/day	PSE Electric Existing	33.28	1.12	48.58	59%	\$0.137	\$0.157	Lighting	Level F	Level F
2	222	CFL Fixtures, 6.0 hr/day	PSE Electric Existing	32.21	1.07	49.65	61%	\$0.093	\$0.107	Lighting	Level E	Level E
2	300	Base Refrigerator, 15 cu.ft.	PSE Electric Existing	136.76	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
2	301	ENERGY STAR or better Refrigerator	PSE Electric Existing	116.27	20.50	20.50	15%	\$0.064	\$0.073	Appliances	Level D	Level D
2	310	Base Secondary Refrigerator	PSE Electric Existing	251.69	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
2	311	Removal of Secondary Refrigerator	PSE Electric Existing	220.31	31.38	31.38	12%	\$0.040	\$0.045	Appliances	Level B	Level C
2	400	Base Freezer	PSE Electric Existing	15.53	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
2	401	ENERGY STAR or better Freezer	PSE Electric Existing	13.98	1.55	1.55	10%	\$0.088	\$0.101	Appliances	Level E	Level E
2	410	Base Secondary Freezer	PSE Electric Existing	239.10	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
2	411	Removal of Secondary Freezer	PSE Electric Existing	235.41	3.69	3.69	2%	\$0.042	\$0.048	Appliances	Level B	Level C
2	500	Base 40 gal. Water Heating (EF=0.88)	PSE Electric Existing	568.46	0.00	0.00	0%	N/A	\$0.000	Water Heat	N/A	N/A
2	504	Low-Flow Showerheads	PSE Electric Existing	549.84	18.62	18.62	3%	\$0.009	\$0.011	Water Heat	Level A	Level A
2	505	Hot Water Pipe Insulation	PSE Electric Existing	545.74	4.10	22.72	4%	\$0.019	\$0.021	Water Heat	Level A	Level A
2	506	Water Heater Thermostat Setback	PSE Electric Existing	522.52	23.22	45.94	8%	\$0.066	\$0.076	Water Heat	Level D	Level D
2	508	Drain Water Heat Recovery (GFX)	PSE Electric Existing	490.25	32.27	78.21	14%	\$0.068	\$0.078	Water Heat	Level D	Level D
2	501	Heat Pump Water Heater (EF=2.9)	PSE Electric Existing	353.70	136.55	214.76	38%	\$0.112	\$0.129	Water Heat	Level F	Level F
2	503	Solar Water Heater	PSE Electric Existing	321.90	31.80	246.56	43%	\$0.190	\$0.219	Water Heat	Level F	Level F
2	502	HE Water Heater (EF=0.93)	PSE Electric Existing	315.39	6.51	253.07	45%	\$0.289	\$0.332	Water Heat	Level F	Level F
2	507	Tankless Water Heater (EF=0.98)	PSE Electric Existing	312.17	3.22	256.29	45%	\$0.612	\$0.704	Water Heat	Level F	Level F

**APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings GWH	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
2	600	Base Clotheswasher (EF=1.18)	PSE Electric Existing	666.99	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
2	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	PSE Electric Existing	627.79	39.20	39.20	6%	\$0.099	\$0.114	Appliances	Level E	Level F
2	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	PSE Electric Existing	597.54	30.25	69.45	10%	\$0.103	\$0.118	Appliances	Level E	Level F
2	800	Base Dishwasher (EF=0.46)	PSE Electric Existing	6,503.18	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
2	801	Energy Star DW (EF=0.58)	PSE Electric Existing	6,262.22	240.96	240.96	4%	\$0.006	\$0.007	Appliances	Level A	Level A
2	900	Base Conventional Oven	PSE Electric Existing	1,011.29	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
2	901	Convection Oven	PSE Electric Existing	826.49	184.80	184.80	18%	\$0.015	\$0.018	Appliances	Level A	Level A
2	950	Base Plug Loads	PSE Electric Existing	352.14	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
2	951	Powerstrip with Occupancy Sensor	PSE Electric Existing	345.86	6.28	6.28	2%	\$0.297	\$0.342	Appliances	Level F	Level F
3	120	Base Heat Pump, 2 ton	PSE Electric Existing	29.48	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
3	131	HVAC Diagnostic Testing, Repair and Maintenance	PSE Electric Existing	27.11	2.37	2.37	8%	\$0.027	\$0.031	HVAC	Level A	Level B

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH Savings	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
3	123	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	PSE Electric Existing	26.25	0.86	3.23	11%	\$0.041	\$0.048	HVAC	Level B	Level C
3	133	Addition of Attic and Crawlspace Ventilation	PSE Electric Existing	24.99	1.25	4.48	15%	\$0.031	\$0.035	HVAC	Level B	Level B
3	122	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=13)	PSE Electric Existing	22.72	2.28	6.76	23%	\$0.038	\$0.044	HVAC	Level B	Level B
3	121	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=12)	PSE Electric Existing	21.38	1.34	8.10	27%	\$0.046	\$0.053	HVAC	Level C	Level C
3	130	Duct Insulation (R-3 to R-6)	PSE Electric Existing	20.40	0.97	9.07	31%	\$0.062	\$0.072	HVAC	Level D	Level D
3	128	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Electric Existing	20.01	0.39	9.47	32%	\$0.094	\$0.108	HVAC	Level E	Level E
3	126	Floor R-0 to R-19 Insulation-Batts	PSE Electric Existing	19.16	0.85	10.32	35%	\$0.129	\$0.149	HVAC	Level F	Level F
3	132	Windows (high efficiency / ENERGY STAR+)	PSE Electric Existing	15.87	3.29	13.61	46%	\$0.172	\$0.198	HVAC	Level F	Level F
3	124	Ceiling R-0 to R-19 Insulation	PSE Electric Existing	15.65	0.22	13.82	47%	\$0.220	\$0.253	HVAC	Level F	Level F
3	129	Duct Testing and Sealing	PSE Electric Existing	15.19	0.46	14.28	48%	\$0.308	\$0.354	HVAC	Level F	Level F
3	125	Ceiling R-19 to R-38 Insulation	PSE Electric Existing	14.87	0.32	14.61	50%	\$0.350	\$0.402	HVAC	Level F	Level F

**APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
3	127	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Electric Existing	14.73	0.14	14.75	50%	\$1.402	\$1.612	HVAC	Level F	Level F
3	160	Base Room Air Conditioner, 10 kBtu	PSE Electric Existing	2.67	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
3	161	ENERGY STAR or better Room AC, 10 kBtu	PSE Electric Existing	2.43	0.24	0.24	9%	\$0.703	\$0.809	HVAC	Level F	Level F
3	180	Base Resistance Space Heating	PSE Electric Existing	150.41	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
3	191	HVAC Diagnostic Testing, Repair and Maintenance	PSE Electric Existing	138.33	12.08	12.08	8%	\$0.036	\$0.042	HVAC	Level B	Level B
3	183	ENERGY STAR Programmable Thermostat (Electronic w/ Adaptive Recovery)	PSE Electric Existing	133.92	4.41	16.49	11%	\$0.056	\$0.065	HVAC	Level C	Level D
3	193	Addition of Attic and Crawlspace Ventilation	PSE Electric Existing	127.53	6.39	22.88	15%	\$0.041	\$0.048	HVAC	Level B	Level C
3	190	Duct Insulation (R-3 to R-6)	PSE Electric Existing	121.72	5.81	28.69	19%	\$0.072	\$0.083	HVAC	Level D	Level D
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Electric Existing	119.37	2.35	31.05	21%	\$0.109	\$0.125	HVAC	Level E	Level F
3	186	Floor R-0 to R-19 Insulation-Batts	PSE Electric Existing	114.28	5.08	36.13	24%	\$0.150	\$0.172	HVAC	Level F	Level F
3	192	Windows (high efficiency / ENERGY STAR+)	PSE Electric Existing	94.67	19.62	55.75	37%	\$0.200	\$0.230	HVAC	Level F	Level F

APPENDIX A

RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
3	184	Ceiling R-0 to R-19 Insulation	PSE Electric Existing	93.38	1.28	57.03	38%	\$0.255	\$0.293	HVAC	Level F	Level F
3	189	Duct Testing and Sealing	PSE Electric Existing	90.63	2.75	59.78	40%	\$0.357	\$0.411	HVAC	Level F	Level F
3	185	Ceiling R-19 to R-38 Insulation	PSE Electric Existing	88.71	1.92	61.70	41%	\$0.406	\$0.467	HVAC	Level F	Level F
3	182	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=13)	PSE Electric Existing	80.63	8.08	69.78	46%	\$0.209	\$0.240	HVAC	Level F	Level F
3	181	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=12)	PSE Electric Existing	75.88	4.75	74.53	50%	\$0.286	\$0.329	HVAC	Level F	Level F
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Electric Existing	75.14	0.74	75.27	50%	\$1.904	\$2.189	HVAC	Level F	Level F
3	200	Base Lighting, 0.5 hr/day	PSE Electric Existing	7.58	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
3	201	CFL, 0.5 hr/day	PSE Electric Existing	3.19	4.40	4.40	58%	\$0.098	\$0.113	Lighting	Level E	Level F
3	203	Fluorescent Torchieries, 0.5 hr/day	PSE Electric Existing	3.08	0.10	4.50	59%	\$1.216	\$1.399	Lighting	Level F	Level F
3	202	CFL Fixtures, 0.5 hr/day	PSE Electric Existing	2.98	0.10	4.60	61%	\$0.939	\$1.080	Lighting	Level F	Level F
3	210	Base Lighting, 2.5 hr/day	PSE Electric Existing	67.43	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
3	211	CFL, 2.5 hr/day	PSE Electric Existing	28.34	39.10	39.10	58%	\$0.020	\$0.023	Lighting	Level A	Level A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
3	213	Fluorescent Torcheries, 2.5 hr/day	PSE Electric Existing	27.41	0.92	40.02	59%	\$0.243	\$0.280	Lighting	Level F	Level F
3	212	CFL Fixtures, 2.5 hr/day	PSE Electric Existing	26.53	0.88	40.90	61%	\$0.188	\$0.216	Lighting	Level F	Level F
3	220	Base Lighting, 6.0 hr/day	PSE Electric Existing	36.58	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
3	221	CFL, 6.0 hr/day	PSE Electric Existing	15.37	21.21	21.21	58%	\$0.011	\$0.013	Lighting	Level A	Level A
3	223	Fluorescent Torcheries, 6.0 hr/day	PSE Electric Existing	14.87	0.50	21.71	59%	\$0.137	\$0.157	Lighting	Level F	Level F
3	222	CFL Fixtures, 6.0 hr/day	PSE Electric Existing	14.39	0.48	22.19	61%	\$0.093	\$0.107	Lighting	Level E	Level E
3	300	Base Refrigerator, 15 cu.ft.	PSE Electric Existing	55.27	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
3	301	ENERGY STAR or better Refrigerator	PSE Electric Existing	46.98	8.28	8.28	15%	\$0.049	\$0.056	Appliances	Level C	Level C
3	310	Base Secondary Refrigerator	PSE Electric Existing	72.41	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
3	311	Removal of Secondary Refrigerator	PSE Electric Existing	62.71	9.70	9.70	13%	\$0.040	\$0.045	Appliances	Level B	Level C
3	400	Base Freezer	PSE Electric Existing	24.97	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
3	401	ENERGY STAR or better Freezer	PSE Electric Existing	22.47	2.49	2.49	10%	\$0.065	\$0.075	Appliances	Level D	Level D



APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
3	410	Base Secondary Freezer	PSE Electric Existing	68.79	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
3	411	Removal of Secondary Freezer	PSE Electric Existing	64.38	4.41	4.41	6%	\$0.042	\$0.048	Appliances	Level B	Level C
3	500	Base 40 gal. Water Heating (EF=0.88)	PSE Electric Existing	116.15	0.00	0.00	0%	N/A	\$0.000	Water Heat	N/A	N/A
3	504	Low-Flow Showerheads	PSE Electric Existing	112.35	3.81	3.81	3%	\$0.013	\$0.015	Water Heat	Level A	Level A
3	505	Hot Water Pipe Insulation	PSE Electric Existing	111.24	1.11	4.92	4%	\$0.019	\$0.021	Water Heat	Level A	Level A
3	508	Drain Water Heat Recovery (GFX)	PSE Electric Existing	104.28	6.95	11.87	10%	\$0.091	\$0.104	Water Heat	Level E	Level E
3	506	Water Heater Thermostat Setback	PSE Electric Existing	99.85	4.44	16.31	14%	\$0.100	\$0.115	Water Heat	Level E	Level F
3	501	Heat Pump Water Heater (EF=2.9)	PSE Electric Existing	72.04	27.81	44.12	38%	\$0.159	\$0.183	Water Heat	Level F	Level F
3	503	Solar Water Heater	PSE Electric Existing	65.56	6.48	50.60	44%	\$0.270	\$0.311	Water Heat	Level F	Level F
3	502	HE Water Heater (EF=0.93)	PSE Electric Existing	64.23	1.33	51.92	45%	\$0.411	\$0.472	Water Heat	Level F	Level F
3	507	Tankless Water Heater (EF=0.98)	PSE Electric Existing	63.58	0.66	52.58	45%	\$0.870	\$1.001	Water Heat	Level F	Level F
3	600	Base Clotheswasher (EF=1.18)	PSE Electric Existing	136.29	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A

**APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
3	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	PSE Electric Existing	124.63	11.65	11.65	9%	\$0.097	\$0.111	Appliances	Level E	Level F
3	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	PSE Electric Existing	115.85	8.78	20.44	15%	\$0.103	\$0.118	Appliances	Level E	Level F
3	800	Base Dishwasher (EF=0.46)	PSE Electric Existing	136.29	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
3	801	Energy Star DW (EF=0.58)	PSE Electric Existing	126.35	9.93	9.93	7%	\$0.045	\$0.052	Appliances	Level C	Level C
3	900	Base Conventional Oven	PSE Electric Existing	30.36	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
3	901	Convection Oven	PSE Electric Existing	25.87	4.49	4.49	15%	\$0.167	\$0.192	Appliances	Level F	Level F
3	950	Base Plug Loads	PSE Electric Existing	83.57	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
3	951	Powerstrip with Occupancy Sensor	PSE Electric Existing	82.37	1.20	1.20	1%	\$0.447	\$0.514	Appliances	Level F	Level F
4	120	Base Heat Pump, 4 ton	PSE Electric New	4.97	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
4	121	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=12)	PSE Electric New	4.74	0.23	0.23	5%	\$0.064	\$0.073	HVAC	Level D	Level D
4	122	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=13)	PSE Electric New	4.39	0.35	0.58	12%	\$0.107	\$0.123	HVAC	Level E	Level F
4	138	ENERGY STAR New Construction	PSE Electric New	3.15	1.24	1.82	37%	\$0.117	\$0.135	HVAC	Level F	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
4	137	Geothermal Heat Pump	PSE Electric New	2.82	0.33	2.15	43%	\$0.470	\$0.541	HVAC	Level F	Level F
4	139	ENERGY STAR New Construction Plus	PSE Electric New	1.76	1.07	3.22	65%	\$0.228	\$0.262	HVAC	Level F	Level F
4	160	Base Room Air Conditioner, 14 kBtu	PSE Electric New	0.33	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
4	161	ENERGY STAR or better Room AC, 14 kBtu	PSE Electric New	0.30	0.03	0.03	9%	\$0.522	\$0.601	HVAC	Level F	Level F
4	200	Base Lighting, 0.5 hr/day	PSE Electric New	1.80	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
4	201	CFL, 0.5 hr/day	PSE Electric New	0.76	1.04	1.04	58%	\$0.098	\$0.113	Lighting	Level E	Level F
4	202	CFL Fixtures, 0.5 hr/day	PSE Electric New	0.73	0.02	1.07	59%	\$0.338	\$0.388	Lighting	Level F	Level F
4	203	Fluorescent Torchiere's, 0.5 hr/day	PSE Electric New	0.71	0.02	1.09	61%	\$1.257	\$1.445	Lighting	Level F	Level F
4	210	Base Lighting, 2.5 hr/day	PSE Electric New	16.00	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
4	211	CFL, 2.5 hr/day	PSE Electric New	6.72	9.27	9.27	58%	\$0.020	\$0.023	Lighting	Level A	Level A
4	212	CFL Fixtures, 2.5 hr/day	PSE Electric New	6.50	0.22	9.49	59%	\$0.068	\$0.078	Lighting	Level D	Level D
4	213	Fluorescent Torchiere's, 2.5 hr/day	PSE Electric New	6.29	0.21	9.70	61%	\$0.251	\$0.289	Lighting	Level F	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
4	220	Base Lighting, 6.0 hr/day	PSE Electric New	8.68	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
4	221	CFL, 6.0 hr/day	PSE Electric New	3.65	5.03	5.03	58%	\$0.011	\$0.013	Lighting	Level A	Level A
4	222	CFL Fixtures, 6.0 hr/day	PSE Electric New	3.53	0.12	5.15	59%	\$0.033	\$0.038	Lighting	Level B	Level B
4	223	Fluorescent Torchiere's, 6.0 hr/day	PSE Electric New	3.41	0.11	5.26	61%	\$0.141	\$0.162	Lighting	Level F	Level F
4	300	Base Refrigerator, 20 cu.ft.	PSE Electric New	8.43	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
4	301	ENERGY STAR or better Refrigerator	PSE Electric New	7.16	1.26	1.26	15%	\$0.082	\$0.095	Appliances	Level D	Level E
4	400	Base Freezer	PSE Electric New	3.61	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
4	401	ENERGY STAR or better Freezer	PSE Electric New	3.25	0.36	0.36	10%	\$0.081	\$0.093	Appliances	Level D	Level E
4	500	Base 40 gal. Water Heating (EF=0.88)	PSE Electric New	12.52	0.00	0.00	0%	N/A	\$0.000	Water Heat	N/A	N/A
4	508	Drain Water Heat Recovery (GFX)	PSE Electric New	11.42	1.10	1.10	9%	\$0.048	\$0.055	Water Heat	Level C	Level C
4	501	Heat Pump Water Heater (EF=2.9)	PSE Electric New	8.24	3.18	4.28	34%	\$0.082	\$0.095	Water Heat	Level D	Level E
4	503	Solar Water Heater	PSE Electric New	7.50	0.74	5.02	40%	\$0.140	\$0.161	Water Heat	Level F	Level F

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
4	502	HE Water Heater (EF=0.93)	PSE Electric New	7.35	0.15	5.17	41%	\$0.213	\$0.245	Water Heat	Level F	Level F
4	507	Tankless Water Heater (EF=0.98)	PSE Electric New	7.27	0.07	5.24	42%	\$0.452	\$0.520	Water Heat	Level F	Level F
4	600	Base Clotheswasher (EF=1.18)	PSE Electric New	12.52	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
4	602	Energy Star Vertical-Axis Clothes Washer. SEHA CW Tier 2 (EF=3.25)	PSE Electric New	11.55	0.97	0.97	8%	\$0.068	\$0.078	Appliances	Level D	Level D
4	601	Horizontal-Axis Clothes Washer. Energy Star CW (EF=2.5)	PSE Electric New	10.81	0.74	1.71	14%	\$0.071	\$0.082	Appliances	Level D	Level D
4	800	Base Dishwasher (EF=0.46)	PSE Electric New	12.52	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
4	801	Energy Star DW (EF=0.58)	PSE Electric New	11.88	0.64	0.64	5%	\$0.043	\$0.050	Appliances	Level B	Level C
4	900	Base Conventional Oven	PSE Electric New	4.09	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
4	901	Convection Oven	PSE Electric New	3.61	0.48	0.48	12%	\$0.189	\$0.218	Appliances	Level F	Level F
4	950	Base Plug Loads	PSE Electric New	38.54	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
4	951	Powerstrip with Occupancy Sensor	PSE Electric New	38.39	0.15	0.15	0%	\$0.618	\$0.711	Appliances	Level F	Level F
5	120	Base Exhaust Air Heat Pump, 2 ton	PSE Electric New	0.07	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
5	122	ENERGY STAR or better Exhaust Air Heat Pump (HSPF=xxx; SEER=13)	PSE Electric New	0.07	0.01	0.01	8%	\$0.112	\$0.129	HVAC	Level F	Level F
5	121	ENERGY STAR or better Exhaust Air Heat Pump (HSPF=xxx; SEER=12)	PSE Electric New	0.06	0.00	0.01	13%	\$0.134	\$0.154	HVAC	Level F	Level F
5	137	Geothermal Heat Pump	PSE Electric New	0.06	0.01	0.02	22%	\$0.208	\$0.239	HVAC	Level F	Level F
5	138	ENERGY STAR New Construction	PSE Electric New	0.03	0.03	0.04	62%	\$0.156	\$0.179	HVAC	Level F	Level F
5	139	ENERGY STAR New Construction Plus	PSE Electric New	0.01	0.02	0.06	88%	\$0.418	\$0.481	HVAC	Level F	Level F
5	160	Base Room Air Conditioner, 10 kBtu	PSE Electric New	0.09	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
5	161	ENERGY STAR or better Room AC, 10 kBtu	PSE Electric New	0.08	0.01	0.01	9%	\$0.708	\$0.815	HVAC	Level F	Level F
5	200	Base Lighting, 0.5 hr/day	PSE Electric New	0.40	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
5	201	CFL, 0.5 hr/day	PSE Electric New	0.17	0.23	0.23	58%	\$0.098	\$0.113	Lighting	Level E	Level F
5	202	CFL Fixtures, 0.5 hr/day	PSE Electric New	0.16	0.01	0.24	59%	\$0.338	\$0.388	Lighting	Level F	Level F
5	203	Fluorescent Torchierees, 0.5 hr/day	PSE Electric New	0.16	0.01	0.24	61%	\$1.257	\$1.445	Lighting	Level F	Level F
5	210	Base Lighting, 2.5 hr/day	PSE Electric New	3.59	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
5	211	CFL, 2.5 hr/day	PSE Electric New	1.51	2.08	58%	\$0.020	\$0.023	Lighting	Level A	Level A
5	212	CFL Fixtures, 2.5 hr/day	PSE Electric New	1.46	2.13	59%	\$0.068	\$0.078	Lighting	Level D	Level D
5	213	Fluorescent Torchieries, 2.5 hr/day	PSE Electric New	1.41	2.18	61%	\$0.251	\$0.289	Lighting	Level F	Level F
5	220	Base Lighting, 6.0 hr/hday	PSE Electric New	1.95	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
5	221	CFL, 6.0 hr/day	PSE Electric New	0.82	1.13	58%	\$0.011	\$0.013	Lighting	Level A	Level A
5	222	CFL Fixtures, 6.0 hr/day	PSE Electric New	0.79	1.16	59%	\$0.033	\$0.038	Lighting	Level B	Level B
5	223	Fluorescent Torchieries, 6.0 hr/day	PSE Electric New	0.77	1.18	61%	\$0.141	\$0.162	Lighting	Level F	Level F
5	300	Base Refrigerator, 15 cu.ft.	PSE Electric New	3.17	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
5	301	ENERGY STAR or better Refrigerator	PSE Electric New	2.70	0.48	15%	\$0.065	\$0.075	Appliances	Level D	Level D
5	400	Base Freezer	PSE Electric New	0.36	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
5	401	ENERGY STAR or better Freezer	PSE Electric New	0.32	0.04	10%	\$0.091	\$0.104	Appliances	Level E	Level E
5	500	Base 40 gal. Water Heating (EF=0.88)	PSE Electric New	14.73	0.00	0%	N/A	\$0.000	Water Heat	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
5	508	Drain Water Heat Recovery (GFX)	PSE Electric New	13.67	1.06	1.06	7%	\$0.049	\$0.057	Water Heat	Level C	Level C
5	501	Heat Pump Water Heater (EF=2.9)	PSE Electric New	9.86	3.81	4.86	33%	\$0.095	\$0.110	Water Heat	Level E	Level E
5	503	Solar Water Heater	PSE Electric New	8.98	0.89	5.75	39%	\$0.162	\$0.187	Water Heat	Level F	Level F
5	502	HE Water Heater (EF=0.93)	PSE Electric New	8.80	0.18	5.93	40%	\$0.247	\$0.284	Water Heat	Level F	Level F
5	507	Tankless Water Heater (EF=0.98)	PSE Electric New	8.71	0.09	6.02	41%	\$0.522	\$0.601	Water Heat	Level F	Level F
5	600	Base Clotheswasher (EF=1.18)	PSE Electric New	14.73	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
5	602	Energy Star Vertical-Axis Clothes Washer: SEHA CW Tier 2 (EF=3.25)	PSE Electric New	13.80	0.93	0.93	6%	\$0.099	\$0.114	Appliances	Level E	Level F
5	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	PSE Electric New	13.08	0.72	1.65	11%	\$0.103	\$0.119	Appliances	Level E	Level F
5	800	Base Dishwasher (EF=0.46)	PSE Electric New	14.73	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
5	801	Energy Star DW (EF=0.58)	PSE Electric New	14.14	0.59	0.59	4%	\$0.063	\$0.072	Appliances	Level D	Level D
5	900	Base Conventional Oven	PSE Electric New	2.47	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
5	901	Convection Oven	PSE Electric New	2.00	0.47	0.47	19%	\$0.143	\$0.164	Appliances	Level F	Level F



APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
5	950	Base Plug Loads	PSE Electric New	8.38	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
5	951	Powerstrip with Occupancy Sensor	PSE Electric New	8.21	0.17	0.17	2%	\$0.267	\$0.307	Appliances	Level F	Level F
6	120	Base Heat Pump, 3 ton	PSE Electric New	1.48	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
6	122	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=13)	PSE Electric New	1.35	0.14	0.14	9%	\$0.042	\$0.048	HVAC	Level B	Level C
6	121	ENERGY STAR or better Air Source Heat Pump (HSPF=xxx; SEER=12)	PSE Electric New	1.27	0.08	0.21	14%	\$0.050	\$0.057	HVAC	Level C	Level C
6	138	Super Good Cents / ENERGY STAR New Man. Housing	PSE Electric New	0.99	0.27	0.49	33%	\$0.067	\$0.078	HVAC	Level D	Level D
6	139	Super Good Cents / ENERGY STAR New Man. Housing Plus	PSE Electric New	0.71	0.29	0.77	52%	\$0.129	\$0.148	HVAC	Level F	Level F
6	160	Base Room Air Conditioner, 10 kBtu	PSE Electric New	0.15	0.00	0.00	0%	N/A	\$0.000	HVAC	N/A	N/A
6	161	ENERGY STAR or better Room AC, 10 kBtu	PSE Electric New	0.13	0.01	0.01	9%	\$0.476	\$0.547	HVAC	Level F	Level F
6	200	Base Lighting, 0.5 hr/day	PSE Electric New	0.33	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
6	201	CFL, 0.5 hr/day	PSE Electric New	0.14	0.19	0.19	58%	\$0.098	\$0.113	Lighting	Level E	Level F
6	202	CFL Fixtures, 0.5 hr/day	PSE Electric New	0.13	0.00	0.19	59%	\$0.338	\$0.388	Lighting	Level F	Level F

**APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
6	203	Fluorescent Torchieries, 0.5 hr/day	PSE Electric New	0.13	0.00	0.20	61%	\$1.257	\$1.445	Lighting	Level F	Level F
6	210	Base Lighting, 2.5 hr/day	PSE Electric New	2.90	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
6	211	CFL, 2.5 hr/day	PSE Electric New	1.22	1.68	1.68	58%	\$0.020	\$0.023	Lighting	Level A	Level A
6	212	CFL Fixtures, 2.5 hr/day	PSE Electric New	1.18	0.04	1.72	59%	\$0.068	\$0.078	Lighting	Level D	Level D
6	213	Fluorescent Torchieries, 2.5 hr/day	PSE Electric New	1.14	0.04	1.76	61%	\$0.251	\$0.289	Lighting	Level F	Level F
6	220	Base Lighting, 6.0 hr/day	PSE Electric New	1.57	0.00	0.00	0%	N/A	\$0.000	Lighting	N/A	N/A
6	221	CFL, 6.0 hr/day	PSE Electric New	0.66	0.91	0.91	58%	\$0.011	\$0.013	Lighting	Level A	Level A
6	222	CFL Fixtures, 6.0 hr/day	PSE Electric New	0.64	0.02	0.93	59%	\$0.033	\$0.038	Lighting	Level B	Level B
6	223	Fluorescent Torchieries, 6.0 hr/day	PSE Electric New	0.62	0.02	0.96	61%	\$0.141	\$0.162	Lighting	Level F	Level F
6	300	Base Refrigerator, 15 cu.ft.	PSE Electric New	1.89	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
6	301	ENERGY STAR or better Refrigerator	PSE Electric New	1.61	0.28	0.28	15%	\$0.061	\$0.070	Appliances	Level D	Level D
6	400	Base Freezer	PSE Electric New	0.86	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A

APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total GWH Savings	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
6	401	ENERGY STAR or better Freezer	PSE Electric New	0.77	0.09	0.09	10%	\$0.082	\$0.095	Appliances	Level D	Level E
6	500	Base 40 gal. Water Heating (EF=0.88)	PSE Electric New	5.58	0.00	0.00	0%	N/A	\$0.000	Water Heat	N/A	N/A
6	508	Drain Water Heat Recovery (GFX)	PSE Electric New	5.23	0.35	0.35	6%	\$0.078	\$0.090	Water Heat	Level D	Level E
6	501	Heat Pump Water Heater (EF=2.9)	PSE Electric New	3.77	1.46	1.81	32%	\$0.131	\$0.150	Water Heat	Level F	Level F
6	503	Solar Water Heater	PSE Electric New	3.43	0.34	2.14	38%	\$0.222	\$0.255	Water Heat	Level F	Level F
6	502	HE Water Heater (EF=0.93)	PSE Electric New	3.37	0.07	2.21	40%	\$0.338	\$0.388	Water Heat	Level F	Level F
6	507	Tankless Water Heater (EF=0.98)	PSE Electric New	3.37	0.00	2.21	40%	N/A	\$0.000	Water Heat	N/A	N/A
6	600	Base Clotheswasher (EF=1.18)	PSE Electric New	5.58	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
6	602	Energy Star Vertical-Axis Clothes Washer: Washer: SEHA CW Tier 2 (EF=3.25)	PSE Electric New	5.08	0.50	0.50	9%	\$0.097	\$0.111	Appliances	Level E	Level F
6	601	Horizontal-Axis Clothes Washer: Energy Star CW (EF=2.5)	PSE Electric New	4.70	0.38	0.88	16%	\$0.103	\$0.118	Appliances	Level E	Level F
6	800	Base Dishwasher (EF=0.46)	PSE Electric New	5.58	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
6	801	Energy Star DW (EF=0.58)	PSE Electric New	5.15	0.43	0.43	8%	\$0.045	\$0.052	Appliances	Level C	Level C

**APPENDIX A RESIDENTIAL ELECTRIC RESULTS AND DATA INPUTS**

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	Bundle	Technical Potential Cost Group	Achievable Potential Cost Group
6	900	Base Conventional Oven	PSE Electric New	1.31	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
6	901	Convection Oven	PSE Electric New	1.08	0.23	0.23	18%	\$0.141	\$0.162	Appliances	Level F	Level F
6	950	Base Plug Loads	PSE Electric New	3.60	0.00	0.00	0%	N/A	\$0.000	Appliances	N/A	N/A
6	951	Powerstrip with Occupancy Sensor	PSE Electric New	3.54	0.06	0.06	2%	\$0.377	\$0.433	Appliances	Level F	Level F



# B

## RESIDENTIAL GAS RESULTS AND DATA INPUTS

### Building Stock

Seg	Description	Dwellings	Type
1	SF Existing	352,342	Total
2	MF Existing	183,706	Total
3	MH Existing	28,447	Total
4	SF New	9,327	Annual
5	MF New	5,543	Annual
6	MH New	2,332	Annual

### Measure Costs

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1 = Time, 2=ROB)
1	180	Base Furnace, 80 AFUE, 100 kbtu	home	unit	\$0.00		20	\$0.00	2
1	181	Condensing Furnace, 92 AFUE	home	unit	\$724.00	\$0.00	20	\$724.00	2
1	182	Condensing Furnace, 96 AFUE	home	unit	\$978.00	\$0.00	20	\$978.00	2
1	183	ENERGY STAR Programmable Thermostat	home	unit	\$79.00	\$0.00	12	\$79.00	1
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	home	sq.ft.	\$0.86	\$0.00	30	\$0.86	1
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	home	sq.ft.	\$0.33	\$0.53	30	\$0.86	1
1	186	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	30	\$0.80	1
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$0.96	\$0.00	30	\$0.96	1
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$650.00	\$0.00	10	\$650.00	1
1	189	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1

**APPENDIX B**

**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
1	190	Duct Insulation (.6)	home	unit	\$27.00	\$300.00	30	\$327.00	1
1	191	Furnace Diagnostic Testing, Repair and Maintenance	home	unit	\$123.00	\$0.00	10	\$123.00	1
1	192	Windows (high efficiency / ENERGY STAR+)	home	sq.ft.	\$20.81	\$0.00	30	\$20.81	1
1	193	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	30	\$141.00	1
1	194	Integrated Space and Water Heating	home	unit	\$2,910.03	\$1,175.90	20	\$4,085.93	1
1	500	Base 40 gal. Water Heating (EF=0.54)	home	unit	\$0.00		15	\$0.00	2
1	501	HE Water Heater (EF=0.63)	home	unit	\$129.00	\$0.00	15	\$129.00	2
1	502	HE Water Heater (EF=0.70)	home	unit	\$194.00	\$0.00	15	\$194.00	2
1	503	Solar Water Heater	home	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	2
1	504	Low-Flow Showerheads	home	unit	\$20.00	\$0.00	10	\$20.00	1
1	505	Hot Water Pipe Insulation	home	unit	\$1.00	\$4.80	10	\$5.80	1
1	506	Water Heater Thermostat Setback	home	unit	\$70.00	\$0.00	10	\$70.00	1
1	507	Tankless Water Heater	home	unit	\$579.00	\$324.00	15	\$903.00	2
1	508	Drain Water Heat Recovery (GFX)	home	unit	\$319.00	\$81.00	15	\$400.00	1
1	600	Base Clotheswasher (EF=1.18)	home	unit	\$0.00		14	\$0.00	2
1	601	Horizontal-Axis Clothes Washer	home	unit	\$374.00	\$0.00	14	\$374.00	2
1	602	Energy Star Vertical-Axis Clothes Washer	home	unit	\$324.00	\$0.00	14	\$324.00	2
1	800	Base Dishwasher (EF=0.46)	home	unit	\$0.00		13	\$0.00	2
1	801	Energy Star DW (EF=0.58)	home	unit	\$204.00	\$0.00	13	\$204.00	2
1	900	Base Conventional Oven	home	unit	\$0.00		15	\$0.00	2
1	901	Convection Oven	home	unit	\$120.00	\$0.00	15	\$120.00	2
2	180	Base Furnace, 80 AFUE, 60 kbtu	home	unit	\$0.00		20	\$0.00	2
2	181	Condensing Furnace, 92 AFUE	home	unit	\$635.00	\$0.00	20	\$635.00	2
2	182	Condensing Furnace, 96 AFUE	home	unit	\$787.00	\$0.00	20	\$787.00	2
2	183	ENERGY STAR Programmable Thermostat	home	unit	\$79.00	\$0.00	12	\$79.00	1
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	home	sq.ft.	\$0.86	\$0.00	30	\$0.86	1

**APPENDIX B**

**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1 = Time, 2=ROB)
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	home	sq.ft.	\$0.33	\$0.53	30	\$0.86	1
2	186	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	30	\$0.80	1
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$0.96	\$0.00	30	\$0.96	1
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$486.00	\$0.00	10	\$486.00	1
2	189	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
2	190	Duct Insulation (.6)	home	unit	\$13.00	\$200.00	30	\$213.00	1
2	191	Furnace Diagnostic Testing, Repair and Maintenance	home	unit	\$123.00	\$0.00	10	\$123.00	1
2	192	Windows (high efficiency / ENERGY STAR+)	home	home	\$20.81	\$0.00	30	\$20.81	1
2	193	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	30	\$141.00	1
2	194	Integrated Space and Water Heating	home	unit	\$2,910.03	\$1,175.90	20	\$4,085.93	1
2	500	Base 40 gal. Water Heating (EF=0.54)	unit	unit	\$0.00		15	\$0.00	2
2	501	HE Water Heater (EF=0.63)	unit	unit	\$129.00	\$0.00	15	\$129.00	2
2	502	HE Water Heater (EF=0.70)	unit	unit	\$194.00	\$0.00	15	\$194.00	2
2	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	2
2	504	Low-Flow Showerheads	home	unit	\$20.00	\$0.00	10	\$20.00	1
2	505	Hot Water Pipe Insulation	unit	unit	\$1.00	\$4.80	15	\$5.80	1
2	506	Water Heater Thermostat Setback	unit	unit	\$70.00	\$0.00	10	\$70.00	1
2	507	Tankless Water Heater	unit	unit	\$579.00	\$324.00	15	\$903.00	2
2	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
2	550	Base Boiler (AFUE = 80%)	unit	unit	\$0.00		20	\$0.00	2
2	551	High Efficiency Condensing Boiler (AFUE = 90%)	unit	unit	\$734.00	\$0.00	20	\$734.00	2
2	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	2
2	601	Horizontal-Axis Clothes Washer	unit	unit	\$374.00	\$0.00	14	\$374.00	2



**APPENDIX B**

**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
2	602	Energy Star Vertical-Axis Clothes Washer	unit	unit	\$324.00	\$0.00	14	\$324.00	2
2	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	2
2	801	Energy Star DW (EF=0.58)	unit	unit	\$204.00	\$0.00	13	\$204.00	2
2	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	2
2	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	2
3	180	Base Furnace, 80 AFUE, 80 kbtu	home	unit	\$0.00		20	\$0.00	2
3	181	Condensing Furnace, 92 AFUE	home	unit	\$680.00	\$0.00	20	\$680.00	2
3	182	Condensing Furnace, 96 AFUE	home	unit	\$882.00	\$0.00	20	\$882.00	2
3	183	ENERGY STAR Programmable Thermostat	home	unit	\$79.00	\$0.00	12	\$79.00	1
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	home	sq.ft.	\$0.94	\$0.00	25	\$0.94	1
3	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	home	sq.ft.	\$0.41	\$0.53	25	\$0.94	1
3	186	Floor R-0 to R-19 Insulation-Batts	home	sq.ft.	\$0.80	\$0.00	25	\$0.80	1
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	home	sq.ft.	\$1.43	\$0.00	25	\$1.43	1
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	home	home	\$100.00	\$0.00	10	\$100.00	1
3	189	Duct Testing and Sealing	home	home	\$630.00	\$0.00	20	\$630.00	1
3	190	Duct Insulation (.6)	home	unit	\$13.00	\$200.00	25	\$213.00	1
3	191	Furnace Diagnostic Testing, Repair and Maintenance	home	unit	\$123.00	\$0.00	10	\$123.00	1
3	192	Windows (high efficiency / ENERGY STAR+)	home	sq.ft.	\$16.01	\$0.00	25	\$16.01	1
3	193	Addition of Attic and Crawlspace Ventilation	home	home	\$41.00	\$100.00	25	\$141.00	1
3	194	Integrated Space and Water Heating	home	unit	\$2,910.03	\$1,175.90	20	\$4,085.93	1
3	500	Base 40 gal. Water Heating (EF=0.54)	unit	unit	\$0.00		15	\$0.00	2
3	501	HE Water Heater (EF=0.63)	unit	unit	\$129.00	\$0.00	15	\$129.00	2
3	502	HE Water Heater (EF=0.70)	unit	unit	\$194.00	\$0.00	15	\$194.00	2
3	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	2

APPENDIX B

RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
3	504	Low-Flow Showerheads	home	unit	\$20.00	\$0.00	10	\$20.00	1
3	505	Hot Water Pipe Insulation	unit	unit	\$1.00	\$4.80	15	\$5.80	1
3	506	Water Heater Thermostat Setback	unit	unit	\$70.00	\$0.00	5	\$70.00	1
3	507	Tankless Water Heater	unit	unit	\$579.00	\$324.00	15	\$903.00	2
3	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
3	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	2
3	601	Horizontal-Axis Clothes Washer	unit	unit	\$374.00	\$0.00	14	\$374.00	2
3	602	Energy Star Vertical-Axis Clothes Washer	unit	unit	\$324.00	\$0.00	14	\$324.00	2
3	800	Base Dishwasher (EF=0.46) - Does this belong in gas?	unit	unit	\$0.00		13	\$0.00	2
3	801	Energy Star DW (EF=0.58)	unit	unit	\$204.00	\$0.00	13	\$204.00	2
3	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	2
3	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	2
4	180	Base Furnace, 80 AFUE, 120 kbtu	home	unit	\$0.00		20	\$0.00	2
4	181	Condensing Furnace, 92 AFUE	home	unit	\$731.00	\$0.00	20	\$731.00	2
4	182	Condensing Furnace, 96 AFUE	home	unit	\$1,073.00	\$0.00	20	\$1,073.00	2
4	194	Integrated Space and Water Heating	home	unit	\$2,910.03	\$1,175.90	20	\$4,085.93	1
4	195	ENERGY STAR New Construction	home	unit	\$3,000.00	\$0.00	25	\$3,000.00	1
4	196	ENERGY STAR New Construction Plus	home	unit	\$5,000.00	\$0.00	25	\$5,000.00	1
4	500	Base 40 gal. Water Heating (EF=0.54)	unit	unit	\$0.00		15	\$0.00	2
4	501	HE Water Heater (EF=0.63)	unit	unit	\$129.00	\$0.00	15	\$129.00	2
4	502	HE Water Heater (EF=0.70)	unit	unit	\$194.00	\$0.00	15	\$194.00	2
4	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	2
4	507	Tankless Water Heater	unit	unit	\$579.00	\$324.00	15	\$903.00	2
4	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
4	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	2

**APPENDIX B**

**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1=Time, 2=ROB)
4	601	Horizontal-Axis Clothes Washer	unit	unit	\$374.00	\$0.00	14	\$374.00	2
4	602	Energy Star Vertical-Axis Clothes Washer	unit	unit	\$324.00	\$0.00	14	\$324.00	2
4	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	2
4	801	Energy Star DW (EF=0.58)	unit	unit	\$204.00	\$0.00	13	\$204.00	2
4	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	2
4	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	2
5	180	Base Furnace, 80 AFUE, 80 kbtu	home	unit	\$0.00		20	\$0.00	2
5	181	Condensing Furnace, 92 AFUE	home	unit	\$680.00	\$0.00	20	\$680.00	2
5	182	Condensing Furnace, 96 AFUE	home	unit	\$882.00	\$0.00	20	\$882.00	2
5	194	Integrated Space and Water Heating	home	unit	\$2,910.03	\$1,175.90	20	\$4,085.93	1
5	195	ENERGY STAR New Construction	home	unit	\$2,000.00	\$0.00	20	\$2,000.00	1
5	196	ENERGY STAR New Construction Plus	home	unit	\$3,500.00	\$0.00	25	\$3,500.00	1
5	500	Base 40 gal. Water Heating (EF=0.54)	unit	unit	\$0.00		25	\$0.00	2
5	501	HE Water Heater (EF=0.63)	unit	unit	\$129.00	\$0.00	15	\$129.00	2
5	502	HE Water Heater (EF=0.70)	unit	unit	\$194.00	\$0.00	15	\$194.00	2
5	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	2
5	507	Tankless Water Heater	unit	unit	\$579.00	\$324.00	15	\$903.00	2
5	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
5	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	2
5	601	Horizontal-Axis Clothes Washer	unit	unit	\$374.00	\$0.00	14	\$374.00	2
5	602	Energy Star Vertical-Axis Clothes Washer	unit	unit	\$324.00	\$0.00	14	\$324.00	2
5	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	2
5	801	Energy Star DW (EF=0.58)	unit	unit	\$204.00	\$0.00	13	\$204.00	2
5	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	2
5	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	2
6	180	Base Furnace, 80 AFUE, 80 kbtu	home	unit	\$0.00		20	\$0.00	2
6	181	Condensing Furnace, 92 AFUE	home	unit	\$680.00	\$0.00	20	\$680.00	2
6	182	Condensing Furnace, 96 AFUE	home	unit	\$882.00	\$0.00	20	\$882.00	2

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**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Costs	Labor Cost	Service Life	Full Unit Cost	Implementation Type (1 = Time, 2=ROB)
6	194	Integrated Space and Water Heating	home	unit	\$2,910.03	\$1,175.90	20	\$4,085.93	1
6	195	Natural Choice / ENERGY STAR New Man. Housing	home	unit	\$2,000.00	\$0.00	25	\$2,000.00	1
6	500	Base 40 gal. Water Heating (EF=0.54)	unit	unit	\$0.00		15	\$0.00	2
6	501	HE Water Heater (EF=0.63)	unit	unit	\$129.00	\$0.00	15	\$129.00	2
6	502	HE Water Heater (EF=0.70)	unit	unit	\$194.00	\$0.00	15	\$194.00	2
6	503	Solar Water Heater	unit	unit	\$1,800.00	\$1,000.00	15	\$2,800.00	2
6	507	Tankless Water Heater	unit	unit	\$579.00	\$324.00	15	\$903.00	2
6	508	Drain Water Heat Recovery (GFX)	unit	unit	\$319.00	\$81.00	15	\$400.00	1
6	600	Base Clotheswasher (EF=1.18)	unit	unit	\$0.00		14	\$0.00	2
6	601	Horizontal-Axis Clothes Washer	unit	unit	\$374.00	\$0.00	14	\$374.00	2
6	602	Energy Star Vertical-Axis Clothes Washer	unit	unit	\$324.00	\$0.00	14	\$324.00	2
6	800	Base Dishwasher (EF=0.46)	unit	unit	\$0.00		13	\$0.00	2
6	801	Energy Star DW (EF=0.58)	unit	unit	\$204.00	\$0.00	13	\$204.00	2
6	900	Base Conventional Oven	unit	unit	\$0.00		15	\$0.00	2
6	901	Convection Oven	unit	unit	\$120.00	\$0.00	15	\$120.00	2

**Applicability Factor (Percent)**

Seg	Measure #	Measure Description	Applicability Factor
1	180	Base Furnace, 80 AFUE, 80 kbtu	88.2%
1	181	Condensing Furnace, 92 AFUE	88.2%
1	182	Condensing Furnace, 96 AFUE	88.2%
1	183	ENERGY STAR Programmable Thermostat	88.2%
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	88.2%
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	88.2%
1	186	Floor R-0 to R-19 Insulation-Batts	88.2%

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Applicability Factor
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	88.2%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	88.2%
1	189	Duct Repair and Sealing	88.2%
1	190	Duct Insulation (.6)	88.2%
1	191	Furnace Diagnostic Testing, Repair and Maintenance	88.2%
1	192	Windows (high efficiency / ENERGY STAR+)	88.2%
1	193	Addition of Attic and Crawlspace Ventilation	88.2%
1	194	Integrated Space and Water Heating	88.2%
1	500	Base 40 gal. Water Heating (EF=0.54)	76.4%
1	501	HE Water Heater (EF=0.63)	76.4%
1	502	HE Water Heater (EF=0.70)	76.4%
1	503	Solar Water Heater	76.4%
1	504	Low-Flow Showerheads	76.4%
1	505	Hot Water Pipe Insulation	76.4%
1	506	Water Heater Thermostat Setback	76.4%
1	507	Tankless Water Heater	76.4%
1	508	Drain Water Heat Recovery (GFX)	76.4%
1	600	Base Clotheswasher (EF=1.18)	76.4%
1	601	Energy Star CW (EF=2.5)	76.4%
1	602	SEHA CW Tier 2 (EF=3.25)	76.4%
1	800	Base Dishwasher (EF=0.46)	76.4%
1	801	Energy Star DW (EF=0.58)	76.4%
1	900	Conventional Oven	97.3%
1	901	Convection Oven	97.3%
2	180	Base Furnace, 80 AFUE, 80 kbtu	68.0%
2	181	Condensing Furnace, 92 AFUE	68.0%
2	182	Condensing Furnace, 96 AFUE	68.0%
2	183	ENERGY STAR Programmable Thermostat	68.0%
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	68.0%

Seg	Measure #	Measure Description	Applicability Factor
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	68.0%
2	186	Floor R-0 to R-19 Insulation-Batts	68.0%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	68.0%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	68.0%
2	189	Duct Repair and Sealing	68.0%
2	190	Duct Insulation (.6)	68.0%
2	191	Furnace Diagnostic Testing, Repair and Maintenance	68.0%
2	192	Windows (high efficiency / ENERGY STAR+)	68.0%
2	193	Addition of Attic and Crawlspace Ventilation	68.0%
2	194	Integrated Space and Water Heating	68.0%
2	500	Base 40 gal. Water Heating (EF=0.54)	76.5%
2	501	HE Water Heater (EF=0.63)	76.5%
2	502	HE Water Heater (EF=0.70)	76.5%
2	503	Solar Water Heater	76.5%
2	504	Low-Flow Showerheads	76.5%
2	505	Hot Water Pipe Insulation	76.5%
2	506	Water Heater Thermostat Setback	76.5%
2	507	Tankless Water Heater	76.5%
2	508	Drain Water Heat Recovery (GFX)	76.5%
2	550	Base Boiler	68.0%
2	551	High Efficiency Condensing Boiler	68.0%
2	600	Base Clotheswasher (EF=1.18)	76.5%
2	601	Energy Star CW (EF=2.5)	76.5%
2	602	SEHA CW Tier 2 (EF=3.25)	76.5%
2	800	Base Dishwasher (EF=0.46)	76.5%
2	801	Energy Star DW (EF=0.58)	76.5%
2	900	Conventional Oven	99.3%
2	901	Convection Oven	99.3%
3	180	Base Furnace, 80 AFUE, 80 kbtu	93.8%
3	181	Condensing Furnace, 92 AFUE	93.8%

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**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Applicability Factor
3	182	Condensing Furnace, 96 AFUE	93.8%
3	183	ENERGY STAR Programmable Thermostat	93.8%
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	93.8%
3	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	93.8%
3	186	Floor R-0 to R-19 Insulation-Batts	93.8%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	93.8%
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	93.8%
3	189	Duct Repair and Sealing	93.8%
3	190	Duct Insulation (.6)	93.8%
3	191	Furnace Diagnostic Testing, Repair and Maintenance	93.8%
3	192	Windows (high efficiency / ENERGY STAR+)	93.8%
3	193	Addition of Attic and Crawlspace Ventilation	93.8%
3	194	Integrated Space and Water Heating	93.8%
3	500	Base 40 gal. Water Heating (EF=0.54)	71.9%
3	501	HE Water Heater (EF=0.63)	71.9%
3	502	HE Water Heater (EF=0.70)	71.9%
3	503	Solar Water Heater.	71.9%
3	504	Low-Flow Showerheads	71.9%
3	505	Hot Water Pipe Insulation	71.9%
3	506	Water Heater Thermostat Setback	71.9%
3	507	Tankless Water Heater	71.9%
3	508	Drain Water Heat Recovery (GFX)	71.9%
3	600	Base Clotheswasher (EF=1.18)	71.9%
3	601	Energy Star CW (EF=2.5)	71.9%
3	602	SEHA CW Tier 2 (EF=3.25)	71.9%
3	800	Base Dishwasher (EF=0.46)	71.9%
3	801	Energy Star DW (EF=0.58)	71.9%
3	900	Conventional Oven	97.1%

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Applicability Factor
3	901	Convection Oven	97.1%
4	180	Base Furnace, 80 AFUE, 80 kbtu	93.2%
4	181	Condensing Furnace, 92 AFUE	93.2%
4	182	Condensing Furnace, 96 AFUE	93.2%
4	194	Integrated Space and Water Heating	93.2%
4	195	ENERGY STAR New Construction	93.2%
4	196	ENERGY STAR New Construction Plus	93.2%
4	500	Base 40 gal. Water Heating (EF=0.54)	94.8%
4	501	HE Water Heater (EF=0.63)	94.8%
4	502	HE Water Heater (EF=0.70)	94.8%
4	503	Solar Water Heater	94.8%
4	507	Tankless Water Heater	94.8%
4	508	Drain Water Heat Recovery (GFX)	94.8%
4	600	Base Clotheswasher (EF=1.18)	94.8%
4	601	Energy Star CW (EF=2.5)	94.8%
4	602	SEHA CW Tier 2 (EF=3.25)	94.8%
4	800	Base Dishwasher (EF=0.46)	94.8%
4	801	Energy Star DW (EF=0.58)	94.8%
4	900	Conventional Oven	98.8%
4	901	Convection Oven	98.8%
5	180	Base Furnace, 80 AFUE, 80 kbtu	68.0%
5	181	Condensing Furnace, 92 AFUE	68.0%
5	182	Condensing Furnace, 96 AFUE	68.0%
5	194	Integrated Space and Water Heating	68.0%
5	195	ENERGY STAR New Construction	68.0%
5	196	ENERGY STAR New Construction Plus	68.0%
5	500	Base 40 gal. Water Heating (EF=0.54)	76.5%
5	501	HE Water Heater (EF=0.63)	76.5%
5	502	HE Water Heater (EF=0.70)	76.5%
5	503	Solar Water Heater	76.5%
5	507	Tankless Water Heater	76.5%
5	508	Drain Water Heat Recovery (GFX)	76.5%



Seg	Measure #	Measure Description	Applicability Factor
5	600	Base Clotheswasher (EF=1.18)	76.5%
5	601	Energy Star CW (EF=2.5)	76.5%
5	602	SEHA CW Tier 2 (EF=3.25)	76.5%
5	800	Base Dishwasher (EF=0.46)	76.5%
5	801	Energy Star DW (EF=0.58)	76.5%
5	900	Conventional Oven	99.3%
5	901	Convection Oven	99.3%
6	180	Base Furnace, 80 AFUE, 80 kbtu	93.8%
6	181	Condensing Furnace, 92 AFUE	93.8%
6	182	Condensing Furnace, 96 AFUE	93.8%
6	194	Integrated Space and Water Heating	93.8%
6	195	Natural Choice / ENERGY STAR New Man. Housing	93.8%
6	500	Base 40 gal. Water Heating (EF=0.54)	71.9%
6	501	HE Water Heater (EF=0.63)	71.9%
6	502	HE Water Heater (EF=0.70)	71.9%
6	503	Solar Water Heater	71.9%
6	507	Tankless Water Heater	71.9%
6	508	Drain Water Heat Recovery (GFX)	71.9%
6	600	Base Clotheswasher (EF=1.18)	71.9%
6	601	Energy Star CW (EF=2.5)	71.9%
6	602	SEHA CW Tier 2 (EF=3.25)	71.9%
6	800	Base Dishwasher (EF=0.46)	71.9%
6	801	Energy Star DW (EF=0.58)	71.9%
6	900	Conventional Oven	97.1%
6	901	Convection Oven	97.1%

Base Technology EUIs

Seg	Measure #	Measure Description	Therms/Year
1	180	Base Furnace, 80 AFUE, 80 kbtu	779
1	500	Base 40 gal. Water Heating (EF=0.54)	282
1	600	Base Clotheswasher (EF=1.18)	40
1	800	Base Dishwasher (EF=0.46)	24

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Therms/Year
1	900	Conventional Oven	50
2	180	Base Furnace, 80 AFUE, 80 kbtu	522
2	500	Base 40 gal. Water Heating (EF=0.54)	189
2	550	Base Boiler	711
2	600	Base Clotheswasher (EF=1.18)	27
2	800	Base Dishwasher (EF=0.46)	16
2	900	Conventional Oven	34
3	180	Base Furnace, 80 AFUE, 80 kbtu	701
3	500	Base 40 gal. Water Heating (EF=0.54)	254
3	600	Base Clotheswasher (EF=1.18)	28
3	700	Base Clothes Dryer (EF=.46)	36
3	800	Base Dishwasher (EF=0.46)	22
3	900	Conventional Oven	45
4	180	Base Furnace, 80 AFUE, 80 kbtu	690
4	500	Base 40 gal. Water Heating (EF=0.58)	323
4	600	Base Clotheswasher (EF=1.18)	46
4	800	Base Dishwasher (EF=0.46)	28
4	900	Conventional Oven	50
5	180	Base Furnace, 80 AFUE, 80 kbtu	463
5	500	Base 40 gal. Water Heating (EF=0.58)	216
5	600	Base Clotheswasher (EF=1.18)	31
5	800	Base Dishwasher (EF=0.46)	18
5	900	Conventional Oven	34
6	180	Base Furnace, 80 AFUE, 80 kbtu	621
6	500	Base 40 gal. Water Heating (EF=0.58)	291
6	600	Base Clotheswasher (EF=1.18)	41
6	800	Base Dishwasher (EF=0.46)	25
6	900	Conventional Oven	45

## Energy Savings (Percent)

Seg	Measure #	Measure Description	Annual % Savings
1	180	Base Furnace, 80 AFUE, 80 kbtu	0.0%
1	181	Condensing Furnace, 92 AFUE	13.0%
1	182	Condensing Furnace, 96 AFUE	16.7%
1	183	ENERGY STAR Programmable Thermostat	6.0%
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	24.3%
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	8.4%
1	186	Floor R-0 to R-19 Insulation-Batts	5.6%
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	17.6%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	6.3%
1	189	Duct Repair and Sealing	10.0%
1	190	Duct Insulation (.6)	3.9%
1	191	Furnace Diagnostic Testing, Repair and Maintenance	17.7%
1	192	Windows (high efficiency / ENERGY STAR+)	7.0%
1	193	Addition of Attic and Crawlspace Ventilation	10.0%
1	194	Integrated Space and Water Heating	17.4%
1	500	Base 40 gal. Water Heating (EF=0.54)	0.0%
1	501	HE Water Heater (EF=0.63)	14.3%
1	502	HE Water Heater (EF=0.70)	22.9%
1	503	Solar Water Heater	90.0%
1	504	Low-Flow Showerheads	10.6%
1	505	Hot Water Pipe Insulation	4.6%
1	506	Water Heater Thermostat Setback	4.3%
1	507	Tankless Water Heater (EF=0.82)	34.1%
1	508	Drain Water Heat Recovery (GFX)	37.6%
1	600	Base Clotheswasher (EF=1.18)	0.0%
1	601	Energy Star CW (EF=2.5)	52.8%
1	602	SEHA CW Tier 2 (EF=3.25)	63.7%
1	800	Base Dishwasher (EF=0.46)	0.0%
1	801	Energy Star DW (EF=0.58)	20.7%

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
1	900	Conventional Oven	
1	901	Convection Oven	15.9%
2	180	Base Furnace, 80 AFUE, 80 kbtu	0.0%
2	181	Condensing Furnace, 92 AFUE	13.0%
2	182	Condensing Furnace, 96 AFUE	16.7%
2	183	ENERGY STAR Programmable Thermostat	6.0%
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	14.2%
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	2.2%
2	186	Floor R-0 to R-19 Insulation-Batts	8.8%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	23.1%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	14.4%
2	189	Duct Repair and Sealing	0.3%
2	190	Duct Insulation (.6)	0.0%
2	191	Furnace Diagnostic Testing, Repair and Maintenance	3.4%
2	192	Windows (high efficiency / ENERGY STAR+)	10.9%
2	193	Addition of Attic and Crawlspace Ventilation	4.4%
2	194	Integrated Space and Water Heating	13.8%
2	500	Base 40 gal. Water Heating (EF=0.54)	0.0%
2	501	HE Water Heater (EF=0.63)	14.3%
2	502	HE Water Heater (EF=0.70)	22.9%
2	503	Solar Water Heater	90.0%
2	504	Low-Flow Showerheads	10.6%
2	505	Hot Water Pipe Insulation	4.8%
2	506	Water Heater Thermostat Setback	4.3%
2	507	Tankless Water Heater (EF=0.82)	34.1%
2	508	Drain Water Heat Recovery (GFX)	39.7%
2	550	Base Boiler (AFUE = 78%)	0.0%
2	551	High Efficiency Condensing Boiler (AFUE = 90%)	13.3%
2	600	Base Clotheswasher (EF=1.18)	0.0%

Seg	Measure #	Measure Description	Annual % Savings
2	601	Energy Star CW (EF=2.5)	52.8%
2	602	SEHA CW Tier 2 (EF=3.25)	63.7%
2	800	Base Dishwasher (EF=0.46)	0.0%
2	801	Energy Star DW (EF=0.58)	20.7%
2	900	Conventional Oven	
2	901	Convection Oven	50.0%
3	180	Base Furnace, 80 AFUE, 80 kbtu	0.0%
3	181	Condensing Furnace, 92 AFUE	13.0%
3	182	Condensing Furnace, 96 AFUE	16.7%
3	183	ENERGY STAR Programmable Thermostat	6.0%
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	10.3%
3	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	7.3%
3	186	Floor R-0 to R-19 Insulation-Batts	12.9%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	5.20%
3	189	Duct Repair and Sealing	
3	190	Duct Insulation (.6)	3.1%
3	191	Furnace Diagnostic Testing, Repair and Maintenance	11.8%
3	192	Windows (high efficiency / ENERGY STAR+)	24.8%
3	193	Addition of Attic and Crawlspace Ventilation	10.0%
3	194	Integrated Space and Water Heating	36.5%
3	500	Base 40 gal. Water Heating (EF=0.54)	0.0%
3	501	HE Water Heater (EF=0.63)	14.3%
3	502	HE Water Heater (EF=0.70)	22.9%
3	503	Solar Water Heater	90.0%
3	504	Low-Flow Showerheads	10.6%
3	505	Hot Water Pipe Insulation	4.3%
3	506	Water Heater Thermostat Setback	4.3%
3	507	Tankless Water Heater (EF=0.82)	34.1%
3	508	Drain Water Heat Recovery (GFX)	35.8%

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
3	600	Base Clotheswasher (EF=1.18)	0.0%
3	601	Energy Star CW (EF=2.5)	52.8%
3	602	SEHA CW Tier 2 (EF=3.25)	63.7%
3	800	Base Dishwasher (EF=0.46)	0.0%
3	801	Energy Star DW (EF=0.58)	20.7%
3	900	Conventional Oven	
3	901	Convection Oven	17.8%
4	180	Base Furnace, 80 AFUE, 80 kbtu	0.0%
4	181	Condensing Furnace, 92 AFUE	13.0%
4	182	Condensing Furnace, 96 AFUE	16.7%
4	194	Integrated Space and Water Heating	24.5%
4	195	ENERGY STAR New Construction	30.0%
4	196	ENERGY STAR New Construction Plus	40.0%
4	500	Base 40 gal. Water Heating (EF=0.54)	0.0%
4	501	HE Water Heater (EF=0.63)	14.3%
4	502	HE Water Heater (EF=0.70)	22.9%
4	503	Solar Water Heater	90.0%
4	507	Tankless Water Heater (EF=0.82)	34.1%
4	508	Drain Water Heat Recovery (GFX)	31.3%
4	600	Base Clotheswasher (EF=1.18)	0.0%
4	601	Energy Star CW (EF=2.5)	52.8%
4	602	SEHA CW Tier 2 (EF=3.25)	63.7%
4	800	Base Dishwasher (EF=0.46)	0.0%
4	801	Energy Star DW (EF=0.58)	20.7%
4	900	Conventional Oven	
4	901	Convection Oven	17.9%
5	180	Base Furnace, 80 AFUE, 80 kbtu	0.0%
5	181	Condensing Furnace, 92 AFUE	13.0%
5	182	Condensing Furnace, 96 AFUE	16.7%
5	194	Integrated Space and Water Heating	8.2%
5	195	ENERGY STAR New Construction	30.0%
5	196	ENERGY STAR New Construction Plus	40.0%
5	500	Base 40 gal. Water Heating (EF=0.54)	0.0%
5	501	HE Water Heater (EF=0.63)	14.3%

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Annual % Savings
5	502	HE Water Heater (EF=0.70)	22.9%
5	503	Solar Water Heater	90.0%
5	507	Tankless Water Heater (EF=0.82)	34.1%
5	508	Drain Water Heat Recovery (GFX)	33.3%
5	600	Base Clotheswasher (EF=1.18)	0.0%
5	601	Energy Star CW (EF=2.5)	52.8%
5	602	SEHA CW Tier 2 (EF=3.25)	63.7%
5	800	Base Dishwasher (EF=0.46)	0.0%
5	801	Energy Star DW (EF=0.58)	20.7%
5	900	Conventional Oven	
5	901	Convection Oven	52.9%
6	180	Base Furnace, 80 AFUE, 80 kbtu	0.0%
6	181	Condensing Furnace, 92 AFUE	13.0%
6	182	Condensing Furnace, 96 AFUE	16.7%
6	194	Integrated Space and Water Heating	16.6%
6	195	Natural Choice / ENERGY STAR New Man. Housing	30.0%
6	500	Base 40 gal. Water Heating (EF=0.54)	0.0%
6	501	HE Water Heater (EF=0.63)	14.3%
6	502	HE Water Heater (EF=0.70)	22.9%
6	503	Solar Water Heater	90.0%
6	507	Tankless Water Heater (EF=0.82)	34.1%
6	508	Drain Water Heat Recovery (GFX)	29.9%
6	600	Base Clotheswasher (EF=1.18)	0.0%
6	601	Energy Star CW (EF=2.5)	52.8%
6	602	SEHA CW Tier 2 (EF=3.25)	63.7%
6	800	Base Dishwasher (EF=0.46)	0.0%
6	801	Energy Star DW (EF=0.58)	20.7%
6	900	Conventional Oven	
6	901	Convection Oven	17.8%

## Standards Adjustment Factor (Percent)

Seg	Measure #	Measure Description	EUI Adjust
1	180	Base Furnace, 80 AFUE, 80 kbtu	87.5%
1	181	Condensing Furnace, 92 AFUE	87.5%
1	182	Condensing Furnace, 96 AFUE	87.5%
1	183	ENERGY STAR Programmable Thermostat	100.0%
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	100.0%
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	100.0%
1	186	Floor R-0 to R-19 Insulation-Batts	100.0%
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
1	189	Duct Repair and Sealing	100.0%
1	190	Duct Insulation (.6)	100.0%
1	191	Furnace Diagnostic Testing, Repair and Maintenance	100.0%
1	192	Windows (high efficiency / ENERGY STAR+)	100.0%
1	193	Addition of Attic and Crawlspace Ventilation	100.0%
1	194	Integrated Space and Water Heating	100.0%
1	500	Base 40 gal. Water Heating (EF=0.54)	94.4%
1	501	HE Water Heater (EF=0.63)	94.4%
1	502	HE Water Heater (EF=0.70)	94.4%
1	503	Solar Water Heater	94.4%
1	504	Low-Flow Showerheads	100.0%
1	505	Hot Water Pipe Insulation	100.0%
1	506	Water Heater Thermostat Setback	100.0%
1	507	Tankless Water Heater	100.0%
1	508	Drain Water Heat Recovery (GFX)	100.0%
1	600	Base Clotheswasher (EF=1.18)	100.0%
1	601	Energy Star CW (EF=2.5)	100.0%
1	602	SEHA CW Tier 2 (EF=3.25)	100.0%
1	800	Base Dishwasher (EF=0.46)	100.0%
1	801	Energy Star DW (EF=0.58)	100.0%



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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	EUI Adjust
1	900	Conventional Oven	100.0%
1	901	Convection Oven	100.0%
2	180	Base Furnace, 80 AFUE, 80 kbtu	91.6%
2	181	Condensing Furnace, 92 AFUE	91.6%
2	182	Condensing Furnace, 96 AFUE	91.6%
2	183	ENERGY STAR Programmable Thermostat	100.0%
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	100.0%
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	100.0%
2	186	Floor R-0 to R-19 Insulation-Batts	100.0%
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
2	189	Duct Repair and Sealing	100.0%
2	190	Duct Insulation (.6)	100.0%
2	191	Furnace Diagnostic Testing, Repair and Maintenance	100.0%
2	192	Windows (high efficiency / ENERGY STAR+)	100.0%
2	193	Addition of Attic and Crawlspace Ventilation	100.0%
2	194	Integrated Space and Water Heating	100.0%
2	500	Base 40 gal. Water Heating (EF=0.54)	94.4%
2	501	HE Water Heater (EF=0.63)	94.4%
2	502	HE Water Heater (EF=0.70)	94.4%
2	503	Solar Water Heater	94.4%
2	504	Low-Flow Showerheads	100.0%
2	505	Hot Water Pipe Insulation	100.0%
2	506	Water Heater Thermostat Setback	100.0%
2	507	Tankless Water Heater	100.0%
2	508	Drain Water Heat Recovery (GFX)	100.0%
2	550	Base Boiler	89.7%
2	551	High Efficiency Condensing Boiler	89.7%
2	600	Base Clotheswasher (EF=1.18)	100.0%
2	601	Energy Star CW (EF=2.5)	100.0%

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Seg	Measure #	Measure Description	EUI Adjust
2	602	SEHA CW Tier 2 (EF=3.25)	100.0%
2	800	Base Dishwasher (EF=0.46)	100.0%
2	801	Energy Star DW (EF=0.58)	100.0%
2	900	Conventional Oven	100.0%
2	901	Convection Oven	100.0%
3	180	Base Furnace, 80 AFUE, 80 kbtu	87.5%
3	181	Condensing Furnace, 92 AFUE	87.5%
3	182	Condensing Furnace, 96 AFUE	87.5%
3	183	ENERGY STAR Programmable Thermostat	100.0%
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	100.0%
3	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	100.0%
3	186	Floor R-0 to R-19 Insulation-Batts	100.0%
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	100.0%
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	100.0%
3	189	Duct Repair and Sealing	100.0%
3	190	Duct Insulation (.6)	100.0%
3	191	Furnace Diagnostic Testing, Repair and Maintenance	100.0%
3	192	Windows (high efficiency / ENERGY STAR+)	100.0%
3	193	Addition of Attic and Crawlspace Ventilation	100.0%
3	194	Integrated Space and Water Heating	100.0%
3	500	Base 40 gal. Water Heating (EF=0.54)	84.9%
3	501	HE Water Heater (EF=0.63)	84.9%
3	502	HE Water Heater (EF=0.70)	84.9%
3	503	Solar Water Heater	84.9%
3	504	Low-Flow Showerheads	100.0%
3	505	Hot Water Pipe Insulation	100.0%
3	506	Water Heater Thermostat Setback	100.0%
3	507	Tankless Water Heater	100.0%
3	508	Drain Water Heat Recovery (GFX)	100.0%
3	600	Base Clotheswasher (EF=1.18)	100.0%

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Seg	Measure #	Measure Description	EUI Adjust
3	601	Energy Star CW (EF=2.5)	100.0%
3	602	SEHA CW Tier 2 (EF=3.25)	100.0%
3	800	Base Dishwasher (EF=0.46)	100.0%
3	801	Energy Star DW (EF=0.58)	100.0%
3	900	Conventional Oven	100.0%
3	901	Convection Oven	100.0%
4	180	Base Furnace, 80 AFUE, 80 kbtu	100.0%
4	181	Condensing Furnace, 92 AFUE	100.0%
4	182	Condensing Furnace, 96 AFUE	100.0%
4	194	Integrated Space and Water Heating	100.0%
4	195	ENERGY STAR New Construction	100.0%
4	196	ENERGY STAR New Construction Plus	100.0%
4	500	Base 40 gal. Water Heating (EF=0.54)	100.0%
4	501	HE Water Heater (EF=0.63)	100.0%
4	502	HE Water Heater (EF=0.70)	100.0%
4	503	Solar Water Heater	100.0%
4	507	Tankless Water Heater	100.0%
4	508	Drain Water Heat Recovery (GFX)	100.0%
4	600	Base Clotheswasher (EF=1.18)	100.0%
4	601	Energy Star CW (EF=2.5)	100.0%
4	602	SEHA CW Tier 2 (EF=3.25)	100.0%
4	800	Base Dishwasher (EF=0.46)	100.0%
4	801	Energy Star DW (EF=0.58)	100.0%
4	900	Conventional Oven	100.0%
4	901	Convection Oven	100.0%
5	180	Base Furnace, 80 AFUE, 80 kbtu	100.0%
5	181	Condensing Furnace, 92 AFUE	100.0%
5	182	Condensing Furnace, 96 AFUE	100.0%
5	194	Integrated Space and Water Heating	100.0%
5	195	ENERGY STAR New Construction	100.0%
5	196	ENERGY STAR New Construction Plus	100.0%
5	500	Base 40 gal. Water Heating (EF=0.54)	100.0%
5	501	HE Water Heater (EF=0.63)	100.0%
5	502	HE Water Heater (EF=0.70)	100.0%

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Seg	Measure #	Measure Description	EUI Adjust
5	503	Solar Water Heater	100.0%
5	507	Tankless Water Heater	100.0%
5	508	Drain Water Heat Recovery (GFX)	100.0%
5	600	Base Clotheswasher (EF=1.18)	100.0%
5	601	Energy Star CW (EF=2.5)	100.0%
5	602	SEHA CW Tier 2 (EF=3.25)	100.0%
5	800	Base Dishwasher (EF=0.46)	100.0%
5	801	Energy Star DW (EF=0.58)	100.0%
5	900	Conventional Oven	100.0%
5	901	Convection Oven	100.0%
6	180	Base Furnace, 80 AFUE, 80 kbtu	100.0%
6	181	Condensing Furnace, 92 AFUE	100.0%
6	182	Condensing Furnace, 96 AFUE	100.0%
6	194	Integrated Space and Water Heating	100.0%
6	195	Natural Choice / ENERGY STAR New Man. Housing	100.0%
6	500	Base 40 gal. Water Heating (EF=0.54)	100.0%
6	501	HE Water Heater (EF=0.63)	100.0%
6	502	HE Water Heater (EF=0.70)	100.0%
6	503	Solar Water Heater	100.0%
6	507	Tankless Water Heater	100.0%
6	508	Drain Water Heat Recovery (GFX)	100.0%
6	600	Base Clotheswasher (EF=1.18)	100.0%
6	601	Energy Star CW (EF=2.5)	100.0%
6	602	SEHA CW Tier 2 (EF=3.25)	100.0%
6	800	Base Dishwasher (EF=0.46)	100.0%
6	801	Energy Star DW (EF=0.58)	100.0%
6	900	Conventional Oven	100.0%
6	901	Convection Oven	100.0%

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**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

**Feasibility Factor(Percent)**

Seg	Measure #	Measure Description	Feasibility Factor
1	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
1	181	Condensing Furnace, 92 AFUE	0.40
1	182	Condensing Furnace, 96 AFUE	0.40
1	183	ENERGY STAR Programmable Thermostat	0.80
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	0.67
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	0.33
1	186	Floor R-0 to R-19 Insulation-Batts	0.33
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	0.50
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	0.90
1	189	Duct Repair and Sealing	0.50
1	190	Duct Insulation (.6)	0.50
1	191	Furnace Diagnostic Testing, Repair and Maintenance	1.00
1	192	Windows (high efficiency / ENERGY STAR+)	0.75
1	193	Addition of Attic and Crawlspace Ventilation	0.50
1	194	Integrated Space and Water Heating	0.10
1	500	Base 40 gal. Water Heating (EF=0.54)	1.00
1	501	HE Water Heater (EF=0.63)	0.45
1	502	HE Water Heater (EF=0.70)	0.45
1	503	Solar Water Heater	0.33
1	504	Low-Flow Showerheads	0.95
1	505	Hot Water Pipe Insulation	0.75
1	506	Water Heater Thermostat Setback	1.00
1	507	Tankless Water Heater	0.25
1	508	Drain Water Heat Recovery (GFX)	0.25
1	600	Base Clotheswasher (EF=1.18)	1.00
1	601	Energy Star CW (EF=2.5)	1.00
1	602	SEHA CW Tier 2 (EF=3.25)	1.00
1	800	Base Dishwasher (EF=0.46)	1.00
1	801	Energy Star DW (EF=0.58)	1.00

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Feasibility Factor
1	900	Conventional Oven	1.00
1	901	Convection Oven	1.00
2	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
2	181	Condensing Furnace, 92 AFUE	0.40
2	182	Condensing Furnace, 96 AFUE	0.40
2	183	ENERGY STAR Programmable Thermostat	0.80
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	0.67
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	0.33
2	186	Floor R-0 to R-19 Insulation-Batts	0.33
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	0.50
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	0.90
2	189	Duct Repair and Sealing	0.50
2	190	Duct Insulation (.6)	0.50
2	191	Furnace Diagnostic Testing, Repair and Maintenance	1.00
2	192	Windows (high efficiency / ENERGY STAR+)	0.75
2	193	Addition of Attic and Crawlspace Ventilation	0.50
2	194	Integrated Space and Water Heating	0.10
2	500	Base 40 gal. Water Heating (EF=0.54)	1.00
2	501	HE Water Heater (EF=0.63)	0.45
2	502	HE Water Heater (EF=0.70)	0.45
2	503	Solar Water Heater	0.33
2	504	Low-Flow Showerheads	0.95
2	505	Hot Water Pipe Insulation	0.75
2	506	Water Heater Thermostat Setback	1.00
2	507	Tankless Water Heater	0.25
2	508	Drain Water Heat Recovery (GFX)	0.25
2	550	Base Boiler	1.00
2	551	High Efficiency Condensing Boiler	0.50
2	600	Base Clotheswasher (EF=1.18)	1.00
2	601	Energy Star CW (EF=2.5)	1.00

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Seg	Measure #	Measure Description	Feasibility Factor
2	602	SEHA CW Tier 2 (EF=3.25)	1.00
2	800	Base Dishwasher (EF=0.46)	1.00
2	801	Energy Star DW (EF=0.58)	1.00
2	900	Conventional Oven	1.00
2	901	Convection Oven	1.00
3	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
3	181	Condensing Furnace, 92 AFUE	0.40
3	182	Condensing Furnace, 96 AFUE	0.40
3	183	ENERGY STAR Programmable Thermostat	0.80
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	0.67
3	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	0.33
3	186	Floor R-0 to R-19 Insulation-Batts	0.33
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	0.50
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	0.90
3	189	Duct Repair and Sealing	0.50
3	190	Duct Insulation (.6)	0.50
3	191	Furnace Diagnostic Testing, Repair and Maintenance	1.00
3	192	Windows (high efficiency / ENERGY STAR+)	0.75
3	193	Addition of Attic and Crawlspace Ventilation	0.50
3	194	Integrated Space and Water Heating	0.10
3	500	Base 40 gal. Water Heating (EF=0.54)	1.00
3	501	HE Water Heater (EF=0.63)	0.45
3	502	HE Water Heater (EF=0.70)	0.45
3	503	Solar Water Heater	0.33
3	504	Low-Flow Showerheads	0.95
3	505	Hot Water Pipe Insulation	0.75
3	506	Water Heater Thermostat Setback	1.00
3	507	Tankless Water Heater	0.25
3	508	Drain Water Heat Recovery (GFX)	0.25
3	600	Base Clotheswasher (EF=1.18)	1.00

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Seg	Measure #	Measure Description	Feasibility Factor
3	601	Energy Star CW (EF=2.5)	1.00
3	602	SEHA CW Tier 2 (EF=3.25)	1.00
3	800	Base Dishwasher (EF=0.46)	1.00
3	801	Energy Star DW (EF=0.58)	1.00
3	900	Conventional Oven	1.00
3	901	Convection Oven	1.00
4	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
4	181	Condensing Furnace, 92 AFUE	0.40
4	182	Condensing Furnace, 96 AFUE	0.40
4	194	Integrated Space and Water Heating	0.20
4	195	ENERGY STAR New Construction	1.00
4	196	ENERGY STAR New Construction Plus	1.00
4	500	Base 40 gal. Water Heating (EF=0.54)	1.00
4	501	HE Water Heater (EF=0.63)	0.40
4	502	HE Water Heater (EF=0.70)	0.40
4	503	Solar Water Heater	0.25
4	507	Tankless Water Heater	0.50
4	508	Drain Water Heat Recovery (GFX)	0.50
4	600	Base Clotheswasher (EF=1.18)	1.00
4	601	Energy Star CW (EF=2.5)	1.00
4	602	SEHA CW Tier 2 (EF=3.25)	1.00
4	800	Base Dishwasher (EF=0.46)	1.00
4	801	Energy Star DW (EF=0.58)	1.00
4	900	Conventional Oven	1.00
4	901	Convection Oven	1.00
5	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
5	181	Condensing Furnace, 92 AFUE	0.40
5	182	Condensing Furnace, 96 AFUE	0.40
5	194	Integrated Space and Water Heating	0.20
5	195	ENERGY STAR New Construction	1.00
5	196	ENERGY STAR New Construction Plus	1.00
5	500	Base 40 gal. Water Heating (EF=0.54)	1.00
5	501	HE Water Heater (EF=0.63)	0.40
5	502	HE Water Heater (EF=0.70)	0.40



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**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Feasibility Factor
5	503	Solar Water Heater	0.25
5	507	Tankless Water Heater	0.50
5	508	Drain Water Heat Recovery (GFX)	0.50
5	600	Base Clotheswasher (EF=1.18)	1.00
5	601	Energy Star CW (EF=2.5)	1.00
5	602	SEHA CW Tier 2 (EF=3.25)	1.00
5	800	Base Dishwasher (EF=0.46)	1.00
5	801	Energy Star DW (EF=0.58)	1.00
5	900	Conventional Oven	1.00
5	901	Convection Oven	1.00
6	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
6	181	Condensing Furnace, 92 AFUE	0.40
6	182	Condensing Furnace, 96 AFUE	0.40
6	194	Integrated Space and Water Heating	0.20
6	195	Natural Choice / ENERGY STAR New Man. Housing	1.00
6	500	Base 40 gal. Water Heating (EF=0.54)	1.00
6	501	HE Water Heater (EF=0.63)	0.40
6	502	HE Water Heater (EF=0.70)	0.40
6	503	Solar Water Heater	0.25
6	507	Tankless Water Heater	0.50
6	508	Drain Water Heat Recovery (GFX)	0.50
6	600	Base Clotheswasher (EF=1.18)	1.00
6	601	Energy Star CW (EF=2.5)	1.00
6	602	SEHA CW Tier 2 (EF=3.25)	1.00
6	800	Base Dishwasher (EF=0.46)	1.00
6	801	Energy Star DW (EF=0.58)	1.00
6	900	Conventional Oven	1.00
6	901	Convection Oven	1.00

## Incomplete Factor(Percent)

Seg	Measure #	Measure Description	Incomplete Factor
1	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
1	181	Condensing Furnace, 92 AFUE	0.90
1	182	Condensing Furnace, 96 AFUE	0.90
1	183	ENERGY STAR Programmable Thermostat	0.50
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	0.18
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	0.69
1	186	Floor R-0 to R-19 Insulation-Batts	0.80
1	187	Wall 2x4 R-0 to Blow-in R-13 Insulation (.86)	0.50
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	0.40
1	189	Duct Repair and Sealing	0.72
1	190	Duct Insulation (.6)	0.25
1	191	Furnace Diagnostic Testing, Repair and Maintenance	0.30
1	192	Windows (high efficiency / ENERGY STAR+)	0.99
1	193	Addition of Attic and Crawlspace Ventilation	1.00
1	194	Integrated Space and Water Heating	1.00
1	500	Base 40 gal. Water Heating (EF=0.54)	1.00
1	501	HE Water Heater (EF=0.63)	0.88
1	502	HE Water Heater (EF=0.70)	0.88
1	503	Solar Water Heater	0.99
1	504	Low-Flow Showerheads	0.30
1	505	Hot Water Pipe Insulation	0.80
1	506	Water Heater Thermostat Setback	1.00
1	507	Tankless Water Heater	1.00
1	508	Drain Water Heat Recovery (GFX)	1.00
1	600	Base Clotheswasher (EF=1.18)	1.00
1	601	Energy Star CW (EF=2.5)	0.97
1	602	SEHA CW Tier 2 (EF=3.25)	0.97

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**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	Measure Description	Incomplete Factor
1	800	Base Dishwasher (EF=0.46)	1.00
1	801	Energy Star DW (EF=0.58)	0.92
1	900	Conventional Oven	1.00
1	901	Convection Oven	1.00
2	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
2	181	Condensing Furnace, 92 AFUE	0.90
2	182	Condensing Furnace, 96 AFUE	0.90
2	183	ENERGY STAR Programmable Thermostat	0.10
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	1.00
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	0.68
2	186	Floor R-0 to R-19 Insulation-Batts	1.00
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	1.00
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	0.20
2	189	Duct Repair and Sealing	0.36
2	190	Duct Insulation (.6)	1.00
2	191	Furnace Diagnostic Testing, Repair and Maintenance	0.30
2	192	Windows (high efficiency / ENERGY STAR+)	1.00
2	193	Addition of Attic and Crawlspace Ventilation	1.00
2	194	Integrated Space and Water Heating	1.00
2	500	Base 40 gal. Water Heating (EF=0.54)	1.00
2	501	HE Water Heater (EF=0.63)	0.88
2	502	HE Water Heater (EF=0.70)	0.88
2	503	Solar Water Heater	0.99
2	504	Low-Flow Showerheads	0.30
2	505	Hot Water Pipe Insulation	0.80
2	506	Water Heater Thermostat Setback	1.00
2	507	Tankless Water Heater	1.00
2	508	Drain Water Heat Recovery (GFX)	1.00

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
2	550	Base Boiler	1.00
2	551	High Efficiency Condensing Boiler	1.00
2	600	Base Clotheswasher (EF=1.18)	1.00
2	601	Energy Star CW (EF=2.5)	0.97
2	602	SEHA CW Tier 2 (EF=3.25)	0.97
2	800	Base Dishwasher (EF=0.46)	1.00
2	801	Energy Star DW (EF=0.58)	0.92
2	900	Conventional Oven	1.00
2	901	Convection Oven	1.00
3	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
3	181	Condensing Furnace, 92 AFUE	0.90
3	182	Condensing Furnace, 96 AFUE	0.90
3	183	ENERGY STAR Programmable Thermostat	0.65
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	0.18
3	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	0.69
3	186	Floor R-0 to R-19 Insulation-Batts	1.00
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	0.60
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	0.40
3	189	Duct Repair and Sealing	0.72
3	190	Duct Insulation (.6)	0.25
3	191	Furnace Diagnostic Testing, Repair and Maintenance	0.30
3	192	Windows (high efficiency / ENERGY STAR+)	1.00
3	193	Addition of Attic and Crawlspace Ventilation	1.00
3	194	Integrated Space and Water Heating	1.00
3	500	Base 40 gal. Water Heating (EF=0.54)	1.00
3	501	HE Water Heater (EF=0.63)	0.88
3	502	HE Water Heater (EF=0.70)	0.88
3	503	Solar Water Heater	0.99

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
3	504	Low-Flow Showerheads	0.30
3	505	Hot Water Pipe Insulation	0.80
3	506	Water Heater Thermostat Setback	1.00
3	507	Tankless Water Heater	1.00
3	508	Drain Water Heat Recovery (GFX)	1.00
3	600	Base Clotheswasher (EF=1.18)	1.00
3	601	Energy Star CW (EF=2.5)	0.97
3	602	SEHA CW Tier 2 (EF=3.25)	0.97
3	800	Base Dishwasher (EF=0.46)	1.00
3	801	Energy Star DW (EF=0.58)	0.92
3	900	Conventional Oven	1.00
3	901	Convection Oven	1.00
4	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
4	181	Condensing Furnace, 92 AFUE	0.90
4	182	Condensing Furnace, 96 AFUE	0.90
4	194	Integrated Space and Water Heating	1.00
4	195	ENERGY STAR New Construction	1.00
4	196	ENERGY STAR New Construction Plus	1.00
4	500	Base 40 gal. Water Heating (EF=0.54)	1.00
4	501	HE Water Heater (EF=0.63)	0.88
4	502	HE Water Heater (EF=0.70)	0.88
4	503	Solar Water Heater	0.99
4	507	Tankless Water Heater	1.00
4	508	Drain Water Heat Recovery (GFX)	1.00
4	600	Base Clotheswasher (EF=1.18)	1.00
4	601	Energy Star CW (EF=2.5)	0.97
4	602	SEHA CW Tier 2 (EF=3.25)	0.97
4	800	Base Dishwasher (EF=0.46)	1.00
4	801	Energy Star DW (EF=0.58)	0.92
4	900	Conventional Oven	1.00
4	901	Convection Oven	1.00
5	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
5	181	Condensing Furnace, 92 AFUE	0.90
5	182	Condensing Furnace, 96 AFUE	0.90

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
5	194	Integrated Space and Water Heating	1.00
5	195	ENERGY STAR New Construction	1.00
5	196	ENERGY STAR New Construction Plus	1.00
5	500	Base 40 gal. Water Heating (EF=0.54)	1.00
5	501	HE Water Heater (EF=0.63)	0.88
5	502	HE Water Heater (EF=0.70)	0.88
5	503	Solar Water Heater	0.99
5	507	Tankless Water Heater	1.00
5	508	Drain Water Heat Recovery (GFX)	1.00
5	600	Base Clotheswasher (EF=1.18)	1.00
5	601	Energy Star CW (EF=2.5)	0.97
5	602	SEHA CW Tier 2 (EF=3.25)	0.97
5	800	Base Dishwasher (EF=0.46)	1.00
5	801	Energy Star DW (EF=0.58)	0.92
5	900	Conventional Oven	1.00
5	901	Convection Oven	1.00
6	180	Base Furnace, 80 AFUE, 80 kbtu	1.00
6	181	Condensing Furnace, 92 AFUE	0.90
6	182	Condensing Furnace, 96 AFUE	0.90
6	194	Integrated Space and Water Heating	1.00
6	195	Natural Choice / ENERGY STAR New Man. Housing	1.00
6	500	Base 40 gal. Water Heating (EF=0.54)	1.00
6	501	HE Water Heater (EF=0.63)	0.88
6	502	HE Water Heater (EF=0.70)	0.88
6	503	Solar Water Heater	0.99
6	507	Tankless Water Heater	1.00
6	508	Drain Water Heat Recovery (GFX)	1.00
6	600	Base Clotheswasher (EF=1.18)	1.00
6	601	Energy Star CW (EF=2.5)	0.97
6	602	SEHA CW Tier 2 (EF=3.25)	0.97
6	800	Base Dishwasher (EF=0.46)	1.00
6	801	Energy Star DW (EF=0.58)	0.92

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Incomplete Factor
6	900	Conventional Oven	1.00
6	901	Convection Oven	1.00

Technology Saturation (units per dwelling unit; e.g., square feet of ceiling per home, linear feet of ductwork per home)

Seg	Measure #	<i>B.1.1 Measure Description</i>	Tech Saturation
1	180	Base Furnace, 80 AFUE, 80 kbtu	1
1	181	Condensing Furnace, 92 AFUE	1
1	182	Condensing Furnace, 96 AFUE	1
1	183	ENERGY STAR Programmable Thermostat	1
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	945
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	945
1	186	Floor R-0 to R-19 Insulation-Batts	1350
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	1011
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	1
1	189	Duct Repair and Sealing	1
1	190	Duct Insulation (.6)	1
1	191	Furnace Diagnostic Testing, Repair and Maintenance	1
1	192	Windows (high efficiency / ENERGY STAR+)	149
1	193	Addition of Attic and Crawlspace Ventilation	1
1	194	Integrated Space and Water Heating	1
1	500	Base 40 gal. Water Heating (EF=0.54)	1
1	501	HE Water Heater (EF=0.63)	1
1	502	HE Water Heater (EF=0.70)	1
1	503	Solar Water Heater	1

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Seg	Measure #	B.1.1 Measure Description	Tech Saturation
1	504	Low-Flow Showerheads	1
1	505	Hot Water Pipe Insulation	1
1	506	Water Heater Thermostat Setback	1
1	507	Tankless Water Heater	1
1	508	Drain Water Heat Recovery (GFX)	1
1	600	Base Clotheswasher (EF=1.18)	1
1	601	Energy Star CW (EF=2.5)	1
1	602	SEHA CW Tier 2 (EF=3.25)	1
1	800	Base Dishwasher (EF=0.46)	1
1	801	Energy Star DW (EF=0.58)	1
1	900	Conventional Oven	1
1	901	Convection Oven	1
2	180	Base Furnace, 80 AFUE, 80 kbtu	1
2	181	Condensing Furnace, 92 AFUE	1
2	182	Condensing Furnace, 96 AFUE	1
2	183	ENERGY STAR Programmable Thermostat	1
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	680
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	680
2	186	Floor R-0 to R-19 Insulation-Batts	680
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	316.586081
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	1
2	189	Duct Repair and Sealing	1
2	190	Duct Insulation (.6)	1
2	191	Furnace Diagnostic Testing, Repair and Maintenance	1
2	192	Windows (high efficiency / ENERGY STAR+)	70.989011
2	193	Addition of Attic and Crawlspace Ventilation	1
2	194	Integrated Space and Water Heating	1



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**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	<i>B.1.1 Measure Description</i>	Tech Saturation
2	500	Base 40 gal. Water Heating (EF=0.54)	1
2	501	HE Water Heater (EF=0.63)	1
2	502	HE Water Heater (EF=0.70)	1
2	503	Solar Water Heater	1
2	504	Low-Flow Showerheads	1
2	505	Hot Water Pipe Insulation	1
2	506	Water Heater Thermostat Setback	1
2	507	Tankless Water Heater	1
2	508	Drain Water Heat Recovery (GFX)	1
2	550	Base Boiler	1
2	551	High Efficiency Condensing Boiler	1
2	600	Base Clotheswasher (EF=1.18)	1
2	601	Energy Star CW (EF=2.5)	1
2	602	SEHA CW Tier 2 (EF=3.25)	1
2	800	Base Dishwasher (EF=0.46)	1
2	801	Energy Star DW (EF=0.58)	1
2	900	Conventional Oven	1
2	901	Convection Oven	1
3	180	Base Furnace, 80 AFUE, 80 kbtu	1
3	181	Condensing Furnace, 92 AFUE	1
3	182	Condensing Furnace, 96 AFUE	1
3	183	ENERGY STAR Programmable Thermostat	1
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	805
3	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	805
3	186	Floor R-0 to R-19 Insulation-Batts	805
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	913.030303
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	1
3	189	Duct Repair and Sealing	1
3	190	Duct Insulation (.6)	1
3	191	Furnace Diagnostic Testing, Repair and Maintenance	1

Seg	Measure #	<i>B.1.1 Measure Description</i>	Tech Saturation
3	192	Windows (high efficiency / ENERGY STAR+)	101.060606
3	193	Addition of Attic and Crawlspace Ventilation	1
3	194	Integrated Space and Water Heating	1
3	500	Base 40 gal. Water Heating (EF=0.54)	1
3	501	HE Water Heater (EF=0.63)	1
3	502	HE Water Heater (EF=0.70)	1
3	503	Solar Water Heater	1
3	504	Low-Flow Showerheads	1
3	505	Hot Water Pipe Insulation	1
3	506	Water Heater Thermostat Setback	1
3	507	Tankless Water Heater	1
3	508	Drain Water Heat Recovery (GFX)	1
3	600	Base Clotheswasher (EF=1.18)	1
3	601	Energy Star CW (EF=2.5)	1
3	602	SEHA CW Tier 2 (EF=3.25)	1
3	800	Base Dishwasher (EF=0.46)	1
3	801	Energy Star DW (EF=0.58)	1
3	900	Conventional Oven	1
3	901	Convection Oven	1
4	180	Base Furnace, 80 AFUE, 80 kbtu	1
4	181	Condensing Furnace, 92 AFUE	1
4	182	Condensing Furnace, 96 AFUE	1
4	194	Integrated Space and Water Heating	1
4	195	ENERGY STAR New Construction	1
4	196	ENERGY STAR New Construction Plus	1
4	500	Base 40 gal. Water Heating (EF=0.54)	1
4	501	HE Water Heater (EF=0.63)	1
4	502	HE Water Heater (EF=0.70)	1
4	503	Solar Water Heater	1
4	507	Tankless Water Heater	1

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**RESIDENTIAL GAS RESULTS AND DATA INPUTS**

Seg	Measure #	<i>B.1.1 Measure Description</i>	Tech Saturation
4	508	Drain Water Heat Recovery (GFX)	1
4	600	Base Clotheswasher (EF=1.18)	1
4	601	Energy Star CW (EF=2.5)	1
4	602	SEHA CW Tier 2 (EF=3.25)	1
4	800	Base Dishwasher (EF=0.46)	1
4	801	Energy Star DW (EF=0.58)	1
4	900	Conventional Oven	1
4	901	Convection Oven	1
5	180	Base Furnace, 80 AFUE, 80 kbtu	1
5	181	Condensing Furnace, 92 AFUE	1
5	182	Condensing Furnace, 96 AFUE	1
5	194	Integrated Space and Water Heating	1
5	195	ENERGY STAR New Construction	1
5	196	ENERGY STAR New Construction Plus	1
5	500	Base 40 gal. Water Heating (EF=0.54)	1
5	501	HE Water Heater (EF=0.63)	1
5	502	HE Water Heater (EF=0.70)	1
5	503	Solar Water Heater	1
5	507	Tankless Water Heater	1
5	508	Drain Water Heat Recovery (GFX)	1
5	600	Base Clotheswasher (EF=1.18)	1
5	601	Energy Star CW (EF=2.5)	1
5	602	SEHA CW Tier 2 (EF=3.25)	1
5	800	Base Dishwasher (EF=0.46)	1
5	801	Energy Star DW (EF=0.58)	1
5	900	Conventional Oven	1
5	901	Convection Oven	1
6	180	Base Furnace, 80 AFUE, 80 kbtu	1
6	181	Condensing Furnace, 92 AFUE	1
6	182	Condensing Furnace, 96 AFUE	1
6	194	Integrated Space and Water Heating	1

Seg	Measure #	<i>B.1.1 Measure Description</i>	Tech Saturation
6	195	Natural Choice / ENERGY STAR New Man. Housing	1
6	500	Base 40 gal. Water Heating (EF=0.54)	1
6	501	HE Water Heater (EF=0.63)	1
6	502	HE Water Heater (EF=0.70)	1
6	503	Solar Water Heater	1
6	507	Tankless Water Heater	1
6	508	Drain Water Heat Recovery (GFX)	1
6	600	Base Clotheswasher (EF=1.18)	1
6	601	Energy Star CW (EF=2.5)	1
6	602	SEHA CW Tier 2 (EF=3.25)	1
6	800	Base Dishwasher (EF=0.46)	1
6	801	Energy Star DW (EF=0.58)	1
6	900	Conventional Oven	1
6	901	Convection Oven	1

APPENDIX B RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgml	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	180	Base Furnace, 80 AFUE, 100 kbtu	PSE Gas Existing	226,584,685	0	0	0%	N/A	\$0.000	Space Heat	N/A	N/A
1	191	Furnace Diagnostic Testing, Repair and Maintenance	PSE Gas Existing	212,838,193	13,746,492	13,746,492	6%	\$0.132	\$0.152	Space Heat	Level A	Level A
1	183	ENERGY STAR Programmable Thermostat	PSE Gas Existing	207,572,093	5,266,100	19,012,591	8%	\$0.250	\$0.288	Space Heat	Level A	Level A
1	193	Addition of Attic and Crawlspace Ventilation	PSE Gas Existing	197,193,489	10,378,605	29,391,196	13%	\$0.175	\$0.202	Space Heat	Level A	Level A
1	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	PSE Gas Existing	189,978,847	7,214,642	36,605,838	16%	\$0.351	\$0.403	Space Heat	Level B	Level B
1	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Gas Existing	180,795,632	9,183,215	45,789,053	20%	\$0.680	\$0.782	Space Heat	Level D	Level D
1	189	Duct Testing and Sealing	PSE Gas Existing	174,099,497	6,696,134	52,485,187	23%	\$1.017	\$1.170	Space Heat	Level E	Level E
1	181	Condensing Furnace, 92 AFUE	PSE Gas Existing	165,816,349	8,283,148	60,768,335	27%	\$0.945	\$1.087	Space Heat	Level D	Level E
1	182	Condensing Furnace, 96 AFUE	PSE Gas Existing	155,698,742	10,117,608	70,885,943	31%	\$1.045	\$1.202	Space Heat	Level E	Level E
1	190	Duct Insulation (.6)	PSE Gas Existing	154,926,937	771,805	71,657,748	32%	\$1.367	\$1.572	Space Heat	Level E	Level E
1	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	PSE Gas Existing	151,886,113	3,040,824	74,698,572	33%	\$1.570	\$1.806	Space Heat	Level E	Level E

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	188	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Gas Existing	148,285,099	3,601,014	78,299,586	35%	\$3.198	\$3.678	Space Heat	Level E	Level E
1	186	Floor R-0 to R-19 Insulation-Batts	PSE Gas Existing	146,083,919	2,201,180	80,500,766	36%	\$3.343	\$3.844	Space Heat	Level E	Level E
1	194	Integrated Space and Water Heating	PSE Gas Existing	143,542,059	2,541,860	83,042,626	37%	\$4.827	\$5.551	Space Heat	Level E	Level E
1	192	Windows (high efficiency / ENERGY STAR+)	PSE Gas Existing	136,087,836	7,454,223	90,496,849	40%	\$7.976	\$9.172	Space Heat	Level E	Level E
1	500	Base 40 gal. Water Heating (EF=0.54)	PSE Gas Existing	76,723,467	0	0	0%	N/A	\$0.000	Water Heat	N/A	N/A
1	505	Hot Water Pipe Insulation	PSE Gas Existing	74,581,580	2,141,886	2,141,886	3%	\$0.069	\$0.080	Water Heat	Level A	Level A
1	504	Low-Flow Showerheads	PSE Gas Existing	72,138,391	2,443,190	4,585,076	6%	\$0.099	\$0.114	Water Heat	Level A	Level A
1	502	HE Water Heater (EF=0.70)	PSE Gas Existing	65,424,688	6,713,702	11,298,778	15%	\$0.348	\$0.401	Water Heat	Level B	Level B
1	501	HE Water Heater (EF=0.63)	PSE Gas Existing	61,658,965	3,765,723	15,064,502	20%	\$0.413	\$0.475	Water Heat	Level B	Level C
1	508	Drain Water Heat Recovery (GFX)	PSE Gas Existing	55,864,772	5,794,194	20,858,695	27%	\$0.526	\$0.604	Water Heat	Level C	Level C
1	506	Water Heater Thermostat Setback	PSE Gas Existing	53,487,547	2,377,224	23,235,919	30%	\$1.256	\$1.444	Water Heat	Level E	Level E

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	507	Tankless Water Heater	PSE Gas Existing	48,921,537	4,566,010	27,801,929	36%	\$1.506	\$1.731	Water Heat	Level E	Level E
1	503	Solar Water Heater	PSE Gas Existing	34,406,502	14,515,035	42,316,964	55%	\$1.919	\$2.207	Water Heat	Level E	Level E
1	600	Base Clotheswasher (EF=1.18)	PSE Gas Existing	11,522,924	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
1	602	Energy Star Vertical-Axis Clothes Washer	PSE Gas Existing	4,265,206	7,257,718	7,257,718	63%	\$1.385	\$1.592	Appliances	Level E	Level E
1	601	Horizontal-Axis Clothes Washer	PSE Gas Existing	2,045,579	2,219,627	9,477,345	82%	\$5.226	\$6.010	Appliances	Level E	Level E
1	800	Base Dishwasher (EF=0.46)	PSE Gas Existing	6,913,754	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
1	801	Energy Star DW (EF=0.58)	PSE Gas Existing	5,578,425	1,335,329	1,335,329	19%	\$4.745	\$5.457	Appliances	Level E	Level E
1	900	Base Conventional Oven	PSE Gas Existing	18,425,505	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
1	901	Convection Oven	PSE Gas Existing	15,492,908	2,932,596	2,932,596	16%	\$1.586	\$1.823	Appliances	Level E	Level E
2	180	Base Furnace, 80 AFUE, 60 kbtu	PSE Gas Existing	63,870,216	0	0	0%	N/A	\$0.000	Space Heat	N/A	N/A
2	183	ENERGY STAR Programmable Thermostat	PSE Gas Existing	63,546,139	324,077	324,077	1%	\$0.327	\$0.376	Space Heat	Level B	Level B

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End-Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Gas Existing	56,207,180	7,338,960	7,663,037	12%	\$0.214	\$0.246	Space Heat	Level A	Level A
2	193	Addition of Attic and Crawlspace Ventilation	PSE Gas Existing	54,970,622	1,236,558	8,899,595	14%	\$0.591	\$0.680	Space Heat	Level C	Level D
2	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	PSE Gas Existing	49,731,844	5,238,777	14,138,372	22%	\$0.774	\$0.891	Space Heat	Level D	Level D
2	188	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Gas Existing	48,274,962	1,456,882	15,595,254	24%	\$1.188	\$1.366	Space Heat	Level E	Level E
2	182	Condensing Furnace, 96 AFUE	PSE Gas Existing	45,329,371	2,945,591	18,540,845	29%	\$1.161	\$1.335	Space Heat	Level E	Level E
2	181	Condensing Furnace, 92 AFUE	PSE Gas Existing	43,172,731	2,156,640	20,697,485	32%	\$1.279	\$1.471	Space Heat	Level E	Level E
2	191	Furnace Diagnostic Testing, Repair and Maintenance	PSE Gas Existing	42,715,070	457,661	21,155,147	33%	\$1.595	\$1.834	Space Heat	Level E	Level E
2	186	Floor R-0 to R-19 Insulation-Batts	PSE Gas Existing	41,475,797	1,239,273	22,394,419	35%	\$1.501	\$1.726	Space Heat	Level E	Level E
2	192	Windows (high efficiency / ENERGY STAR+)	PSE Gas Existing	38,093,066	3,382,732	25,777,151	40%	\$3.389	\$3.897	Space Heat	Level E	Level E
2	185	Ceiling R-19 to R-38 Insulation Blown in (.73)	PSE Gas Existing	37,903,674	189,391	25,966,542	41%	\$7.187	\$8.265	Space Heat	Level E	Level E
2	194	Integrated Space and Water Heating	PSE Gas Existing	37,380,604	523,071	26,489,613	41%	\$9.427	\$10.841	Space Heat	Level E	Level E



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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	189	Duct Testing and Sealing	PSE Gas Existing	37,360,379	20,224	26,509,837	42%	\$67.666	\$77.816	Space Heat	Level E	Level E
2	190	Duct Insulation (6)	PSE Gas Existing	37,360,379	0	26,509,837	42%	N/A	\$0.000	Space Heat	Level E	Level A
2	500	Base 40 gal. Water Heating (EF=0.54)	PSE Gas Existing	26,819,110	0	0	0%	N/A	\$0.000	Water Heat	N/A	N/A
2	505	Hot Water Pipe Insulation	PSE Gas Existing	26,045,482	773,628	773,628	3%	\$0.071	\$0.082	Water Heat	Level A	Level A
2	504	Low-Flow Showerheads	PSE Gas Existing	25,192,268	853,214	1,626,842	6%	\$0.149	\$0.171	Water Heat	Level A	Level A
2	502	HE Water Heater (EF=0.70)	PSE Gas Existing	22,847,700	2,344,568	3,971,411	15%	\$0.520	\$0.598	Water Heat	Level C	Level C
2	501	HE Water Heater (EF=0.63)	PSE Gas Existing	21,532,629	1,315,071	5,286,482	20%	\$0.617	\$0.709	Water Heat	Level C	Level D
2	508	Drain Water Heat Recovery (GFX)	PSE Gas Existing	19,396,455	2,136,173	7,422,655	28%	\$0.743	\$0.855	Water Heat	Level D	Level D
2	506	Water Heater Thermostat Setback	PSE Gas Existing	18,571,074	825,381	8,248,036	31%	\$1.886	\$2.169	Water Heat	Level E	Level E
2	507	Tankless Water Heater	PSE Gas Existing	16,985,739	1,585,336	9,933,372	37%	\$2.262	\$2.601	Water Heat	Level E	Level E
2	503	Solar Water Heater	PSE Gas Existing	11,946,065	5,039,674	14,873,046	55%	\$2.883	\$3.315	Water Heat	Level E	Level E

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End-Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	550	Base Boiler (AFUE = 80%)	PSE Gas Existing	85,249,862	0	0	0%	N/A	\$0.000	Space Heat	N/A	N/A
2	551	High Efficiency Condensing Boiler (AFUE = 90%)	PSE Gas Existing	79,566,538	5,683,324	5,683,324	7%	\$0.779	\$0.896	Space Heat	Level D	Level D
2	600	Base Clotheswasher (EF=1.18)	PSE Gas Existing	4,027,901	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
2	602	Energy Star Vertical-Axis Clothes Washer	PSE Gas Existing	1,490,926	2,536,975	2,536,975	63%	\$2.066	\$2.376	Appliances	Level E	Level E
2	601	Horizontal-Axis Clothes Washer	PSE Gas Existing	715,043	775,883	3,312,858	82%	\$7.798	\$8.968	Appliances	Level E	Level E
2	800	Base Dishwasher (EF=0.46)	PSE Gas Existing	2,416,741	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
2	801	Energy Star DW (EF=0.58)	PSE Gas Existing	1,949,969	466,772	466,772	19%	\$7.080	\$8.141	Appliances	Level E	Level E
2	900	Base Conventional Oven	PSE Gas Existing	6,635,385	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
2	901	Convection Oven	PSE Gas Existing	3,317,692	3,317,692	3,317,692	50%	\$0.746	\$0.858	Appliances	Level D	Level D
3	180	Base Furnace, 80 AFUE, 80 kbtu	PSE Gas Existing	17,495,333	0	0	0%	N/A	\$0.000	Space Heat	N/A	N/A
3	183	ENERGY STAR Programmable Thermostat	PSE Gas Existing	16,937,770	557,563	557,563	3%	\$0.264	\$0.303	Space Heat	Level A	Level B

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
3	193	Addition of Attic and Crawspace Ventilation	PSE Gas Existing	16,090,881	846,888	1,404,452	8%	\$0.196	\$0.225	Space Heat	Level A	Level A
3	191	Furnace Diagnostic Testing, Repair and Maintenance	PSE Gas Existing	15,467,669	623,212	2,027,664	12%	\$0.250	\$0.288	Space Heat	Level A	Level A
3	188	Comprehensive Shell Air Sealing - Inf. Reduction	PSE Gas Existing	15,168,789	298,880	2,326,543	13%	\$0.509	\$0.585	Space Heat	Level C	Level C
3	186	Floor R-0 to R-19 Insulation-Batts	PSE Gas Existing	14,523,054	645,735	2,972,279	17%	\$0.774	\$0.890	Space Heat	Level D	Level D
3	181	Condensing Furnace, 92 AFUE	PSE Gas Existing	13,832,089	690,965	3,663,243	21%	\$0.913	\$1.050	Space Heat	Level D	Level E
3	182	Condensing Furnace, 96 AFUE	PSE Gas Existing	12,988,097	843,992	4,507,235	26%	\$0.969	\$1.115	Space Heat	Level D	Level E
3	192	Windows (high efficiency / ENERGY STAR+)	PSE Gas Existing	10,572,311	2,415,786	6,923,022	40%	\$1.181	\$1.358	Space Heat	Level E	Level E
3	190	Duct Insulation (6)	PSE Gas Existing	10,529,837	42,475	6,965,496	40%	\$1.474	\$1.695	Space Heat	Level E	Level E
3	184	Ceiling R-0 to R-19 Insulation Blown-in (.71)	PSE Gas Existing	10,386,971	142,866	7,108,362	41%	\$1.504	\$1.729	Space Heat	Level E	Level E
3	185	Ceiling R-19 to R-38 Insulation Blown-in (.73)	PSE Gas Existing	10,210,320	176,651	7,285,013	42%	\$2.293	\$2.637	Space Heat	Level E	Level E
3	194	Integrated Space and Water Heating	PSE Gas Existing	9,837,447	372,873	7,657,886	44%	\$2.823	\$3.247	Space Heat	Level E	Level E

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
3	187	Wall 2x4 R-0 to Blow-In R-13 Insulation (.86)	PSE Gas Existing	9,837,447	0	7,657,886	44%	N/A	\$0.000	Space Heat	Level E	Level A
3	189	Duct Testing and Sealing	PSE Gas Existing	9,837,447	0	7,657,886	44%	N/A	\$0.000	Space Heat	Level E	Level A
3	500	Base 40 gal. Water Heating (EF=0.54)	PSE Gas Existing	4,718,206	0	0	0%	N/A	\$0.000	Water Heat	N/A	N/A
3	505	Hot Water Pipe Insulation	PSE Gas Existing	4,594,536	123,670	123,670	3%	\$0.065	\$0.075	Water Heat	Level A	Level A
3	504	Low-Flow Showerheads	PSE Gas Existing	4,444,025	150,511	274,181	6%	\$0.123	\$0.141	Water Heat	Level A	Level A
3	502	HE Water Heater (EF=0.70)	PSE Gas Existing	4,030,433	413,592	687,773	15%	\$0.429	\$0.494	Water Heat	Level B	Level C
3	501	HE Water Heater (EF=0.63)	PSE Gas Existing	3,798,449	231,984	919,757	19%	\$0.509	\$0.585	Water Heat	Level C	Level C
3	508	Drain Water Heat Recovery (GFX)	PSE Gas Existing	3,458,234	340,215	1,259,973	27%	\$0.679	\$0.781	Water Heat	Level D	Level D
3	507	Tankless Water Heater	PSE Gas Existing	3,163,018	295,215	1,555,188	33%	\$1.768	\$2.033	Water Heat	Level E	Level E
3	503	Solar Water Heater	PSE Gas Existing	2,224,550	938,469	2,493,656	53%	\$2.253	\$2.591	Water Heat	Level E	Level E
3	506	Water Heater Thermostat Setback	PSE Gas Existing	2,129,888	94,662	2,588,318	55%	\$4.307	\$4.954	Water Heat	Level E	Level E

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
3	600	Base Clotheswasher (EF=1.18)	PSE Gas Existing	612,295	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
3	601	Horizontal-Axis Clothes Washer	PSE Gas Existing	293,655	318,640	318,640	52%	\$2.764	\$3.178	Appliances	Level E	Level E
3	602	Energy Star Vertical-Axis Clothes Washer	PSE Gas Existing	108,696	184,959	503,599	82%	\$4.125	\$4.743	Appliances	Level E	Level E
3	800	Base Dishwasher (EF=0.46) - Does this belong in gas?	PSE Gas Existing	472,714	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
3	801	Energy Star DW (EF=0.58)	PSE Gas Existing	381,414	91,300	91,300	19%	\$5.268	\$6.058	Appliances	Level E	Level E
3	900	Base Conventional Oven	PSE Gas Existing	1,328,839	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
3	901	Convection Oven	PSE Gas Existing	1,092,601	236,238	236,238	18%	\$1.586	\$1.823	Appliances	Level E	Level E
4	180	Base Furnace, 80 AFUE, 120 kbtu	PSE Gas New	6,411,964	0	0	0%	N/A	\$0.000	Space Heat	N/A	N/A
4	181	Condensing Furnace, 92 AFUE	PSE Gas New	6,106,902	305,063	305,063	5%	\$0.724	\$0.833	Space Heat	Level D	Level D
4	182	Condensing Furnace, 96 AFUE	PSE Gas New	5,734,277	372,625	677,687	11%	\$0.870	\$1.001	Space Heat	Level D	Level E
4	194	Integrated Space and Water Heating	PSE Gas New	5,453,304	280,974	958,661	15%	\$2.442	\$2.808	Space Heat	Level E	Level E

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
4	195	ENERGY STAR New Construction	PSE Gas New	3,817,312	1,635,991	2,594,652	40%	\$1.405	\$1.615	Space Heat	Level E	Level E
4	196	ENERGY STAR New Construction Plus	PSE Gas New	2,290,387	1,526,925	4,121,577	64%	\$2.508	\$2.885	Space Heat	Level E	Level E
4	500	Base 40 gal. Water Heating (EF=0.54)	PSE Gas New	3,054,996	0	0	0%	N/A	\$0.000	Water Heat	N/A	N/A
4	502	HE Water Heater (EF=0.70)	PSE Gas New	2,802,268	252,728	252,728	8%	\$0.270	\$0.311	Water Heat	Level A	Level B
4	501	HE Water Heater (EF=0.63)	PSE Gas New	2,658,896	143,372	396,100	13%	\$0.317	\$0.364	Water Heat	Level B	Level B
4	508	Drain Water Heat Recovery (GFX)	PSE Gas New	2,243,347	415,549	811,649	27%	\$0.481	\$0.553	Water Heat	Level C	Level C
4	507	Tankless Water Heater	PSE Gas New	1,860,337	383,010	1,194,660	39%	\$1.178	\$1.355	Water Heat	Level E	Level E
4	503	Solar Water Heater	PSE Gas New	1,442,183	418,153	1,612,813	53%	\$1.656	\$1.905	Water Heat	Level E	Level E
4	600	Base Clotheswasher (EF=1.18)	PSE Gas New	433,333	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
4	602	Energy Star Vertical-Axis Clothes Washer	PSE Gas New	160,398	272,935	272,935	63%	\$1.208	\$1.390	Appliances	Level E	Level E
4	601	Horizontal-Axis Clothes Washer	PSE Gas New	76,926	83,472	356,406	82%	\$4.561	\$5.245	Appliances	Level E	Level E

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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
4	800	Base Dishwasher (EF=0.46)	PSE Gas New	260,000	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
4	801	Energy Star DW (EF=0.58)	PSE Gas New	209,783	50,217	50,217	19%	\$4.141	\$4.762	Appliances	Level E	Level E
4	900	Base Conventional Oven	PSE Gas New	495,213	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
4	901	Convection Oven	PSE Gas New	406,543	88,670	88,670	18%	\$1.409	\$1.621	Appliances	Level E	Level E
5	180	Base Furnace, 80 AFUE, 80 kbtu	PSE Gas New	1,866,548	0	0	0%	N/A	\$0.000	Space Heat	N/A	N/A
5	181	Condensing Furnace, 92 AFUE	PSE Gas New	1,777,743	88,805	88,805	5%	\$1.004	\$1.154	Space Heat	Level E	Level E
5	182	Condensing Furnace, 96 AFUE	PSE Gas New	1,669,270	108,472	197,277	11%	\$1.066	\$1.226	Space Heat	Level E	Level E
5	194	Integrated Space and Water Heating	PSE Gas New	1,641,871	27,400	224,677	12%	\$10.860	\$12.489	Space Heat	Level E	Level E
5	195	ENERGY STAR New Construction	PSE Gas New	1,149,309	492,561	717,238	38%	\$1.479	\$1.700	Space Heat	Level E	Level E
5	196	ENERGY STAR New Construction Plus	PSE Gas New	689,586	459,724	1,176,962	63%	\$2.529	\$2.909	Space Heat	Level E	Level E
5	500	Base 40 gal. Water Heating (EF=0.54)	PSE Gas New	980,833	0	0	0%	N/A	\$0.000	Water Heat	N/A	N/A

# RESIDENTIAL GAS RESULTS AND DATA INPUTS

## APPENDIX B

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
5	502	HE Water Heater (EF=0.70)	PSE Gas New	899,693	81,141	81,141	8%	\$0.403	\$0.464	Water Heat	Level B	Level C
5	501	HE Water Heater (EF=0.63)	PSE Gas New	853,662	46,031	127,171	13%	\$0.473	\$0.544	Water Heat	Level C	Level C
5	508	Drain Water Heat Recovery (GFX)	PSE Gas New	711,618	142,043	269,215	27%	\$0.675	\$0.776	Water Heat	Level D	Level D
5	507	Tankless Water Heater	PSE Gas New	590,123	121,496	390,711	40%	\$1.781	\$2.048	Water Heat	Level E	Level E
5	503	Solar Water Heater	PSE Gas New	457,479	132,644	523,354	53%	\$2.504	\$2.879	Water Heat	Level E	Level E
5	600	Base Clotheswasher (EF=1.18)	PSE Gas New	139,125	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
5	602	Energy Star Vertical-Axis Clothes Washer	PSE Gas New	51,497	87,628	87,628	63%	\$1.805	\$2.076	Appliances	Level E	Level E
5	601	Horizontal-Axis Clothes Washer	PSE Gas New	24,698	26,799	114,427	82%	\$6.812	\$7.834	Appliances	Level E	Level E
5	800	Base Dishwasher (EF=0.46)	PSE Gas New	83,475	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A
5	801	Energy Star DW (EF=0.58)	PSE Gas New	67,353	16,122	16,122	19%	\$6.184	\$7.112	Appliances	Level E	Level E
5	900	Base Conventional Oven	PSE Gas New	200,211	0	0	0%	N/A	\$0.000	Appliances	N/A	N/A



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RESIDENTIAL GAS RESULTS AND DATA INPUTS

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
5	901	Convection Oven	PSE Gas New	94,217	105,994	105,994	53%	\$0.705	\$0.810	Appliances	Level D	Level D
6	180	Base Furnace, 80 AFUE, 80 kbtu	PSE Gas New	1,451,876	0	0	0%	N/A	\$0.000	Space Heat	N/A	N/A
6	181	Condensing Furnace, 92 AFUE	PSE Gas New	1,382,800	69,076	69,076	5%	\$0.748	\$0.861	Space Heat	Level D	Level D
6	182	Condensing Furnace, 96 AFUE	PSE Gas New	1,298,426	84,374	153,450	11%	\$0.795	\$0.914	Space Heat	Level D	Level D
6	194	Integrated Space and Water Heating	PSE Gas New	1,255,353	43,072	196,522	14%	\$4.007	\$4.608	Space Heat	Level E	Level E
6	195	Natural Choice / ENERGY STAR New Man. Housing	PSE Gas New	878,747	376,606	573,128	39%	\$1.023	\$1.177	Space Heat	Level E	Level E
6	500	Base 40 gal. Water Heating (EF=0.54)	PSE Gas New	521,679	0	0	0%	N/A	\$0.000	Water Heat	N/A	N/A
6	502	HE Water Heater (EF=0.70)	PSE Gas New	478,523	43,157	43,157	8%	\$0.300	\$0.345	Water Heat	Level A	Level B
6	501	HE Water Heater (EF=0.63)	PSE Gas New	454,040	24,483	67,639	13%	\$0.351	\$0.404	Water Heat	Level B	Level B
6	508	Drain Water Heat Recovery (GFX)	PSE Gas New	386,178	67,862	135,501	26%	\$0.558	\$0.642	Water Heat	Level C	Level C
6	507	Tankless Water Heater	PSE Gas New	320,245	65,933	201,434	39%	\$1.297	\$1.492	Water Heat	Level E	Level E

# RESIDENTIAL GAS RESULTS AND DATA INPUTS

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Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
6	503	Solar Water Heater	PSE Gas New	248,263	71,982	273,416	52%	\$1,824	\$2,098	Water Heat	Level E	Level E
6	600	Base Clotheswasher (EF=1.18)	PSE Gas New	73,997	0	0	0%	N/A	\$0,000	Appliances	N/A	N/A
6	602	Energy Star Vertical-Axis Clothes Washer	PSE Gas New	27,390	46,607	46,607	63%	\$1,342	\$1,543	Appliances	Level E	Level E
6	601	Horizontal-Axis Clothes Washer	PSE Gas New	13,136	14,254	60,861	82%	\$5,064	\$5,824	Appliances	Level E	Level E
6	800	Base Dishwasher (EF=0.46)	PSE Gas New	44,398	0	0	0%	N/A	\$0,000	Appliances	N/A	N/A
6	801	Energy Star DW (EF=0.58)	PSE Gas New	35,823	8,575	8,575	19%	\$4,597	\$5,287	Appliances	Level E	Level E
6	900	Base Conventional Oven	PSE Gas New	108,923	0	0	0%	N/A	\$0,000	Appliances	N/A	N/A
6	901	Convection Oven	PSE Gas New	89,559	19,364	19,364	18%	\$1,586	\$1,823	Appliances	Level E	Level E



# C

## COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

### Building Stock

Segment	Type	Office	Dry Goods Retail	Restaurant	Grocery	Warehouse	School	University	Hospital & Health Care	Hotel	Miscellaneous
Existing	Total	214,980,009	128,262,941	23,514,077	24,590,925	183,582,929	12,946,197	5,657,636	38,096,583	13,084,808	34,709,620
New	Annual	3,385,742	2,048,911	325,892	340,818	2,544,363	311,919	136,307	917,869	315,254	836,262

### Measure Costs

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr. = 0 Initial Cost	Replace Cost	Full Unit Cost	Type: 1=1 time 2=ROB
1	100	Base Cooking	\$/unit	\$/unit	\$0.00	\$0.00		\$0.00	1	15	1		\$0.00	1
1	101	High-Efficiency Convection Oven	\$/unit	\$/unit	\$29.40	\$0.00		\$29.40	1	15	1		\$29.40	2
1	102	High-Efficiency Range and Oven	\$/unit	\$/unit	\$400.00	\$0.00		\$400.00	1	15	1		\$400.00	2
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	fixture	fixture	\$27.00	\$15.00	\$0.00	\$42.00	1	45,000	1		\$42.00	2
1	111	RET 4L4' Premium T8, 1EB	fixture	fixture	\$35.00	\$15.00	\$0.00	\$50.00	1	70,000	1		\$50.00	1
1	112	RET 2L4' Premium T8, 1EB, Reflector	fixture	fixture	\$52.00	\$15.00	\$0.00	\$67.00	1	70,000	1		\$67.00	1
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	fixture	fixture	\$24.50	\$3.15	\$0.00	\$27.65	1	40,000	1		\$27.65	1
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	fixture	fixture	\$180.63	\$107.27	\$0.00	\$287.90	1	50,000	1		\$287.90	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implement-ation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=f time 2=ROB
1	115	RNV 2L4'T5HO, 1EB	fixture	fixture	\$93.00	\$62.52	\$0.00	\$155.52	1	70,000	1	1	\$155.52	1
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	fixture	fixture	\$14.00	\$9.40	\$0.00	\$23.40	1	45,000	1	1	\$23.40	2
1	121	RET 2L4' Premium T8, 1EB	fixture	fixture	\$25.00	\$9.40	\$0.00	\$34.40	1	70,000	1	1	\$34.40	1
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	fixture	fixture	\$41.00	\$7.80	\$0.00	\$48.80	1	70,000	1	1	\$48.80	1
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	fixture	fixture	\$12.25	\$1.58	\$0.00	\$13.83	1	40,000	1	1	\$13.83	1
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	fixture	fixture	\$90.31	\$53.64	\$0.00	\$143.95	1	50,000	1	1	\$143.95	1
1	125	RNV 1L4'T5HO, 1EB	fixture	fixture	\$83.70	\$62.52	\$0.00	\$146.22	1	70,000	1	1	\$146.22	1
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	fixture	fixture	\$36.00	\$17.00	\$0.00	\$53.00	1	45,000	1	1	\$53.00	2
1	131	RET 2L8'T12, 60W, 1EB	fixture	fixture	\$48.00	\$17.00	\$0.00	\$65.00	1	70,000	1	1	\$65.00	1
1	132	RET 1L8'T12, 60W, 1EB, Reflector	fixture	fixture	\$72.00	\$17.00	\$0.00	\$89.00	1	70,000	1	1	\$89.00	1
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	fixture	fixture	\$24.50	\$3.15	\$0.00	\$27.65	1	40,000	1	1	\$27.65	1
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	fixture	fixture	\$180.62	\$107.00	\$0.00	\$287.62	1	50,000	1	1	\$287.62	1
1	140	Base Incandescent Flood, 75W	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	2,000	1	1	\$0.00	2
1	141	CFL Screw-in, Modular 18W	fixture	fixture	\$17.00	\$0.00	-\$8.41	\$17.00	1	20,000	1	1	\$8.59	1
1	150	Base Incandescent Flood, 150W PAR	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	2,000	1	1	\$0.00	2
1	151	Halogen PAR Flood, 90W	fixture	fixture	\$4.10	\$0.00	\$0.00	\$4.10	1	2,500	1	1	\$4.10	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr. = 0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	152	Metal Halide, 50W	fixture	fixture	\$110.00	\$46.00	\$0.00	\$156.00	1	24,000	1	1	\$156.00	1
1	160	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	fixture	fixture	\$14.00	\$9.00	\$0.00	\$23.00	1	45,000	1	1	\$23.00	2
1	161	RET 2L4T8, 1EB	fixture	fixture	\$20.00	\$9.40	\$0.00	\$29.40	1	70,000	1	1	\$29.40	1
1	170	Base Mercury Vapor 400W Lamp	fixture	fixture			\$0.00	\$0.00	1	24,000	1	1	\$0.00	2
1	171	High Pressure Sodium 250W Lamp	fixture	fixture	\$89.00	\$60.00	\$0.00	\$149.00	1	24,000	1	1	\$149.00	1
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	fixture	fixture	\$87.00	\$108.00	\$0.00	\$195.00	1	24,000	1	1	\$195.00	1
1	180	Base 4L4T8, 1EB	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	70,000	1	1	\$0.00	2
1	181	ROB 4L4' Premium T8, 1EB	fixture	fixture	\$7.00	\$0.00	\$0.00	\$7.00	1	70,000	1	1	\$7.00	2
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	fixture	fixture	\$24.50	\$3.15	\$0.00	\$27.65	1	40,000	1	1	\$27.65	1
1	185	Base 2L4T8, 1EB	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	70,000	1	1	\$0.00	2
1	186	ROB 2L4' Premium T8, 1EB	fixture	fixture	\$5.00	\$0.00	\$0.00	\$5.00	1	70,000	1	1	\$5.00	2
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	fixture	fixture	\$12.25	\$1.58	\$0.00	\$13.83	1	40,000	1	1	\$13.83	1
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	\$/ton	\$/ton	\$283.00			\$283.00	1	20	1	1	\$283.00	2
1	201	Chiller Tune-Up / Diagnostics	\$/ton	\$/ton		\$16.67	\$20.91	\$16.67	1	5	1	1	\$37.58	1
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf-window	\$/sf-window	\$0.68			\$0.68	1	30	1	1	\$0.68	1
1	207	Installation of Energy Management Systems	\$/ton	\$/ton	\$60.00			\$60.00	1	10	1	1	\$60.00	1
1	208	Insulation of Pipes	\$/Lin Ft	\$/Lin Ft	\$4.00	\$0.00		\$4.00	1	20	1	1	\$4.00	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
			Pipe											
1	209	Installation of Chiller Economizers (water side)	\$/sf	\$/sf	\$0.59			\$0.59	1	20	1	1	\$0.59	1
1	210	Optimize Chilled Water and Condenser Water Settings	\$/system	\$/system	\$10,000.00	\$10,000.00		\$20,000.00	1	10	1	1	\$20,000.00	1
1	203	Roof / Ceiling Insulation	\$/sf- ceiling	\$/sf- ceiling	\$0.49			\$0.49	1	20	1	1	\$0.49	1
1	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	\$/ton	\$/ton	\$97.09			\$97.09	1	10	1	1	\$97.09	1
1	203	HE Chiller, 0.51 kW/ton, 300 Tons	\$/ton	\$/ton	\$343.00			\$343.00	1	20	1	1	\$343.00	2
1	205	EMS Optimization	\$/unit	\$/unit	\$0.00	\$1,200.00		\$1,200.00	1	5	1	1	\$1,352.00	1
1	204	Cool Roofs (Reflective and Spray Evaporative)	\$/sf-roof	\$/sf-roof	\$0.47			\$0.47	1	10	1	1	\$0.47	1
1	250	Base DX Packaged System, EER=10.3, 10 tons	\$/ton	\$/ton	\$0.00			\$0.00	1	15	1	1	\$0.00	2
1	251	DX Tune-Up / Diagnostics	\$/ton	\$/ton		\$78.00		\$78.00	1	3	1	1	\$78.00	1
1	252	High-Efficiency Packaged A/C System	\$/ton	\$/ton	\$171.00			\$171.00	1	15	1	1	\$171.00	2
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf- window	\$/sf- window	\$0.68			\$0.68	1	30	1	1	\$0.68	1
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	\$/ton	\$/ton	\$133.33	\$160.00		\$293.33	1	10	1	1	\$293.33	1
1	256	Duct Insulation	\$/Lin Ft Pipe	\$/Lin Ft Pipe	\$0.40	\$0.00		\$0.40	1	20	1	1	\$0.40	1

**APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	257	Duct Repair and Sealing	\$/sf building	\$/sf building	\$0.16	\$0.00		\$0.16	1	20	1	1	\$0.16	1
1	261	Clock / Programmable Thermostat	\$/ton	\$/ton	\$5.50	\$15.00		\$20.50	1	10	1	1	\$20.50	1
1	262	Installation of Air Side Economizers	\$/sf	\$/sf	\$0.59			\$0.59	1	10	1	1	\$0.59	1
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	\$/HP	\$/HP	\$72.20		\$0.00	\$72.20	1	15	1	1	\$72.20	2
1	401	Energy Efficient Fan & Pump Motors	\$/HP	\$/HP	\$76.27		\$0.00	\$114.60	1	15	1	1	\$114.60	2
1	402	VSD, ASD Fan & Pump Applications	\$/HP	\$/HP	\$129.00	\$102.00	\$0.00	\$385.00	1	15	1	1	\$385.00	1
1	500	Base Refrigeration System	40,000 sqft store	40,000 sqft store	\$0.00	\$0.00	\$0.00	\$0.00	1	10	1	1	\$0.00	2
1	501	High Efficiency Case Fans	40,000 sqft store	40,000 sqft store	\$46,429.20	\$0.00	\$0.00	\$46,429.20	1	16	1	1	\$46,429.20	1
1	502	Strip Curtains for Walk-ins	40,000 sqft store	40,000 sqft store	\$1,995.00	\$0.00	\$0.00	\$1,995.00	1	4	1	1	\$1,995.00	1
1	503	Night Covers for Display Cases	linear ft. display	linear ft. display	\$9.25	\$0.00	\$0.00	\$9.25	1	5	1	1	\$9.25	1
1	504	Reduced Speed or Cycling of Evaporator Fans	controller	controller	\$300.00	\$0.00	\$0.00	\$300.00	1	5	1	1	\$300.00	1
1	505	High-Efficiency Compressors	40,000 sqft store	40,000 sqft store	\$3,510.00	\$0.00	\$0.00	\$3,510.00	1	10	1	1	\$3,510.00	2
1	506	Compressor VSD retrofit	40,000 sqft store	40,000 sqft store	\$16,200.00	\$0.00	\$0.00	\$16,200.00	1	10	1	1	\$16,200.00	1
1	507	Installation of Floating Condenser Head Pressure Controls	40,000 sqft store	40,000 sqft store	\$4,995.00	\$0.00	\$0.00	\$4,995.00	1	14	1	1	\$4,995.00	1
1	508	Refrigeration Commissioning	Ton of Load	Ton of Load	\$113.00	\$0.00	\$0.00	\$113.00	1	3	1	1	\$113.00	1



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	509	Demand Hot Gas Defrost	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1
1	510	Demand Defrost Electric	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1
1	511	Anti-Sweat (Humidistat) Controls	40,000 sqft store	40,000 sqft store	\$6,450.40	\$0.00	\$0.00	\$6,450.40	1	12	1	1	\$6,450.40	1
1	610	Base Desktop PC	PC	PC				\$0.00	1	4	1	1	\$0.00	1
1	611	ENERGY STAR or Better Office Equipment: Computer	PC	PC	\$100.00		\$0.00	\$100.00	1	4	1	1	\$100.00	1
1	620	Base Display Monitor	Monitor	Monitor				\$0.00	1	4	1	1	\$0.00	1
1	621	ENERGY STAR or Better Office Equipment: Monitors	Monitor	Monitor	\$100.00		\$0.00	\$100.00	1	4	1	1	\$100.00	1
1	623	Smart Networks	Monitor	Monitor		\$4.00	\$0.00	\$4.00	1	4	1	1	\$4.00	1
1	630	Base Copier	Copier	Copier				\$0.00	1	4	1	1	\$0.00	1
1	631	ENERGY STAR or Better Office Equipment: Copiers	Copier	Copier	\$200.00		\$0.00	\$200.00	1	4	1	1	\$200.00	1
1	640	Base Laser Printer	Printer	Printer				\$0.00	4	4	1	1	\$0.00	1
1	641	ENERGY STAR or Better Office Equipment: Printers	Printer	Printer	\$100.00		\$0.00	\$100.00	1	4	1	1	\$100.00	1
1	700	Base Water Heating	kBTU/hr	\$/kBTUhr				\$0.00	1	15	1	1	\$0.00	2
1	701	Demand controlled circulating systems	\$/unit	\$/unit	\$3,000.00			\$3,000.00	1	15	1	1	\$3,000.00	1
1	702	Heat Pump Water Heater	\$/kBTUhr	\$/kBTUhr	\$124.20		\$0.06	\$124.20	1	15	1	1	\$124.26	2
1	703	High-Efficiency Water Heater (electric)	Water Heater	Water Heater	\$300.00	\$300.00		\$600.00	1	15	1	1	\$600.00	2
1	704	Hot Water (SHW) Pipe Insulation	kBTU/hr	\$/Lin Ft Pipe	\$4.00	\$0.00	\$0.00	\$4.00	1	15	1	1	\$4.00	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full = 1 Incr. = 0 Initial Cost	Replace Cost	Full Unit Cost	Type, 1=1 time 2=ROB
1	800	Base Heating	KBtu/HR	\$/Kbtuhr	\$0.00	\$0.60	\$0.00	\$0.00	1	20	1	1	\$0.00	1
1	802	Roof / Ceiling Insulation	\$/sf- ceiling	\$/sf- ceiling	\$0.49	\$0.00	\$0.00	\$0.49	1	20	1	1	\$0.49	1
1	805	Clock / Programmable Thermostat	\$/sf	\$/sf	\$0.15		\$0.00	\$0.15	1	10	1	1	\$0.15	1
1	810	Installation of Air Side Economizers	\$/sf	\$/sf	\$0.59			\$0.59	1	15	1	1	\$0.59	1
1	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	\$/sf	\$/sf	\$0.28			\$0.28	1	15	1	1	\$0.28	1
2	100	Base Cooking	\$/unit	\$/unit	\$0.00	\$0.00		\$0.00	1	15	1	1	\$0.00	1
2	101	High-Efficiency Convection Oven	\$/unit	\$/unit	\$29.40	\$0.00		\$29.40	1	15	1	1	\$29.40	2
2	102	High-Efficiency Range and Oven	\$/unit	\$/unit	\$400.00	\$0.00		\$400.00	1	15	1	1	\$400.00	2
2	190	Base NC Lighting	\$/ft2	\$/ft2				\$0.00	1	20	1	1	\$0.00	2
2	191	10 % More Efficient Design (Lighting)	\$/ft2	\$/ft2	\$0.10			\$0.10	1	20	1	1	\$0.10	2
2	192	20 % More Efficient Design (Lighting)	\$/ft2	\$/ft2	\$0.14			\$0.14	1	20	1	1	\$0.14	2
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	\$/ton	\$/ton	\$283.00			\$283.00	1	20	1	1	\$283.00	2
2	201	Chiller Tune-Up / Diagnostics	\$/ton	\$/ton		\$16.67	\$20.91	\$16.67	1	5	1	1	\$37.58	1
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf- window	\$/sf- window	\$0.68			\$0.68	1	30	1	1	\$0.68	1
2	207	Installation of Energy Management Systems	\$/ton	\$/ton	\$60.00			\$60.00	1	10	1	1	\$60.00	1
2	208	Insulation of Pipes	\$/Lin Ft Pipe	\$/Lin Ft Pipe	\$4.00	\$0.00		\$4.00	1	20	1	1	\$4.00	1
2	209	Installation of Chiller Economizers (water)	\$/sf	\$/sf	\$0.59			\$0.59	1	20	1	1	\$0.59	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
		side)												
2	210	Optimize Chilled Water and Condenser Water Settings	\$/system	\$/system	\$10,000.00	\$10,000.00		\$20,000.00	1	10	1	1	\$20,000.00	1
2	203	Roof / Ceiling Insulation	\$/sf ceiling	\$/sf ceiling	\$0.49			\$0.49	1	20	1	1	\$0.49	1
2	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	\$/ton	\$/ton	\$97.09			\$97.09	1	10	1	1	\$97.09	1
2	203	HE Chiller, 0.51 kW/ton, 300 Tons	\$/ton	\$/ton	\$343.00			\$343.00	1	20	1	1	\$343.00	2
2	205	EMS Optimization	\$/unit	\$/unit	\$0.00	\$1,200.00		\$1,200.00	1	5	1	1	\$1,352.00	1
2	204	Cool Roofs (Reflective and Spray Evaporative)	\$/sf-roof	\$/sf-roof	\$0.47			\$0.47	1	10	1	1	\$0.47	1
2	250	Base DX Packaged System, EER=10.3, 10 tons	\$/ton	\$/ton	\$0.00			\$0.00	1	15	1	1	\$0.00	2
2	251	DX Tune-Up / Diagnostics	\$/ton	\$/ton		\$78.00		\$78.00	1	3	1	1	\$78.00	1
2	252	High-Efficiency Packaged A/C System	\$/ton	\$/ton	\$241.00			\$241.00	1	15	1	1	\$241.00	2
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf-window	\$/sf-window	\$0.68			\$0.68	1	30	1	1	\$0.68	1
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	\$/ton	\$/ton	\$133.33	\$160.00		\$293.33	1	10	1	1	\$293.33	1
2	256	Duct Insulation	\$/Lin Ft Pipe	\$/Lin Ft Pipe	\$0.40	\$0.00		\$0.40	1	20	1	1	\$0.40	1
2	257	Duct Repair and Sealing	\$/sf building	\$/sf building	\$0.16	\$0.00		\$0.16	1	20	1	1	\$0.16	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr. = 0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
2	261	Clock / Programmable Thermostat	\$/ton	\$/ton	\$5.50	\$15.00		\$20.50	1	10	1	1	\$20.50	1
2	262	Installation of Air Side Economizers	\$/sf	\$/sf	\$0.59			\$0.59	1	10	1	1	\$0.59	1
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	\$/HP	\$/HP	\$72.20		\$0.00	\$72.20	1	15	1	1	\$72.20	2
2	401	Energy Efficient Fan & Pump Motors	\$/HP	\$/HP	\$76.27		\$0.00	\$114.60	1	15	1	1	\$114.60	2
2	402	VSD, ASD Fan & Pump Applications	\$/HP	\$/HP	\$129.00	\$102.00	\$0.00	\$385.00	1	15	1	1	\$385.00	1
2	500	Base Refrigeration System	40,000 sqft store	40,000 sqft store	\$0.00	\$0.00	\$0.00	\$0.00	1	10	1	1	\$0.00	2
2	501	High Efficiency Case Fans	40,000 sqft store	40,000 sqft store	\$46,429.20	\$0.00	\$0.00	\$46,429.20	1	16	1	1	\$46,429.20	1
2	502	Strip Curtains for Walk-Ins	40,000 sqft store	40,000 sqft store	\$1,995.00	\$0.00	\$0.00	\$1,995.00	1	4	1	1	\$1,995.00	1
2	503	Night Covers for Display Cases	linear ft. display	linear ft. display	\$9.25	\$0.00	\$0.00	\$9.25	1	5	1	1	\$9.25	1
2	504	Reduced Speed or Cycling of Evaporator Fans	controller	controller	\$300.00	\$0.00	\$0.00	\$300.00	1	5	1	1	\$300.00	1
2	505	High-Efficiency Compressors	40,000 sqft store	40,000 sqft store	\$3,510.00	\$0.00	\$0.00	\$3,510.00	1	10	1	1	\$3,510.00	2
2	506	Compressor VSD retrofit	40,000 sqft store	40,000 sqft store	\$16,200.00	\$0.00	\$0.00	\$16,200.00	1	10	1	1	\$16,200.00	1
2	507	Installation of Floating Condenser Head Pressure Controls	40,000 sqft store	40,000 sqft store	\$4,995.00	\$0.00	\$0.00	\$4,995.00	1	14	1	1	\$4,995.00	1
2	508	Refrigeration Commissioning	Ton of Load	Ton of Load	\$113.00	\$0.00	\$0.00	\$113.00	1	3	1	1	\$113.00	1
2	509	Demand Hot Gas Defrost	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr = 0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
2	510	Demand Defrost Electric	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1
2	511	Anti-Sweat (Humidistat) Controls	40,000 sqft store	40,000 sqft store	\$6,450.40	\$0.00	\$0.00	\$6,450.40	1	12	1	1	\$6,450.40	1
2	610	Base Desktop PC	PC	PC		\$0.00	\$0.00	\$0.00	1	4	1	1	\$0.00	1
2	611	ENERGY STAR or Better Office Equipment: Computer	PC	PC	\$100.00		\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	620	Base Display Monitor	Monitor	Monitor		\$0.00	\$0.00	\$0.00	1	4	1	1	\$0.00	1
2	621	ENERGY STAR or Better Office Equipment: Monitors	Monitor	Monitor	\$100.00		\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	623	Smart Networks	Monitor	Monitor		\$4.00	\$0.00	\$4.00	1	4	1	1	\$4.00	1
2	630	Base Copier	Copier	Copier			\$0.00	\$0.00	1	4	1	1	\$0.00	1
2	631	ENERGY STAR or Better Office Equipment: Copiers	Copier	Copier	\$200.00		\$0.00	\$200.00	1	4	1	1	\$200.00	1
2	640	Base Laser Printer	Printer	Printer			\$0.00	\$0.00	4	4	1	1	\$0.00	1
2	641	ENERGY STAR or Better Office Equipment: Printers	Printer	Printer	\$100.00		\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	700	Base Water Heating	kBTU/Hr	\$/kBTUhr	\$0.00	\$0.00	\$0.00	\$0.00	1	15	1	1	\$0.00	2
2	701	Demand controlled circulating systems	\$/unit	\$/unit	\$3,000.00			\$3,000.00	1	15	1	1	\$3,000.00	1
2	702	Heat Pump Water Heater	\$/kBTUhr	\$/kBTUhr	\$124.20		\$0.06	\$124.20	1	15	1	1	\$124.26	2
2	703	High-Efficiency Water Heater (electric)	Water Heater	Water Heater	\$300.00	\$50.00		\$350.00	1	15	1	1	\$350.00	2
2	704	Hot Water (SHW) Pipe Insulation	kBTU/Hr	\$/Lin Ft Pipe	\$4.00	\$0.00	\$0.00	\$4.00	1	15	1	1	\$4.00	1
2	800	Base Heating	kBTU/Hr	\$/kBTUhr	\$0.00	\$0.00	\$0.00	\$0.00	1	20	1	1	\$0.00	1

**APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
2	802	Roof / Ceiling Insulation	\$/sf- ceiling	\$/sf- ceiling	\$0.49	\$0.00	\$0.00	\$0.49	1	20	1	1	\$0.49	1
2	805	Clock / Programmable Thermostat	\$/sf	\$/sf	\$0.15	\$0.00	\$0.00	\$0.15	1	10	1	1	\$0.15	1
2	810	Installation of Air Side Economizers	\$/sf	\$/sf	\$0.59			\$0.59	1	15	1	1	\$0.59	1
2	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	\$/sf	\$/sf	\$0.28			\$0.28	1	15	1	1	\$0.28	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Base Technology EUIs

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	100	Base Cooking			52.39							
1	110	Base Fluorescent Fixture, 4L4'T12, 34W, 2EEMAG	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
1	140	Base Incandescent Flood, 75W	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
1	150	Base Incandescent Flood, 150W PAR	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
1	170	Base Mercury Vapor 400W Lamp	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
1	180	Base Fluorescent Fixture, 4L4'T8, 32W, 1EB	4.24	4.71	6.99	10.21	2.36	2.14	4.24	8.62	2.41	1.70
1	185	Base Fluorescent Fixture, 2L4'T8, 32W, 1EB	4.24	4.71	6.99	10.21	2.36	2.14	4.24	8.62	2.41	1.70
1	200	Base Centrifugal Chiller, 0.58 kW/ton, 500 tons	3.76	1.22	5.20	6.72	1.59	0.30	3.76	8.98	1.50	2.54
1	250	Base DX Packaged System, EER=10.3, 10 tons	3.76	1.22	5.20	6.72	1.59	0.30	3.76	8.98	1.50	2.54
1	400	Base Fan Motor	2.25	3.96	0.67	5.40	1.71	0.75	0.98	2.67	0.60	1.89
1	500	Base Refrigeration System	0.30	0.44	3.05	7.62		0.64	0.30	1.74	2.25	
1	610	Base Desktop PC	0.60	0.06	0.04	0.11	0.05	0.03	0.10	0.14	0.02	0.03

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	620	Base Display Monitor	0.58	0.06	0.04	0.11	0.05	0.03	0.10	0.13	0.02	0.02
1	630	Base Copier	0.19	0.06	0.03	0.10	0.03	0.03	0.05	0.13	0.05	0.03
1	640	Base Laser Printer	0.21	0.06	0.04	0.09	0.03	0.02	0.06	0.12	0.01	0.01
1	700	Base Water Heating	0.30	0.44	3.05	3.05	0.33	0.64	0.64	1.25	1.74	2.25
1	800	Base Heating	0.79	0.93	7.23	1.37	0.79	9.71	0.79	4.58	4.84	4.58
2	100	Base Cooking			52.39							
2	190	Base NC Lighting	5.29	5.89	8.74	12.76	2.94	2.68	5.29	10.77	3.01	2.12
2	200	Base Centrifugal Chiller, 0.58 kW/ton, 500 tons	3.76	1.22	5.20	6.72	1.59	0.30	3.76	8.98	1.50	2.54
2	250	Base DX Packaged System, EER=10.3, 10 tons	3.76	1.22	5.20	6.72	1.59	0.30	3.76	8.98	1.50	2.54
2	400	Base Fan Motor	2.25	3.96	0.67	5.40	1.71	0.75	0.98	2.67	0.60	1.89
2	500	Base Refrigeration System	0.30	0.44	3.05	7.62		0.64	0.30	1.74	2.25	
2	610	Base Desktop PC	0.60	0.06	0.04	0.11	0.05	0.03	0.10	0.14	0.02	0.03
2	620	Base Display Monitor	0.58	0.06	0.04	0.11	0.05	0.03	0.10	0.13	0.02	0.02
2	630	Base Copier	0.19	0.06	0.03	0.10	0.03	0.03	0.05	0.13	0.05	0.03
2	640	Base Laser Printer	0.21	0.06	0.04	0.09	0.03	0.02	0.06	0.12	0.01	0.01
2	700	Base Water Heating	0.30	0.44	3.05	3.05	0.33	0.64	0.64	1.25	1.74	2.25
2	800	Base Heating	0.79	0.93	7.23	1.37	0.79	9.71	0.79	4.58	4.84	4.58



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Applicability Factor

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
1	100	Base Cooking			50.0%							
1	101	High-Efficiency Convection Oven			50.0%							
1	102	High-Efficiency Range and Oven			50.0%							
1	110	Base Fluorescent Fixture, 4L4'T12, 34W, 2EEMAG	9.5%	19.8%	22.9%	16.3%	21.3%	11.8%	18.0%	13.2%	12.8%	12.6%
1	111	RET 4L4' Premium T8, 1EB	9.5%	19.8%	22.9%	16.3%	21.3%	11.8%	18.0%	13.2%	12.8%	12.6%
1	112	RET 2L4' Premium T8, 1EB, Reflector	9.5%	19.8%	22.9%	16.3%	21.3%	11.8%	18.0%	13.2%	12.8%	12.6%
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	9.5%	19.8%	22.9%	16.3%	21.3%	11.8%	18.0%	13.2%	12.8%	12.6%
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	9.5%	19.8%	22.9%	16.3%	21.3%	11.8%	18.0%	13.2%	12.8%	12.6%
1	115	RNV 2L4'T5HO, 1EB	9.5%	19.8%	22.9%	16.3%	21.3%	11.8%	18.0%	13.2%	12.8%	12.6%
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	7.1%	14.9%	17.2%	12.2%	16.0%	8.9%	13.5%	9.9%	9.6%	9.4%
1	121	RET 2L4' Premium T8, 1EB	7.1%	14.9%	17.2%	12.2%	16.0%	8.9%	13.5%	9.9%	9.6%	9.4%
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	7.1%	14.9%	17.2%	12.2%	16.0%	8.9%	13.5%	9.9%	9.6%	9.4%
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	7.1%	14.9%	17.2%	12.2%	16.0%	8.9%	13.5%	9.9%	9.6%	9.4%
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	7.1%	14.9%	17.2%	12.2%	16.0%	8.9%	13.5%	9.9%	9.6%	9.4%
1	125	RNV 1L4'T5HO, 1EB	7.1%	14.9%	17.2%	12.2%	16.0%	8.9%	13.5%	9.9%	9.6%	9.4%
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	26.7%	15.6%	25.2%	22.5%	18.9%	27.0%	27.0%	19.8%	12.0%	20.4%
1	131	RET 2L8'T12, 60W, 1EB	26.7%	15.6%	25.2%	22.5%	18.9%	27.0%	27.0%	19.8%	12.0%	20.4%
1	132	RET 1L8'T12, 60W, 1EB, Reflector	26.7%	15.6%	25.2%	22.5%	18.9%	27.0%	27.0%	19.8%	12.0%	20.4%
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	26.7%	15.6%	25.2%	22.5%	18.9%	27.0%	27.0%	19.8%	12.0%	20.4%
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	26.7%	15.6%	25.2%	22.5%	18.9%	27.0%	27.0%	19.8%	12.0%	20.4%
1	140	Base Incandescent Flood, 75W	11.0%	48.0%	16.0%	25.0%	37.0%	10.0%	10.0%	34.0%	60.0%	32.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
1	141	CFL Screw-in, Modular 18W	11.0%	48.0%	16.0%	25.0%	37.0%	10.0%	10.0%	34.0%	60.0%	32.0%
1	150	Base Incandescent Flood, 150W/ PAR	11.0%	48.0%	16.0%	25.0%	37.0%	10.0%	10.0%	34.0%	60.0%	32.0%
1	151	Halogen PAR Flood, 90W	11.0%	48.0%	16.0%	25.0%	37.0%	10.0%	10.0%	34.0%	60.0%	32.0%
1	152	Metal Halide, 50W	11.0%	48.0%	16.0%	25.0%	37.0%	10.0%	10.0%	34.0%	60.0%	32.0%
1	160	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	26.7%	15.6%	25.2%	22.5%	18.9%	27.0%	27.0%	19.8%	12.0%	20.4%
1	161	RET 2L4'T8, 1EB	26.7%	15.6%	25.2%	22.5%	18.9%	27.0%	27.0%	19.8%	12.0%	20.4%
1	170	Base Mercury Vapor 400W Lamp	83.0%	89.0%	54.0%	91.0%	68.0%	70.0%	70.0%	75.0%	90.0%	70.0%
1	171	High Pressure Sodium 250W Lamp	83.0%	89.0%	54.0%	91.0%	68.0%	70.0%	70.0%	75.0%	90.0%	70.0%
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	83.0%	89.0%	54.0%	91.0%	68.0%	70.0%	70.0%	75.0%	90.0%	70.0%
1	180	Base 4L4'T8, 1EB	26.1%	1.0%	10.7%	13.7%	3.9%	24.2%	18.0%	13.2%	3.2%	14.6%
1	181	ROB 4L4' Premium T8, 1EB	26.1%	1.0%	10.7%	13.7%	3.9%	24.2%	18.0%	13.2%	3.2%	14.6%
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	26.1%	1.0%	10.7%	13.7%	3.9%	24.2%	18.0%	13.2%	3.2%	14.6%
1	185	Base 2L4'T8, 1EB	19.6%	0.7%	8.0%	10.3%	2.9%	18.1%	13.5%	9.9%	2.4%	11.0%
1	186	ROB 2L4' Premium T8, 1EB	19.6%	0.7%	8.0%	10.3%	2.9%	18.1%	13.5%	9.9%	2.4%	11.0%
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	19.6%	0.7%	8.0%	10.3%	2.9%	18.1%	13.5%	9.9%	2.4%	11.0%
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	201	Chiller Tune-Up / Diagnostics	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	207	Installation of Energy Management Systems	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	208	Insulation of Pipes	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	209	Installation of Chiller Economizers (water side)	50.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	210	Optimize Chilled Water and Condenser Water Settings	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
1	203	Roof / Ceiling Insulation	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	50.0%	67.6%	50.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	203	HE Chiller, 0.51 kW/ton, 300 Tons	32.5%	33.8%	37.5%	31.0%	14.2%	25.1%	7.9%	19.4%	42.8%	28.6%
1	205	EMS Optimization	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	204	Cool Roofs (Reflective and Spray Evaporative)	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	250	Base DX Packaged System, EER=10.3, 10 tons	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	251	DX Tune-Up / Diagnostics	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	252	High-Efficiency Packaged A/C System	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	256	Duct Insulation	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	257	Duct Repair and Sealing	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	261	Clock / Programmable Thermostat	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
1	262	Installation of Air Side Economizers	50.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	50.0%	57.2%
1	400	Base Fan Motor, 5hp, 1800rpm, 87.3%	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
1	401	Energy Efficient Fan & Pump Motors	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
1	402	VSD, ASD Fan & Pump Applications	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
1	500	Base Refrigeration System				100.0%						
1	501	High Efficiency Case Fans				100.0%						
1	502	Strip Curtains for Walk-Ins				100.0%						
1	503	Night Covers for Display Cases				100.0%						

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
1	504	Reduced Speed or Cycling of Evaporator Fans				100.0%						
1	505	High-Efficiency Compressors				100.0%						
1	506	Compressor VSD retrofit				100.0%						
1	507	Installation of Floating Condenser Head Pressure Controls				100.0%						
1	508	Refrigeration Commissioning				100.0%						
1	509	Demand Hot Gas Defrost				100.0%						
1	510	Demand Defrost Electric				100.0%						
1	511	Anti-Sweat (Humidistat) Controls				100.0%						
1	610	Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	611	ENERGY STAR or Better Office Equipment: Computer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	620	Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	621	ENERGY STAR or Better Office Equipment: Monitors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	623	Smart Networks	75.0%	10.0%	25.0%	10.0%	10.0%	80.0%	75.0%	25.0%	25.0%	25.0%
1	630	Base Copier	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	631	ENERGY STAR or Better Office Equipment: Copiers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	640	Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	641	ENERGY STAR or Better Office Equipment: Printers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	700	Base Water Heating	95.0%	83.0%	50.0%	16.1%	71.1%	100.0%	100.0%	100.0%	100.0%	10.5%
1	701	Demand-controlled circulating systems	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
1	702	Heat Pump Water Heater	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
1	703	High-Efficiency Water Heater (electric)	90.0%	83.0%	50.0%	16.1%	71.1%	90.0%	90.0%	90.0%	90.0%	10.5%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
1	704	Hot Water (SHW) Pipe Insulation	90.0%	83.0%	50.0%	16.1%	71.1%	90.0%	90.0%	90.0%	90.0%	10.5%
1	800	Base Heating	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
1	802	Roof / Ceiling Insulation	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
1	805	Clock / Programmable Thermostat	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
1	810	Installation of Air Side Economizers	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
1	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
2	100	Base Cooking			50.0%							
2	101	High-Efficiency Convection Oven			50.0%							
2	102	High-Efficiency Range and Oven			50.0%							
2	190	Base NC Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	191	10 % More Efficient Design (Lighting)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	192	20 % More Efficient Design (Lighting)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	201	Chiller Tune-Up / Diagnostics	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	207	Installation of Energy Management Systems	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	208	Insulation of Pipes	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	209	Installation of Chiller Economizers (water side)	50.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	210	Optimize Chilled Water and Condenser Water Settings	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	203	Roof / Ceiling Insulation	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
2	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	50.0%	67.6%	50.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	203	HE Chiller, 0.51 kW/ton, 300 Tons	32.5%	33.8%	37.5%	31.0%	14.2%	25.1%	7.9%	19.4%	42.8%	28.6%
2	205	EMS Optimization	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	204	Cool Roofs (Reflective and Spray Evaporative)	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	250	Base DX Packaged System, EER=10.3, 10 tons	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	251	DX Tune-Up / Diagnostics	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	252	High-Efficiency Packaged A/C System	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	256	Duct Insulation	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	257	Duct Repair and Sealing	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	261	Clock / Programmable Thermostat	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	262	Installation of Air Side Economizers	65.0%	67.6%	75.0%	62.0%	28.4%	50.3%	15.9%	38.9%	85.6%	57.2%
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
2	401	Energy Efficient Fan & Pump Motors	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
2	402	VSD, ASD Fan & Pump Applications	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
2	500	Base Refrigeration System				100.0%						
2	501	High Efficiency Case Fans				100.0%						
2	502	Strip Curtains for Walk-Ins				100.0%						
2	503	Night Covers for Display Cases				100.0%						
2	504	Reduced Speed or Cycling of Evaporator Fans				100.0%						

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Sag	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
2	505	High-Efficiency Compressors				100.0%						
2	506	Compressor VSD retrofit				100.0%						
2	507	Installation of Floating Condenser Head Pressure Controls				100.0%						
2	508	Refrigeration Commissioning				100.0%						
2	509	Demand Hot Gas Defrost				100.0%						
2	510	Demand Defrost Electric				100.0%						
2	511	Anti-Sweat (Humidistat) Controls				100.0%						
2	610	Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	611	ENERGY STAR or Better Office Equipment: Computer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	620	Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	621	ENERGY STAR or Better Office Equipment: Monitors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	623	Smart Networks	75.0%	10.0%	25.0%	10.0%	10.0%	80.0%	75.0%	25.0%	25.0%	25.0%
2	630	Base Copier	100.0%	25.0%	25.0%	25.0%	25.0%	90.0%	90.0%	90.0%	50.0%	25.0%
2	631	ENERGY STAR or Better Office Equipment: Copiers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	640	Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	641	ENERGY STAR or Better Office Equipment: Printers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	700	Base Water Heating	95.0%	83.0%	50.0%	16.1%	71.1%	100.0%	100.0%	100.0%	100.0%	10.5%
2	701	Demand controlled circulating systems	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
2	702	Heat Pump Water Heater	50.0%	83.0%	50.0%	16.1%	71.1%	50.0%	50.0%	77.8%	71.6%	10.5%
2	703	High-Efficiency Water Heater (electric)	90.0%	83.0%	50.0%	16.1%	71.1%	90.0%	90.0%	90.0%	90.0%	10.5%
2	704	Hot Water (SHW) Pipe Insulation	90.0%	83.0%	50.0%	16.1%	71.1%	90.0%	90.0%	90.0%	90.0%	10.5%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Ware-house	School	College	Hospital	Hotel	Misc.
2	800	Base Heating	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
2	802	Roof / Ceiling Insulation	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
2	805	Clock / Programmable Thermostat	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
2	810	Installation of Air Side Economizers	7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%
		Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)										
2	812		7.9%	28.5%	31.2%	6.1%	6.6%	37.1%	39.2%	3.0%	30.3%	11.9%

Energy Savings

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
1	100	Base Cooking										
1	101	High-Efficiency Convection Oven			20.0%							
1	102	High-Efficiency Range and Oven			20.0%							
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG										
1	111	RET 4L4' Premium T8, 1EB	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%
1	112	RET 2L4' Premium T8, 1EB, Reflector	65.7%	65.7%	65.7%	65.7%	65.7%	65.7%	65.7%	65.7%	65.7%	65.7%
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	30.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	115	RNV 2L4'T5HO, 1EB	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%
1	120	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG										
1	121	RET 2L4' Premium T8, 1EB	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%
1	122	RET 1L4' Premium T8, 1EB, Reflector	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
		OEM										
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	30.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	125	RNV 1L4T5HO, 1EB	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, IEEMAG										
1	131	RET 2L8'T12, 60W, 1EB	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%
1	132	RET 1L8'T12, 60W, 1EB, Reflector	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	30.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	140	Base Incandescent Flood, 75W										
1	141	CFL Screw-in, Modular 18W	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
1	150	Base Incandescent Flood, 150W, PAR										
1	151	Halogen PAR Flood, 90W	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
1	152	Metal Halide, 50W	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, IEEMAG										
1	161	RET 2L4'T8, 1EB	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%
1	170	Base Mercury Vapor 400W Lamp										
1	171	High Pressure Sodium 250W Lamp	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%
1	180	Base 4L4'T8, 1EB										

**APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
1	181	ROB 4L4' Premium T8, 1EB	15.8%	15.8%	15.8%	15.8%	15.8%	15.8%	15.8%	15.8%	15.8%	15.8%
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	30.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	185	Base 2L4T8, 1EB										
1	186	ROB 2L4' Premium T8, 1EB	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	30.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons										
1	201	Chiller Tune-Up / Diagnostics	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	9.3%	10.3%	2.5%	9.4%	12.4%	3.9%	4.0%	1.2%	7.0%	2.5%
1	207	Installation of Energy Management Systems	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	208	Insulation of Pipes	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
1	209	Installation of Chiller Economizers (water side)	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	210	Optimize Chilled Water and Condenser Water Settings	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1	203	Roof / Ceiling Insulation	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
1	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	203	HE Chiller, 0.51 kW/ton, 300 Tons	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%
1	205	EMS Optimization										
1	204	Cool Roofs (Reflective and Spray Evaporative)	1.8%	6.9%	13.0%	15.5%	18.4%	6.1%	1.3%	0.6%	0.4%	13.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
1	250	Base DX Packaged System, EER=10.3, 10 tons										
1	251	DX Tune-Up / Diagnostics	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	252	High-Efficiency Packaged A/C System	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	256	Duct Insulation	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
1	257	Duct Repair and Sealing	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
1	261	Clock / Programmable Thermostat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	262	Installation of Air Side Economizers	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%										
1	401	Energy Efficient Fan & Pump Motors	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
1	402	VSD, ASD Fan & Pump Applications	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
1	500	Base Refrigeration System										
1	501	High Efficiency Case Fans				12.0%						
1	502	Strip Curtains for Walk-Ins				4.0%						
1	503	Night Covers for Display Cases				5.8%						
1	504	Reduced Speed or Cycling of Evaporator Fans				0.6%						
1	505	High-Efficiency Compressors				6.8%						
1	506	Compressor VSD retrofit				6.2%						
1	507	Installation of Floating Condenser Head Pressure Controls				6.8%						
1	508	Refrigeration Commissioning				5.0%						

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
1	509	Demand Hot Gas Defrost				2.5%						
1	510	Demand Defrost Electric				7.8%						
1	511	Anti-Sweat (Humidistat) Controls				5.0%						
1	610	Base Desktop/PC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	611	ENERGY STAR or Better Office Equipment: Computer	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
1	620	Base Display Monitor										
1	621	ENERGY STAR or Better Office Equipment: Monitors	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
1	623	Smart Networks	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
1	630	Base Copier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	631	ENERGY STAR or Better Office Equipment: Copiers	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
1	640	Base Laser Printer	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	641	ENERGY STAR or Better Office Equipment: Printers	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
1	700	Base Water Heating										
1	701	Demand controlled circulating systems	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1	702	Heat Pump Water Heater	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
-1	703	High-Efficiency Water Heater (electric)	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%
1	704	Hot Water (SHW) Pipe Insulation	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1	800	Base Heating										
1	802	Roof / Ceiling Insulation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	805	Clock / Programmable Thermostat	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
1	810	Installation of Air Side Economizers	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
1	812	Installation of Automated Building Ventilation Control ( Via Occupancy	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
		Sensors, CO2 Sensors, Etc.)										
2	100	Base Cooking										
2	101	High-Efficiency Convection Oven			20.0%							
2	102	High-Efficiency Range and Oven			20.0%							
2	190	Base Mercury Vapor 400W Lamp										
2	191	High Pressure Sodium 250W Lamp	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	192	Outdoor Lighting Controls (Photocell/Timeclock)	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons										
2	201	Chiller Tune-Up / Diagnostics	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	9.3%	10.3%	2.5%	9.4%	12.4%	3.9%	4.0%	1.2%	7.0%	2.5%
2	207	Installation of Energy Management Systems	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	208	Insulation of Pipes	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
2	209	Installation of Chiller Economizers (water side)	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	210	Optimize Chilled Water and Condenser Water Settings	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
2	203	Roof / Ceiling Insulation	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
2	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	203	HE Chiller, 0.51 kW/ton, 300 Tons	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%
2	205	EMS Optimization										
2	204	Cool Roofs (Reflective and Spray	1.8%	6.9%	13.0%	15.5%	18.4%	6.1%	1.3%	0.6%	0.4%	13.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
		Evaporative)										
2	250	Base DX Packaged System, EER=10.3, 10 tons										
2	251	DX Tune-Up / Diagnostics	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	252	High-Efficiency Packaged A/C System	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	256	Duct Insulation	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
2	257	Duct Repair and Sealing	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
2	261	Clock / Programmable Thermostat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	262	Installation of Air Side Economizers	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%										
2	401	Energy Efficient Fan & Pump Motors	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
2	402	VSD, ASD Fan & Pump Applications	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
2	500	Base Refrigeration System										
2	501	High Efficiency Case Fans				12.0%						
2	502	Strip Curtains for Walk-Ins				4.0%						
2	503	Night Covers for Display Cases				5.8%						
2	504	Reduced Speed or Cycling of Evaporator Fans				0.6%						
2	505	High-Efficiency Compressors				6.8%						
2	506	Compressor VSD retrofit				6.2%						
2	507	Installation of Floating Condenser Head Pressure Controls				6.8%						

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	FoodStore	Warehouse	School	College	Hospital	Hotel	Misc.
2	508	Refrigeration Commissioning				5.0%						
2	509	Demand Hot Gas Defrost				2.5%						
2	510	Demand Defrost Electric				7.8%						
2	511	Anti-Sweat (Humidistat) Controls				5.0%						
2	610	Base Desktop PC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	611	ENERGY STAR or Better Office Equipment: Computer	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
2	620	Base Display Monitor										
2	621	ENERGY STAR or Better Office Equipment: Monitors	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
2	623	Smart Networks	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
2	630	Base Copier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	631	ENERGY STAR or Better Office Equipment: Copiers	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
2	640	Base Laser Printer	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	641	ENERGY STAR or Better Office Equipment: Printers	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
2	700	Base Water Heating										
2	701	Demand controlled circulating systems	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
2	702	Heat Pump Water Heater	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
2	703	High-Efficiency Water Heater (electric)	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%
2	704	Hot Water (SHW) Pipe Insulation	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
2	800	Base Heating										
2	802	Roof / Ceiling Insulation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
2	805	Clock / Programmable Thermostat	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
2	810	Installation of Air Side Economizers	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
2	812	Installation of Automated Building	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%

**APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)										

**EUI Adjustment Factor**

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	100	Base Cooking			100.0%							
1	101	High-Efficiency Convection Oven			100.0%							
1	102	High-Efficiency Range and Oven			100.0%							
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%
1	111	RET 4L4' Premium T8, 1EB	70.0%	70.0%	70.0%	100.0%		80.0%	80.0%	80.0%	80.0%	80.0%
1	112	RET 2L4' Premium T8, 1EB, Reflector	70.0%	70.0%	70.0%	100.0%		80.0%	80.0%	80.0%	80.0%	80.0%
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	70.0%	70.0%	70.0%	100.0%		80.0%	80.0%	80.0%	80.0%	80.0%
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	70.0%	70.0%	70.0%	100.0%		80.0%	80.0%	80.0%	80.0%	80.0%
1	115	RNV 2L4T5HO, 1EB	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%
1	120	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%
1	121	RET 2L4' Premium T8, 1EB	70.0%	70.0%	70.0%	100.0%		80.0%	80.0%	80.0%	80.0%	80.0%
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	70.0%	70.0%	70.0%	100.0%		80.0%	80.0%	80.0%	80.0%	80.0%
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	125	RNV 1L4T5HO, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	130	Base Fluorescent Fixture, 2L8T12, 60W, 1EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	131	RET 2L8T12, 60W, 1EB	70.0%	70.0%	70.0%	100.0%	100.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	132	RET 1L8T12, 60W, 1EB, Reflector	70.0%	70.0%	70.0%	100.0%	100.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	140	Base Incandescent Flood, 75W	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	141	CFL Screw-in, Modular 18W	70.0%	70.0%	70.0%	100.0%	100.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	150	Base Incandescent Flood, 150W PAR	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	151	Halogen PAR Flood, 90W	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	152	Metal Halide, 50W	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	160	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	161	RET 2L4T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	170	Base Mercury Vapor 400W Lamp	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	171	High Pressure Sodium 250W Lamp	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	180	Base 4L4T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	181	ROB 4L4' Premium T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	185	Base 2L4T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	186	ROB 2L4' Premium T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	187	Occupancy Sensor, 8L4' Fluorescent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Fixtures										
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	201	Chiller Tune-Up / Diagnostics	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	207	Installation of Energy Management Systems	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	208	Insulation of Pipes	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	209	Installation of Chiller Economizers (water side)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	210	Optimize Chilled Water and Condenser Water Settings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	203	Roof / Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	203	HE Chiller, 0.51 kW/ton, 300 Tons	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%
1	205	EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	204	Cool Roofs (Reflective and Spray Evaporative)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	250	Base DX Packaged System, EER=10.3, 10 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	251	DX Tune-Up / Diagnostics	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	252	High-Efficiency Packaged A/C System	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measur e:#	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Cooling, and Absorption Cooling										
1	256	Duct Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	257	Duct Repair and Sealing	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	261	Clock / Programmable Thermostat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	262	Installation of Air Side Economizers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	401	Energy Efficient Fan & Pump Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	402	VSD, ASD Fan & Pump Applications	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	500	Base Refrigeration System				100.0%						
1	501	High Efficiency Case Fans				100.0%						
1	502	Slrip Curtains for Walk-Ins				100.0%						
1	503	Night Covers for Display Cases				100.0%						
1	504	Reduced Speed or Cycling of Evaporator Fans				100.0%						
1	505	High-Efficiency Compressors				100.0%						
1	506	Compressor VSD retrofit				100.0%						
1	507	Installation of Floating Condenser Head Pressure Controls				100.0%						
1	508	Refrigeration Commissioning				100.0%						
1	509	Demand Hot Gas Defrost				100.0%						
1	510	Demand Defrost Electric				100.0%						
1	511	Anti-Sweat (Humidistat) Controls				100.0%						
1	610	Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	611	ENERGY STAR or Better Office Equipment: Computer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	620	Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	621	ENERGY STAR or Better Office	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Equipment: Monitors										
1	623	Smart Networks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	630	Base Copier	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	631	ENERGY STAR or Better Office	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Equipment: Copiers										
1	640	Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	641	ENERGY STAR or Better Office	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Equipment: Printers										
1	700	Base Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	701	Demand controlled circulating systems	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	702	Heat Pump Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	703	High-Efficiency Water Heater (electric)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	704	Hot Water (SHW) Pipe Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	800	Base Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	802	Roof / Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	805	Clock / Programmable Thermostat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	810	Installation of Air Side Economizers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	100	Base Cooking			100.0%							
2	101	High-Efficiency Convection Oven			100.0%							
2	102	High-Efficiency Range and Oven			100.0%							
2	190	Base NC Lighting	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
2	191	10 % More Efficient Design (Lighting)	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
2	192	20 % More Efficient Design (Lighting)	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	201	Chiller Tune-Up / Diagnostics	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	207	Installation of Energy Management Systems	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	208	Insulation of Pipes	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	209	Installation of Chiller Economizers (water side)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	210	Optimize Chilled Water and Condenser Water Settings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	203	Roof / Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	203	HE Chiller, 0.51 kW/ton, 300 Tons	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%	89.2%
2	205	EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	204	Cool Roofs (Reflective and Spray Evaporative)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	250	Base DX Packaged System, EER=10.3, 10 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	251	DX Tune-Up / Diagnostics	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	252	High-Efficiency Packaged A/C System	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%	86.4%
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	256	Duct Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	257	Duct Repair and Sealing	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	261	Clock / Programmable Thermostat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	262	Installation of Air Side Economizers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	401	Energy Efficient Fan & Pump Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	402	VSD, ASD Fan & Pump Applications	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	500	Base Refrigeration System				100.0%						
2	501	High Efficiency Case Fans				100.0%						
2	502	Strip Curtains for Walk-Ins				100.0%						
2	503	Night Covers for Display Cases				100.0%						
2	504	Reduced Speed or Cycling of Evaporator Fans				100.0%						
2	505	High-Efficiency Compressors				100.0%						
2	506	Compressor VSD retrofit				100.0%						
2	507	Installation of Floating Condenser Head Pressure Controls				100.0%						
2	508	Refrigeration Commissioning				100.0%						
2	509	Demand Hot Gas Defrost				100.0%						
2	510	Demand Defrost Electric				100.0%						
2	511	Anti-Sweat (Humidistat) Controls				100.0%						
2	610	Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	611	ENERGY STAR or Better Office Equipment: Computer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	620	Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	621	ENERGY STAR or Better Office Equipment: Monitors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	623	Smart Networks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	630	Base Copier	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	631	ENERGY STAR or Better Office Equipment: Copiers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	640	Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	641	ENERGY STAR or Better Office Equipment: Printers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	700	Base Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	701	Demand controlled circulating systems	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	702	Heat Pump Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	703	High-Efficiency Water Heater (electric)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	704	Hot Water (SHW) Pipe Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	800	Base Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	802	Roof / Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	805	Clock / Programmable Thermostat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	810	Installation of Air Side Economizers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Feasibility Factor

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	100	Base Cooking			25%							
1	101	High-Efficiency Convection Oven			25.0%							
1	102	High-Efficiency Range and Oven			25.0%							
1	110	Base Fluorescent Fixture, 4L4'T12, 34W, 2EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	111	RET 4L4' Premium T8, 1EB	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	112	RET 2L4' Premium T8, 1EB, Reflector	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	40.0%	10.0%	10.0%	10.0%	20.0%	50.0%	50.0%	50.0%	20.0%	20.0%
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	40.0%	50.0%	12.0%	26.0%	40.0%	30.0%	30.0%	10.0%	30.0%	30.0%
1	115	RNV 2L4'T5HO, 1EB	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	121	RET 2L4' Premium T8, 1EB	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	40.0%	10.0%	10.0%	10.0%	20.0%	50.0%	50.0%	50.0%	20.0%	20.0%
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	40.0%	50.0%	12.0%	26.0%	40.0%	30.0%	30.0%	10.0%	30.0%	30.0%
1	125	RNV 1L4'T5HO, 1EB	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
1	130	Base Fluorescent Fixture, 2L8'T12	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
	60W, 1EEMAG										
1	131 RET 2L8T12, 60W, 1EB	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	132 RET 1L8T12, 60W, 1EB, Reflector	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	133 Occupancy Sensor, 4L8' Fluorescent Fixtures	40.0%	10.0%	10.0%	10.0%	20.0%	50.0%	50.0%	50.0%	20.0%	20.0%
1	134 Continuous Dimming, 5L8' Fluorescent Fixtures	40.0%	20.0%	12.0%	26.0%	40.0%	30.0%	30.0%	10.0%	30.0%	30.0%
1	140 Base Incandescent Flood, 75W	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	141 CFL Screw-in, Modular 18W	90.0%	50.0%	50.0%	90.0%	90.0%	90.0%	90.0%	90.0%	70.0%	90.0%
1	150 Base Incandescent Flood, 150W PAR	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	151 Halogen PAR Flood, 90W	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	152 Metal Halide, 50W	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	160 Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	161 RET 2L4T8, 1EB	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	170 Base Mercury Vapor 400W Lamp	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	171 High Pressure Sodium 250W Lamp	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	172 Outdoor Lighting Controls (Photocell/Timeclock)	75.0%	50.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	180 Base 4L4T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	181 ROB 4L4' Premium T8, 1EB	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
1	182 Occupancy Sensor, 4L4' Fluorescent Fixtures	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
1	185 Base 2L4T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	186 ROB 2L4' Premium T8, 1EB	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%

**APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	201	Chiller Tune-Up / Diagnostics	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	75.0%	75.0%	50.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	207	Installation of Energy Management Systems	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	208	Insulation of Pipes	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	209	Installation of Chiller Economizers (water side)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	210	Optimize Chilled Water and Condenser Water Settings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	203	Roof / Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	203	HE Chiller, 0.51 kW/ton, 300 Tons	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	205	EMS Optimization	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	204	Cool Roofs (Reflective and Spray Evaporative)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	250	Base DX Packaged System, EER=10.3, 10 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	251	DX Tune-Up / Diagnostics	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	252	High-Efficiency Packaged A/C	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		System										
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
1	256	Duct Insulation	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
1	257	Duct Repair and Sealing	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	261	Clock / Programmable Thermostat	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	262	Installation of Air Side Economizers	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	401	Energy Efficient Fan & Pump Motors	29.3%	25.0%	81.4%	25.0%	44.5%	33.2%	11.9%	14.3%	93.5%	65.2%
1	402	VSD, ASD Fan & Pump Applications	70.7%	75.0%	18.6%	75.0%	55.5%	66.8%	88.1%	85.7%	6.5%	34.8%
1	500	Base Refrigeration System				100.0%						
1	501	High Efficiency Case Fans				100.0%						
1	502	Strip Curtains for Walk-Ins				100.0%						
1	503	Night Covers for Display Cases				50.0%						
1	504	Reduced Speed or Cycling of Evaporator Fans				100.0%						
1	505	High-Efficiency Compressors				100.0%						
1	506	Compressor VSD retrofit				50.0%						
1	507	Installation of Floating Condenser Head Pressure Controls				100.0%						
1	508	Refrigeration Commissioning				100.0%						

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	509	Demand Hot Gas Defrost				100.0%						
1	510	Demand Defrost Electric				100.0%						
1	511	Anti-Sweat (Humidistat) Controls				100.0%						
1	610	Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	611	ENERGY STAR or Better Office Equipment: Computer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	620	Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	621	ENERGY STAR or Better Office Equipment: Monitors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	623	Smart Networks	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
1	630	Base Copier	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	631	ENERGY STAR or Better Office Equipment: Copiers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	640	Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	641	ENERGY STAR or Better Office Equipment: Printers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	700	Base Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	701	Demand controlled circulating systems	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	702	Heat Pump Water Heater	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	703	High-Efficiency Water Heater (electric)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
1	704	Hot Water (SHW) Pipe Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	800	Base Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	802	Roof / Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	805	Clock / Programmable Thermostat	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
1	810	Installation of Air Side Economizers	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	100	Base Cooking			25.0%							
2	101	High-Efficiency Convection Oven			25.0%							
2	102	High-Efficiency Range and Oven			25.0%							
2	190	Base-NC Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	191	10 % More Efficient Design (Lighting)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	192	20 % More Efficient Design (Lighting)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	201	Chiller Tune-Up / Diagnostics	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	75.0%	75.0%	50.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
2	207	Installation of Energy Management Systems	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	208	Insulation of Pipes	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	209	Installation of Chiller Economizers (water side)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	210	Optimize Chilled Water and Condenser Water Settings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	203	Roof / Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	202	Installation of Automated Building Ventilation Control ( Via Occupancy	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%

**APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS**

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Sensors, CO2 Sensors, Etc.)										
2	203	HE Chiller, 0.51 kW/ton, 300 Tons	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	205	EMS Optimization	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	204	Cool Roofs (Reflective and Spray Evaporative)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	250	Base DX Packaged System, EER=10.3, 10 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	251	DX Tune-Up / Diagnostics	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	252	High-Efficiency Packaged A/C System	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
2	256	Duct Insulation	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
2	257	Duct Repair and Sealing	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	261	Clock / Programmable Thermostat	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
2	262	Installation of Air Side Economizers	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	401	Energy Efficient Fan & Pump Motors	29.3%	25.0%	81.4%	25.0%	44.5%	33.2%	11.9%	14.3%	93.5%	65.2%
2	402	VSD, ASD Fan & Pump Applications	70.7%	75.0%	18.6%	75.0%	55.5%	66.8%	88.1%	85.7%	6.5%	34.8%
2	500	Base Refrigeration System				100.0%						
2	501	High Efficiency Case Fans				100.0%						
2	502	Strip Curtains for Walk-Ins				100.0%						

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	503	Night Covers for Display Cases				50.0%						
2	504	Reduced Speed or Cycling of Evaporator Fans				100.0%						
2	505	High-Efficiency Compressors				100.0%						
2	506	Compressor VSD retrofit				50.0%						
2	507	Installation of Floating Condenser Head Pressure Controls				100.0%						
2	508	Refrigeration Commissioning				100.0%						
2	509	Demand Hot Gas Defrost				100.0%						
2	510	Demand Defrost Electric				100.0%						
2	511	Anti-Sweat (Humidistat) Controls				100.0%						
2	610	Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	611	ENERGY STAR or Better Office Equipment: Computer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	620	Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	621	ENERGY STAR or Better Office Equipment: Monitors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	623	Smart Networks	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
2	630	Base Copier	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	631	ENERGY STAR or Better Office Equipment: Copiers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	640	Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	641	ENERGY STAR or Better Office Equipment: Printers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	700	Base Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	C.1.2 PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	701	Demand controlled circulating systems	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	702	Heat Pump Water Heater	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
2	703	High-Efficiency Water Heater (electric)	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
2	704	Hot Water (SHW) Pipe Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	800	Base Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	802	Roof / Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	805	Clock / Programmable Thermostat	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
2	810	Installation of Air Side Economizers	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Incomplete Factor

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	100 Base Cooking			75%							
1	101 High-Efficiency Convection Oven			75.0%							
1	102 High-Efficiency Range and Oven			75.0%							
1	110 Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	111 RET 4L4' Premium T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	112 RET 2L4' Premium T8, 1EB, Reflector	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	113 Occupancy Sensor, 4L4' Fluorescent Fixtures	79.6%	100.0%	95.7%	100.0%	98.0%	94.7%	90.0%	90.0%	89.6%	95.0%
1	114 Continuous Dimming, 5L4' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%	96.4%	100.0%	100.0%	100.0%	100.0%	100.0%
1	115 RNV 2L4'T5HO, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	120 Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	121 RET 2L4' Premium T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	122 RET 1L4' Premium T8, 1EB, Reflector OEM	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	123 Occupancy Sensor, 8L4' Fluorescent Fixtures	79.6%	100.0%	95.7%	100.0%	98.0%	94.7%	90.0%	90.0%	89.6%	95.0%
1	124 Continuous Dimming, 10L4' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%	96.4%	100.0%	100.0%	100.0%	100.0%	100.0%
1	125 RNV 1L4'T5HO, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	130 Base Fluorescent Fixture, 2L8'T12,	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
	60W, 1EEMAG										
1	RET 2L8T12, 60W, 1EB	26.6%	95.4%	68.1%	54.2%	84.7%	32.9%	50.0%	50.0%	79.9%	46.2%
1	RET 1L8T12, 60W, 1EB, Reflector	26.6%	95.4%	68.1%	54.2%	84.7%	32.9%	50.0%	50.0%	79.9%	46.2%
1	Occupancy Sensor, 4L8' Fluorescent Fixtures	79.6%	100.0%	95.7%	100.0%	98.0%	94.7%	90.0%	90.0%	89.6%	95.0%
1	Continuous Dimming, 5L8' Fluorescent Fixtures	100.0%	100.0%	100.0%	100.0%	96.4%	100.0%	100.0%	100.0%	100.0%	100.0%
1	Base Incandescent Flood, 75W	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	CFL Screw-in, Modular 18W	72.5%	75.0%	89.1%	95.4%	88.7%	88.4%	85.0%	85.0%	72.5%	95.3%
1	Base Incandescent Flood, 150W PAR	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	Halogen PAR Flood, 90W	100.0%	99.3%	100.0%	99.6%	100.0%	97.3%	95.0%	95.0%	99.0%	98.7%
1	Metal Halide, 50W	87.7%	83.2%	80.8%	88.7%	80.4%	71.0%	80.0%	80.0%	84.5%	96.0%
1	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	RET 2L4'T8, 1EB	59.0%	99.1%	89.8%	90.9%	98.0%	32.1%	100.0%	17.9%	100.0%	98.5%
1	Base Mercury Vapor 400W Lamp	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	High Pressure Sodium 250W Lamp	15.0%	25.5%	21.9%	16.2%	10.1%	14.8%	40.0%	11.5%	25.2%	19.4%
1	Outdoor Lighting Controls (Photocell/Timeclock)	15.3%	51.7%	27.3%	22.7%	13.1%	30.7%	3.6%	22.8%	3.1%	30.4%
1	Base 4L4'T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	ROB 4L4' Premium T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	Occupancy Sensor, 4L4' Fluorescent Fixtures	79.6%	100.0%	95.7%	100.0%	98.0%	94.7%	90.0%	90.0%	89.6%	95.0%
1	Base 2L4'T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	186 ROB 2L4' Premium T8, 1EB	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	187 Occupancy Sensor, 8L4' Fluorescent Fixtures	79.6%	100.0%	95.7%	100.0%	98.0%	94.7%	90.0%	90.0%	89.6%	95.0%
1	200 Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	201 Chiller Tune-Up / Diagnostics.	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	206 High Efficiency Windows (Low-E Glass or Multiple Glazed)	99.4%	100.0%	100.0%	100.0%	100.0%	66.0%	66.0%	66.0%	92.9%	76.3%
1	207 Installation of Energy Management Systems	19.1%	100.0%	100.0%	100.0%	80.0%	70.7%	50.0%	75.0%	37.5%	100.0%
1	208 Insulation of Pipes	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	209 Installation of Chiller Economizers (water side)	56.9%	100.0%	100.0%	100.0%	100.0%	81.3%	100.0%	100.0%	40.1%	76.3%
1	210 Optimize Chilled Water and Condenser Water Settings	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	203 Roof / Ceiling Insulation	8.7%	100.0%	100.0%	20.0%	20.0%	23.4%	20.0%	20.0%	34.6%	40.2%
1	202 Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	203 HE Chiller, 0.51 kW/ton, 300 Tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	205 EMS Optimization	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	204 Cool Roofs (Reflective and Spray Evaporative)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	250 Base DX Packaged System, EER=10.3, 10 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	251 DX Tune-Up / Diagnostics	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	252 High-Efficiency Packaged A/C System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	253 High Efficiency Windows (Low-E Glass or Multiple Glazed)	99.4%	100.0%	100.0%	100.0%	100.0%	66.0%	66.0%	66.0%	92.9%	76.3%
1	254 Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
1	256 Duct Insulation	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
1	257 Duct Repair and Sealing	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
1	261 Clock / Programmable Thermostat	58.4%	50.0%	80.4%	84.7%	46.6%	41.1%	30.0%	60.0%	80.0%	35.9%
1	262 Installation of Air Side Economizers	30.4%	92.3%	55.4%	98.6%	53.5%	41.1%	100.0%	40.0%	40.0%	79.7%
1	400 Base Fan Motor, 5hp, 1800rpm, 87.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	401 Energy Efficient Fan & Pump Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	402 VSD, ASD Fan & Pump Applications	85.0%	50.0%	41.9%	50.0%	100.0%	100.0%	83.5%	86.8%	100.0%	83.8%
1	500 Base Refrigeration System				100.0%						
1	501 High Efficiency Case Fans				95.0%						
1	502 Strip Curtains for Walk-Ins				30.0%						
1	503 Night Covers for Display Cases				95.0%						
1	504 Reduced Speed or Cycling of Evaporator Fans				80.0%						
1	505 High-Efficiency Compressors				81.0%						
1	506 Compressor VSD retrofit				95.0%						
1	507 Installation of Floating Condenser Head Pressure Controls				44.4%						

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	508 Refrigeration Commissioning				50.0%						
1	509 Demand Hot Gas Defrost				69.6%						
1	510 Demand Defrost Electric				48.0%						
1	511 Anti-Sweat (Humidistat) Controls				48.0%						
1	610 Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	611 ENERGY STAR or Better Office Equipment: Computer	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
1	620 Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	621 ENERGY STAR or Better Office Equipment: Monitors	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
1	623 Smart Networks	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
1	630 Base Copier	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	631 ENERGY STAR or Better Office Equipment: Copiers	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
1	640 Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	641 ENERGY STAR or Better Office Equipment: Printers	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
1	700 Base Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	701 Demand controlled circulating systems	93.2%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	90.0%	100.0%	100.0%
1	702 Heat Pump Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	87.2%	100.0%	100.0%	100.0%	100.0%
1	703 High-Efficiency Water Heater (electric)	90.0%	90.0%	90.0%	90.0%	90.0%	80.0%	90.0%	90.0%	90.0%	90.0%
1	704 Hot Water (SHW) Pipe Insulation	39.3%	100.0%	100.0%	100.0%	95.2%	9.9%	80.0%	80.0%	100.0%	100.0%
1	800 Base Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1	802 Roof / Ceiling Insulation	12.9%	55.7%	67.0%	85.0%	33.7%	44.9%	40.0%	40.0%	62.3%	13.4%

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C-1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	805 Clock / Programmable Thermostat	76.3%	50.0%	46.2%	50.0%	41.8%	77.2%	70.0%	70.0%	59.4%	41.8%
1	810 Installation of Air Side Economizers	86.4%	87.3%	46.7%	100.0%	100.0%	43.0%	40.0%	40.0%	94.9%	66.5%
1	812 Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	100 Base Cooking			75.0%							
2	101 High-Efficiency Convection Oven			75.0%							
2	102 High-Efficiency Range and Oven			75.0%							
2	190 Base NC Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	191 10 % More Efficient Design (Lighting)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	192 20 % More Efficient Design (Lighting)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	200 Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	201 Chiller Tune-Up / Diagnostics	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	206 High Efficiency Windows (Low-E Glass or Multiple Glazed)	99.4%	100.0%	100.0%	100.0%	100.0%	66.0%	66.0%	66.0%	92.9%	76.3%
2	207 Installation of Energy Management Systems	19.1%	100.0%	100.0%	100.0%	80.0%	70.7%	50.0%	75.0%	37.5%	100.0%
2	208 Insulation of Pipes	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	209 Installation of Chiller Economizers (water side)	56.9%	100.0%	100.0%	100.0%	100.0%	81.3%	100.0%	100.0%	40.1%	76.3%
2	210 Optimize Chilled Water and Condenser Water Settings	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	203 Roof / Ceiling Insulation	8.7%	100.0%	100.0%	20.0%	20.0%	23.4%	20.0%	20.0%	34.6%	40.2%
2	202 Installation of Automated Building	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
	Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)										
2	203 HE Chiller, 0.51 kW/ton, 300 Tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	205 EMS Optimization	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	204 Cool Roofs (Reflective and Spray Evaporative)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	250 Base DX Packaged System, EER=10.3, 10 tons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	251 DX Tune-Up / Diagnostics	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	252 High-Efficiency Packaged A/C System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	253 High Efficiency Windows (Low-E Glass or Multiple Glazed)	99.4%	100.0%	100.0%	100.0%	100.0%	66.0%	66.0%	66.0%	92.9%	76.3%
2	254 Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
2	256 Duct Insulation	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
2	257 Duct Repair and Sealing	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
2	261 Clock / Programmable Thermostat	58.4%	50.0%	80.4%	84.7%	46.6%	41.1%	30.0%	60.0%	80.0%	35.9%
2	262 Installation of Air Side Economizers	30.4%	92.3%	55.4%	98.6%	53.5%	41.1%	100.0%	40.0%	40.0%	79.7%
2	400 Base Fan Motor, 5hp, 1800rpm, 87.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	401 Energy Efficient Fan & Pump Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	402 VSD, ASD Fan & Pump Applications	85.0%	50.0%	41.9%	50.0%	100.0%	100.0%	83.5%	86.8%	100.0%	83.8%
2	500 Base Refrigeration System				100.0%						
2	501 High Efficiency Case Fans				95.0%						

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	Strip Curtains for Walk-Ins				30.0%						
2	Night Covers for Display Cases				95.0%						
2	Reduced Speed or Cycling of Evaporator Fans				80.0%						
2	High-Efficiency Compressors				81.0%						
2	Compressor VSD retrofit				95.0%						
2	Installation of Floating Condenser Head Pressure Controls				44.4%						
2	Refrigeration Commissioning				50.0%						
2	Demand Hot Gas Defrost				69.6%						
2	Demand Defrost Electric				48.0%						
2	Anti-Sweat (Humidistat) Controls				48.0%						
2	Base Desktop PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	ENERGY STAR or Better Office Equipment: Computer	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
2	Base Display Monitor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	ENERGY STAR or Better Office Equipment: Monitors	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
2	Smart Networks	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
2	Base Copier	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	ENERGY STAR or Better Office Equipment: Copiers	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
2	Base Laser Printer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	ENERGY STAR or Better Office Equipment: Printers	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

C.1. Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	Base Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	Demand controlled circulating systems	93.2%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	90.0%	100.0%	100.0%
2	Heat Pump Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	87.2%	100.0%	100.0%	100.0%	100.0%
2	High-Efficiency Water Heater (electric)	90.0%	90.0%	90.0%	90.0%	90.0%	80.0%	90.0%	90.0%	90.0%	90.0%
2	Hot Water (SHW) Pipe Insulation	39.3%	100.0%	100.0%	100.0%	95.2%	9.9%	80.0%	80.0%	100.0%	100.0%
2	Base Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2	Roof / Ceiling Insulation	12.9%	55.7%	67.0%	85.0%	33.7%	44.9%	40.0%	40.0%	62.3%	13.4%
2	Clock / Programmable Thermostat	76.3%	50.0%	46.2%	50.0%	41.8%	77.2%	70.0%	70.0%	59.4%	41.8%
2	Installation of Air Side Economizers	86.4%	87.3%	46.7%	100.0%	100.0%	43.0%	40.0%	40.0%	94.9%	66.5%
2	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Technology Saturation

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	100	Base Cooking			0.05502							
1	101	High-Efficiency Convection Oven			0.05502							
1	102	High-Efficiency Range and Oven			0.05502							
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	111	RET 4L4' Premium T8, 1EB	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	112	RET 2L4' Premium T8, 1EB, Reflector	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	115	RNV 2L4'T5HO, 1EB	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	120	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	121	RET 2L4' Premium T8, 1EB	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	125	RNV 1L4'T5HO, 1EB	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	130	Base Fluorescent Fixture, 2L8T12, 60W, 1EEMAG	0.01430	0.01754	0.01529	0.01483	0.00836	0.01442	0.01294	0.01394	0.00724	0.01407

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	131	RET 2L8T12, 60W, 1EB	0.01430	0.01754	0.01529	0.01483	0.00836	0.01442	0.01294	0.01394	0.00724	0.01407
1	132	RET 1L8T12, 60W, 1EB, Reflector	0.01430	0.01754	0.01529	0.01483	0.00836	0.01442	0.01294	0.01394	0.00724	0.01407
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	0.01430	0.01754	0.01529	0.01483	0.00836	0.01442	0.01294	0.01394	0.00724	0.01407
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	0.01430	0.01754	0.01529	0.01483	0.00836	0.01442	0.01294	0.01394	0.00724	0.01407
1	140	Base Incandescent Flood, 75W	0.09374	0.11668	0.09702	0.09816	0.05576	0.08011	0.07913	0.09545	0.05148	0.10165
1	141	CFL Screw-in, Modular 18W	0.09374	0.11668	0.09702	0.09816	0.05576	0.08011	0.07913	0.09545	0.05148	0.10165
1	150	Base Incandescent Flood, 150W PAR	0.03901	0.04171	0.04144	0.07312	0.02190	0.01698	0.03115	0.02319	0.01612	0.04270
1	151	Halogen PAR Flood, 90W	0.03901	0.04171	0.04144	0.07312	0.02190	0.01698	0.03115	0.02319	0.01612	0.04270
1	152	Metal Halide, 50W	0.03901	0.04171	0.04144	0.07312	0.02190	0.01698	0.03115	0.02319	0.01612	0.04270
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	0.00507	0.01248	0.00398	0.00621	0.00063	0.00418	0.00081	0.00128	0.00200	0.00337
1	161	RET 2L4'T8, 1EB	0.00507	0.01248	0.00398	0.00621	0.00063	0.00418	0.00081	0.00128	0.00200	0.00337
1	170	Base Mercury Vapor, 400W Lamp	0.00105	0.00265	0.00085	0.00136	0.00014	0.00083	0.00016	0.00025	0.00043	0.00074
1	171	High Pressure Sodium 250W Lamp	0.00105	0.00265	0.00085	0.00136	0.00014	0.00083	0.00016	0.00025	0.00043	0.00074
1	172	Outdoor Lighting Controls (Photoell/Timeclock)	0.00026	0.00066	0.00021	0.00034	0.00004	0.00021	0.00004	0.00006	0.00011	0.00018
1	180	Base 4L4'T8, 1EB	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	181	ROB 4L4' Premium T8, 1EB	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	0.01376	0.01529	0.01403	0.01364	0.00682	0.01231	0.01155	0.01342	0.00671	0.01291
1	185	Base 2L4'T8, 1EB	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	186	ROB 2L4' Premium T8, 1EB	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532
1	187	Occupancy Sensor, 8L4' Fluorescent	0.02671	0.03045	0.02717	0.02622	0.01349	0.02364	0.02246	0.02614	0.01319	0.02532

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Fixtures										
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	201	Chiller Tune-Up / Diagnostics	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	0.06770	0.04600	0.02844	0.04090	0.01707	0.02423	0.06252	0.02012	0.09450	0.02844
1	207	Installation of Energy Management Systems	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	208	Insulation of Pipes	0.00098	0.00638	0.00591	0.00232	0.00042	0.00377	0.00634	0.00233	0.00864	0.00234
1	209	Installation of Chiller Economizers (water side)	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1	210	Optimize Chilled Water and Condenser Water Settings	0.00001	0.00001	0.00001	0.00001	0.00000	0.00001	0.00002	0.00002	0.00002	0.00001
1	203	Roof / Ceiling Insulation	0.66373	0.96180	0.91481	0.98187	0.92540	0.95274	0.60215	0.87281	0.43073	0.90014
1	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	203	HE Chiller, 0.51 kW/ton, 300 Tons	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	205	EMS Optimization										
1	204	Cool Roofs (Reflective and Spray Evaporative)	0.50000	1.00000	1.00000	1.00000	1.00000	0.50000	0.43333	0.33333	0.08333	1.00000
1	250	Base DX Packaged System, EER=10.3, 10 tons	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	251	DX Tune-Up / Diagnostics	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	252	High-Efficiency Packaged A/C System	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	253	High Efficiency Windows (Low-E Glass)	0.08770	0.04600	0.02844	0.04090	0.01707	0.02423	0.06252	0.02012	0.09450	0.02844

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		or Multiple Glazed)										
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	256	Duct Insulation	0.04533	0.07934	0.03109	0.03319	0.01533	0.01697	0.01450	0.01424	0.03146	0.03127
1	257	Duct Repair and Sealing	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000	0.25000
1	261	Clock / Programmable Thermostat	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
1	262	Installation of Air Side Economizers	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	0.00889	0.00194	0.00034	0.00115	0.00056	0.00045	0.00057	0.00064	0.00045	0.00142
1	401	Energy Efficient Fan & Pump Motors	0.00889	0.00194	0.00034	0.00115	0.00056	0.00045	0.00057	0.00064	0.00045	0.00142
1	402	VSD, ASD Fan & Pump Applications	0.00889	0.00194	0.00034	0.00115	0.00056	0.00045	0.00057	0.00064	0.00045	0.00142
1	500	Base Refrigeration System				0.00003						
1	501	High Efficiency Case Fans				0.00003						
1	502	Strip Curtains for Walk-Ins				0.00003						
1	503	Night Covers for Display Cases				0.01230						
		Reduced Speed or Cycling of Evaporator Fans										
1	504	Evaporator Fans				0.00015						
1	505	High-Efficiency Compressors				0.00003						
1	506	Compressor VSD retrofit				0.00003						
		Installation of Floating Condenser Head Pressure Controls				0.00003						
1	507	Refrigeration Commissioning				0.00155						
1	508	Demand Hot Gas Defrost				0.00130						
1	509	Demand Defrost Electric				0.00130						
1	510	Anti-Sweat (Humidistat) Controls				0.00003						
1	511											

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
1	610	Base Desktop PC	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
1	611	ENERGY STAR or Better Office Equipment: Computer	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
1	620	Base Display Monitor	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
1	621	ENERGY STAR or Better Office Equipment: Monitors	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
1	623	Smart Networks	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
1	630	Base Copier	0.00017	0.00003	0.00006	0.00006	0.00011	0.00007	0.00002	0.00020	0.00001	0.00021
1	631	ENERGY STAR or Better Office Equipment: Copiers	0.00017	0.00003	0.00006	0.00006	0.00011	0.00007	0.00002	0.00020	0.00001	0.00021
1	640	Base Laser Printer	0.00052	0.00010	0.00018	0.00006	0.00031	0.00032	0.00009	0.00056	0.00005	0.00053
1	641	ENERGY STAR or Better Office Equipment: Printers	0.00052	0.00010	0.00018	0.00006	0.00031	0.00032	0.00009	0.00056	0.00005	0.00053
1	700	Base Water Heating	0.00465	0.02000	0.01452	0.00677	0.00085	0.02037	0.03619	0.03182	0.02795	0.02730
1	701	Demand controlled circulating systems	0.00001	0.00009	0.00002	0.00007	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001
1	702	Heat Pump Water Heater	0.00465	0.02000	0.01452	0.00677	0.00085	0.02037	0.03619	0.03182	0.02795	0.02730
1	703	High-Efficiency Water Heater (electric)	0.00025	0.00108	0.00078	0.00036	0.00005	0.00110	0.00195	0.00171	0.00150	0.00147
1	704	Hot Water (SHW) Pipe Insulation	0.00098	0.00638	0.00591	0.00232	0.00042	0.00377	0.00634	0.00233	0.00864	0.00234
1	800	Base Heating	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1	802	Roof / Ceiling Insulation	0.66373	0.96180	0.91481	0.98187	0.92540	0.95274	0.60215	0.87281	0.43073	0.90014
1	805	Clock / Programmable Thermostat	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1	810	Installation of Air Side Economizers	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc
2	100	Base Cooking			0.05502							
2	101	High-Efficiency Convection Oven			0.05502							
2	102	High-Efficiency Range and Oven			0.05502							
2	190	Base NC Lighting	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	191	10 % More Efficient Design (Lighting)	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	192	20 % More Efficient Design (Lighting)	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	201	Chiller Tune-Up / Diagnostics	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	0.08770	0.04600	0.02844	0.04090	0.01707	0.02423	0.06252	0.02012	0.09450	0.02844
2	207	Installation of Energy Management Systems	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	208	Insulation of Pipes	0.00098	0.00638	0.00591	0.00232	0.00042	0.00377	0.00634	0.00233	0.00864	0.00234
2	209	Installation of Chiller Economizers (water side)	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	210	Optimize Chilled Water and Condenser Water Settings	0.00001	0.00001	0.00001	0.00001	0.00000	0.00001	0.00002	0.00002	0.00002	0.00001
2	203	Roof / Ceiling Insulation	0.66373	0.96180	0.91481	0.98187	0.92540	0.95274	0.60215	0.87281	0.43073	0.90014
2	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	203	HE Chiller, 0.51 kW/ton, 300 Tons	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	205	EMS Optimization										
2	204	Cool Roofs (Reflective and Spray	0.50000	1.00000	1.00000	1.00000	1.00000	0.50000	0.43333	0.33333	0.08333	1.00000

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Evaporative)										
2	250	Base DX Packaged System, EER=10.3, 10 tons	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	251	DX Tune-Up / Diagnostics	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	252	High-Efficiency Packaged A/C System	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	0.08770	0.04600	0.02844	0.04090	0.01707	0.02423	0.06252	0.02012	0.09450	0.02844
		Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	254		0.04533	0.07934	0.03109	0.03319	0.01533	0.01697	0.01450	0.01424	0.03146	0.03127
2	256	Duct Insulation	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	257	Duct Repair and Sealing	0.00300	0.00250	0.00190	0.00325	0.00090	0.00225	0.00450	0.00450	0.00475	0.00200
2	261	Clock / Programmable Thermostat	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	262	Installation of Air Side Economizers	0.00089	0.00194	0.00034	0.00115	0.00056	0.00045	0.00057	0.00064	0.00045	0.00142
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	0.00089	0.00194	0.00034	0.00115	0.00056	0.00045	0.00057	0.00064	0.00045	0.00142
2	401	Energy Efficient Fan & Pump Motors	0.00089	0.00194	0.00034	0.00115	0.00056	0.00045	0.00057	0.00064	0.00045	0.00142
2	402	VSD, ASD Fan & Pump Applications	0.00089	0.00194	0.00034	0.00115	0.00056	0.00045	0.00057	0.00064	0.00045	0.00142
2	500	Base Refrigeration System				0.00003						
2	501	High Efficiency Case Fans				0.00003						
2	502	Strip Curtains for Walk-Ins				0.00003						
2	503	Night Covers for Display Cases				0.01230						
2	504	Reduced Speed or Cycling of Evaporator Fans				0.00015						
2	505	High-Efficiency Compressors				0.00003						
2	506	Compressor VSD retrofit				0.00003						



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
		Installation of Floating Condenser Head Pressure Controls				0.00003						
2	507					0.00155						
2	508	Refrigeration Commissioning				0.00130						
2	509	Demand Hot Gas Defrost				0.00130						
2	510	Demand Defrost Electric				0.00003						
2	511	Anti-Sweat (Humidistat) Controls				0.00012						
2	610	Base Desktop PC	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
2	611	ENERGY STAR or Better Office Equipment: Computer	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
2	620	Base Display Monitor	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
2	621	ENERGY STAR or Better Office Equipment: Monitors	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
2	623	Smart Networks	0.00183	0.00015	0.00030	0.00012	0.00099	0.00116	0.00031	0.00111	0.00010	0.00145
2	630	Base Copier	0.00017	0.00003	0.00006	0.00006	0.00011	0.00007	0.00002	0.00020	0.00001	0.00021
2	631	ENERGY STAR or Better Office Equipment: Copiers	0.00017	0.00003	0.00006	0.00006	0.00011	0.00007	0.00002	0.00020	0.00001	0.00021
2	640	Base Laser Printer	0.00052	0.00010	0.00018	0.00006	0.00031	0.00032	0.00009	0.00056	0.00005	0.00053
2	641	ENERGY STAR or Better Office Equipment: Printers	0.00052	0.00010	0.00018	0.00006	0.00031	0.00032	0.00009	0.00056	0.00005	0.00053
2	700	Base Water Heating	0.00465	0.02000	0.01452	0.00677	0.00085	0.02037	0.03619	0.03182	0.02795	0.02730
2	701	Demand controlled circulating systems	0.00001	0.00009	0.00002	0.00007	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001
2	702	Heat Pump Water Heater	0.00465	0.02000	0.01452	0.00677	0.00085	0.02037	0.03619	0.03182	0.02795	0.02730
2	703	High-Efficiency Water Heater (electric)	0.00025	0.00108	0.00078	0.00036	0.00005	0.00110	0.00195	0.00171	0.00150	0.00147
2	704	Hot Water (SHW) Pipe Insulation	0.00098	0.00638	0.00591	0.00232	0.00042	0.00377	0.00634	0.00233	0.00864	0.00234
2	800	Base Heating	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Office	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Hotel	Misc.
2	802	Roof / Ceiling Insulation	0.66373	0.96180	0.91481	0.98187	0.92540	0.95274	0.60215	0.87281	0.43073	0.90014
2	805	Clock / Programmable Thermostat	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	810	Installation of Air Side Economizers	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Lighting

Seg	Measure #	Measure Description	Retail	Restaurant	Food Store	Warehouse	School	College	Hospital	Office	Retail
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	111	RET 4L4T8, 1EB	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	112	RET 2L4T8, 1EB, Reflector	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	115	RNV 2L4T5HO, 1EB	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	120	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	121	RET 2L4T8, 1EB	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	122	RET 1L4T8, 1EB, Reflector OEM	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	125	RNV 1L4T5HO, 1EB	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	130	Base Fluorescent Fixture, 2L8T12, 60W, 1EEMAG	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail

**APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS**

1	131	RET 2L8'T12, 60W, 1EB	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	132	RET 1L8'T12, 60W, 1EB, Reflector	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	140	Base Incandescent Flood, 75W	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	141	CFL Screw-in, Modular 18W	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	150	Base Incandescent Flood, 150W PAR	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	151	Halogen PAR Flood, 90W	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	152	Metal Halide, 50W	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	Office	Retail
1	161	RET 2L4'T8, 1EB	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	Office	Retail
1	170	Base Mercury Vapor, 400W Lamp	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	Office	Retail
1	171	High Pressure Sodium 250W Lamp	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	Office	Retail
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	Office	Retail
1	180	Base 4L4'T8, 1EB	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	181	ROB 4L4' Premium T8, 1EB	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	185	Base 2L4'T8, 1EB	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	186	ROB 2L4' Premium T8, 1EB	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	4,358	2,847	3,113	6,055	3,212	2,045	2,158	5,999	Office	Retail

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

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APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	Office	115.23	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	Office	86.26	28.97	28.97	25%	\$0.042	\$0.048	Lighting	Level B	Level C
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Office	77.48	8.77	37.74	33%	\$0.047	\$0.054	Lighting	Level C	Level C
1	112	RET 2L4' Premium T8, 1EB, Reflector	Office	67.30	10.18	47.93	42%	\$0.040	\$0.046	Lighting	Level B	Level C
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Office	47.11	20.19	68.12	59%	\$0.222	\$0.255	Lighting	Level F	Level F
1	115	RNV 2L4T5HO, 1EB	Office	44.33	2.78	70.90	62%	\$0.423	\$0.486	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	Office	86.42	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Office	64.69	21.73	21.73	25%	\$0.056	\$0.064	Lighting	Level C	Level D
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Office	58.11	6.58	28.31	33%	\$0.046	\$0.052	Lighting	Level C	Level C
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Office	54.38	3.74	32.04	37%	\$0.057	\$0.066	Lighting	Level C	Level D
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Office	38.06	16.31	48.36	56%	\$0.200	\$0.230	Lighting	Level F	Level F
1	125	RNV 1L4T5HO, 1EB	Office	35.82	2.25	50.60	59%	\$0.716	\$0.824	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8T12, 60W, 1EEMAG	Office	325.05	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8T12, 60W, 1EB	Office	307.26	17.79	17.79	5%	\$0.069	\$0.079	Lighting	Level D	Level D
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Office	276.01	31.25	49.04	15%	\$0.039	\$0.044	Lighting	Level B	Level B
1	132	RET 1L8T12, 60W, 1EB, Reflector	Office	260.06	15.95	64.99	20%	\$0.026	\$0.030	Lighting	Level A	Level B
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Office	182.04	78.02	143.01	44%	\$0.168	\$0.193	Lighting	Level F	Level F

APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	140	Base Incandescent Flood, 75W	Office	133.92	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Office	55.47	78.44	78.44	59%	\$0.049	\$0.057	Lighting	Level C	Level C
1	150	Base Incandescent Flood, 150W PAR	Office	133.92	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Office	107.13	26.78	26.78	20%	\$0.161	\$0.185	Lighting	Level F	Level F
1	152	Metal Halide, 50W	Office	77.79	29.34	56.13	42%	\$0.565	\$0.650	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	Office	325.05	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4T8, 1EB	Office	299.33	25.72	25.72	8%	\$0.016	\$0.018	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	Office	1,010.45	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	Office	978.82	31.63	31.63	3%	\$0.009	\$0.010	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Office	920.34	58.48	90.11	9%	\$0.015	\$0.017	Lighting	Level A	Level A
1	180	Base 4L4T8, 1EB	Office	254.54	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Office	222.38	32.15	32.15	13%	\$0.015	\$0.017	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Office	211.08	11.31	43.46	17%	\$0.050	\$0.058	Lighting	Level C	Level C
1	185	Base 2L4T8, 1EB	Office	190.90	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	Office	164.57	26.33	26.33	14%	\$0.018	\$0.021	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Office	160.39	4.18	30.52	16%	\$0.050	\$0.057	Lighting	Level C	Level C
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Office	562.04	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	Office	560.63	1.41	1.41	0%	\$0.009	\$0.011	HVAC	Level A	Level A
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Office	521.90	38.73	40.14	7%	\$0.013	\$0.015	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	Office	518.56	3.35	43.49	8%	\$0.168	\$0.193	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Office	498.61	19.94	63.43	11%	\$0.124	\$0.143	HVAC	Level F	Level F

APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	207	Installation of Energy Management Systems	Office	493.44	5.17	68.60	12%	\$0.073	\$0.084	HVAC	Level D	Level D
1	203	Roof/Ceiling Insulation	Office	492.77	0.66	69.27	12%	\$0.288	\$0.332	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Office	481.51	11.27	80.53	14%	\$0.155	\$0.178	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	Office	469.16	12.35	92.88	17%	\$0.179	\$0.206	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Office	468.53	0.63	93.51	17%	\$0.303	\$0.349	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Office	464.30	4.23	97.74	17%	\$0.614	\$0.706	HVAC	Level F	Level F
1	205	EMS Optimization	Office	464.30	0.00	97.74	17%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Office	562.04	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	Office	560.96	1.08	1.08	0%	\$0.014	\$0.017	HVAC	Level A	Level A
1	261	Clock/Programmable Thermostat	Office	541.46	19.50	20.58	4%	\$0.031	\$0.035	HVAC	Level B	Level B
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Office	528.00	13.46	34.04	6%	\$0.026	\$0.029	HVAC	Level A	Level A
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Office	507.69	20.31	54.35	10%	\$0.122	\$0.140	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	Office	490.44	17.25	71.60	13%	\$0.235	\$0.270	HVAC	Level F	Level F
1	262	Installation of Air Side Economizers	Office	480.84	9.60	81.20	14%	\$0.159	\$0.183	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	Office	461.86	18.98	100.18	18%	\$0.293	\$0.337	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Office	461.24	0.62	100.80	18%	\$0.308	\$0.354	HVAC	Level F	Level F
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Office	450.23	11.01	111.81	20%	\$0.420	\$0.483	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Office	449.10	1.13	112.94	20%	\$0.119	\$0.137	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Office	445.05	4.06	117.00	21%	\$0.641	\$0.737	HVAC	Level F	Level F



APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Office	259.05	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Office	210.14	48.91	48.91	19%	\$0.051	\$0.059	HVAC	Level C	Level C
1	401	Energy Efficient Fan & Pump Motors	Office	209.22	0.92	49.83	19%	\$0.392	\$0.451	HVAC	Level F	Level F
1	610	Base Desktop PC	Office	138.61	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	Office	63.38	75.23	75.23	54%	\$0.118	\$0.136	Appliances	Level F	Level F
1	620	Base Display Monitor	Office	133.40	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Office	122.83	10.57	10.57	8%	\$0.014	\$0.016	Appliances	Level A	Level A
1	621	ENERGY STAR or Better Office Equipment: Monitors	Office	60.01	62.82	73.39	55%	\$0.155	\$0.178	Appliances	Level F	Level F
1	630	Base Copier	Office	44.13	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Office	32.17	11.96	11.96	27%	\$0.138	\$0.159	Appliances	Level F	Level F
1	640	Base Laser Printer	Office	48.74	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Office	26.64	22.10	22.10	45%	\$0.114	\$0.131	Appliances	Level F	Level F
1	700	Base Water Heating	Office	64.96	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	Office	64.34	0.62	0.62	1%	\$0.027	\$0.031	Water Heat	Level A	Level B
1	701	Demand controlled circulating systems	Office	63.55	0.79	1.41	2%	\$0.155	\$0.178	Water Heat	Level F	Level F
1	702	Heat Pump Water Heater	Office	56.02	7.53	8.94	14%	\$0.699	\$0.804	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Office	53.69	2.33	11.27	17%	\$1.139	\$1.309	Water Heat	Level F	Level F
1	800	Base Heating	Office	14.38	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	Office	12.46	1.92	1.92	13%	\$0.121	\$0.139	HVAC	Level F	Level F
1	802	Roof/Ceiling Insulation	Office	12.37	0.09	2.01	14%	\$0.392	\$0.451	HVAC	Level F	Level F
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Office	12.06	0.31	2.32	16%	\$0.872	\$1.003	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	Office	11.26	0.80	3.12	22%	\$0.615	\$0.708	HVAC	Level F	Level F
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	Dry Goods Retail	160.30	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A

APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	111	RET 4L4' Premium T8, 1EB	Dry Goods Retail	120.00	40.30	40.30	25%	\$0.035	\$0.040	Lighting	Level B	Level B
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Dry Goods Retail	117.60	2.40	42.70	27%	\$0.053	\$0.061	Lighting	Level C	Level D
1	112	RET 2L4' Premium T8, 1EB, Reflector	Dry Goods Retail	102.14	15.46	58.16	36%	\$0.030	\$0.035	Lighting	Level B	Level B
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Dry Goods Retail	63.84	38.30	96.46	60%	\$0.152	\$0.175	Lighting	Level F	Level F
1	115	RNV 2L4'T5HO, 1EB	Dry Goods Retail	60.07	3.77	100.23	63%	\$0.360	\$0.414	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Dry Goods Retail	120.23	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Dry Goods Retail	90.00	30.23	30.23	25%	\$0.047	\$0.055	Lighting	Level C	Level C
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Dry Goods Retail	88.20	1.80	32.03	27%	\$0.053	\$0.061	Lighting	Level C	Level D
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Dry Goods Retail	82.53	5.67	37.70	31%	\$0.045	\$0.052	Lighting	Level B	Level C
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Dry Goods Retail	51.58	30.95	68.65	57%	\$0.141	\$0.162	Lighting	Level F	Level F
1	125	RNV 1L4'T5HO, 1EB	Dry Goods Retail	48.54	3.04	71.69	60%	\$0.626	\$0.719	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	Dry Goods Retail	126.01	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8'T12, 60W, 1EB	Dry Goods Retail	104.99	21.02	21.02	17%	\$0.074	\$0.085	Lighting	Level D	Level E
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Dry Goods Retail	102.89	2.10	23.12	18%	\$0.055	\$0.063	Lighting	Level C	Level D
1	132	RET 1L8'T12, 60W, 1EB, Reflector	Dry Goods Retail	90.68	12.21	35.33	28%	\$0.044	\$0.050	Lighting	Level B	Level C

APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Dry Goods Retail	77.08	13.60	48.93	39%	\$0.154	\$0.177	Lighting	Level F	Level F
1	140	Base Incandescent Flood, 75W	Dry Goods Retail	387.73	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Dry Goods Retail	260.06	127.66	127.66	33%	\$0.038	\$0.044	Lighting	Level B	Level B
1	150	Base Incandescent Flood, 150W PAR	Dry Goods Retail	387.73	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Dry Goods Retail	310.52	77.21	77.21	20%	\$0.101	\$0.116	Lighting	Level E	Level F
1	152	Metal Halide, 50W	Dry Goods Retail	227.51	83.01	160.22	41%	\$0.358	\$0.411	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Dry Goods Retail	126.01	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4'T8, 1EB	Dry Goods Retail	110.38	15.63	15.63	12%	\$0.038	\$0.044	Lighting	Level B	Level B
1	170	Base Mercury Vapor 400W Lamp	Dry Goods Retail	718.91	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	Dry Goods Retail	672.72	46.20	46.20	6%	\$0.021	\$0.025	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Dry Goods Retail	607.71	65.01	111.21	15%	\$0.037	\$0.042	Lighting	Level B	Level B
1	180	Base 4L4'T8, 1EB	Dry Goods Retail	6.17	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Dry Goods Retail	5.39	0.78	0.78	13%	\$0.012	\$0.014	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Dry Goods Retail	5.18	0.22	1.00	16%	\$0.057	\$0.065	Lighting	Level C	Level D
1	185	Base 2L4'T8, 1EB	Dry Goods Retail	4.63	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A

APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	186	ROB 2L4' Premium T8, 1EB	Dry Goods Retail	3.99	0.64	0.64	14%	\$0.016	\$0.018	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Dry Goods Retail	3.91	0.08	0.72	16%	\$0.057	\$0.066	Lighting	Level C	Level D
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Dry Goods Retail	113.04	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	Dry Goods Retail	112.76	0.28	0.28	0%	\$0.188	\$0.216	HVAC	Level F	Level F
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Dry Goods Retail	104.03	8.73	9.01	8%	\$0.019	\$0.022	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	Dry Goods Retail	103.36	0.67	9.68	9%	\$0.435	\$0.500	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Dry Goods Retail	98.19	5.17	14.85	13%	\$0.322	\$0.371	HVAC	Level F	Level F
1	207	Installation of Energy Management Systems	Dry Goods Retail	93.28	4.91	19.76	17%	\$0.210	\$0.241	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Dry Goods Retail	91.89	1.40	21.16	19%	\$1.410	\$1.622	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Dry Goods Retail	87.29	4.59	25.75	23%	\$0.538	\$0.618	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	Dry Goods Retail	85.05	2.24	27.99	25%	\$0.511	\$0.588	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Dry Goods Retail	83.78	1.28	29.27	26%	\$1.547	\$1.779	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Dry Goods Retail	80.88	2.90	32.16	28%	\$1.113	\$1.280	HVAC	Level F	Level F
1	205	EMS Optimization	Dry Goods Retail	80.88	0.00	32.16	28%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Dry Goods Retail	113.04	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A

**APPENDIX C**

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Dry Goods Retail	110.22	2.83	2.83	3%	\$0.040	\$0.046	HVAC	Level B	Level C
1	256	Duct Insulation	Dry Goods Retail	110.01	0.21	3.04	3%	\$0.079	\$0.091	HVAC	Level D	Level E
1	261	Clock/Programmable Thermostat	Dry Goods Retail	106.83	3.18	6.21	5%	\$0.083	\$0.095	HVAC	Level D	Level E
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Dry Goods Retail	101.49	5.34	11.56	10%	\$0.312	\$0.359	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	Dry Goods Retail	98.04	3.45	15.00	13%	\$0.607	\$0.699	HVAC	Level F	Level F
1	262	Installation of Air Side Economizers	Dry Goods Retail	91.17	6.86	21.87	19%	\$0.544	\$0.626	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	Dry Goods Retail	87.58	3.60	25.47	23%	\$0.800	\$0.920	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Dry Goods Retail	84.55	3.03	28.50	25%	\$1.065	\$1.225	HVAC	Level F	Level F
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Dry Goods Retail	82.53	2.02	30.51	27%	\$1.185	\$1.362	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Dry Goods Retail	81.29	1.24	31.75	28%	\$1.594	\$1.833	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Dry Goods Retail	81.09	0.20	31.96	28%	\$0.410	\$0.471	HVAC	Level F	Level F
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Dry Goods Retail	451.15	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Dry Goods Retail	391.44	59.71	59.71	13%	\$0.056	\$0.065	HVAC	Level C	Level D
1	401	Energy Efficient Fan & Pump Motors	Dry Goods Retail	389.97	1.47	61.18	14%	\$0.455	\$0.523	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	610	Base Desktop PC	Dry Goods Retail	8.37	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	Dry Goods Retail	3.99	4.38	4.38	52%	\$0.096	\$0.111	Appliances	Level E	Level F
1	620	Base Display Monitor	Dry Goods Retail	8.06	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Dry Goods Retail	7.97	0.08	0.08	1%	\$0.011	\$0.013	Appliances	Level A	Level A
1	621	ENERGY STAR or Better Office Equipment: Monitors	Dry Goods Retail	3.87	4.10	4.18	52%	\$0.112	\$0.129	Appliances	Level F	Level F
1	630	Base Copier	Dry Goods Retail	7.56	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Dry Goods Retail	5.59	1.97	1.97	26%	\$0.075	\$0.086	Appliances	Level D	Level E
1	640	Base Laser Printer	Dry Goods Retail	7.68	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Dry Goods Retail	4.54	3.14	3.14	41%	\$0.095	\$0.110	Appliances	Level E	Level E
1	700	Base Water Heating	Dry Goods Retail	50.00	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	Dry Goods Retail	48.75	1.25	1.25	2%	\$0.123	\$0.141	Water Heat	Level F	Level F
1	701	Demand controlled circulating systems	Dry Goods Retail	47.53	1.22	2.47	5%	\$1.371	\$1.576	Water Heat	Level F	Level F
1	702	Heat Pump Water Heater	Dry Goods Retail	36.84	10.70	13.16	26%	\$2.097	\$2.412	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Dry Goods Retail	35.22	1.62	14.78	30%	\$3.884	\$4.467	Water Heat	Level F	Level F
1	800	Base Heating	Dry Goods Retail	36.29	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A

APPENDIX C

Sqft	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	805	Clock/Programmable Thermostat	Dry Goods Retail	33.13	3.17	3.17	9%	\$0.103	\$0.118	HVAC	Level E	Level F
1	802	Roof/Ceiling Insulation	Dry Goods Retail	32.16	0.97	4.13	11%	\$0.480	\$0.552	HVAC	Level F	Level F
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Dry Goods Retail	31.36	0.80	4.94	14%	\$0.719	\$0.827	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	Dry Goods Retail	29.26	2.09	7.03	19%	\$0.508	\$0.584	HVAC	Level F	Level F
1	100	Base Cooking	Restaurant	658.78	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	102	High-Efficiency Range and Oven	Restaurant	632.78	26.00	26.00	4%	\$0.211	\$0.243	Appliances	Level F	Level F
1	110	Base Fluorescent Fixture, 4L4'T12, 34W, 2EEMAG	Restaurant	50.28	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	Restaurant	37.64	12.64	12.64	25%	\$0.022	\$0.025	Lighting	Level A	Level A
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Restaurant	36.91	0.73	13.37	27%	\$0.035	\$0.040	Lighting	Level B	Level B
1	112	RET 2L4' Premium T8, 1EB, Reflector	Restaurant	32.06	4.85	18.22	36%	\$0.019	\$0.022	Lighting	Level A	Level A
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Restaurant	29.18	2.89	21.11	42%	\$0.098	\$0.112	Lighting	Level E	Level F
1	115	RNV 2L4'T5HO, 1EB	Restaurant	27.46	1.72	22.83	45%	\$0.155	\$0.178	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Restaurant	37.71	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Restaurant	28.23	9.48	9.48	25%	\$0.029	\$0.033	Lighting	Level A	Level B
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Restaurant	27.69	0.55	10.03	27%	\$0.034	\$0.039	Lighting	Level B	Level B
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Restaurant	25.91	1.78	11.81	31%	\$0.027	\$0.031	Lighting	Level A	Level B
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Restaurant	23.57	2.33	14.14	37%	\$0.088	\$0.101	Lighting	Level E	Level E
1	125	RNV 1L4'T5HO, 1EB	Restaurant	22.18	1.39	15.53	41%	\$0.261	\$0.300	Lighting	Level F	Level F

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1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	Restaurant	55.38	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8'T12, 60W, 1EB	Restaurant	48.36	7.01	7.01	13%	\$0.041	\$0.048	Lighting	Level B	Level C
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Restaurant	47.43	0.93	7.95	14%	\$0.033	\$0.038	Lighting	Level B	Level B
1	132	RET 1L8'T12, 60W, 1EB, Reflector	Restaurant	42.59	4.84	12.79	23%	\$0.021	\$0.024	Lighting	Level A	Level A
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Restaurant	38.76	3.83	16.62	30%	\$0.088	\$0.101	Lighting	Level E	Level E
1	140	Base Incandescent Flood, 75W	Restaurant	35.16	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Restaurant	22.92	12.24	12.24	35%	\$0.026	\$0.030	Lighting	Level A	Level A
1	150	Base Incandescent Flood, 150W PAR	Restaurant	35.16	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Restaurant	28.13	7.03	7.03	20%	\$0.074	\$0.085	Lighting	Level D	Level D
1	152	Metal Halide, 50W	Restaurant	20.71	7.42	14.45	41%	\$0.258	\$0.297	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Restaurant	55.38	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4'T8, 1EB	Restaurant	49.05	6.32	6.32	11%	\$0.008	\$0.009	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	Restaurant	118.67	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	Restaurant	112.24	6.42	6.42	5%	\$0.004	\$0.005	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Restaurant	102.75	9.49	15.91	13%	\$0.008	\$0.009	Lighting	Level A	Level A
1	180	Base 4L4'T8, 1EB	Restaurant	18.84	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Restaurant	16.46	2.38	2.38	13%	\$0.008	\$0.009	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Restaurant	15.83	0.64	3.02	16%	\$0.037	\$0.043	Lighting	Level B	Level B
1	185	Base 2L4'T8, 1EB	Restaurant	14.13	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	Restaurant	12.18	1.95	1.95	14%	\$0.010	\$0.011	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Restaurant	11.95	0.24	2.18	15%	\$0.037	\$0.042	Lighting	Level B	Level B
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Restaurant	98.07	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A



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1	208	Insulation of Pipes	Restaurant	97.82	0.25	0.25	0%	\$0.041	\$0.047	HVAC	Level B	Level C
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Restaurant	96.62	1.21	1.45	1%	\$0.012	\$0.013	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	Restaurant	96.00	0.62	2.07	2%	\$0.072	\$0.083	HVAC	Level D	Level D
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Restaurant	92.80	3.20	5.27	5%	\$0.054	\$0.062	HVAC	Level C	Level D
1	207	Installation of Energy Management Systems	Restaurant	88.16	4.64	9.91	10%	\$0.034	\$0.039	HVAC	Level B	Level B
1	203	Roof/Ceiling Insulation	Restaurant	86.84	1.32	11.24	11%	\$0.289	\$0.332	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Restaurant	82.49	4.34	15.58	16%	\$0.116	\$0.133	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	Restaurant	80.38	2.12	17.69	18%	\$0.084	\$0.096	HVAC	Level D	Level E
1	203	Roof/Ceiling Insulation	Restaurant	79.17	1.21	18.90	19%	\$0.317	\$0.364	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Restaurant	74.04	5.13	24.03	24%	\$0.128	\$0.147	HVAC	Level F	Level F
1	205	EMS Optimization	Restaurant	74.04	0.00	24.03	24%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Restaurant	98.07	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	Restaurant	97.88	0.19	0.19	0%	\$0.007	\$0.008	HVAC	Level A	Level A
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Restaurant	95.43	2.45	2.64	3%	\$0.006	\$0.007	HVAC	Level A	Level A
1	261	Clock/Programmable Thermostat	Restaurant	91.47	3.96	6.60	7%	\$0.017	\$0.019	HVAC	Level A	Level A
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Restaurant	88.42	3.05	9.65	10%	\$0.056	\$0.065	HVAC	Level C	Level D
1	262	Installation of Air Side Economizers	Restaurant	84.49	3.94	13.58	14%	\$0.116	\$0.133	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Restaurant	79.01	5.47	19.06	19%	\$0.120	\$0.138	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	Restaurant	75.90	3.12	22.17	23%	\$0.143	\$0.164	HVAC	Level F	Level F

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1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Restaurant	74.08	1.81	23.99	24%	\$0.204	\$0.235	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Restaurant	72.97	1.11	25.10	26%	\$0.344	\$0.395	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Restaurant	72.79	0.18	25.28	26%	\$0.093	\$0.107	HVAC	Level E	Level E
1	252	High-Efficiency Packaged A/C System	Restaurant	70.32	2.47	27.75	28%	\$0.131	\$0.151	HVAC	Level F	Level F
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Restaurant	8.43	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Restaurant	8.19	0.24	0.24	3%	\$0.057	\$0.066	HVAC	Level C	Level D
1	401	Energy Efficient Fan & Pump Motors	Restaurant	8.09	0.10	0.34	4%	\$0.426	\$0.490	HVAC	Level F	Level F
1	610	Base Desktop PC	Restaurant	1.06	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	Restaurant	0.50	0.57	0.57	53%	\$0.286	\$0.329	Appliances	Level F	Level F
1	620	Base Display Monitor	Restaurant	1.02	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Restaurant	1.00	0.03	0.03	3%	\$0.034	\$0.039	Appliances	Level B	Level B
1	621	ENERGY STAR or Better Office Equipment: Monitors	Restaurant	0.48	0.51	0.54	53%	\$0.346	\$0.398	Appliances	Level F	Level F
1	630	Base Copier	Restaurant	0.73	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Restaurant	0.54	0.19	0.19	27%	\$0.313	\$0.360	Appliances	Level F	Level F
1	640	Base Laser Printer	Restaurant	0.94	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Restaurant	0.53	0.40	0.40	43%	\$0.235	\$0.270	Appliances	Level F	Level F
1	700	Base Water Heating	Restaurant	38.36	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	Restaurant	37.40	0.96	0.96	3%	\$0.016	\$0.019	Water Heat	Level A	Level A
1	701	Demand controlled circulating systems	Restaurant	36.46	0.93	1.89	5%	\$0.049	\$0.057	Water Heat	Level C	Level C
1	702	Heat Pump Water Heater	Restaurant	28.26	8.20	10.10	26%	\$0.219	\$0.252	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Restaurant	27.02	1.24	11.34	30%	\$0.406	\$0.467	Water Heat	Level F	Level F
1	800	Base Heating	Restaurant	56.77	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	Restaurant	51.83	4.94	4.94	9%	\$0.012	\$0.014	HVAC	Level A	Level A
1	802	Roof/Ceiling Insulation	Restaurant	50.03	1.80	6.73	12%	\$0.059	\$0.068	HVAC	Level C	Level D

# APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Restaurant	48.78	1.25	7.98	14%	\$0.093	\$0.107	HVAC	Level E	Level E
1	810	Installation of Air Side Economizers	Restaurant	46.93	1.86	9.84	17%	\$0.062	\$0.071	HVAC	Level D	Level D
1	110	Base Fluorescent Fixture, 4L4'T12, 34W, 2EEMAG	Grocery	54.61	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	Grocery	40.88	13.73	13.73	25%	\$0.022	\$0.025	Lighting	Level A	Level A
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Grocery	40.06	0.82	14.55	27%	\$0.041	\$0.048	Lighting	Level B	Level C
1	112	RET 2L4' Premium T8, 1EB, Reflector	Grocery	34.80	5.27	19.81	36%	\$0.019	\$0.022	Lighting	Level A	Level A
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Grocery	28.01	6.79	26.60	49%	\$0.109	\$0.126	Lighting	Level E	Level F
1	115	RNV 2L4'T5HO, 1EB	Grocery	26.36	1.65	28.25	52%	\$0.179	\$0.206	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Grocery	40.96	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Grocery	30.66	10.30	10.30	25%	\$0.029	\$0.034	Lighting	Level A	Level B
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Grocery	30.05	0.61	10.91	27%	\$0.040	\$0.046	Lighting	Level B	Level C
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Grocery	28.12	1.93	12.84	31%	\$0.028	\$0.032	Lighting	Level A	Level B
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Grocery	22.63	5.48	18.33	45%	\$0.098	\$0.112	Lighting	Level E	Level F
1	125	RNV 1L4'T5HO, 1EB	Grocery	21.30	1.34	19.66	48%	\$0.300	\$0.345	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	Grocery	75.52	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8'T12, 60W, 1EB	Grocery	67.65	7.87	7.87	10%	\$0.041	\$0.047	Lighting	Level B	Level C
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Grocery	66.30	1.35	9.22	12%	\$0.038	\$0.043	Lighting	Level B	Level B
1	132	RET 1L8'T12, 60W, 1EB, Reflector	Grocery	60.29	6.01	15.23	20%	\$0.018	\$0.021	Lighting	Level A	Level A
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Grocery	48.53	11.76	26.99	36%	\$0.095	\$0.109	Lighting	Level E	Level E

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	140	Base Incandescent Flood, 75W	Grocery	83.91	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Grocery	30.27	53.65	53.65	64%	\$0.034	\$0.039	Lighting	Level B	Level B
1	150	Base Incandescent Flood, 150W PAR	Grocery	83.91	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Grocery	67.18	16.74	16.74	20%	\$0.173	\$0.199	Lighting	Level F	Level F
1	152	Metal Halide, 50W	Grocery	48.69	18.49	35.23	42%	\$0.591	\$0.680	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	Grocery	75.52	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4T8, 1EB	Grocery	66.81	8.71	8.71	12%	\$0.009	\$0.010	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	Grocery	305.44	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timerlock)	Grocery	291.48	13.96	13.96	5%	\$0.005	\$0.005	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Grocery	272.70	18.78	32.74	11%	\$0.008	\$0.009	Lighting	Level A	Level A
1	180	Base 4L4T8, 1EB	Grocery	36.87	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Grocery	32.21	4.66	4.66	13%	\$0.008	\$0.009	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Grocery	30.92	1.29	5.95	16%	\$0.044	\$0.051	Lighting	Level B	Level C
1	185	Base 2L4T8, 1EB	Grocery	27.65	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	Grocery	23.84	3.81	3.81	14%	\$0.010	\$0.011	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Grocery	23.36	0.48	4.29	16%	\$0.043	\$0.050	Lighting	Level B	Level C
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Grocery	109.53	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	Grocery	109.26	0.28	0.28	0%	\$0.012	\$0.014	HVAC	Level A	Level A
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Grocery	101.58	7.67	7.95	7%	\$0.003	\$0.004	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	Grocery	100.93	0.65	8.60	8%	\$0.102	\$0.117	HVAC	Level E	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Grocery	95.89	5.05	13.64	12%	\$0.075	\$0.087	HVAC	Level D	Level E

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	207	Installation of Energy Management Systems	Grocery	91.09	4.79	18.44	17%	\$0.049	\$0.056	HVAC	Level C	Level C
1	203	Roof/Ceiling Insulation	Grocery	90.81	0.28	18.72	17%	\$0.253	\$0.291	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Grocery	86.27	4.54	23.26	21%	\$0.096	\$0.110	HVAC	Level E	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	Grocery	84.06	2.21	25.47	23%	\$0.118	\$0.136	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Grocery	83.80	0.26	25.73	23%	\$0.274	\$0.315	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Grocery	77.32	6.48	32.21	29%	\$0.088	\$0.101	HVAC	Level E	Level E
1	205	EMS Optimization	Grocery	77.32	0.00	32.21	29%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Grocery	109.53	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	Grocery	109.32	0.21	0.21	0%	\$0.006	\$0.007	HVAC	Level A	Level A
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Grocery	106.59	2.73	2.94	3%	\$0.006	\$0.007	HVAC	Level A	Level A
1	261	Clock/Programmable Thermostat	Grocery	101.80	4.79	7.73	7%	\$0.021	\$0.025	HVAC	Level A	Level A
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Grocery	96.71	5.09	12.82	12%	\$0.075	\$0.086	HVAC	Level D	Level E
1	262	Installation of Air Side Economizers	Grocery	89.54	7.17	19.99	18%	\$0.098	\$0.113	HVAC	Level E	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Grocery	82.62	6.92	26.91	25%	\$0.082	\$0.094	HVAC	Level D	Level E
1	251	DX Tune-Up/Diagnostics	Grocery	79.36	3.26	30.17	28%	\$0.202	\$0.232	HVAC	Level F	Level F
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Grocery	77.47	1.89	32.06	29%	\$0.289	\$0.332	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Grocery	77.23	0.24	32.30	29%	\$0.298	\$0.342	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Grocery	77.04	0.19	32.49	30%	\$0.076	\$0.087	HVAC	Level D	Level E
1	252	High-Efficiency Packaged A/C System	Grocery	74.42	2.62	35.11	32%	\$0.183	\$0.210	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Grocery	22.89	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Grocery	19.86	3.03	3.03	13%	\$0.025	\$0.028	HVAC	Level A	Level A
1	401	Energy Efficient Fan & Pump Motors	Grocery	19.79	0.07	3.10	14%	\$0.198	\$0.228	HVAC	Level F	Level F
1	500	Base Refrigeration System	Grocery	200.52	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	510	Demand Defrost Electric	Grocery	192.73	7.78	7.78	4%	\$0.008	\$0.009	Appliances	Level A	Level A
1	505	High-Efficiency Compressors	Grocery	181.93	10.80	18.58	9%	\$0.026	\$0.029	Appliances	Level A	Level A
1	509	Demand Hot Gas Defrost	Grocery	178.74	3.20	21.78	11%	\$0.027	\$0.032	Appliances	Level A	Level B
1	507	Installation of Floating Condenser Head Pressure Controls	Grocery	175.09	3.65	25.43	13%	\$0.044	\$0.051	Appliances	Level B	Level C
1	502	Strip Curtains for Walk-Ins	Grocery	172.91	2.17	27.60	14%	\$0.059	\$0.068	Appliances	Level C	Level D
1	511	Anti-Sweat (Humidistat) Controls	Grocery	169.41	3.51	31.11	16%	\$0.073	\$0.084	Appliances	Level D	Level D
1	503	Night Covers for Display Cases	Grocery	166.34	3.07	34.18	17%	\$0.123	\$0.142	Appliances	Level F	Level F
1	501	High Efficiency Case Fans	Grocery	147.29	19.04	53.22	27%	\$0.154	\$0.178	Appliances	Level F	Level F
1	506	Compressor VSD retrofit	Grocery	143.69	3.60	56.83	28%	\$0.208	\$0.239	Appliances	Level F	Level F
1	508	Refrigeration Commissioning	Grocery	140.01	3.68	60.51	30%	\$0.265	\$0.305	Appliances	Level F	Level F
1	504	Reduced Speed or Cycling of Evaporator Fans	Grocery	139.60	0.41	60.92	30%	\$0.622	\$0.715	Appliances	Level F	Level F
1	610	Base Desktop PC	Grocery	2.97	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	Grocery	1.39	1.58	1.58	53%	\$0.041	\$0.047	Appliances	Level B	Level C
1	620	Base Display Monitor	Grocery	2.86	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Grocery	2.83	0.03	0.03	1%	\$0.005	\$0.006	Appliances	Level A	Level A
1	621	ENERGY STAR or Better Office Equipment: Monitors	Grocery	1.38	1.45	1.48	52%	\$0.049	\$0.056	Appliances	Level C	Level C
1	630	Base Copier	Grocery	2.63	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Grocery	1.94	0.70	0.70	27%	\$0.099	\$0.113	Appliances	Level E	Level F
1	640	Base Laser Printer	Grocery	2.35	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Grocery	1.34	1.01	1.01	43%	\$0.034	\$0.039	Appliances	Level B	Level B

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	700	Base Water Heating	Grocery	12.94	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	Grocery	12.62	0.32	0.32	3%	\$0.006	\$0.007	Water Heat	Level A	Level A
1	702	Heat Pump Water Heater	Grocery	9.78	2.84	3.16	24%	\$0.100	\$0.115	Water Heat	Level E	Level F
1	701	Demand controlled circulating systems	Grocery	9.53	0.24	3.41	26%	\$0.201	\$0.231	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Grocery	9.12	0.42	3.83	30%	\$0.189	\$0.218	Water Heat	Level F	Level F
1	800	Base Heating	Grocery	2.19	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	Grocery	1.99	0.21	0.21	9%	\$0.065	\$0.075	HVAC	Level D	Level D
1	802	Roof/Ceiling Insulation	Grocery	1.90	0.09	0.29	13%	\$0.346	\$0.398	HVAC	Level F	Level F
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Grocery	1.85	0.05	0.34	15%	\$0.500	\$0.575	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	Grocery	1.71	0.14	0.48	22%	\$0.360	\$0.414	HVAC	Level F	Level F
1	110	Base Fluorescent Fixture, 4L4'T12, 34W, 2EEMAG	Warehouse	123.35	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	Warehouse	92.34	31.01	31.01	25%	\$0.032	\$0.037	Lighting	Level B	Level B
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Warehouse	88.71	3.63	34.65	28%	\$0.052	\$0.059	Lighting	Level C	Level C
1	112	RET 2L4' Premium T8, 1EB, Reflector	Warehouse	77.05	11.66	46.31	38%	\$0.029	\$0.033	Lighting	Level A	Level B
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Warehouse	54.15	22.90	69.21	56%	\$0.144	\$0.166	Lighting	Level F	Level F
1	115	RNV 2L4'T5HO, 1EB	Warehouse	50.95	3.20	72.40	59%	\$0.304	\$0.350	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Warehouse	92.52	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Warehouse	69.25	23.26	23.26	25%	\$0.044	\$0.050	Lighting	Level B	Level C
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Warehouse	66.53	2.72	25.99	28%	\$0.051	\$0.059	Lighting	Level C	Level C
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Warehouse	62.25	4.28	30.26	33%	\$0.042	\$0.049	Lighting	Level B	Level C
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Warehouse	43.75	18.50	48.77	53%	\$0.133	\$0.152	Lighting	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	125	RNV 1L4T5HO, 1EB	Warehouse	41.17	2.58	51.35	56%	\$0.525	\$0.604	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8T12, 60W, 1EEMAG	Warehouse	109.26	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8T12, 60W, 1EB	Warehouse	92.69	16.57	16.57	15%	\$0.072	\$0.083	Lighting	Level D	Level D
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Warehouse	89.05	3.65	20.21	19%	\$0.056	\$0.064	Lighting	Level C	Level D
1	132	RET 1L8T12, 60W, 1EB, Reflector	Warehouse	79.00	10.05	30.26	28%	\$0.041	\$0.047	Lighting	Level B	Level C
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Warehouse	55.52	23.48	53.74	49%	\$0.153	\$0.175	Lighting	Level F	Level F
1	140	Base Incandescent Flood, 75W	Warehouse	213.90	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Warehouse	80.06	133.84	133.84	63%	\$0.045	\$0.052	Lighting	Level C	Level C
1	150	Base Incandescent Flood, 150W PAR	Warehouse	213.90	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Warehouse	171.12	42.78	42.78	20%	\$0.120	\$0.137	Lighting	Level F	Level F
1	152	Metal Halide, 50W	Warehouse	126.10	45.02	87.80	41%	\$0.411	\$0.472	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	Warehouse	109.26	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4T8, 1EB	Warehouse	95.84	13.42	13.42	12%	\$0.004	\$0.004	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	Warehouse	393.11	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	Warehouse	382.50	10.61	10.61	3%	\$0.002	\$0.002	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Warehouse	366.63	15.86	26.48	7%	\$0.004	\$0.004	Lighting	Level A	Level A
1	180	Base 4L4T8, 1EB	Warehouse	17.86	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Warehouse	15.61	2.26	2.26	13%	\$0.011	\$0.013	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Warehouse	14.99	0.61	2.87	16%	\$0.055	\$0.063	Lighting	Level C	Level D
1	185	Base 2L4T8, 1EB	Warehouse	13.40	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	Warehouse	11.55	1.85	1.85	14%	\$0.015	\$0.017	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Warehouse	11.32	0.23	2.07	15%	\$0.055	\$0.064	Lighting	Level C	Level D



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1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Warehouse	88.59	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	Warehouse	88.36	0.22	0.22	0%	\$0.009	\$0.011	HVAC	Level A	Level A
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Warehouse	80.16	8.20	8.42	10%	\$0.005	\$0.005	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	Warehouse	79.65	0.51	8.94	10%	\$0.122	\$0.141	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Warehouse	75.67	3.98	12.92	15%	\$0.091	\$0.104	HVAC	Level E	Level E
1	207	Installation of Energy Management Systems	Warehouse	72.58	3.09	16.01	18%	\$0.058	\$0.066	HVAC	Level C	Level D
1	203	Roof/Ceiling Insulation	Warehouse	72.36	0.22	16.23	18%	\$1.024	\$1.178	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Warehouse	68.74	3.62	19.85	22%	\$0.411	\$0.472	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	Warehouse	66.98	1.76	21.61	24%	\$0.141	\$0.162	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Warehouse	66.77	0.21	21.82	25%	\$1.110	\$1.276	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Warehouse	60.64	6.13	27.94	32%	\$0.317	\$0.364	HVAC	Level F	Level F
1	205	EMS Optimization	Warehouse	60.64	0.00	27.94	32%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Warehouse	88.59	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	Warehouse	88.42	0.17	0.17	0%	\$0.011	\$0.013	HVAC	Level A	Level A
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Warehouse	86.21	2.21	2.38	3%	\$0.011	\$0.013	HVAC	Level A	Level A
1	261	Clock/Programmable Thermostat	Warehouse	84.22	1.98	4.36	5%	\$0.027	\$0.031	HVAC	Level A	Level B
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Warehouse	80.01	4.21	8.58	10%	\$0.086	\$0.099	HVAC	Level E	Level E
1	251	DX Tune-Up/Diagnostics	Warehouse	76.85	3.16	11.73	13%	\$0.197	\$0.227	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	204	Cool Roofs (Reflective and Spray Evaporative)	Warehouse	69.80	7.05	18.79	21%	\$0.275	\$0.316	HVAC	Level F	Level F
1	262	Installation of Air Side Economizers	Warehouse	66.79	3.01	21.79	25%	\$0.433	\$0.498	HVAC	Level F	Level F
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Warehouse	65.20	1.59	23.39	26%	\$0.325	\$0.373	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Warehouse	65.00	0.20	23.59	27%	\$1.140	\$1.311	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Warehouse	64.83	0.16	23.75	27%	\$0.308	\$0.354	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	Warehouse	62.63	2.20	25.95	29%	\$0.206	\$0.237	HVAC	Level F	Level F
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Warehouse	238.26	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Warehouse	198.62	39.64	39.64	17%	\$0.045	\$0.051	HVAC	Level B	Level C
1	401	Energy Efficient Fan & Pump Motors	Warehouse	197.29	1.33	40.96	17%	\$0.319	\$0.367	HVAC	Level F	Level F
1	610	Base Desktop PC	Warehouse	9.20	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	Warehouse	4.31	4.90	4.90	53%	\$0.837	\$0.962	Appliances	Level F	Level F
1	620	Base Display Monitor	Warehouse	8.86	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Warehouse	8.77	0.09	0.09	1%	\$0.099	\$0.114	Appliances	Level E	Level F
1	621	ENERGY STAR or Better Office Equipment: Monitors	Warehouse	4.27	4.50	4.59	52%	\$0.995	\$1.145	Appliances	Level F	Level F
1	630	Base Copier	Warehouse	5.05	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Warehouse	3.71	1.34	1.34	27%	\$0.663	\$0.762	Appliances	Level F	Level F
1	640	Base Laser Printer	Warehouse	5.43	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Warehouse	3.10	2.33	2.33	43%	\$0.562	\$0.646	Appliances	Level F	Level F
1	700	Base Water Heating	Warehouse	46.08	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	Warehouse	44.98	1.10	1.10	2%	\$0.011	\$0.012	Water Heat	Level A	Level A
1	702	Heat Pump Water Heater	Warehouse	34.86	10.12	11.22	24%	\$0.116	\$0.133	Water Heat	Level F	Level F
1	701	Demand controlled circulating systems	Warehouse	33.99	0.87	12.09	26%	\$0.196	\$0.226	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Warehouse	32.50	1.49	13.59	29%	\$0.220	\$0.253	Water Heat	Level F	Level F

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Sqft	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	800	Base Heating	Warehouse	10.24	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	Warehouse	9.42	0.82	0.82	8%	\$0.110	\$0.127	HVAC	Level F	Level F
1	802	Roof/Ceiling Insulation	Warehouse	9.25	0.17	0.99	10%	\$0.527	\$0.606	HVAC	Level F	Level F
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Warehouse	9.02	0.23	1.22	12%	\$0.830	\$0.955	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	Warehouse	8.34	0.68	1.90	19%	\$0.598	\$0.688	HVAC	Level F	Level F
1	110	Base Fluorescent Fixture, 4L4'T12, 34W, 2EEMAG	School	4.39	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	School	3.28	1.10	1.10	25%	\$0.055	\$0.063	Lighting	Level C	Level D
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	School	2.97	0.31	1.42	32%	\$0.078	\$0.089	Lighting	Level D	Level E
1	112	RET 2L4' Premium T8, 1EB, Reflector	School	2.58	0.39	1.81	41%	\$0.052	\$0.059	Lighting	Level C	Level C
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	School	2.00	0.58	2.39	54%	\$0.246	\$0.283	Lighting	Level F	Level F
1	115	RNV 2L4'T5HO, 1EB	School	1.88	0.12	2.51	57%	\$0.496	\$0.570	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	School	3.29	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	School	2.46	0.83	0.83	25%	\$0.072	\$0.083	Lighting	Level D	Level D
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	School	2.23	0.24	1.06	32%	\$0.075	\$0.086	Lighting	Level D	Level E
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	School	2.08	0.14	1.21	37%	\$0.074	\$0.085	Lighting	Level D	Level D
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	School	1.62	0.47	1.68	51%	\$0.220	\$0.253	Lighting	Level F	Level F
1	125	RNV 1L4'T5HO, 1EB	School	1.52	0.10	1.77	54%	\$0.831	\$0.955	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	School	10.01	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8'T12, 60W, 1EB	School	9.34	0.67	0.67	7%	\$0.103	\$0.119	Lighting	Level E	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	School	8.45	0.89	1.56	16%	\$0.073	\$0.084	Lighting	Level D	Level D
1	132	RET 1L8'T12, 60W, 1EB, Reflector	School	7.88	0.57	2.13	21%	\$0.042	\$0.048	Lighting	Level B	Level C
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	School	6.11	1.77	3.90	39%	\$0.215	\$0.248	Lighting	Level F	Level F
1	140	Base Incandescent Flood, 75W	School	3.71	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	School	1.39	2.32	2.32	63%	\$0.050	\$0.057	Lighting	Level C	Level C
1	150	Base Incandescent Flood, 150W PAR	School	3.71	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	School	2.98	0.73	0.73	20%	\$0.064	\$0.074	Lighting	Level D	Level D
1	152	Metal Halide, 50W	School	2.24	0.74	1.47	40%	\$0.227	\$0.261	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	School	10.01	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4'T8, 1EB	School	9.56	0.45	0.45	5%	\$0.025	\$0.028	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	School	25.95	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	School	24.38	1.57	1.57	6%	\$0.014	\$0.016	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	School	22.94	1.44	3.01	12%	\$0.024	\$0.027	Lighting	Level A	Level A
1	180	Base 4L4'T8, 1EB	School	7.17	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	School	6.26	0.91	0.91	13%	\$0.019	\$0.022	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	School	6.02	0.24	1.15	16%	\$0.083	\$0.096	Lighting	Level D	Level E
1	185	Base 2L4'T8, 1EB	School	5.38	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	School	4.63	0.74	0.74	14%	\$0.024	\$0.027	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	School	4.55	0.09	0.83	15%	\$0.081	\$0.093	Lighting	Level D	Level E
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	School	2.10	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	School	2.09	0.01	0.01	0%	\$0.449	\$0.517	HVAC	Level F	Level F
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	School	2.05	0.04	0.05	2%	\$0.108	\$0.124	HVAC	Level E	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	201	Chiller Tune-Up/Diagnostics	School	2.04	0.01	0.06	3%	\$1.489	\$1.712	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	School	1.94	0.10	0.16	8%	\$1.103	\$1.269	HVAC	Level F	Level F
1	207	Installation of Energy Management Systems	School	1.87	0.07	0.23	11%	\$0.697	\$0.801	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	School	1.86	0.01	0.24	11%	\$5.118	\$5.886	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	School	1.78	0.08	0.32	15%	\$1.956	\$2.249	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	School	1.74	0.05	0.36	17%	\$1.690	\$1.943	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	School	1.73	0.01	0.37	18%	\$5.500	\$6.325	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	School	1.68	0.05	0.42	20%	\$2.276	\$2.618	HVAC	Level F	Level F
1	205	EMS Optimization	School	1.68	0.00	0.42	20%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	School	2.10	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	School	2.09	0.00	0.00	0%	\$0.067	\$0.077	HVAC	Level D	Level D
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	School	2.06	0.04	0.04	2%	\$0.084	\$0.096	HVAC	Level D	Level E
1	261	Clock/Programmable Thermostat	School	2.01	0.05	0.09	4%	\$0.299	\$0.344	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	School	1.91	0.10	0.19	9%	\$1.119	\$1.287	HVAC	Level F	Level F
1	262	Installation of Air Side Economizers	School	1.85	0.06	0.25	12%	\$1.934	\$2.224	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	School	1.79	0.06	0.31	15%	\$2.135	\$2.456	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	School	1.72	0.07	0.38	18%	\$2.753	\$3.166	HVAC	Level F	Level F
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	School	1.68	0.04	0.42	20%	\$3.937	\$4.528	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	203	Roof/Ceiling Insulation	School	1.67	0.01	0.43	20%	\$5.698	\$6.552	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	School	1.67	0.00	0.43	21%	\$1.495	\$1.719	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	School	1.61	0.06	0.49	23%	\$2.498	\$2.873	HVAC	Level F	Level F
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	School	5.20	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	School	4.16	1.04	1.04	20%	\$0.081	\$0.093	HVAC	Level D	Level E
1	401	Energy Efficient Fan & Pump Motors	School	4.14	0.02	1.06	20%	\$0.604	\$0.695	HVAC	Level F	Level F
1	610	Base Desktop PC	School	0.47	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	School	0.22	0.25	0.25	53%	\$1.385	\$1.593	Appliances	Level F	Level F
1	620	Base Display Monitor	School	0.45	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	School	0.41	0.04	0.04	8%	\$0.164	\$0.188	Appliances	Level F	Level F
1	621	ENERGY STAR or Better Office Equipment: Monitors	School	0.20	0.21	0.25	55%	\$1.751	\$2.014	Appliances	Level F	Level F
1	630	Base Copier	School	0.35	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	School	0.26	0.09	0.09	26%	\$0.468	\$0.538	Appliances	Level F	Level F
1	640	Base Laser Printer	School	0.29	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	School	0.17	0.12	0.12	41%	\$0.777	\$0.893	Appliances	Level F	Level F
1	700	Base Water Heating	School	8.85	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	School	8.83	0.02	0.02	0%	\$0.048	\$0.055	Water Heat	Level C	Level C
1	701	Demand controlled circulating systems	School	8.71	0.11	0.13	1%	\$0.211	\$0.243	Water Heat	Level F	Level F
1	702	Heat Pump Water Heater	School	7.83	0.89	1.02	12%	\$1.363	\$1.567	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	School	7.55	0.28	1.30	15%	\$2.253	\$2.591	Water Heat	Level F	Level F
1	800	Base Heating	School	49.81	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	School	43.15	6.66	6.66	13%	\$0.010	\$0.011	HVAC	Level A	Level A
1	802	Roof/Ceiling Insulation	School	42.12	1.03	7.69	15%	\$0.047	\$0.054	HVAC	Level C	Level C
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	School	41.07	1.05	8.74	18%	\$0.072	\$0.083	HVAC	Level D	Level D

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	810	Installation of Air Side Economizers	School	39.62	1.45	10.19	20%	\$0.047	\$0.055	HVAC	Level C	Level C
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	University	5.77	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	University	4.32	1.45	1.45	25%	\$0.026	\$0.030	Lighting	Level A	Level B
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	University	3.92	0.40	1.85	32%	\$0.037	\$0.043	Lighting	Level B	Level B
1	112	RET 2L4' Premium T8, 1EB, Reflector	University	3.41	0.52	2.36	41%	\$0.025	\$0.028	Lighting	Level A	Level A
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	University	2.64	0.77	3.13	54%	\$0.120	\$0.138	Lighting	Level F	Level F
1	115	RNV 2L4'T5HO, 1EB	University	2.48	0.16	3.28	57%	\$0.236	\$0.272	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	University	4.33	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	University	3.24	1.09	1.09	25%	\$0.035	\$0.040	Lighting	Level B	Level B
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	University	2.94	0.30	1.38	32%	\$0.036	\$0.042	Lighting	Level B	Level B
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	University	2.75	0.19	1.57	36%	\$0.036	\$0.041	Lighting	Level B	Level B
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	University	2.13	0.62	2.19	51%	\$0.108	\$0.124	Lighting	Level E	Level F
1	125	RNV 1L4'T5HO, 1EB	University	2.01	0.13	2.32	54%	\$0.401	\$0.461	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	University	8.65	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8'T12, 60W, 1EB	University	7.81	0.84	0.84	10%	\$0.049	\$0.057	Lighting	Level C	Level C
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	University	7.09	0.72	1.56	18%	\$0.035	\$0.040	Lighting	Level B	Level B
1	132	RET 1L8'T12, 60W, 1EB, Reflector	University	6.48	0.61	2.17	25%	\$0.023	\$0.027	Lighting	Level A	Level A
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	University	5.02	1.46	3.63	42%	\$0.106	\$0.122	Lighting	Level E	Level F
1	140	Base Incandescent Flood, 75W	University	3.20	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	University	1.23	1.98	1.98	62%	\$0.025	\$0.028	Lighting	Level A	Level A

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	150	Base Incandescent Flood, 150W PAR	University	3.20	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	University	2.58	0.62	0.62	19%	\$0.062	\$0.072	Lighting	Level D	Level D
1	152	Metal Halide, 50W	University	1.90	0.68	1.30	41%	\$0.233	\$0.267	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	University	8.65	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4'T8, 1EB	University	7.57	1.08	1.08	12%	\$0.003	\$0.003	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	University	22.43	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	University	22.25	0.17	0.17	1%	\$0.001	\$0.001	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	University	19.10	3.16	3.33	15%	\$0.003	\$0.003	Lighting	Level A	Level A
1	180	Base 4L4'T8, 1EB	University	4.61	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	University	4.03	0.58	0.58	13%	\$0.009	\$0.010	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	University	3.88	0.15	0.73	16%	\$0.040	\$0.046	Lighting	Level B	Level C
1	185	Base 2L4'T8, 1EB	University	3.46	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	University	2.98	0.48	0.48	14%	\$0.012	\$0.013	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	University	2.93	0.05	0.53	15%	\$0.039	\$0.045	Lighting	Level B	Level C
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	University	3.61	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	University	3.61	0.01	0.01	0%	\$0.061	\$0.070	HVAC	Level D	Level D
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	University	3.53	0.07	0.08	2%	\$0.022	\$0.025	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	University	3.51	0.02	0.10	3%	\$0.239	\$0.275	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	University	3.34	0.18	0.28	8%	\$0.177	\$0.204	HVAC	Level F	Level F
1	207	Installation of Energy Management Systems	University	3.25	0.09	0.37	10%	\$0.109	\$0.126	HVAC	Level E	Level F
1	203	Roof/Ceiling Insulation	University	3.24	0.01	0.38	10%	\$0.257	\$0.295	HVAC	Level F	Level F



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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	209	Installation of Chiller Economizers (water side)	University	3.08	0.16	0.54	15%	\$0.158	\$0.182	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	University	3.00	0.08	0.62	17%	\$0.271	\$0.311	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	University	2.99	0.01	0.63	17%	\$0.278	\$0.320	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	University	2.97	0.02	0.65	18%	\$0.719	\$0.826	HVAC	Level F	Level F
1	205	EMS Optimization	University	2.97	0.00	0.65	18%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	University	3.61	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	University	3.61	0.01	0.01	0%	\$0.005	\$0.005	HVAC	Level A	Level A
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	University	3.55	0.06	0.07	2%	\$0.017	\$0.020	HVAC	Level A	Level A
1	261	Clock/Programmable Thermostat	University	3.48	0.06	0.13	4%	\$0.048	\$0.055	HVAC	Level C	Level C
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	University	3.31	0.17	0.30	8%	\$0.178	\$0.205	HVAC	Level F	Level F
1	262	Installation of Air Side Economizers	University	3.06	0.25	0.55	15%	\$0.169	\$0.194	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	University	3.05	0.01	0.56	16%	\$0.272	\$0.313	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	University	2.93	0.12	0.68	19%	\$0.446	\$0.512	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	University	2.93	0.01	0.69	19%	\$0.118	\$0.135	HVAC	Level F	Level F
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	University	2.86	0.07	0.76	21%	\$0.639	\$0.735	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	University	2.84	0.02	0.78	22%	\$0.752	\$0.865	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	University	2.74	0.10	0.87	24%	\$0.406	\$0.466	HVAC	Level F	Level F
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	University	2.95	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	University	2.27	0.69	0.69	23%	\$0.076	\$0.087	HVAC	Level D	Level E
1	401	Energy Efficient Fan & Pump Motors	University	2.26	0.00	0.69	23%	\$0.619	\$0.712	HVAC	Level F	Level F

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1	610	Base Desktop PC	University	0.63	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	University	0.30	0.33	0.33	53%	\$0.121	\$0.139	Appliances	Level F	Level F
1	620	Base Display Monitor	University	0.61	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	University	0.56	0.05	0.05	8%	\$0.014	\$0.016	Appliances	Level A	Level A
1	621	ENERGY STAR or Better Office Equipment: Monitors	University	0.27	0.29	0.34	55%	\$0.152	\$0.175	Appliances	Level F	Level F
1	630	Base Copier	University	0.30	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	University	0.22	0.08	0.08	26%	\$0.058	\$0.067	Appliances	Level C	Level D
1	640	Base Laser Printer	University	0.37	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	University	0.22	0.15	0.15	41%	\$0.078	\$0.089	Appliances	Level D	Level E
1	700	Base Water Heating	University	3.87	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	701	Demand controlled circulating systems	University	3.82	0.05	0.05	1%	\$0.050	\$0.057	Water Heat	Level C	Level C
1	704	Hot Water (SHW) Pipe Insulation	University	3.75	0.07	0.12	3%	\$0.084	\$0.097	Water Heat	Level D	Level E
1	702	Heat Pump Water Heater	University	3.33	0.42	0.54	14%	\$2.554	\$2.937	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	University	3.20	0.13	0.67	17%	\$4.131	\$4.750	Water Heat	Level F	Level F
1	800	Base Heating	University	1.87	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	University	1.64	0.23	0.23	12%	\$0.120	\$0.138	HVAC	Level F	Level F
1	802	Roof/Ceiling Insulation	University	1.61	0.03	0.27	14%	\$0.362	\$0.416	HVAC	Level F	Level F
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	University	1.57	0.04	0.31	16%	\$0.874	\$1.005	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	University	1.51	0.05	0.36	19%	\$0.573	\$0.659	HVAC	Level F	Level F
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	Hospital & Health Care	57.92	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	Hospital & Health Care	43.36	14.56	14.56	25%	\$0.026	\$0.029	Lighting	Level A	Level A

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1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Hospital & Health Care	39.38	3.98	18.54	32%	\$0.047	\$0.054	Lighting	Level C	Level C
1	112	RET 2L4' Premium T8, 1EB, Reflector	Hospital & Health Care	34.20	5.18	23.72	41%	\$0.024	\$0.028	Lighting	Level A	Level A
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Hospital & Health Care	31.64	2.57	26.28	45%	\$0.136	\$0.157	Lighting	Level F	Level F
1	115	RNV 2L4'T5HO, 1EB	Hospital & Health Care	29.77	1.87	28.15	49%	\$0.194	\$0.223	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Hospital & Health Care	43.44	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Hospital & Health Care	32.52	10.92	10.92	25%	\$0.034	\$0.039	Lighting	Level B	Level B
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Hospital & Health Care	29.53	2.99	13.91	32%	\$0.046	\$0.052	Lighting	Level C	Level C
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Hospital & Health Care	27.63	1.90	15.81	36%	\$0.035	\$0.040	Lighting	Level B	Level B
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Hospital & Health Care	25.56	2.07	17.88	41%	\$0.123	\$0.142	Lighting	Level F	Level F
1	125	RNV 1L4'T5HO, 1EB	Hospital & Health Care	24.05	1.51	19.39	45%	\$0.330	\$0.379	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	Hospital & Health Care	86.88	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8'T12, 60W, 1EB	Hospital & Health Care	78.45	8.43	8.43	10%	\$0.045	\$0.051	Lighting	Level B	Level C
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Hospital & Health Care	71.24	7.20	15.64	18%	\$0.040	\$0.046	Lighting	Level B	Level C
1	132	RET 1L8'T12, 60W, 1EB, Reflector	Hospital & Health Care	65.07	6.17	21.81	25%	\$0.021	\$0.024	Lighting	Level A	Level A
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Hospital & Health Care	60.19	4.88	26.69	31%	\$0.112	\$0.128	Lighting	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	140	Base Incandescent Flood, 75W	Hospital & Health Care	149.19	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Hospital & Health Care	57.07	92.12	92.12	62%	\$0.036	\$0.041	Lighting	Level B	Level B
1	150	Base Incandescent Flood, 150W PAR	Hospital & Health Care	149.19	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Hospital & Health Care	120.26	28.92	28.92	19%	\$0.063	\$0.073	Lighting	Level D	Level D
1	152	Metal Halide, 50W	Hospital & Health Care	88.70	31.56	60.49	41%	\$0.207	\$0.238	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	Hospital & Health Care	86.88	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4T8, 1EB	Hospital & Health Care	84.62	2.26	2.26	3%	\$0.002	\$0.002	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	Hospital & Health Care	329.09	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	Hospital & Health Care	314.02	15.07	15.07	5%	\$0.001	\$0.001	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Hospital & Health Care	299.35	14.68	29.74	9%	\$0.002	\$0.002	Lighting	Level A	Level A
1	180	Base 4L4'T8, 1EB	Hospital & Health Care	46.34	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Hospital & Health Care	40.48	5.85	5.85	13%	\$0.009	\$0.010	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Hospital & Health Care	39.00	1.49	7.34	16%	\$0.050	\$0.058	Lighting	Level C	Level C
1	185	Base 2L4'T8, 1EB	Hospital & Health Care	34.75	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	Hospital & Health Care	29.96	4.79	4.79	14%	\$0.011	\$0.013	Lighting	Level A	Level A

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1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Hospital & Health Care	29.41	0.55	5.34	15%	\$0.049	\$0.057	Lighting	Level C	Level C
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Hospital & Health Care	142.18	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	Hospital & Health Care	141.82	0.36	0.36	0%	\$0.009	\$0.011	HVAC	Level A	Level A
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hospital & Health Care	141.00	0.83	1.18	1%	\$0.010	\$0.012	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	Hospital & Health Care	140.09	0.90	2.09	1%	\$0.099	\$0.113	HVAC	Level E	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hospital & Health Care	133.09	7.00	9.09	6%	\$0.073	\$0.084	HVAC	Level D	Level D
1	207	Installation of Energy Management Systems	Hospital & Health Care	127.97	5.12	14.21	10%	\$0.046	\$0.053	HVAC	Level C	Level C
1	203	Roof/Ceiling Insulation	Hospital & Health Care	127.58	0.39	14.60	10%	\$0.155	\$0.179	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Hospital & Health Care	121.20	6.38	20.98	15%	\$0.066	\$0.076	HVAC	Level D	Level D
1	210	Optimize Chilled Water and Condenser Water Settings	Hospital & Health Care	118.09	3.11	24.09	17%	\$0.113	\$0.130	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Hospital & Health Care	117.73	0.36	24.45	17%	\$0.168	\$0.194	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Hospital & Health Care	117.35	0.37	24.83	17%	\$0.491	\$0.565	HVAC	Level F	Level F
1	205	EMS Optimization	Hospital & Health Care	117.35	0.00	24.83	17%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Hospital & Health Care	142.18	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	Hospital & Health Care	141.91	0.27	0.27	0%	\$0.002	\$0.002	HVAC	Level A	Level A

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1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hospital & Health Care	139.53	2.38	2.65	2%	\$0.002	\$0.003	HVAC	Level A	Level A
1	261	Clock/Programmable Thermostat	Hospital & Health Care	135.82	3.70	6.36	4%	\$0.026	\$0.030	HVAC	Level A	Level B
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hospital & Health Care	129.03	6.79	13.15	9%	\$0.075	\$0.087	HVAC	Level D	Level E
1	262	Installation of Air Side Economizers	Hospital & Health Care	124.78	4.25	17.40	12%	\$0.065	\$0.075	HVAC	Level D	Level D
1	203	Roof/Ceiling Insulation	Hospital & Health Care	124.39	0.38	17.79	13%	\$0.159	\$0.183	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	Hospital & Health Care	119.48	4.91	22.70	16%	\$0.180	\$0.207	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Hospital & Health Care	119.18	0.30	23.00	16%	\$0.048	\$0.055	HVAC	Level C	Level C
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Hospital & Health Care	116.34	2.84	25.84	18%	\$0.258	\$0.297	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Hospital & Health Care	115.97	0.37	26.21	18%	\$0.497	\$0.571	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	Hospital & Health Care	112.03	3.94	30.15	21%	\$0.163	\$0.188	HVAC	Level F	Level F
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Hospital & Health Care	84.48	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Hospital & Health Care	64.85	19.62	19.62	23%	\$0.031	\$0.036	HVAC	Level B	Level B
1	401	Energy Efficient Fan & Pump Motors	Hospital & Health Care	64.71	0.14	19.76	23%	\$0.253	\$0.291	HVAC	Level F	Level F
1	610	Base Desktop PC	Hospital & Health Care	5.68	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A

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1	611	ENERGY STAR or Better Office Equipment: Computer	Hospital & Health Care	2.66	3.02	3.02	53%	\$0.318	\$0.366	Appliances	Level F	Level F
1	620	Base Display Monitor	Hospital & Health Care	5.47	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Hospital & Health Care	5.33	0.14	0.14	3%	\$0.038	\$0.043	Appliances	Level B	Level B
1	621	ENERGY STAR or Better Office Equipment: Monitors	Hospital & Health Care	2.59	2.73	2.87	53%	\$0.384	\$0.442	Appliances	Level F	Level F
1	630	Base Copier	Hospital & Health Care	5.43	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Hospital & Health Care	3.99	1.44	1.44	27%	\$0.238	\$0.273	Appliances	Level F	Level F
1	640	Base Laser Printer	Hospital & Health Care	4.69	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Hospital & Health Care	2.68	2.01	2.01	43%	\$0.238	\$0.274	Appliances	Level F	Level F
1	700	Base Water Heating	Hospital & Health Care	50.93	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	Hospital & Health Care	50.01	0.93	0.93	2%	\$0.016	\$0.018	Water Heat	Level A	Level A
1	701	Demand controlled circulating systems	Hospital & Health Care	49.13	0.88	1.81	4%	\$0.058	\$0.066	Water Heat	Level C	Level D
1	702	Heat Pump Water Heater	Hospital & Health Care	40.53	8.60	10.40	20%	\$1.155	\$1.329	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Hospital & Health Care	38.92	1.60	12.01	24%	\$2.010	\$2.312	Water Heat	Level F	Level F
1	800	Base Heating	Hospital & Health Care	5.62	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	Hospital & Health Care	4.92	0.70	0.70	12%	\$0.020	\$0.024	HVAC	Level A	Level A

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1	802	Roof/Ceiling Insulation	Hospital & Health Care	4.82	0.10	0.80	14%	\$0.091	\$0.104	HVAC	Level E	Level E
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hospital & Health Care	4.70	0.12	0.92	16%	\$0.151	\$0.174	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	Hospital & Health Care	4.54	0.15	1.08	19%	\$0.099	\$0.114	HVAC	Level E	Level F
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	Hotel	5.38	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	Hotel	4.03	1.35	1.35	25%	\$0.029	\$0.033	Lighting	Level A	Level B
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Hotel	3.88	0.15	1.50	28%	\$0.043	\$0.049	Lighting	Level B	Level C
1	112	RET 2L4' Premium T8, 1EB, Reflector	Hotel	3.37	0.51	2.01	37%	\$0.025	\$0.029	Lighting	Level A	Level A
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Hotel	2.61	0.76	2.77	51%	\$0.128	\$0.147	Lighting	Level F	Level F
1	115	RNV 2L4T5HO, 1EB	Hotel	2.46	0.15	2.92	54%	\$0.244	\$0.280	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4T12, 34W, 1EEMAG	Hotel	4.03	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Hotel	3.02	1.01	1.01	25%	\$0.039	\$0.044	Lighting	Level B	Level B
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Hotel	2.91	0.11	1.13	28%	\$0.042	\$0.048	Lighting	Level B	Level C
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Hotel	2.72	0.19	1.31	33%	\$0.037	\$0.043	Lighting	Level B	Level B
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Hotel	2.11	0.61	1.92	48%	\$0.117	\$0.134	Lighting	Level F	Level F
1	125	RNV 1L4T5HO, 1EB	Hotel	1.99	0.12	2.05	51%	\$0.418	\$0.481	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8T12, 60W, 1EEMAG	Hotel	5.05	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8T12, 60W, 1EB	Hotel	4.32	0.73	0.73	14%	\$0.056	\$0.064	Lighting	Level C	Level D
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Hotel	4.16	0.16	0.89	18%	\$0.040	\$0.046	Lighting	Level B	Level C



APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	132	RET 1L8'T12, 60W, 1EB, Reflector	Hotel	3.71	0.46	1.35	27%	\$0.030	\$0.035	Lighting	Level B	Level B
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Hotel	2.87	0.83	2.18	43%	\$0.118	\$0.135	Lighting	Level F	Level F
1	140	Base Incandescent Flood, 75W	Hotel	25.26	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Hotel	13.75	11.51	11.51	46%	\$0.031	\$0.035	Lighting	Level B	Level B
1	150	Base Incandescent Flood, 150W PAR	Hotel	25.26	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Hotel	20.24	5.02	5.02	20%	\$0.071	\$0.082	Lighting	Level D	Level D
1	152	Metal Halide, 50W	Hotel	14.79	5.45	10.47	41%	\$0.261	\$0.300	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Hotel	5.05	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4'T8, 1EB	Hotel	4.42	0.63	0.63	12%	\$0.012	\$0.014	Lighting	Level A	Level A
1	170	Base Mercury Vapor 400W Lamp	Hotel	37.89	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (PhotoCell/Timeclock)	Hotel	37.64	0.25	0.25	1%	\$0.006	\$0.007	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Hotel	34.04	3.60	3.85	10%	\$0.011	\$0.012	Lighting	Level A	Level A
1	180	Base 4L4'T8, 1EB	Hotel	1.08	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Hotel	0.95	0.14	0.14	13%	\$0.010	\$0.011	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Hotel	0.91	0.03	0.17	16%	\$0.046	\$0.053	Lighting	Level C	Level C
1	185	Base 2L4'T8, 1EB	Hotel	0.81	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	Hotel	0.70	0.11	0.11	14%	\$0.013	\$0.015	Lighting	Level A	Level A
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Hotel	0.69	0.01	0.13	15%	\$0.045	\$0.052	Lighting	Level C	Level C
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Hotel	17.97	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	Hotel	17.92	0.05	0.05	0%	\$0.207	\$0.238	HVAC	Level F	Level F
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hotel	17.04	0.88	0.93	5%	\$0.047	\$0.054	HVAC	Level C	Level C
1	201	Chiller Tune-Up/Diagnostics	Hotel	16.93	0.11	1.04	6%	\$0.652	\$0.750	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End-Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hotel	16.09	0.85	1.88	10%	\$0.483	\$0.555	HVAC	Level F	Level F
1	207	Installation of Energy Management Systems	Hotel	15.76	0.32	2.20	12%	\$0.295	\$0.339	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Hotel	15.68	0.08	2.29	13%	\$0.473	\$0.544	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Hotel	15.35	0.33	2.62	15%	\$0.383	\$0.440	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	Hotel	14.95	0.39	3.02	17%	\$0.714	\$0.821	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Hotel	14.87	0.08	3.09	17%	\$0.499	\$0.574	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Hotel	14.85	0.03	3.12	17%	\$1.190	\$1.369	HVAC	Level F	Level F
1	205	EMS Optimization	Hotel	14.85	0.00	3.12	17%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Hotel	17.97	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	Hotel	17.93	0.03	0.03	0%	\$0.025	\$0.029	HVAC	Level A	Level A
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hotel	17.52	0.42	0.45	3%	\$0.066	\$0.076	HVAC	Level D	Level D
1	261	Clock/Programmable Thermostat	Hotel	16.91	0.61	1.06	6%	\$0.170	\$0.195	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hotel	16.06	0.85	1.91	11%	\$0.484	\$0.556	HVAC	Level F	Level F
1	262	Installation of Air Side Economizers	Hotel	15.75	0.31	2.22	12%	\$0.395	\$0.455	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Hotel	15.67	0.08	2.30	13%	\$0.474	\$0.545	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Hotel	15.63	0.04	2.34	13%	\$0.275	\$0.316	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Hotel	15.60	0.03	2.37	13%	\$1.133	\$1.303	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	Hotel	14.98	0.62	2.99	17%	\$1.147	\$1.320	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Hotel	14.62	0.36	3.34	19%	\$1.641	\$1.887	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	Hotel	14.13	0.50	3.84	21%	\$1.035	\$1.190	HVAC	Level F	Level F
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Hotel	6.05	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Hotel	5.93	0.12	0.12	2%	\$0.101	\$0.117	HVAC	Level E	Level F
1	401	Energy Efficient Fan & Pump Motors	Hotel	5.85	0.08	0.20	3%	\$0.616	\$0.708	HVAC	Level F	Level F
1	610	Base Desktop PC	Hotel	0.27	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	Hotel	0.13	0.14	0.14	53%	\$0.200	\$0.230	Appliances	Level F	Level F
1	620	Base Display Monitor	Hotel	0.26	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Hotel	0.25	0.01	0.01	3%	\$0.024	\$0.027	Appliances	Level A	Level A
1	621	ENERGY STAR or Better Office Equipment: Monitors	Hotel	0.12	0.13	0.14	53%	\$0.242	\$0.279	Appliances	Level F	Level F
1	630	Base Copier	Hotel	0.72	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Hotel	0.53	0.19	0.19	27%	\$0.041	\$0.047	Appliances	Level B	Level C
1	640	Base Laser Printer	Hotel	0.18	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Hotel	0.10	0.08	0.08	43%	\$0.198	\$0.228	Appliances	Level F	Level F
1	700	Base Water Heating	Hotel	24.36	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	701	Demand controlled circulating systems	Hotel	23.92	0.44	0.44	2%	\$0.035	\$0.040	Water Heat	Level B	Level B
1	704	Hot Water (SHW) Pipe Insulation	Hotel	23.38	0.54	0.97	4%	\$0.043	\$0.049	Water Heat	Level B	Level C
1	702	Heat Pump Water Heater	Hotel	19.62	3.76	4.74	19%	\$0.732	\$0.842	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Hotel	18.84	0.78	5.51	23%	\$1.253	\$1.441	Water Heat	Level F	Level F
1	800	Base Heating	Hotel	20.48	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	Hotel	18.26	2.22	2.22	11%	\$0.019	\$0.022	HVAC	Level A	Level A
1	802	Roof/Ceiling Insulation	Hotel	17.67	0.59	2.81	14%	\$0.043	\$0.049	HVAC	Level B	Level C

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1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hotel	17.23	0.44	3.25	16%	\$0.142	\$0.163	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	Hotel	16.00	1.24	4.49	22%	\$0.101	\$0.117	HVAC	Level E	Level F
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	Misc.	9.88	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	111	RET 4L4' Premium T8, 1EB	Misc.	7.40	2.48	2.48	25%	\$0.072	\$0.083	Lighting	Level D	Level D
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures	Misc.	7.11	0.28	2.77	28%	\$0.101	\$0.116	Lighting	Level E	Level F
1	112	RET 2L4' Premium T8, 1EB, Reflector	Misc.	6.18	0.93	3.70	37%	\$0.064	\$0.074	Lighting	Level D	Level D
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	Misc.	4.79	1.39	5.09	52%	\$0.308	\$0.354	Lighting	Level F	Level F
1	115	RNV 2L4'T5HO, 1EB	Misc.	4.51	0.28	5.38	54%	\$0.616	\$0.708	Lighting	Level F	Level F
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Misc.	7.41	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	121	RET 2L4' Premium T8, 1EB	Misc.	5.55	1.86	1.86	25%	\$0.097	\$0.112	Lighting	Level E	Level F
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	Misc.	5.34	0.21	2.08	28%	\$0.099	\$0.114	Lighting	Level E	Level F
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	Misc.	4.99	0.34	2.42	33%	\$0.094	\$0.108	Lighting	Level E	Level E
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	Misc.	3.87	1.12	3.54	48%	\$0.280	\$0.323	Lighting	Level F	Level F
1	125	RNV 1L4'T5HO, 1EB	Misc.	3.64	0.23	3.77	51%	\$1.053	\$1.211	Lighting	Level F	Level F
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	Misc.	16.05	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	131	RET 2L8'T12, 60W, 1EB	Misc.	14.60	1.45	1.45	9%	\$0.131	\$0.151	Lighting	Level F	Level F
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	Misc.	14.04	0.56	2.01	13%	\$0.090	\$0.104	Lighting	Level E	Level E
1	132	RET 1L8'T12, 60W, 1EB, Reflector	Misc.	12.88	1.16	3.17	20%	\$0.056	\$0.064	Lighting	Level C	Level D
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	Misc.	9.98	2.90	6.07	38%	\$0.262	\$0.301	Lighting	Level F	Level F

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1	140	Base Incandescent Flood, 75W	Misc.	25.18	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	141	CFL Screw-in, Modular 18W	Misc.	9.09	16.10	16.10	64%	\$0.080	\$0.092	Lighting	Level D	Level E
1	150	Base Incandescent Flood, 150W PAR	Misc.	25.18	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	151	Halogen PAR Flood, 90W	Misc.	20.19	5.00	5.00	20%	\$0.195	\$0.225	Lighting	Level F	Level F
1	152	Metal Halide, 50W	Misc.	14.43	5.75	10.75	43%	\$0.808	\$0.929	Lighting	Level F	Level F
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	Misc.	16.05	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	161	RET 2L4'T8, 1EB	Misc.	14.07	1.98	1.98	12%	\$0.028	\$0.033	Lighting	Level A	Level B
1	170	Base Mercury Vapor 400W Lamp	Misc.	55.09	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	172	Outdoor Lighting Controls (PhotoCell/Timeclock)	Misc.	51.79	3.30	3.30	6%	\$0.016	\$0.018	Lighting	Level A	Level A
1	171	High Pressure Sodium 250W Lamp	Misc.	47.87	3.92	7.21	13%	\$0.027	\$0.032	Lighting	Level A	Level B
1	180	Base 4L4'T8, 1EB	Misc.	9.22	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	181	ROB 4L4' Premium T8, 1EB	Misc.	8.05	1.16	1.16	13%	\$0.025	\$0.029	Lighting	Level A	Level A
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	Misc.	7.74	0.31	1.47	16%	\$0.108	\$0.124	Lighting	Level E	Level F
1	185	Base 2L4'T8, 1EB	Misc.	6.91	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
1	186	ROB 2L4' Premium T8, 1EB	Misc.	5.96	0.95	0.95	14%	\$0.032	\$0.037	Lighting	Level B	Level B
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	Misc.	5.85	0.11	1.07	15%	\$0.107	\$0.123	Lighting	Level E	Level F
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Misc.	54.05	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	208	Insulation of Pipes	Misc.	53.92	0.14	0.14	0%	\$0.033	\$0.038	HVAC	Level B	Level B
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Misc.	53.15	0.77	0.90	2%	\$0.024	\$0.027	HVAC	Level A	Level A
1	201	Chiller Tune-Up/Diagnostics	Misc.	52.81	0.34	1.24	2%	\$0.156	\$0.179	HVAC	Level F	Level F
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Misc.	50.17	2.64	3.88	7%	\$0.116	\$0.133	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	207	Installation of Energy Management Systems	Misc.	47.66	2.51	6.39	12%	\$0.075	\$0.087	HVAC	Level D	Level E
1	203	Roof/Ceiling Insulation	Misc.	47.37	0.29	6.68	12%	\$0.581	\$0.669	HVAC	Level F	Level F
1	209	Installation of Chiller Economizers (water side)	Misc.	45.52	1.85	8.53	16%	\$0.233	\$0.268	HVAC	Level F	Level F
1	210	Optimize Chilled Water and Condenser Water Settings	Misc.	44.35	1.17	9.70	18%	\$0.180	\$0.207	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Misc.	44.08	0.27	9.97	18%	\$0.625	\$0.719	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Misc.	41.22	2.86	12.83	24%	\$0.259	\$0.298	HVAC	Level F	Level F
1	205	EMS Optimization	Misc.	41.22	0.00	12.83	24%	N/A	\$-	HVAC	N/A	N/A
1	250	Base DX Packaged System, EER=10.3, 10 tons	Misc.	54.05	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	256	Duct Insulation	Misc.	53.95	0.10	0.10	0%	\$0.015	\$0.017	HVAC	Level A	Level A
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Misc.	52.91	1.04	1.14	2%	\$0.012	\$0.013	HVAC	Level A	Level A
1	261	Clock/Programmable Thermostat	Misc.	51.77	1.14	2.28	4%	\$0.031	\$0.035	HVAC	Level B	Level B
1	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Misc.	49.18	2.59	4.87	9%	\$0.118	\$0.136	HVAC	Level F	Level F
1	262	Installation of Air Side Economizers	Misc.	46.15	3.03	7.90	15%	\$0.244	\$0.280	HVAC	Level F	Level F
1	204	Cool Roofs (Reflective and Spray Evaporative)	Misc.	43.16	2.99	10.89	20%	\$0.247	\$0.284	HVAC	Level F	Level F
1	251	DX Tune-Up/Diagnostics	Misc.	41.46	1.70	12.60	23%	\$0.310	\$0.356	HVAC	Level F	Level F
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Misc.	40.47	0.99	13.58	25%	\$0.443	\$0.509	HVAC	Level F	Level F
1	203	Roof/Ceiling Insulation	Misc.	40.22	0.25	13.83	26%	\$0.685	\$0.788	HVAC	Level F	Level F
1	257	Duct Repair and Sealing	Misc.	40.12	0.10	13.93	26%	\$0.190	\$0.218	HVAC	Level F	Level F
1	252	High-Efficiency Packaged A/C System	Misc.	38.75	1.36	15.30	28%	\$0.282	\$0.324	HVAC	Level F	Level F

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1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Misc.	7.37	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	402	VSD, ASD Fan & Pump Applications	Misc.	6.70	0.68	0.68	9%	\$0.096	\$0.111	HVAC	Level E	Level F
1	401	Energy Efficient Fan & Pump Motors	Misc.	6.63	0.07	0.74	10%	\$0.664	\$0.764	HVAC	Level F	Level F
1	610	Base Desktop PC	Misc.	0.93	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	611	ENERGY STAR or Better Office Equipment: Computer	Misc.	0.45	0.49	0.49	52%	\$2.346	\$2.697	Appliances	Level F	Level F
1	620	Base Display Monitor	Misc.	0.90	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	623	Smart Networks	Misc.	0.88	0.02	0.02	3%	\$0.277	\$0.319	Appliances	Level F	Level F
1	621	ENERGY STAR or Better Office Equipment: Monitors	Misc.	0.43	0.45	0.47	53%	\$2.774	\$3.190	Appliances	Level F	Level F
1	630	Base Copier	Misc.	0.93	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	631	ENERGY STAR or Better Office Equipment: Copiers	Misc.	0.69	0.24	0.24	26%	\$1.386	\$1.594	Appliances	Level F	Level F
1	640	Base Laser Printer	Misc.	0.50	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
1	641	ENERGY STAR or Better Office Equipment: Printers	Misc.	0.30	0.20	0.20	41%	\$2.052	\$2.360	Appliances	Level F	Level F
1	700	Base Water Heating	Misc.	8.77	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
1	704	Hot Water (SHW) Pipe Insulation	Misc.	8.55	0.22	0.22	3%	\$0.009	\$0.010	Water Heat	Level A	Level A
1	701	Demand controlled circulating systems	Misc.	8.34	0.21	0.43	5%	\$0.042	\$0.048	Water Heat	Level B	Level C
1	702	Heat Pump Water Heater	Misc.	6.46	1.88	2.31	26%	\$0.558	\$0.642	Water Heat	Level F	Level F
1	703	High-Efficiency Water Heater (electric)	Misc.	6.18	0.28	2.59	30%	\$1.034	\$1.189	Water Heat	Level F	Level F
1	800	Base Heating	Misc.	20.26	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
1	805	Clock/Programmable Thermostat	Misc.	18.76	1.51	1.51	7%	\$0.020	\$0.024	HVAC	Level A	Level A
1	802	Roof/Ceiling Insulation	Misc.	18.62	0.14	1.64	8%	\$0.086	\$0.099	HVAC	Level E	Level E
1	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Misc.	18.15	0.47	2.11	10%	\$0.141	\$0.162	HVAC	Level F	Level F
1	810	Installation of Air Side Economizers	Misc.	17.20	0.95	3.06	15%	\$0.096	\$0.111	HVAC	Level E	Level F
2	190	Base NC Lighting	Office	16.30	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Office	14.67	1.63	1.63	10%	\$0.019	\$0.022	Lighting	Level A	Level A

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Sgmt Number	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	192	20 % More Efficient Design (Lighting)	Office	13.05	1.61	3.24	20%	\$0.028	\$0.033	Lighting	Level A	Level B
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Office	8.85	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	Office	8.83	0.02	0.02	0%	\$0.009	\$0.011	HVAC	Level A	Level A
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Office	8.22	0.61	0.63	7%	\$0.013	\$0.015	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	Office	8.17	0.05	0.68	8%	\$0.168	\$0.193	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Office	7.85	0.31	1.00	11%	\$0.124	\$0.143	HVAC	Level F	Level F
2	207	Installation of Energy Management Systems	Office	7.77	0.08	1.08	12%	\$0.073	\$0.084	HVAC	Level D	Level D
2	203	Roof/Ceiling Insulation	Office	7.76	0.01	1.09	12%	\$0.288	\$0.332	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Office	7.58	0.18	1.27	14%	\$0.155	\$0.178	HVAC	Level F	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	Office	7.39	0.19	1.46	17%	\$0.179	\$0.206	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Office	7.38	0.01	1.47	17%	\$0.303	\$0.349	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Office	7.31	0.07	1.54	17%	\$0.614	\$0.706	HVAC	Level F	Level F
2	205	EMS Optimization	Office	7.31	0.00	1.54	17%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	Office	8.85	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	Office	8.83	0.02	0.02	0%	\$0.014	\$0.017	HVAC	Level A	Level A
2	261	Clock/Programmable Thermostat	Office	8.53	0.31	0.32	4%	\$0.031	\$0.035	HVAC	Level B	Level B
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Office	8.32	0.21	0.54	6%	\$0.026	\$0.029	HVAC	Level A	Level A
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Office	8.00	0.32	0.86	10%	\$0.122	\$0.140	HVAC	Level F	Level F
2	262	Installation of Air Side Economizers	Office	7.79	0.20	1.06	12%	\$0.154	\$0.177	HVAC	Level F	Level F



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2	251	DX Tune-Up/Diagnostics	Office	7.59	0.21	1.26	14%	\$0.285	\$0.328	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Office	7.58	0.01	1.27	14%	\$0.295	\$0.340	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Office	7.40	0.18	1.46	16%	\$0.403	\$0.463	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	Office	7.38	0.02	1.47	17%	\$0.457	\$0.526	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Office	7.31	0.07	1.54	17%	\$0.614	\$0.706	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Office	6.58	0.73	2.27	26%	\$0.123	\$0.141	HVAC	Level F	Level F
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Office	4.08	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	Office	3.31	0.77	0.77	19%	\$0.051	\$0.059	HVAC	Level C	Level C
2	401	Energy Efficient Fan & Pump Motors	Office	3.29	0.01	0.78	19%	\$0.392	\$0.451	HVAC	Level F	Level F
2	610	Base Desktop PC	Office	2.18	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	Office	1.00	1.18	1.18	54%	\$0.118	\$0.136	Appliances	Level F	Level F
2	620	Base Display Monitor	Office	2.10	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Office	1.93	0.17	0.17	8%	\$0.014	\$0.016	Appliances	Level A	Level A
2	621	ENERGY STAR or Better Office Equipment: Monitors	Office	0.95	0.99	1.16	55%	\$0.155	\$0.178	Appliances	Level F	Level F
2	630	Base Copier	Office	0.69	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	Office	0.58	0.11	0.11	16%	\$0.120	\$0.138	Appliances	Level F	Level F
2	640	Base Laser Printer	Office	0.77	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Office	0.34	0.43	0.43	56%	\$0.141	\$0.162	Appliances	Level F	Level F
2	700	Base Water Heating	Office	1.02	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	704	Hot Water (SHW) Pipe Insulation	Office	1.01	0.01	0.01	1%	\$0.027	\$0.031	Water Heat	Level A	Level B
2	701	Demand controlled circulating systems	Office	1.00	0.01	0.02	2%	\$0.155	\$0.178	Water Heat	Level F	Level F
2	702	Heat Pump Water Heater	Office	0.88	0.12	0.14	14%	\$0.699	\$0.804	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Office	0.85	0.03	0.17	17%	\$0.664	\$0.764	Water Heat	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	800	Base Heating	Office	0.23	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Office	0.20	0.03	0.03	13%	\$0.121	\$0.139	HVAC	Level F	Level F
2	802	Roof/Ceiling Insulation	Office	0.19	0.00	0.03	14%	\$0.392	\$0.451	HVAC	Level F	Level F
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Office	0.19	0.00	0.04	16%	\$0.872	\$1.003	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	Office	0.18	0.01	0.05	22%	\$0.615	\$0.708	HVAC	Level F	Level F
2	190	Base NC Lighting	Dry Goods Retail	10.97	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	190	Base NC Lighting	Dry Goods Retail	10.97	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Dry Goods Retail	9.87	1.10	1.10	10%	\$0.017	\$0.020	Lighting	Level A	Level A
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Dry Goods Retail	1.81	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	Dry Goods Retail	1.80	0.00	0.00	0%	\$0.188	\$0.216	HVAC	Level F	Level F
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Dry Goods Retail	1.66	0.14	0.14	8%	\$0.019	\$0.022	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	Dry Goods Retail	1.65	0.01	0.15	9%	\$0.435	\$0.500	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Dry Goods Retail	1.57	0.08	0.24	13%	\$0.322	\$0.371	HVAC	Level F	Level F
2	207	Installation of Energy Management Systems	Dry Goods Retail	1.49	0.08	0.32	17%	\$0.210	\$0.241	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Dry Goods Retail	1.47	0.02	0.34	19%	\$1.410	\$1.622	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Dry Goods Retail	1.39	0.07	0.41	23%	\$0.538	\$0.618	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	210	Optimize Chilled Water and Condenser Water Settings	Dry Goods Retail	1.36	0.04	0.45	25%	\$0.511	\$0.588	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Dry Goods Retail	1.34	0.02	0.47	26%	\$1.547	\$1.779	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Dry Goods Retail	1.29	0.05	0.51	28%	\$1.113	\$1.280	HVAC	Level F	Level F
2	205	EMS Optimization	Dry Goods Retail	1.29	0.00	0.51	28%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	Dry Goods Retail	1.81	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Dry Goods Retail	1.76	0.05	0.05	3%	\$0.040	\$0.046	HVAC	Level B	Level C
2	256	Duct Insulation	Dry Goods Retail	1.76	0.00	0.05	3%	\$0.079	\$0.091	HVAC	Level D	Level E
2	261	Clock/Programmable Thermostat	Dry Goods Retail	1.71	0.05	0.10	5%	\$0.083	\$0.095	HVAC	Level D	Level E
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Dry Goods Retail	1.62	0.09	0.18	10%	\$0.312	\$0.359	HVAC	Level F	Level F
2	262	Installation of Air Side Economizers	Dry Goods Retail	1.51	0.11	0.30	17%	\$0.526	\$0.605	HVAC	Level F	Level F
2	251	DX Tune-Up/Diagnostics	Dry Goods Retail	1.47	0.04	0.34	19%	\$0.773	\$0.888	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Dry Goods Retail	1.42	0.05	0.39	22%	\$1.015	\$1.167	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Dry Goods Retail	1.38	0.03	0.42	23%	\$1.129	\$1.298	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Dry Goods Retail	1.36	0.02	0.44	25%	\$1.519	\$1.747	HVAC	Level F	Level F

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2	257	Duct Repair and Sealing	Dry Goods Retail	1.36	0.00	0.45	25%	\$1.561	\$1.795	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Dry Goods Retail	1.22	0.14	0.58	32%	\$0.347	\$0.399	HVAC	Level F	Level F
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Dry Goods Retail	7.21	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	Dry Goods Retail	6.25	0.95	0.95	13%	\$0.056	\$0.065	HVAC	Level C	Level D
2	401	Energy Efficient Fan & Pump Motors	Dry Goods Retail	6.23	0.02	0.98	14%	\$0.455	\$0.523	HVAC	Level F	Level F
2	610	Base Desktop PC	Dry Goods Retail	0.13	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	Dry Goods Retail	0.06	0.07	0.07	52%	\$0.096	\$0.111	Appliances	Level E	Level F
2	620	Base Display Monitor	Dry Goods Retail	0.13	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Dry Goods Retail	0.13	0.00	0.00	1%	\$0.011	\$0.013	Appliances	Level A	Level A
2	621	ENERGY STAR or Better Office Equipment: Monitors	Dry Goods Retail	0.06	0.07	0.07	52%	\$0.112	\$0.129	Appliances	Level F	Level F
2	630	Base Copier	Dry Goods Retail	0.03	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	Dry Goods Retail	0.01	0.02	0.02	61%	\$0.065	\$0.075	Appliances	Level D	Level D
2	640	Base Laser Printer	Dry Goods Retail	0.12	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Dry Goods Retail	0.06	0.06	0.06	51%	\$0.116	\$0.133	Appliances	Level F	Level F
2	700	Base Water Heating	Dry Goods Retail	0.80	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A

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2	704	Hot Water (SHW) Pipe Insulation	Dry Goods Retail	0.78	0.02	0.02	2%	\$0.123	\$0.141	Water Heat	Level F	Level F
2	701	Demand controlled circulating systems	Dry Goods Retail	0.76	0.02	0.04	5%	\$1.371	\$1.576	Water Heat	Level F	Level F
2	702	Heat Pump Water Heater	Dry Goods Retail	0.59	0.17	0.21	26%	\$2.097	\$2.412	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Dry Goods Retail	0.57	0.02	0.23	29%	\$2.266	\$2.606	Water Heat	Level F	Level F
2	800	Base Heating	Dry Goods Retail	0.58	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Dry Goods Retail	0.53	0.05	0.05	9%	\$0.103	\$0.118	HVAC	Level E	Level F
2	802	Roof/Ceiling Insulation	Dry Goods Retail	0.51	0.02	0.07	11%	\$0.480	\$0.552	HVAC	Level F	Level F
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Dry Goods Retail	0.50	0.01	0.08	14%	\$0.719	\$0.827	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	Dry Goods Retail	0.47	0.03	0.11	19%	\$0.508	\$0.584	HVAC	Level F	Level F
2	100	Base Cooking	Restaurant	9.13	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	102	High-Efficiency Range and Oven	Restaurant	8.77	0.36	0.36	4%	\$0.211	\$0.243	Appliances	Level F	Level F
2	190	Base NC Lighting	Restaurant	2.59	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Restaurant	2.33	0.26	0.26	10%	\$0.012	\$0.013	Lighting	Level A	Level A
2	192	20 % More Efficient Design (Lighting)	Restaurant	2.07	0.26	0.52	20%	\$0.017	\$0.020	Lighting	Level A	Level A
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Restaurant	1.36	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	Restaurant	1.36	0.00	0.00	0%	\$0.041	\$0.047	HVAC	Level B	Level C
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Restaurant	1.34	0.02	0.02	1%	\$0.012	\$0.013	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	Restaurant	1.33	0.01	0.03	2%	\$0.072	\$0.083	HVAC	Level D	Level D

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Restaurant	1.29	0.04	0.07	5%	\$0.054	\$0.062	HVAC	Level C	Level D
2	207	Installation of Energy Management Systems	Restaurant	1.22	0.06	0.14	10%	\$0.034	\$0.039	HVAC	Level B	Level B
2	203	Roof/Ceiling Insulation	Restaurant	1.20	0.02	0.16	11%	\$0.289	\$0.332	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Restaurant	1.14	0.06	0.22	16%	\$0.116	\$0.133	HVAC	Level F	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	Restaurant	1.11	0.03	0.25	18%	\$0.084	\$0.096	HVAC	Level D	Level E
2	203	Roof/Ceiling Insulation	Restaurant	1.10	0.02	0.26	19%	\$0.317	\$0.364	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Restaurant	1.03	0.07	0.33	24%	\$0.128	\$0.147	HVAC	Level F	Level F
2	205	EMS Optimization	Restaurant	1.03	0.00	0.33	24%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	Restaurant	1.36	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	Restaurant	1.36	0.00	0.00	0%	\$0.007	\$0.008	HVAC	Level A	Level A
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Restaurant	1.32	0.03	0.04	3%	\$0.006	\$0.007	HVAC	Level A	Level A
2	261	Clock/Programmable Thermostat	Restaurant	1.27	0.05	0.09	7%	\$0.017	\$0.019	HVAC	Level A	Level A
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Restaurant	1.23	0.04	0.13	10%	\$0.056	\$0.065	HVAC	Level C	Level D
2	262	Installation of Air Side Economizers	Restaurant	1.17	0.05	0.19	14%	\$0.116	\$0.133	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Restaurant	1.10	0.08	0.26	19%	\$0.120	\$0.138	HVAC	Level F	Level F
2	251	DX Tune-Up/Diagnostics	Restaurant	1.07	0.03	0.29	22%	\$0.143	\$0.164	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Restaurant	1.04	0.03	0.32	23%	\$0.201	\$0.231	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Restaurant	1.03	0.02	0.33	25%	\$0.339	\$0.390	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	257	Duct Repair and Sealing	Restaurant	1.02	0.00	0.34	25%	\$0.366	\$0.421	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Restaurant	0.92	0.10	0.44	32%	\$0.062	\$0.071	HVAC	Level D	Level D
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Restaurant	0.12	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	Restaurant	0.11	0.00	0.00	3%	\$0.057	\$0.066	HVAC	Level C	Level D
2	401	Energy Efficient Fan & Pump Motors	Restaurant	0.11	0.00	0.00	4%	\$0.426	\$0.490	HVAC	Level F	Level F
2	610	Base Desktop PC	Restaurant	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	Restaurant	0.01	0.01	0.01	53%	\$0.286	\$0.329	Appliances	Level F	Level F
2	620	Base Display Monitor	Restaurant	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Restaurant	0.01	0.00	0.00	3%	\$0.034	\$0.039	Appliances	Level B	Level B
2	621	ENERGY STAR or Better Office Equipment: Monitors	Restaurant	0.01	0.01	0.01	53%	\$0.346	\$0.398	Appliances	Level F	Level F
2	630	Base Copier	Restaurant	0.00	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	Restaurant	0.00	0.00	0.00	62%	\$0.272	\$0.313	Appliances	Level F	Level F
2	640	Base Laser Printer	Restaurant	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Restaurant	0.01	0.01	0.01	53%	\$0.287	\$0.330	Appliances	Level F	Level F
2	700	Base Water Heating	Restaurant	0.53	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	704	Hot Water (SHW) Pipe Insulation	Restaurant	0.52	0.01	0.01	3%	\$0.016	\$0.019	Water Heat	Level A	Level A
2	701	Demand controlled circulating systems	Restaurant	0.51	0.01	0.03	5%	\$0.049	\$0.057	Water Heat	Level C	Level C
2	702	Heat Pump Water Heater	Restaurant	0.39	0.11	0.14	26%	\$0.219	\$0.252	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Restaurant	0.38	0.02	0.16	29%	\$0.237	\$0.272	Water Heat	Level F	Level F
2	800	Base Heating	Restaurant	0.79	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Restaurant	0.72	0.07	0.07	9%	\$0.012	\$0.014	HVAC	Level A	Level A
2	802	Roof/Ceiling Insulation	Restaurant	0.69	0.02	0.09	12%	\$0.059	\$0.068	HVAC	Level C	Level D
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Restaurant	0.68	0.02	0.11	14%	\$0.093	\$0.107	HVAC	Level E	Level E
2	810	Installation of Air Side Economizers	Restaurant	0.65	0.03	0.14	17%	\$0.062	\$0.071	HVAC	Level D	Level D

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	190	Base NC Lighting	Grocery	3.95	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Grocery	3.56	0.40	0.40	10%	\$0.008	\$0.009	Lighting	Level A	Level A
2	192	20 % More Efficient Design (Lighting)	Grocery	3.17	0.39	0.79	20%	\$0.012	\$0.014	Lighting	Level A	Level A
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Grocery	1.52	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	Grocery	1.51	0.00	0.00	0%	\$0.012	\$0.014	HVAC	Level A	Level A
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Grocery	1.41	0.11	0.11	7%	\$0.003	\$0.004	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	Grocery	1.40	0.01	0.12	8%	\$0.102	\$0.117	HVAC	Level E	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Grocery	1.33	0.07	0.19	12%	\$0.075	\$0.087	HVAC	Level D	Level E
2	207	Installation of Energy Management Systems	Grocery	1.26	0.07	0.26	17%	\$0.049	\$0.056	HVAC	Level C	Level C
2	203	Roof/Ceiling Insulation	Grocery	1.26	0.00	0.26	17%	\$0.253	\$0.291	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Grocery	1.20	0.06	0.32	21%	\$0.096	\$0.110	HVAC	Level E	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	Grocery	1.17	0.03	0.35	23%	\$0.118	\$0.136	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Grocery	1.16	0.00	0.36	23%	\$0.274	\$0.315	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Grocery	1.07	0.09	0.45	29%	\$0.088	\$0.101	HVAC	Level E	Level E
2	205	EMS Optimization	Grocery	1.07	0.00	0.45	29%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	Grocery	1.52	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	Grocery	1.52	0.00	0.00	0%	\$0.006	\$0.007	HVAC	Level A	Level A
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Grocery	1.48	0.04	0.04	3%	\$0.006	\$0.007	HVAC	Level A	Level A
2	261	Clock/Programmable Thermostat	Grocery	1.41	0.07	0.11	7%	\$0.021	\$0.025	HVAC	Level A	Level A



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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Grocery	1.34	0.07	0.18	12%	\$0.075	\$0.086	HVAC	Level D	Level E
2	262	Installation of Air Side Economizers	Grocery	1.24	0.10	0.28	18%	\$0.098	\$0.113	HVAC	Level E	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Grocery	1.15	0.10	0.37	25%	\$0.082	\$0.094	HVAC	Level D	Level E
2	251	DX Tune-Up/Diagnostics	Grocery	1.11	0.03	0.40	27%	\$0.202	\$0.232	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Grocery	1.09	0.03	0.43	28%	\$0.285	\$0.327	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Grocery	1.09	0.00	0.43	29%	\$0.294	\$0.338	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	Grocery	1.08	0.00	0.44	29%	\$0.299	\$0.344	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Grocery	0.97	0.11	0.54	36%	\$0.086	\$0.099	HVAC	Level E	Level E
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Grocery	0.32	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	Grocery	0.28	0.04	0.04	13%	\$0.025	\$0.028	HVAC	Level A	Level A
2	401	Energy Efficient Fan & Pump Motors	Grocery	0.27	0.00	0.04	14%	\$0.198	\$0.228	HVAC	Level F	Level F
2	500	Base Refrigeration System	Grocery	2.78	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	510	Demand Defrost Electric	Grocery	2.67	0.11	0.11	4%	\$0.008	\$0.009	Appliances	Level A	Level A
2	505	High-Efficiency Compressors	Grocery	2.52	0.15	0.26	9%	\$0.026	\$0.029	Appliances	Level A	Level A
2	509	Demand Hot Gas Defrost	Grocery	2.48	0.04	0.30	11%	\$0.027	\$0.032	Appliances	Level A	Level B
2	507	Installation of Floating Condenser Head Pressure Controls	Grocery	2.43	0.05	0.35	13%	\$0.044	\$0.051	Appliances	Level B	Level C
2	502	Strip Curtains for Walk-Ins	Grocery	2.40	0.03	0.38	14%	\$0.059	\$0.068	Appliances	Level C	Level D
2	511	Anti-Sweat (Humidistat) Controls	Grocery	2.35	0.05	0.43	16%	\$0.073	\$0.084	Appliances	Level D	Level D
2	503	Night Covers for Display Cases	Grocery	2.31	0.04	0.47	17%	\$0.123	\$0.142	Appliances	Level F	Level F
2	501	High Efficiency Case Fans	Grocery	2.04	0.26	0.74	27%	\$0.154	\$0.178	Appliances	Level F	Level F
2	506	Compressor VSD retrofit	Grocery	1.99	0.05	0.79	28%	\$0.208	\$0.239	Appliances	Level F	Level F
2	508	Refrigeration Commissioning	Grocery	1.94	0.05	0.84	30%	\$0.265	\$0.305	Appliances	Level F	Level F
2	504	Reduced Speed or Cycling of Evaporator Fans	Grocery	1.93	0.01	0.84	30%	\$0.622	\$0.715	Appliances	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWH Technical Potential	Marginal Energy Cost \$/kWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	610	Base Desktop PC	Grocery	0.04	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	Grocery	0.02	0.02	0.02	53%	\$0.041	\$0.047	Appliances	Level B	Level C
2	620	Base Display Monitor	Grocery	0.04	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Grocery	0.04	0.00	0.00	1%	\$0.005	\$0.006	Appliances	Level A	Level A
2	621	ENERGY STAR or Better Office Equipment: Monitors	Grocery	0.02	0.02	0.02	52%	\$0.049	\$0.056	Appliances	Level C	Level C
2	630	Base Copier	Grocery	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	Grocery	0.00	0.01	0.01	62%	\$0.086	\$0.099	Appliances	Level E	Level E
2	640	Base Laser Printer	Grocery	0.03	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Grocery	0.02	0.02	0.02	53%	\$0.041	\$0.047	Appliances	Level B	Level C
2	700	Base Water Heating	Grocery	0.18	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	704	Hot Water (SHW) Pipe Insulation	Grocery	0.17	0.00	0.00	3%	\$0.006	\$0.007	Water Heat	Level A	Level A
2	702	Heat Pump Water Heater	Grocery	0.14	0.04	0.04	24%	\$0.100	\$0.115	Water Heat	Level E	Level F
2	701	Demand controlled circulating systems	Grocery	0.13	0.00	0.05	26%	\$0.201	\$0.231	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Grocery	0.13	0.01	0.05	29%	\$0.110	\$0.127	Water Heat	Level F	Level F
2	800	Base Heating	Grocery	0.03	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Grocery	0.03	0.00	0.00	9%	\$0.065	\$0.075	HVAC	Level D	Level D
2	802	Roof/Ceiling Insulation	Grocery	0.03	0.00	0.00	13%	\$0.346	\$0.398	HVAC	Level F	Level F
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Grocery	0.03	0.00	0.00	15%	\$0.500	\$0.575	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	Grocery	0.02	0.00	0.01	22%	\$0.360	\$0.414	HVAC	Level F	Level F
2	190	Base NC Lighting	Warehouse	6.81	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Warehouse	6.13	0.68	0.68	10%	\$0.035	\$0.040	Lighting	Level B	Level B
2	192	20 % More Efficient Design (Lighting)	Warehouse	5.46	0.67	1.36	20%	\$0.051	\$0.059	Lighting	Level C	Level C
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Warehouse	1.23	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	208	Insulation of Pipes	Warehouse	1.22	0.00	0.00	0%	\$0.009	\$0.011	HVAC	Level A	Level A
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Warehouse	1.11	0.11	0.12	10%	\$0.005	\$0.005	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	Warehouse	1.10	0.01	0.12	10%	\$0.122	\$0.141	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Warehouse	1.05	0.06	0.18	15%	\$0.091	\$0.104	HVAC	Level E	Level E
2	207	Installation of Energy Management Systems	Warehouse	1.01	0.04	0.22	18%	\$0.058	\$0.066	HVAC	Level C	Level D
2	203	Roof/Ceiling Insulation	Warehouse	1.00	0.00	0.22	18%	\$1.024	\$1.178	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Warehouse	0.95	0.05	0.28	22%	\$0.411	\$0.472	HVAC	Level F	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	Warehouse	0.93	0.02	0.30	24%	\$0.141	\$0.162	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Warehouse	0.93	0.00	0.30	25%	\$1.110	\$1.276	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Warehouse	0.84	0.08	0.39	32%	\$0.317	\$0.364	HVAC	Level F	Level F
2	205	EMS Optimization	Warehouse	0.84	0.00	0.39	32%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	Warehouse	1.23	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	Warehouse	1.23	0.00	0.00	0%	\$0.011	\$0.013	HVAC	Level A	Level A
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Warehouse	1.19	0.03	0.03	3%	\$0.011	\$0.013	HVAC	Level A	Level A
2	261	Clock/Programmable Thermostat	Warehouse	1.17	0.03	0.06	5%	\$0.027	\$0.031	HVAC	Level A	Level B
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Warehouse	1.11	0.06	0.12	10%	\$0.086	\$0.099	HVAC	Level E	Level E
2	251	DX Tune-Up/Diagnostics	Warehouse	1.08	0.03	0.15	12%	\$0.197	\$0.227	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Warehouse	0.98	0.10	0.25	20%	\$0.271	\$0.312	HVAC	Level F	Level F
2	262	Installation of Air Side Economizers	Warehouse	0.94	0.04	0.29	24%	\$0.427	\$0.491	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Warehouse	0.92	0.02	0.31	25%	\$0.320	\$0.368	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Warehouse	0.91	0.00	0.31	26%	\$1.125	\$1.293	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	Warehouse	0.91	0.00	0.32	26%	\$1.216	\$1.398	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Warehouse	0.82	0.09	0.41	33%	\$0.097	\$0.112	HVAC	Level E	Level F
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Warehouse	3.30	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	Warehouse	2.75	0.55	0.55	17%	\$0.045	\$0.051	HVAC	Level B	Level C
2	401	Energy Efficient Fan & Pump Motors	Warehouse	2.73	0.02	0.57	17%	\$0.319	\$0.367	HVAC	Level F	Level F
2	610	Base Desktop PC	Warehouse	0.13	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	Warehouse	0.06	0.07	0.07	53%	\$0.837	\$0.962	Appliances	Level F	Level F
2	620	Base Display Monitor	Warehouse	0.12	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Warehouse	0.12	0.00	0.00	1%	\$0.099	\$0.114	Appliances	Level E	Level F
2	621	ENERGY STAR or Better Office Equipment: Monitors	Warehouse	0.06	0.06	0.06	52%	\$0.995	\$1.145	Appliances	Level F	Level F
2	630	Base Copier	Warehouse	0.02	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	Warehouse	0.01	0.01	0.01	62%	\$0.576	\$0.663	Appliances	Level F	Level F
2	640	Base Laser Printer	Warehouse	0.08	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Warehouse	0.04	0.04	0.04	53%	\$0.688	\$0.791	Appliances	Level F	Level F
2	700	Base Water Heating	Warehouse	0.64	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	704	Hot Water (SHW) Pipe Insulation	Warehouse	0.62	0.02	0.02	2%	\$0.011	\$0.012	Water Heat	Level A	Level A
2	702	Heat Pump Water Heater	Warehouse	0.48	0.14	0.16	24%	\$0.116	\$0.133	Water Heat	Level F	Level F
2	701	Demand controlled circulating systems	Warehouse	0.47	0.01	0.17	26%	\$0.196	\$0.226	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Warehouse	0.45	0.02	0.19	29%	\$0.128	\$0.148	Water Heat	Level F	Level F
2	800	Base Heating	Warehouse	0.14	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Warehouse	0.13	0.01	0.01	8%	\$0.110	\$0.127	HVAC	Level F	Level F
2	802	Roof/Ceiling Insulation	Warehouse	0.13	0.00	0.01	10%	\$0.527	\$0.606	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Warehouse	0.13	0.00	0.02	12%	\$0.830	\$0.955	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	Warehouse	0.12	0.01	0.03	19%	\$0.598	\$0.688	HVAC	Level F	Level F
2	190	Base NC Lighting	School	0.76	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	School	0.68	0.08	0.08	10%	\$0.038	\$0.044	Lighting	Level B	Level B
2	192	20 % More Efficient Design (Lighting)	School	0.61	0.08	0.15	20%	\$0.056	\$0.065	Lighting	Level C	Level D
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	School	0.05	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	School	0.05	0.00	0.00	0%	\$0.449	\$0.517	HVAC	Level F	Level F
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	School	0.05	0.00	0.00	2%	\$0.108	\$0.124	HVAC	Level E	Level F
2	201	Chiller Tune-Up/Diagnostics	School	0.05	0.00	0.00	3%	\$1.489	\$1.712	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	School	0.05	0.00	0.00	8%	\$1.103	\$1.269	HVAC	Level F	Level F
2	207	Installation of Energy Management Systems	School	0.04	0.00	0.01	11%	\$0.697	\$0.801	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	School	0.04	0.00	0.01	11%	\$5.118	\$5.886	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	School	0.04	0.00	0.01	15%	\$1.956	\$2.249	HVAC	Level F	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	School	0.04	0.00	0.01	17%	\$1.690	\$1.943	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	School	0.04	0.00	0.01	18%	\$5.500	\$6.325	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	School	0.04	0.00	0.01	20%	\$2.276	\$2.618	HVAC	Level F	Level F
2	205	EMS Optimization	School	0.04	0.00	0.01	20%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	School	0.05	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	School	0.05	0.00	0.00	0%	\$0.067	\$0.077	HVAC	Level D	Level D

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	School	0.05	0.00	0.00	2%	\$0.084	\$0.096	HVAC	Level D	Level E
2	261	Clock/Programmable Thermostat	School	0.05	0.00	0.00	4%	\$0.299	\$0.344	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	School	0.05	0.00	0.00	9%	\$1.119	\$1.287	HVAC	Level F	Level F
2	262	Installation of Air Side Economizers	School	0.04	0.00	0.01	12%	\$1.934	\$2.224	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	School	0.04	0.00	0.01	15%	\$2.135	\$2.456	HVAC	Level F	Level F
2	251	DX Tune-Up/Diagnostics	School	0.04	0.00	0.01	17%	\$2.753	\$3.166	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	School	0.04	0.00	0.01	19%	\$3.884	\$4.467	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	School	0.04	0.00	0.01	19%	\$5.621	\$6.464	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	School	0.04	0.00	0.01	19%	\$5.899	\$6.784	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	School	0.04	0.00	0.01	28%	\$1.180	\$1.357	HVAC	Level F	Level F
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	School	0.13	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	School	0.10	0.03	0.03	20%	\$0.081	\$0.093	HVAC	Level D	Level E
2	401	Energy Efficient Fan & Pump Motors	School	0.10	0.00	0.03	20%	\$0.604	\$0.695	HVAC	Level F	Level F
2	610	Base Desktop PC	School	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	School	0.01	0.01	0.01	53%	\$1.385	\$1.593	Appliances	Level F	Level F
2	620	Base Display Monitor	School	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	School	0.01	0.00	0.00	8%	\$0.164	\$0.188	Appliances	Level F	Level F
2	621	ENERGY STAR or Better Office Equipment: Monitors	School	0.00	0.01	0.01	55%	\$1.751	\$2.014	Appliances	Level F	Level F
2	630	Base Copier	School	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	School	0.01	0.00	0.00	17%	\$0.407	\$0.469	Appliances	Level F	Level F
2	640	Base Laser Printer	School	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	641	ENERGY STAR or Better Office Equipment, Printers	School	0.00	0.00	0.00	52%	\$0.945	\$1.087	Appliances	Level F	Level F
2	700	Base Water Heating	School	0.21	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	704	Hot Water (SHW) Pipe Insulation	School	0.21	0.00	0.00	0%	\$0.048	\$0.055	Water Heat	Level C	Level C
2	701	Demand controlled circulating systems	School	0.21	0.00	0.00	1%	\$0.211	\$0.243	Water Heat	Level F	Level F
2	702	Heat Pump Water Heater	School	0.19	0.02	0.02	12%	\$1.363	\$1.567	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	School	0.18	0.01	0.03	14%	\$1.314	\$1.511	Water Heat	Level F	Level F
2	800	Base Heating	School	1.20	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	School	1.04	0.16	0.16	13%	\$0.010	\$0.011	HVAC	Level A	Level A
2	802	Roof/Ceiling Insulation	School	1.01	0.02	0.19	15%	\$0.047	\$0.054	HVAC	Level C	Level C
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	School	0.99	0.03	0.21	18%	\$0.072	\$0.083	HVAC	Level D	Level D
2	810	Installation of Air Side Economizers	School	0.95	0.03	0.25	20%	\$0.047	\$0.055	HVAC	Level C	Level C
2	190	Base NC Lighting	University	0.66	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	University	0.59	0.07	0.07	10%	\$0.019	\$0.022	Lighting	Level A	Level A
2	192	20 % More Efficient Design (Lighting)	University	0.53	0.06	0.13	20%	\$0.028	\$0.033	Lighting	Level A	Level B
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	University	0.09	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	University	0.09	0.00	0.00	0%	\$0.061	\$0.070	HVAC	Level D	Level D
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	University	0.09	0.00	0.00	2%	\$0.022	\$0.025	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	University	0.08	0.00	0.00	3%	\$0.239	\$0.275	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	University	0.08	0.00	0.01	8%	\$0.177	\$0.204	HVAC	Level F	Level F
2	207	Installation of Energy Management Systems	University	0.08	0.00	0.01	10%	\$0.109	\$0.126	HVAC	Level E	Level F
2	203	Roof/Ceiling Insulation	University	0.08	0.00	0.01	10%	\$0.257	\$0.295	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	209	Installation of Chiller Economizers (water side)	University	0.07	0.00	0.01	15%	\$0.158	\$0.182	HVAC	Level F	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	University	0.07	0.00	0.01	17%	\$0.271	\$0.311	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	University	0.07	0.00	0.02	17%	\$0.278	\$0.320	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	University	0.07	0.00	0.02	18%	\$0.719	\$0.826	HVAC	Level F	Level F
2	205	EMS Optimization	University	0.07	0.00	0.02	18%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	University	0.09	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	University	0.09	0.00	0.00	0%	\$0.005	\$0.005	HVAC	Level A	Level A
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	University	0.09	0.00	0.00	2%	\$0.017	\$0.020	HVAC	Level A	Level A
2	261	Clock/Programmable Thermostat	University	0.08	0.00	0.00	4%	\$0.048	\$0.055	HVAC	Level C	Level C
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	University	0.08	0.00	0.01	8%	\$0.178	\$0.205	HVAC	Level F	Level F
2	262	Installation of Air Side Economizers	University	0.07	0.01	0.01	15%	\$0.169	\$0.194	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	University	0.07	0.00	0.01	16%	\$0.272	\$0.313	HVAC	Level F	Level F
2	251	DX Tune-Up/Diagnostics	University	0.07	0.00	0.02	18%	\$0.446	\$0.512	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	University	0.07	0.00	0.02	18%	\$0.464	\$0.534	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	University	0.07	0.00	0.02	20%	\$0.630	\$0.725	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	University	0.07	0.00	0.02	20%	\$0.742	\$0.853	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	University	0.06	0.01	0.02	28%	\$0.192	\$0.220	HVAC	Level F	Level F
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	University	0.07	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	University	0.05	0.02	0.02	23%	\$0.076	\$0.087	HVAC	Level D	Level E
2	401	Energy Efficient Fan & Pump Motors	University	0.05	0.00	0.02	23%	\$0.619	\$0.712	HVAC	Level F	Level F



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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	610	Base Desktop PC	University	0.02	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	University	0.01	0.01	0.01	53%	\$0.121	\$0.139	Appliances	Level F	Level F
2	620	Base Display Monitor	University	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	University	0.01	0.00	0.00	8%	\$0.014	\$0.016	Appliances	Level A	Level A
2	621	ENERGY STAR or Better Office Equipment: Monitors	University	0.01	0.01	0.01	55%	\$0.152	\$0.175	Appliances	Level F	Level F
2	630	Base Copier	University	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	University	0.01	0.00	0.00	17%	\$0.050	\$0.058	Appliances	Level C	Level C
2	640	Base Laser Printer	University	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	University	0.00	0.00	0.00	52%	\$0.094	\$0.109	Appliances	Level E	Level E
2	700	Base Water Heating	University	0.09	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	701	Demand controlled circulating systems	University	0.09	0.00	0.00	1%	\$0.050	\$0.057	Water Heat	Level C	Level C
2	704	Hot Water (SHW) Pipe Insulation	University	0.09	0.00	0.00	3%	\$0.084	\$0.097	Water Heat	Level D	Level E
2	702	Heat Pump Water Heater	University	0.08	0.01	0.01	14%	\$2.554	\$2.937	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	University	0.08	0.00	0.02	17%	\$2.409	\$2.771	Water Heat	Level F	Level F
2	800	Base Heating	University	0.05	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	University	0.04	0.01	0.01	12%	\$0.120	\$0.138	HVAC	Level F	Level F
2	802	Roof/Ceiling Insulation	University	0.04	0.00	0.01	14%	\$0.362	\$0.416	HVAC	Level F	Level F
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	University	0.04	0.00	0.01	16%	\$0.874	\$1.005	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	University	0.04	0.00	0.01	19%	\$0.573	\$0.659	HVAC	Level F	Level F
2	190	Base NC Lighting	Hospital & Health Care	8.99	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Hospital & Health Care	8.09	0.90	0.90	10%	\$0.009	\$0.011	Lighting	Level A	Level A

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	192	20 % More Efficient Design (Lighting)	Hospital & Health Care	7.20	0.89	1.79	20%	\$0.014	\$0.016	Lighting	Level A	Level A
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Hospital & Health Care	3.43	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	Hospital & Health Care	3.42	0.01	0.01	0%	\$0.009	\$0.011	HVAC	Level A	Level A
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hospital & Health Care	3.40	0.02	0.03	1%	\$0.010	\$0.012	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	Hospital & Health Care	3.38	0.02	0.05	1%	\$0.099	\$0.113	HVAC	Level E	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hospital & Health Care	3.21	0.17	0.22	6%	\$0.073	\$0.084	HVAC	Level D	Level D
2	207	Installation of Energy Management Systems	Hospital & Health Care	3.08	0.12	0.34	10%	\$0.046	\$0.053	HVAC	Level C	Level C
2	203	Roof/Ceiling Insulation	Hospital & Health Care	3.07	0.01	0.35	10%	\$0.155	\$0.179	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Hospital & Health Care	2.92	0.15	0.51	15%	\$0.066	\$0.076	HVAC	Level D	Level D
2	210	Optimize Chilled Water and Condenser Water Settings	Hospital & Health Care	2.85	0.07	0.58	17%	\$0.113	\$0.130	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Hospital & Health Care	2.84	0.01	0.59	17%	\$0.168	\$0.194	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Hospital & Health Care	2.83	0.01	0.60	17%	\$0.491	\$0.565	HVAC	Level F	Level F
2	205	EMS Optimization	Hospital & Health Care	2.83	0.00	0.60	17%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	Hospital & Health Care	3.43	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	Hospital & Health Care	3.42	0.01	0.01	0%	\$0.002	\$0.002	HVAC	Level A	Level A

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hospital & Health Care	3.36	0.06	0.06	2%	\$0.002	\$0.003	HVAC	Level A	Level A
2	261	Clock/Programmable Thermostat	Hospital & Health Care	3.27	0.09	0.15	4%	\$0.026	\$0.030	HVAC	Level A	Level B
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hospital & Health Care	3.11	0.16	0.32	9%	\$0.075	\$0.087	HVAC	Level D	Level E
2	262	Installation of Air Side Economizers	Hospital & Health Care	3.01	0.10	0.42	12%	\$0.065	\$0.075	HVAC	Level D	Level D
2	203	Roof/Ceiling Insulation	Hospital & Health Care	3.00	0.01	0.43	13%	\$0.159	\$0.183	HVAC	Level F	Level F
2	251	DX Tune-Up/Diagnostics	Hospital & Health Care	2.92	0.08	0.51	15%	\$0.180	\$0.207	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	Hospital & Health Care	2.91	0.01	0.51	15%	\$0.188	\$0.216	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Hospital & Health Care	2.84	0.07	0.58	17%	\$0.255	\$0.293	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Hospital & Health Care	2.83	0.01	0.59	17%	\$0.490	\$0.564	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Hospital & Health Care	2.55	0.28	0.88	26%	\$0.077	\$0.089	HVAC	Level D	Level E
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Hospital & Health Care	2.04	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	Hospital & Health Care	1.56	0.47	0.47	23%	\$0.031	\$0.036	HVAC	Level B	Level B
2	401	Energy Efficient Fan & Pump Motors	Hospital & Health Care	1.56	0.00	0.48	23%	\$0.253	\$0.291	HVAC	Level F	Level F
2	610	Base Desktop PC	Hospital & Health Care	0.14	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/kWh Technical Potential	Marginal Energy Cost \$/kWh Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	611	ENERGY STAR or Better Office Equipment: Computer	Hospital & Health Care	0.06	0.07	0.07	53%	\$0.318	\$0.366	Appliances	Level F	Level F
2	620	Base Display Monitor	Hospital & Health Care	0.13	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Hospital & Health Care	0.13	0.00	0.00	3%	\$0.038	\$0.043	Appliances	Level B	Level B
2	621	ENERGY STAR or Better Office Equipment: Monitors	Hospital & Health Care	0.06	0.07	0.07	53%	\$0.384	\$0.442	Appliances	Level F	Level F
2	630	Base Copier	Hospital & Health Care	0.12	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	Hospital & Health Care	0.10	0.02	0.02	17%	\$0.207	\$0.238	Appliances	Level F	Level F
2	640	Base Laser Printer	Hospital & Health Care	0.11	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Hospital & Health Care	0.05	0.06	0.06	53%	\$0.292	\$0.335	Appliances	Level F	Level F
2	700	Base Water Heating	Hospital & Health Care	1.23	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	704	Hot Water (SHW) Pipe Insulation	Hospital & Health Care	1.20	0.02	0.02	2%	\$0.016	\$0.018	Water Heat	Level A	Level A
2	701	Demand controlled circulating systems	Hospital & Health Care	1.18	0.02	0.04	4%	\$0.058	\$0.066	Water Heat	Level C	Level D
2	702	Heat Pump Water Heater	Hospital & Health Care	0.98	0.21	0.25	20%	\$1.155	\$1.329	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Hospital & Health Care	0.94	0.03	0.29	23%	\$1.173	\$1.349	Water Heat	Level F	Level F
2	800	Base Heating	Hospital & Health Care	0.14	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Hospital & Health Care	0.12	0.02	0.02	12%	\$0.020	\$0.024	HVAC	Level A	Level A

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	802	Roof/Ceiling Insulation	Hospital & Health Care	0.12	0.00	0.02	14%	\$0.091	\$0.104	HVAC	Level E	Level E
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hospital & Health Care	0.11	0.00	0.02	16%	\$0.151	\$0.174	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	Hospital & Health Care	0.11	0.00	0.03	19%	\$0.099	\$0.114	HVAC	Level E	Level F
2	190	Base NC Lighting	Hotel	0.86	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Hotel	0.78	0.09	0.09	10%	\$0.034	\$0.039	Lighting	Level B	Level B
2	192	20 % More Efficient Design (Lighting)	Hotel	0.69	0.09	0.17	20%	\$0.050	\$0.057	Lighting	Level C	Level C
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Hotel	0.43	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	Hotel	0.43	0.00	0.00	0%	\$0.207	\$0.238	HVAC	Level F	Level F
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hotel	0.41	0.02	0.02	5%	\$0.047	\$0.054	HVAC	Level C	Level C
2	201	Chiller Tune-Up/Diagnostics	Hotel	0.41	0.00	0.02	6%	\$0.652	\$0.750	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hotel	0.39	0.02	0.05	10%	\$0.483	\$0.555	HVAC	Level F	Level F
2	207	Installation of Energy Management Systems	Hotel	0.38	0.01	0.05	12%	\$0.295	\$0.339	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Hotel	0.38	0.00	0.06	13%	\$0.473	\$0.544	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Hotel	0.37	0.01	0.06	15%	\$0.383	\$0.440	HVAC	Level F	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	Hotel	0.36	0.01	0.07	17%	\$0.714	\$0.821	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Hotel	0.36	0.00	0.07	17%	\$0.499	\$0.574	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Hotel	0.36	0.00	0.08	17%	\$1.190	\$1.369	HVAC	Level F	Level F
2	205	EMS Optimization	Hotel	0.36	0.00	0.08	17%	N/A	\$-	HVAC	N/A	N/A

APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	250	Base DX Packaged System, EER=10.3, 10 tons	Hotel	0.43	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	Hotel	0.43	0.00	0.00	0%	\$0.025	\$0.029	HVAC	Level A	Level A
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Hotel	0.42	0.01	0.01	3%	\$0.066	\$0.076	HVAC	Level D	Level D
2	261	Clock/Programmable Thermostat	Hotel	0.41	0.01	0.03	6%	\$0.170	\$0.195	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hotel	0.39	0.02	0.05	11%	\$0.484	\$0.556	HVAC	Level F	Level F
2	262	Installation of Air Side Economizers	Hotel	0.37	0.01	0.06	14%	\$0.395	\$0.455	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Hotel	0.37	0.00	0.06	14%	\$0.481	\$0.553	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	Hotel	0.37	0.00	0.06	14%	\$1.114	\$1.281	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Hotel	0.37	0.00	0.06	14%	\$1.149	\$1.321	HVAC	Level F	Level F
2	251	DX Tune-Up/Diagnostics	Hotel	0.36	0.01	0.07	17%	\$1.164	\$1.338	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Hotel	0.35	0.01	0.08	19%	\$1.642	\$1.888	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Hotel	0.32	0.04	0.12	27%	\$0.496	\$0.570	HVAC	Level F	Level F
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Hotel	0.15	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	402	VSD, ASD Fan & Pump Applications	Hotel	0.14	0.00	0.00	2%	\$0.101	\$0.117	HVAC	Level E	Level F
2	401	Energy Efficient Fan & Pump Motors	Hotel	0.14	0.00	0.00	3%	\$0.616	\$0.708	HVAC	Level F	Level F
2	610	Base Desktop PC	Hotel	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	Hotel	0.00	0.00	0.00	53%	\$0.200	\$0.230	Appliances	Level F	Level F
2	620	Base Display Monitor	Hotel	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Hotel	0.01	0.00	0.00	3%	\$0.024	\$0.027	Appliances	Level A	Level A
2	621	ENERGY STAR or Better Office Equipment: Monitors	Hotel	0.00	0.00	0.00	53%	\$0.242	\$0.279	Appliances	Level F	Level F
2	630	Base Copier	Hotel	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A

APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	631	ENERGY STAR or Better Office Equipment: Copiers	Hotel	0.01	0.00	0.00	31%	\$0.035	\$0.041	Appliances	Level B	Level B
2	640	Base Laser Printer	Hotel	0.00	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Hotel	0.00	0.00	0.00	53%	\$0.243	\$0.279	Appliances	Level F	Level F
2	700	Base Water Heating	Hotel	0.59	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	701	Demand controlled circulating systems	Hotel	0.58	0.01	0.01	2%	\$0.035	\$0.040	Water Heat	Level B	Level B
2	704	Hot Water (SHW) Pipe Insulation	Hotel	0.56	0.01	0.02	4%	\$0.043	\$0.049	Water Heat	Level B	Level C
2	702	Heat Pump Water Heater	Hotel	0.47	0.09	0.11	19%	\$0.732	\$0.842	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Hotel	0.46	0.02	0.13	22%	\$0.731	\$0.841	Water Heat	Level F	Level F
2	800	Base Heating	Hotel	0.49	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Hotel	0.44	0.05	0.05	11%	\$0.019	\$0.022	HVAC	Level A	Level A
2	802	Roof/Ceiling Insulation	Hotel	0.43	0.01	0.07	14%	\$0.043	\$0.049	HVAC	Level B	Level C
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Hotel	0.42	0.01	0.08	16%	\$0.142	\$0.163	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	Hotel	0.39	0.03	0.11	22%	\$0.101	\$0.117	HVAC	Level E	Level F
2	190	Base NC Lighting	Misc.	1.61	0.00	0.00	0%	N/A	\$-	Lighting	N/A	N/A
2	191	10 % More Efficient Design (Lighting)	Misc.	1.45	0.16	0.16	10%	\$0.048	\$0.055	Lighting	Level C	Level C
2	192	20 % More Efficient Design (Lighting)	Misc.	1.29	0.16	0.32	20%	\$0.071	\$0.082	Lighting	Level D	Level D
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	Misc.	1.30	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	208	Insulation of Pipes	Misc.	1.30	0.00	0.00	0%	\$0.033	\$0.038	HVAC	Level B	Level B
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Misc.	1.28	0.02	0.02	2%	\$0.024	\$0.027	HVAC	Level A	Level A
2	201	Chiller Tune-Up/Diagnostics	Misc.	1.27	0.01	0.03	2%	\$0.156	\$0.179	HVAC	Level F	Level F
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Misc.	1.21	0.06	0.09	7%	\$0.116	\$0.133	HVAC	Level F	Level F

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Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	207	Installation of Energy Management Systems	Misc.	1.15	0.06	0.15	12%	\$0.075	\$0.087	HVAC	Level D	Level E
2	203	Roof/Ceiling Insulation	Misc.	1.14	0.01	0.16	12%	\$0.581	\$0.669	HVAC	Level F	Level F
2	209	Installation of Chiller Economizers (water side)	Misc.	1.10	0.04	0.21	16%	\$0.233	\$0.268	HVAC	Level F	Level F
2	210	Optimize Chilled Water and Condenser Water Settings	Misc.	1.07	0.03	0.23	18%	\$0.180	\$0.207	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Misc.	1.06	0.01	0.24	18%	\$0.625	\$0.719	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Misc.	0.99	0.07	0.31	24%	\$0.259	\$0.298	HVAC	Level F	Level F
2	205	EMS Optimization	Misc.	0.99	0.00	0.31	24%	N/A	\$-	HVAC	N/A	N/A
2	250	Base DX Packaged System, EER=10.3, 10 tons	Misc.	1.30	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	256	Duct Insulation	Misc.	1.30	0.00	0.00	0%	\$0.015	\$0.017	HVAC	Level A	Level A
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	Misc.	1.27	0.03	0.03	2%	\$0.012	\$0.013	HVAC	Level A	Level A
2	261	Clock/Programmable Thermostat	Misc.	1.25	0.03	0.05	4%	\$0.031	\$0.035	HVAC	Level B	Level B
2	202	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Misc.	1.18	0.06	0.12	9%	\$0.118	\$0.136	HVAC	Level F	Level F
2	252	High-Efficiency Packaged A/C System	Misc.	1.07	0.12	0.24	18%	\$0.110	\$0.127	HVAC	Level F	Level F
2	204	Cool Roofs (Reflective and Spray Evaporative)	Misc.	1.00	0.07	0.30	23%	\$0.258	\$0.297	HVAC	Level F	Level F
2	251	DX Tune-Up/Diagnostics	Misc.	0.97	0.03	0.33	25%	\$0.323	\$0.371	HVAC	Level F	Level F
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	Misc.	0.95	0.02	0.35	27%	\$0.456	\$0.524	HVAC	Level F	Level F
2	203	Roof/Ceiling Insulation	Misc.	0.94	0.01	0.36	28%	\$0.704	\$0.810	HVAC	Level F	Level F
2	257	Duct Repair and Sealing	Misc.	0.94	0.00	0.36	28%	\$0.780	\$0.897	HVAC	Level F	Level F
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	Misc.	0.18	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A



APPENDIX C

Sgmt	Measure Number	Measure	Building Type	Total GWH	GWH Savings	Total Energy Savings GWH	Percent GWH Savings	Marginal Energy Cost \$/KWH Technical Potential	Marginal Energy Cost \$/KWH Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	402	VSD, ASD Fan & Pump Applications	Misc.	0.16	0.02	0.02	9%	\$0.096	\$0.111	HVAC	Level E	Level F
2	401	Energy Efficient Fan & Pump Motors	Misc.	0.16	0.00	0.02	10%	\$0.664	\$0.764	HVAC	Level F	Level F
2	610	Base Desktop PC	Misc.	0.02	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	611	ENERGY STAR or Better Office Equipment: Computer	Misc.	0.01	0.01	0.01	52%	\$2.346	\$2.697	Appliances	Level F	Level F
2	620	Base Display Monitor	Misc.	0.02	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	623	Smart Networks	Misc.	0.02	0.00	0.00	3%	\$0.277	\$0.319	Appliances	Level F	Level F
2	621	ENERGY STAR or Better Office Equipment: Monitors	Misc.	0.01	0.01	0.01	53%	\$2.774	\$3.190	Appliances	Level F	Level F
2	630	Base Copier	Misc.	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	631	ENERGY STAR or Better Office Equipment: Copiers	Misc.	0.00	0.00	0.00	61%	\$1.209	\$1.390	Appliances	Level F	Level F
2	640	Base Laser Printer	Misc.	0.01	0.00	0.00	0%	N/A	\$-	Appliances	N/A	N/A
2	641	ENERGY STAR or Better Office Equipment: Printers	Misc.	0.01	0.01	0.01	51%	\$2.488	\$2.861	Appliances	Level F	Level F
2	700	Base Water Heating	Misc.	0.21	0.00	0.00	0%	N/A	\$-	Water Heat	N/A	N/A
2	704	Hot Water (SHW) Pipe Insulation	Misc.	0.21	0.01	0.01	3%	\$0.009	\$0.010	Water Heat	Level A	Level A
2	701	Demand controlled circulating systems	Misc.	0.20	0.01	0.01	5%	\$0.042	\$0.048	Water Heat	Level B	Level C
2	702	Heat Pump Water Heater	Misc.	0.16	0.05	0.06	26%	\$0.558	\$0.642	Water Heat	Level F	Level F
2	703	High-Efficiency Water Heater (electric)	Misc.	0.15	0.01	0.06	29%	\$0.603	\$0.694	Water Heat	Level F	Level F
2	800	Base Heating	Misc.	0.49	0.00	0.00	0%	N/A	\$-	HVAC	N/A	N/A
2	805	Clock/Programmable Thermostat	Misc.	0.45	0.04	0.04	7%	\$0.020	\$0.024	HVAC	Level A	Level A
2	802	Roof/Ceiling Insulation	Misc.	0.45	0.00	0.04	8%	\$0.086	\$0.099	HVAC	Level E	Level E
2	812	Installation of Automated Building Ventilation Control (Via Occupancy Sensors, CO2 Sensors, Etc.)	Misc.	0.44	0.01	0.05	10%	\$0.141	\$0.162	HVAC	Level F	Level F
2	810	Installation of Air Side Economizers	Misc.	0.41	0.02	0.07	15%	\$0.096	\$0.111	HVAC	Level E	Level F

C

# COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

## Building Stock

Segment	Type	Office	Dry Goods Retail	Restaurant	Grocery	Warehouse	School	University	Hospital & Health Care	Hotel	Miscellaneous
Existing	Total	214,980,009	128,262,941	23,514,077	24,590,925	183,582,929	12,946,197	5,657,636	38,096,583	13,084,808	34,709,620
New	Annual	3,385,742	2,048,911	325,892	340,818	2,544,363	311,919	136,307	917,869	315,254	836,262

## Measure Costs

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr. = 0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	100	Base Cooking	\$/unit	\$/unit	\$0.00	\$0.00			1	15	1		\$0.00	1
1	101	High-Efficiency Convection Oven	\$/unit	\$/unit	\$29.40	\$0.00		\$29.40	1	15	1		\$29.40	2
1	102	High-Efficiency Range and Oven	\$/unit	\$/unit	\$400.00	\$0.00		\$400.00	1	15	1		\$400.00	2
1	110	Base Fluorescent Fixture, 4L4T12, 34W, 2EEMAG	fixture	fixture	\$27.00	\$15.00	\$0.00	\$42.00	1	45,000	1		\$42.00	2
1	111	RET 4L4' Premium T8, 1EB	fixture	fixture	\$35.00	\$15.00	\$0.00	\$50.00	1	70,000	1		\$50.00	1
1	112	RET 2L4' Premium T8, 1EB, Reflector	fixture	fixture	\$52.00	\$15.00	\$0.00	\$67.00	1	70,000	1		\$67.00	1
1	113	Occupancy Sensor, 4L4' Fluorescent Fixtures.	fixture	fixture	\$24.50	\$3.15	\$0.00	\$27.65	1	40,000	1		\$27.65	1
1	114	Continuous Dimming, 5L4' Fluorescent Fixtures	fixture	fixture	\$180.63	\$107.27	\$0.00	\$287.90	1	50,000	1		\$287.90	1

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COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implement-ation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=f time 2=ROB
1	115	RNV 2L4'T5HO, 1EB	fixture	fixture	\$93.00	\$62.52	\$0.00	\$155.52	1	70,000	1	1	\$155.52	1
1	120	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	fixture	fixture	\$14.00	\$9.40	\$0.00	\$23.40	1	45,000	1	1	\$23.40	2
1	121	RET 2L4' Premium T8, 1EB	fixture	fixture	\$25.00	\$9.40	\$0.00	\$34.40	1	70,000	1	1	\$34.40	1
1	122	RET 1L4' Premium T8, 1EB, Reflector OEM	fixture	fixture	\$41.00	\$7.80	\$0.00	\$48.80	1	70,000	1	1	\$48.80	1
1	123	Occupancy Sensor, 8L4' Fluorescent Fixtures	fixture	fixture	\$12.25	\$1.58	\$0.00	\$13.83	1	40,000	1	1	\$13.83	1
1	124	Continuous Dimming, 10L4' Fluorescent Fixtures	fixture	fixture	\$90.31	\$53.64	\$0.00	\$143.95	1	50,000	1	1	\$143.95	1
1	125	RNV 1L4'T5HO, 1EB	fixture	fixture	\$83.70	\$62.52	\$0.00	\$146.22	1	70,000	1	1	\$146.22	1
1	130	Base Fluorescent Fixture, 2L8'T12, 60W, 1EEMAG	fixture	fixture	\$36.00	\$17.00	\$0.00	\$53.00	1	45,000	1	1	\$53.00	2
1	131	RET 2L8'T12, 60W, 1EB	fixture	fixture	\$48.00	\$17.00	\$0.00	\$65.00	1	70,000	1	1	\$65.00	1
1	132	RET 1L8'T12, 60W, 1EB, Reflector	fixture	fixture	\$72.00	\$17.00	\$0.00	\$89.00	1	70,000	1	1	\$89.00	1
1	133	Occupancy Sensor, 4L8' Fluorescent Fixtures	fixture	fixture	\$24.50	\$3.15	\$0.00	\$27.65	1	40,000	1	1	\$27.65	1
1	134	Continuous Dimming, 5L8' Fluorescent Fixtures	fixture	fixture	\$180.62	\$107.00	\$0.00	\$287.62	1	50,000	1	1	\$287.62	1
1	140	Base Incandescent Flood, 75W	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	2,000	1	1	\$0.00	2
1	141	CFL Screw-in, Modular 18W	fixture	fixture	\$17.00	\$0.00	-\$8.41	\$17.00	1	20,000	1	1	\$8.59	1
1	150	Base Incandescent Flood, 150W PAR	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	2,000	1	1	\$0.00	2
1	151	Halogen PAR Flood, 90W	fixture	fixture	\$4.10	\$0.00	\$0.00	\$4.10	1	2,500	1	1	\$4.10	1

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	152	Metal Halide, 50W	fixture	fixture	\$110.00	\$46.00	\$0.00	\$156.00	1	24,000	1	1	\$156.00	1
1	160	Base Fluorescent Fixture, 2L4'T12, 34W, 1EEMAG	fixture	fixture	\$14.00	\$9.00	\$0.00	\$23.00	1	45,000	1	1	\$23.00	2
1	161	RET 2L4'T8, 1EB	fixture	fixture	\$20.00	\$9.40	\$0.00	\$29.40	1	70,000	1	1	\$29.40	1
1	170	Base Mercury Vapor 400W Lamp	fixture	fixture			\$0.00	\$0.00	1	24,000	1	1	\$0.00	2
1	171	High Pressure Sodium 250W Lamp	fixture	fixture	\$89.00	\$60.00	\$0.00	\$149.00	1	24,000	1	1	\$149.00	1
1	172	Outdoor Lighting Controls (Photocell/Timeclock)	fixture	fixture	\$87.00	\$108.00	\$0.00	\$195.00	1	24,000	1	1	\$195.00	1
1	180	Base 4L4'T8, 1EB	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	70,000	1	1	\$0.00	2
1	181	ROB 4L4' Premium T8, 1EB	fixture	fixture	\$7.00	\$0.00	\$0.00	\$7.00	1	70,000	1	1	\$7.00	2
1	182	Occupancy Sensor, 4L4' Fluorescent Fixtures	fixture	fixture	\$24.50	\$3.15	\$0.00	\$27.65	1	40,000	1	1	\$27.65	1
1	185	Base 2L4'T8, 1EB	fixture	fixture	\$0.00	\$0.00	\$0.00	\$0.00	1	70,000	1	1	\$0.00	2
1	186	ROB 2L4' Premium T8, 1EB	fixture	fixture	\$5.00	\$0.00	\$0.00	\$5.00	1	70,000	1	1	\$5.00	2
1	187	Occupancy Sensor, 8L4' Fluorescent Fixtures	fixture	fixture	\$12.25	\$1.58	\$0.00	\$13.83	1	40,000	1	1	\$13.83	1
1	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	\$/ton	\$/ton	\$283.00			\$283.00	1	20	1	1	\$283.00	2
1	201	Chiller Tune-Up / Diagnostics	\$/ton	\$/ton		\$16.67	\$20.91	\$16.67	1	5	1	1	\$37.58	1
1	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf-window	\$/sf-window	\$0.68			\$0.68	1	30	1	1	\$0.68	1
1	207	Installation of Energy Management Systems	\$/ton	\$/ton	\$60.00			\$60.00	1	10	1	1	\$60.00	1
1	208	Insulation of Pipes	\$/Lin Ft	\$/Lin Ft	\$4.00	\$0.00		\$4.00	1	20	1	1	\$4.00	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
			Pipe											
1	209	Installation of Chiller Economizers (water side)	\$/sf	\$/sf	\$0.59			\$0.59	1	20	1		\$0.59	1
1	210	Optimize Chilled Water and Condenser Water Settings	\$/system	\$/system	\$10,000.00	\$10,000.00		\$20,000.00	1	10	1		\$20,000.00	1
1	203	Roof / Ceiling Insulation	\$/sf- ceiling	\$/sf- ceiling	\$0.49			\$0.49	1	20	1		\$0.49	1
1	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	\$/ton	\$/ton	\$97.09			\$97.09	1	10	1		\$97.09	1
1	203	HE Chiller, 0.51 kW/ton, 300 Tons	\$/ton	\$/ton	\$343.00			\$343.00	1	20	1		\$343.00	2
1	205	EMS Optimization	\$/unit	\$/unit	\$0.00	\$1,200.00		\$1,200.00	1	5	1		\$1,352.00	1
1	204	Cool Roofs (Reflective and Spray Evaporative)	\$/sf-roof	\$/sf-roof	\$0.47			\$0.47	1	10	1		\$0.47	1
1	250	Base DX Packaged System, EER=10.3, 10 tons	\$/ton	\$/ton	\$0.00			\$0.00	1	15	1		\$0.00	2
1	251	DX Tune-Up / Diagnostics	\$/ton	\$/ton		\$78.00		\$78.00	1	3	1		\$78.00	1
1	252	High-Efficiency Packaged A/C System	\$/ton	\$/ton	\$171.00			\$171.00	1	15	1		\$171.00	2
1	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf- window	\$/sf- window	\$0.68			\$0.68	1	30	1		\$0.68	1
1	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	\$/ton	\$/ton	\$133.33	\$160.00		\$293.33	1	10	1		\$293.33	1
1	256	Duct Insulation	\$/Lin Ft Pipe	\$/Lin Ft Pipe	\$0.40	\$0.00		\$0.40	1	20	1		\$0.40	1

APPENDIX C

COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	257	Duct Repair and Sealing	\$/sf building	\$/sf building	\$0.16	\$0.00		\$0.16	1	20	1	1	\$0.16	1
1	261	Clock / Programmable Thermostat	\$/ton	\$/ton	\$5.50	\$15.00		\$20.50	1	10	1	1	\$20.50	1
1	262	Installation of Air Side Economizers	\$/sf	\$/sf	\$0.59			\$0.59	1	10	1	1	\$0.59	1
1	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	\$/HP	\$/HP	\$72.20		\$0.00	\$72.20	1	15	1	1	\$72.20	2
1	401	Energy Efficient Fan & Pump Motors	\$/HP	\$/HP	\$76.27		\$0.00	\$114.60	1	15	1	1	\$114.60	2
1	402	VSD, ASD Fan & Pump Applications	\$/HP	\$/HP	\$129.00	\$102.00	\$0.00	\$385.00	1	15	1	1	\$385.00	1
1	500	Base Refrigeration System	40,000 sqft store	40,000 sqft store	\$0.00	\$0.00	\$0.00	\$0.00	1	10	1	1	\$0.00	2
1	501	High Efficiency Case Fans.	40,000 sqft store	40,000 sqft store	\$46,429.20	\$0.00	\$0.00	\$46,429.20	1	16	1	1	\$46,429.20	1
1	502	Strip Curtains for Walk-Ins	40,000 sqft store	40,000 sqft store	\$1,995.00	\$0.00	\$0.00	\$1,995.00	1	4	1	1	\$1,995.00	1
1	503	Night Covers for Display Cases	linear ft. display	linear ft. display	\$9.25	\$0.00	\$0.00	\$9.25	1	5	1	1	\$9.25	1
1	504	Reduced Speed or Cycling of Evaporator Fans	controller	controller	\$300.00	\$0.00	\$0.00	\$300.00	1	5	1	1	\$300.00	1
1	505	High-Efficiency Compressors	40,000 sqft store	40,000 sqft store	\$3,510.00	\$0.00	\$0.00	\$3,510.00	1	10	1	1	\$3,510.00	2
1	506	Compressor VSD retrofit	40,000 sqft store	40,000 sqft store	\$16,200.00	\$0.00	\$0.00	\$16,200.00	1	10	1	1	\$16,200.00	1
1	507	Installation of Floating Condenser Head Pressure Controls	40,000 sqft store	40,000 sqft store	\$4,995.00	\$0.00	\$0.00	\$4,995.00	1	14	1	1	\$4,995.00	1
1	508	Refrigeration Commissioning	Ton of Load	Ton of Load	\$113.00	\$0.00	\$0.00	\$113.00	1	3	1	1	\$113.00	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr = 0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	509	Demand Hot Gas Defrost	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1
1	510	Demand Defrost Electric	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1
1	511	Anti-Sweat (Humidistat) Controls	40,000 sqft store	40,000 sqft store	\$6,450.40	\$0.00	\$0.00	\$6,450.40	1	12	1	1	\$6,450.40	1
1	610	Base Desktop PC	PC	PC				\$0.00	1	4	1	1	\$0.00	1
1	611	ENERGY STAR or Better Office Equipment: Computer	PC	PC	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
1	620	Base Display Monitor	Monitor	Monitor				\$0.00	1	4	1	1	\$0.00	1
1	621	ENERGY STAR or Better Office Equipment: Monitors	Monitor	Monitor	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
1	623	Smart Networks	Monitor	Monitor		\$4.00	\$0.00	\$4.00	1	4	1	1	\$4.00	1
1	630	Base Copier	Copier	Copier				\$0.00	1	4	1	1	\$0.00	1
1	631	ENERGY STAR or Better Office Equipment: Copiers	Copier	Copier	\$200.00	\$0.00	\$0.00	\$200.00	1	4	1	1	\$200.00	1
1	640	Base Laser Printer	Printer	Printer				\$0.00	4	4	1	1	\$0.00	
1	641	ENERGY STAR or Better Office Equipment: Printers	Printer	Printer	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
1	700	Base Water Heating	kBTU/Hr	\$/kBTUhr				\$0.00	1	15	1	1	\$0.00	2
1	701	Demand controlled circulating systems	\$/unit	\$/unit	\$3,000.00			\$3,000.00	1	15	1	1	\$3,000.00	1
1	702	Heat Pump Water Heater	\$/kBTUhr	\$/kBTUhr	\$124.20		\$0.06	\$124.20	1	15	1	1	\$124.26	2
1	703	High-Efficiency Water Heater (electric)	Water Heater	Water Heater	\$300.00	\$300.00		\$600.00	1	15	1	1	\$600.00	2
1	704	Hot Water (SHW) Pipe Insulation	kBTU/Hr	\$/Lin Ft Pipe	\$4.00	\$0.00	\$0.00	\$4.00	1	15	1	1	\$4.00	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
1	800	Base Heating	kBTU/Hr	\$/kBTUhr	\$0.00	\$0.00	\$0.00	\$0.00	1	20	1	1	\$0.00	1
1	802	Roof / Ceiling Insulation	\$/sf- ceiling	\$/sf- ceiling	\$0.49	\$0.00	\$0.00	\$0.49	1	20	1	1	\$0.49	1
1	805	Clock / Programmable Thermostat	\$/sf	\$/sf	\$0.15		\$0.00	\$0.15	1	10	1	1	\$0.15	1
1	810	Installation of Air Side Economizers	\$/sf	\$/sf	\$0.59			\$0.59	1	15	1	1	\$0.59	1
1	812	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	\$/sf	\$/sf	\$0.28			\$0.28	1	15	1	1	\$0.28	
2	100	Base Cooking	\$/unit	\$/unit	\$0.00	\$0.00	\$0.00	\$0.00	1	15	1	1	\$0.00	1
2	101	High-Efficiency Convection Oven	\$/unit	\$/unit	\$29.40	\$0.00		\$29.40	1	15	1	1	\$29.40	2
2	102	High-Efficiency Range and Oven	\$/unit	\$/unit	\$400.00	\$0.00		\$400.00	1	15	1	1	\$400.00	2
2	190	Base NC Lighting	\$/ft2	\$/ft2				\$0.00	1	20	1	1	\$0.00	2
2	191	10 % More Efficient Design (Lighting)	\$/ft2	\$/ft2	\$0.10			\$0.10	1	20	1	1	\$0.10	2
2	192	20 % More Efficient Design (Lighting)	\$/ft2	\$/ft2	\$0.14			\$0.14	1	20	1	1	\$0.14	2
2	200	Base Centrifugal Chiller, 0.65 kW/ton, 300 tons	\$/ton	\$/ton	\$283.00			\$283.00	1	20	1	1	\$283.00	2
2	201	Chiller Tune-Up / Diagnostics	\$/ton	\$/ton		\$16.67	\$20.91	\$16.67	1	5	1	1	\$37.58	1
2	206	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf- window	\$/sf- window	\$0.68			\$0.68	1	30	1	1	\$0.68	1
2	207	Installation of Energy Management Systems	\$/ton	\$/ton	\$60.00			\$60.00	1	10	1	1	\$60.00	1
2	208	Insulation of Pipes	\$/Lin Ft Pipe	\$/Lin Ft Pipe	\$4.00	\$0.00		\$4.00	1	20	1	1	\$4.00	1
2	209	Installation of Chiller Economizers (water)	\$/sf	\$/sf	\$0.59			\$0.59	1	20	1	1	\$0.59	1



APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
		side)												
2	210	Optimize Chilled Water and Condenser Water Settings	\$/system	\$/system	\$10,000.00	\$10,000.00		\$20,000.00	1	10	1	1	\$20,000.00	1
2	203	Roof / Ceiling Insulation	\$/sf- ceiling	\$/sf- ceiling	\$0.49			\$0.49	1	20	1	1	-\$0.49	1
2	202	Installation of Automated Building Ventilation Control ( Via Occupancy Sensors, CO2 Sensors, Etc.)	\$/ton	\$/ton	\$97.09			\$97.09	1	10	1	1	\$97.09	1
2	203	HE Chiller, 0.51 kW/ton, 300 Tons	\$/ton	\$/ton	\$343.00			\$343.00	1	20	1	1	\$343.00	2
2	205	EMS Optimization	\$/unit	\$/unit	\$0.00	\$1,200.00		\$1,200.00	1	5	1	1	\$1,352.00	1
2	204	Cool Roofs (Reflective and Spray Evaporative)	\$/sf-roof	\$/sf-roof	\$0.47			\$0.47	1	10	1	1	\$0.47	1
2	250	Base-DX Packaged System, EER=10.3, 10 tons	\$/ton	\$/ton	\$0.00			\$0.00	1	15	1	1	\$0.00	2
2	251	DX Tune-Up / Diagnostics	\$/ton	\$/ton		\$78.00		\$78.00	1	3	1	1	\$78.00	1
2	252	High-Efficiency Packaged A/C System	\$/ton	\$/ton	\$241.00			\$241.00	1	15	1	1	\$241.00	2
2	253	High Efficiency Windows (Low-E Glass or Multiple Glazed)	\$/sf- window	\$/sf- window	\$0.68			\$0.68	1	30	1	1	\$0.68	1
2	254	Installation of Direct of Indirect Evaporative Cooling, Evaporative Pre-Cooling, and Absorption Cooling	\$/ton	\$/ton	\$133.33	\$160.00		\$293.33	1	10	1	1	\$293.33	1
2	256	Duct Insulation	\$/Lin Ft Pipe	\$/Lin Ft Pipe	\$0.40	\$0.00		\$0.40	1	20	1	1	\$0.40	1
2	257	Duct Repair and Sealing	\$/sf building	\$/sf building	\$0.16	\$0.00		\$0.16	1	20	1	1	\$0.16	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implementation Cost Factor	Cost per Savings Unit	Service Life	Full=1 Incr. = 0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
2	261	Clock / Programmable Thermostat	\$/ton	\$/ton	\$5.50	\$15.00		\$20.50	1	10	1	1	\$20.50	1
2	262	Installation of Air Side Economizers	\$/sf	\$/sf	\$0.59			\$0.59	1	10	1	1	\$0.59	1
2	400	Base Fan Motor, 5hp, 1800rpm, 87.5%	\$/HP	\$/HP	\$72.20		\$0.00	\$72.20	1	15	1	1	\$72.20	2
2	401	Energy Efficient Fan & Pump Motors	\$/HP	\$/HP	\$76.27		\$0.00	\$114.60	1	15	1	1	\$114.60	2
2	402	VSD, ASD Fan & Pump Applications	\$/HP	\$/HP	\$129.00	\$102.00	\$0.00	\$385.00	1	15	1	1	\$385.00	1
2	500	Base Refrigeration System	40,000 sqft store	40,000 sqft store	\$0.00	\$0.00	\$0.00	\$0.00	1	10	1	1	\$0.00	2
2	501	High Efficiency Case Fans	40,000 sqft store	40,000 sqft store	\$46,429.20	\$0.00	\$0.00	\$46,429.20	1	16	1	1	\$46,429.20	1
2	502	Strip Curtains for Walk-Ins	40,000 sqft store	40,000 sqft store	\$1,995.00	\$0.00	\$0.00	\$1,995.00	1	4	1	1	\$1,995.00	1
2	503	Night Covers for Display Cases	linear ft. display	linear ft. display	\$9.25	\$0.00	\$0.00	\$9.25	1	5	1	1	\$9.25	1
2	504	Reduced Speed or Cycling of Evaporator Fans	controller	controller	\$300.00	\$0.00	\$0.00	\$300.00	1	5	1	1	\$300.00	1
2	505	High-Efficiency Compressors	40,000 sqft store	40,000 sqft store	\$3,510.00	\$0.00	\$0.00	\$3,510.00	1	10	1	1	\$3,510.00	2
2	506	Compressor VSD retrofit	40,000 sqft store	40,000 sqft store	\$16,200.00	\$0.00	\$0.00	\$16,200.00	1	10	1	1	\$16,200.00	1
2	507	Installation of Floating Condenser Head Pressure Controls	40,000 sqft store	40,000 sqft store	\$4,995.00	\$0.00	\$0.00	\$4,995.00	1	14	1	1	\$4,995.00	1
2	508	Refrigeration Commissioning	Ton of Load	Ton of Load	\$113.00	\$0.00	\$0.00	\$113.00	1	3	1	1	\$113.00	1
2	509	Demand Hot Gas Defrost	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1

APPENDIX C COMMERCIAL ELECTRIC RESULTS AND DATA INPUTS

Seg	Measure #	PSE Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implement-ation Cost Factor	Cost Units per Savings Unit	Service Life	Full=1 Incr.=0 Initial Cost	Replace Cost	Full Unit Cost	Type 1=1 time 2=ROB
2	510	Demand Defrost Electric	HP	HP	\$25.00	\$0.00	\$0.00	\$25.00	1	10	1	1	\$25.00	1
2	511	Anti-Sweat (Humidistat) Controls	40,000 sqft store	40,000 sqft store	\$6,450.40	\$0.00	\$0.00	\$6,450.40	1	12	1	1	\$6,450.40	1
2	610	Base Desktop PC	PC	PC	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	611	ENERGY STAR or Better Office Equipment: Computer	PC	PC	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	620	Base Display Monitor	Monitor	Monitor	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	621	ENERGY STAR or Better Office Equipment: Monitors	Monitor	Monitor	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	623	Smart Networks	Monitor	Monitor	\$4.00	\$0.00	\$0.00	\$4.00	1	4	1	1	\$4.00	1
2	630	Base Copier	Copier	Copier	\$200.00	\$0.00	\$0.00	\$200.00	1	4	1	1	\$200.00	1
2	631	ENERGY STAR or Better Office Equipment: Copiers	Copier	Copier	\$200.00	\$0.00	\$0.00	\$200.00	1	4	1	1	\$200.00	1
2	640	Base Laser Printer	Printer	Printer	\$100.00	\$0.00	\$0.00	\$100.00	4	4	1	1	\$100.00	1
2	641	ENERGY STAR or Better Office Equipment: Printers	Printer	Printer	\$100.00	\$0.00	\$0.00	\$100.00	1	4	1	1	\$100.00	1
2	700	Base Water Heating	kBTU/Hr	\$/kbtuhr	\$0.00	\$0.00	\$0.00	\$0.00	1	15	1	1	\$0.00	2
2	701	Demand controlled circulating systems	\$/unit	\$/unit	\$3,000.00	\$0.00	\$0.00	\$3,000.00	1	15	1	1	\$3,000.00	1
2	702	Heat Pump Water Heater	\$/kbtuhr	\$/kbtuhr	\$124.20	\$0.06	\$0.06	\$124.20	1	15	1	1	\$124.26	2
2	703	High-Efficiency Water Heater (electric)	Water Heater	Water Heater	\$300.00	\$50.00	\$0.00	\$350.00	1	15	1	1	\$350.00	2
2	704	Hot Water (SHW) Pipe Insulation	kBTU/Hr	\$/Lin Ft Pipe	\$4.00	\$0.00	\$0.00	\$4.00	1	15	1	1	\$4.00	1
2	800	Base Heating	kBTU/Hr	\$/kbtuhr	\$0.00	\$0.00	\$0.00	\$0.00	1	20	1	1	\$0.00	1



# D

## COMMERCIAL GAS RESULTS AND DATA INPUTS

Building Stock Table

Segment	Type	Office	Dry Goods Retail	Restaurant	Grocery	Warehouse	School	University	Hospital & Health Care	Hotel	Miscellaneous
Existing	Total	219,780,050	117,945,647	21,370,214	22,255,571	172,445,278	11,110,812	4,855,561	33,366,544	10,415,387	29,878,021
New	Annual	3,086,919	2,138,411	387,452	403,503	3,126,523	201,446	88,041	604,935	188,834	541,704

Measure Costs

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O & M Cost	Implement-ation Cost Factor	Cost Units per Savings Unit	Service Life	Initial Cost (Full = 1, Incr. = 0)	Replace Cost	Full Unit Cost	Implement-ation Type (1=1 time, 2=ROB)
1	100	Base Cooking	kBTU/Hr	\$/unit	\$-	\$0.00	\$0.00	\$0.00	1	15	1	1	\$-	1
1	102	High-Efficiency Convection Oven	kBTU/Hr	\$/unit	\$29.40	\$0.00	\$0.00	\$29.40	1	15	1	1	\$29.40	2
1	103	Efficient Infrared Griddle	kBTU/Hr	\$/unit	\$8.46	\$0.00	\$0.00	\$8.46	1	15	1	1	\$8.46	2
1	104	Infrared Fryer	kBTU/Hr	\$/unit	\$12.01	\$0.00	\$0.00	\$12.01	1	15	1	1	\$12.01	2
1	105	Power Burner Oven	kBTU/Hr	\$/unit	\$35.75	\$0.00	\$0.00	\$35.75	1	15	1	1	\$35.75	2
1	106	Power Burner Fryer	kBTU/Hr	\$/unit	\$14.31	\$0.00	\$0.00	\$14.31	1	15	1	1	\$14.31	2
1	107	Infrared Conveyor Oven	kBTU/Hr	\$/unit	\$38.33	\$0.00	\$0.00	\$38.33	1	15	1	1	\$38.33	2
1	200	Base Heating	kBTU/Hr	\$/kBTUhr	\$-	\$-	\$-	\$-	1	20	1	1	\$-	1

APPENDIX D

Seg	Measure #	Measure Description	Savings Units	Cost/Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Factor	Cost Units per Savings Unit	Service Life	Initial Cost (Full = 1, Incr. = 0)	Replace Cost	Full Unit Cost	Implementation Type (1=1 time, 2=ROB)
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	kBTU/Hr	\$/sf-window	\$0.68	\$0.00	\$0.00	\$0.68	1	60	1	1	\$0.68	2
1	202	Insulation (ceiling)	kBTU/Hr	\$/sf-ceiling	\$0.49	\$0.00	\$0.00	\$0.49	1	20	1	1	\$0.49	1
1	203	Insulation (wall)	kBTU/Hr	\$/sf-wall	\$0.55	\$0.00	\$0.00	\$0.55	1	20	1	1	\$0.55	1
1	206	Duct Repair and Sealing	kBTU/Hr	\$/Lin Ft Pipe	\$0.16	\$0.00	\$0.00	\$0.16	1	20	1	1	\$0.16	1
1	207	Duct Insulation	kBTU/Hr	\$/Lin Ft Pipe	\$0.40	\$0.00	\$0.00	\$0.40	1	20	1	1	\$0.40	1
1	209	Insulation of Pipes	kBTU/Hr	\$/Lin Ft Pipe	\$0.40	\$0.00	\$0.00	\$0.40	1	20	1	1	\$0.40	1
1	212	Boiler Tune-Up	kBTU/Hr	\$/boiler	\$-	\$300.00	\$0.00	\$300.00	1	2	1	1	\$300.00	1
1	216	Clock / Programmable Thermostat	kBTU/Hr	\$/sqft	\$0.20	\$7.60	\$0.00	\$7.80	1	10	1	1	\$7.80	1
1	218	Installation of Energy Management Systems (EMS)	kBTU/Hr	\$/sqft	\$0.29	\$0.00	\$0.00	\$0.29	1	20	1	1	\$0.29	1
1	222	Installation of Air Side Heat Recovery Systems	kBTU/Hr	\$/O-A CFM	\$2.00	\$0.00	\$0.00	\$2.00	1	20	1	1	\$2.00	1
1	227	High Efficiency Gas Furnace	kBTU/Hr	\$/kBTUhr	\$6.50	\$0.00	\$0.00	\$6.50	1	20	1	1	\$6.50	2
1	228	Stack Heat Exchanger	kBTU/Hr	\$/install	\$1,290.00	\$0.00	\$0.00	\$1,290.00	1	20	1	1	\$1,290.00	1
1	300	Base Pool Heating	kBTU/Hr	\$/unit	\$-	\$0.00	\$0.00	\$0.00	1	10	1	1	\$-	1
1	301	Installation of Solar Pool/Spa Heating Systems	kBTU/Hr	\$/pool sqft	\$18.14	\$0.00	\$0.00	\$18.14	1	10	1	1	\$18.14	1
1	302	Installation of Swimming Pool / Spa Covers	kBTU/Hr	\$/pool sqft	\$0.28	\$0.00	\$0.00	\$0.28	1	5	1	1	\$0.28	1
1	400	Base Water Heating	kBTU/Hr	\$/kBTUhr	\$-	\$0.00	\$0.00	\$0.00	1	15	1	1	\$-	1
1	401	Hot Water (SHW) Pipe Insulation	kBTU/Hr	\$/Lin Ft Pipe	\$4.00	\$0.00	\$0.00	\$4.00	1	15	1	1	\$4.00	1
1	402	High-Efficiency Water Heater (gas)	kBTU/Hr	\$/kBTUhr	\$12.60	\$0.00	\$0.00	\$12.60	1	15	1	1	\$12.60	2
1	403	Water Heater Tank Blanket/Insulation	kBTU/Hr	\$/tank	\$34.00	\$22.00	\$0.00	\$56.00	1	15	1	1	\$56.00	1

APPENDIX D

Seg	Measure #	Measure Description	Savings Units	Cost Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implement-ation Cost Factor	Cost Units per Savings Unit	Service Life	Initial Cost (Full=1, Incr.=0)	Replace Cost	Full Unit Cost	Implement-ation Type (1=1 time, 2=ROB)
1	404	Tankless Water Heater	kBTU/HR	\$/kbtuhr	\$4.24	\$0.00	\$0.00	\$4.24	1	15	1	1	\$4.24	1
2	100	Base Cooking	kBTU/HR	\$/unit	\$-	\$0.00	\$0.00	\$0.00	1	15	1	1	\$-	1
2	102	High-Efficiency Convection Oven	kBTU/HR	\$/unit	\$29.40	\$0.00	\$0.00	\$29.40	1	15	1	1	\$29.40	2
2	103	Efficient Infrared Griddle	kBTU/HR	\$/unit	\$8.46	\$0.00	\$0.00	\$8.46	1	15	1	1	\$8.46	2
2	104	Infrared Fryer	kBTU/HR	\$/unit	\$12.01	\$0.00	\$0.00	\$12.01	1	15	1	1	\$12.01	2
2	105	Power Burner Oven	kBTU/HR	\$/unit	\$35.75	\$0.00	\$0.00	\$35.75	1	15	1	1	\$35.75	2
2	106	Power Burner Fryer	kBTU/HR	\$/unit	\$14.31	\$0.00	\$0.00	\$14.31	1	15	1	1	\$14.31	2
2	107	Infrared Conveyor Oven	kBTU/HR	\$/unit	\$38.33	\$0.00	\$0.00	\$38.33	1	15	1	1	\$38.33	2
2	200	Base Heating	kBTU/HR	\$/kbtuhr	\$-	\$-	\$-	\$-	1	20	1	1	\$-	1
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	kBTU/HR	\$/sf-window	\$0.65	\$0.00	\$0.00	\$0.65	1	60	1	1	\$0.65	2
2	202	Insulation (ceiling)	kBTU/HR	\$/sf-ceiling	\$0.47	\$0.00	\$0.00	\$0.47	1	20	1	1	\$0.47	1
2	203	Insulation (wall)	kBTU/HR	\$/sf-wall	\$0.53	\$0.00	\$0.00	\$0.53	1	20	1	1	\$0.53	1
2	206	Duct Repair and Sealing	kBTU/HR	\$/sf building	\$0.15	\$0.00	\$0.00	\$0.15	1	20	1	1	\$0.15	1
2	207	Duct Insulation	kBTU/HR	\$/Lin Ft Pipe	\$0.37	\$0.00	\$0.00	\$0.37	1	20	1	1	\$0.37	1
2	209	Insulation of Pipes	kBTU/HR	\$/Lin Ft Pipe	\$0.37	\$0.00	\$0.00	\$0.37	1	20	1	1	\$0.37	1
2	212	Boiler Tune-Up	kBTU/HR	\$/boiler	\$-	\$250.00	\$0.00	\$250.00	1	2	1	1	\$250.00	1
2	216	Clock / Programmable Thermostat	kBTU/HR	\$/sqft	\$0.15	\$5.00	\$0.00	\$5.15	1	10	1	1	\$5.15	1
2	218	Installation of Energy Management Systems (EMS)	kBTU/HR	\$/sqft	\$0.25	\$0.00	\$0.00	\$0.25	1	20	1	1	\$0.25	1
2	222	Installation of Air Side Heat Recovery Systems	kBTU/HR	\$/O-A CFM	\$1.86	\$0.00	\$0.00	\$1.86	1	20	1	1	\$1.86	1
2	227	High Efficiency Gas Furnace	kBTU/HR	\$/kbtuhr	\$6.15	\$0.00	\$0.00	\$6.15	1	20	1	1	\$6.50	2
2	228	Stack Heat Exchanger	kBTU/HR	\$/install	\$1,150.00	\$0.00	\$0.00	\$1,150.00	1	20	1	1	\$1,150.00	1

APPENDIX D

Seg	Measure #	Measure Description	Savings Units	Cost/Units	Unit Equip Cost	Unit Labor Cost	NPV of Lifetime O&M Cost	Implementation Factor	Cost Units per Savings Unit	Service Life	Initial Cost (Full=1, Incr.=0)	Replace Cost	Full Unit Cost	Implementation Type (1=1 time, 2=ROB)
2	300	Base Pool Heating	kBTU/Hr	\$/unit	\$	\$0.00	\$0.00	\$0.00	1	10	1	1	\$	1
2	301	Installation of Solar Pool/Spa Heating Systems	kBTU/Hr	\$/pool sqft	\$18.00	\$0.00	\$0.00	\$18.00	1	10	1	1	\$18.00	1
2	302	Installation of Swimming Pool / Spa Covers	kBTU/Hr	\$/pool sqft	\$0.25	\$0.00	\$0.00	\$0.25	1	5	1	1	\$0.25	1
2	400	Base Water Heating	kBTU/Hr	\$/kBTUhr	\$	\$0.00	\$0.00	\$0.00	1	15	1	1	\$	1
2	401	Hot Water (SHW) Pipe Insulation	kBTU/Hr	\$/Lin Ft Pipe	\$3.75	\$0.00	\$0.00	\$3.75	1	15	1	1	\$3.75	1
2	402	High-Efficiency Water Heater (gas)	kBTU/Hr	\$/kBTUhr	\$11.86	\$0.00	\$0.00	\$11.86	1	15	1	1	\$11.86	2
2	403	Water Heater Tank Blanket/Insulation	kBTU/Hr	\$/tank	\$30.00	\$15.00	\$0.00	\$45.00	1	15	1	1	\$45.00	1
2	404	Tankless Water Heater	kBTU/Hr	\$/kBTUhr	\$4.00	\$0.00	\$0.00	\$4.00	1	15	1	1	\$4.00	1

Base Tech EUI

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	100	Base Cooking	0.05	0.09	1.72	0.67		0.03	0.03	0.09	0.11	0.13
1	200	Base Heating	0.18	0.12	0.14	0.20	0.12	0.18	0.26	0.47	0.08	0.23
1	300	Base Pool Heating	0.00	0.00	0.00	0.00	0.00	0.17	0.14	0.03	0.11	0.00
1	400	Base Water Heating	0.06	0.19	0.54	0.09	0.01	0.18	0.48	0.71	0.37	0.37
2	100	Base Cooking	0.05	0.09	1.72	0.67		0.03	0.03	0.09	0.11	0.13
2	200	Base Heating	0.18	0.12	0.14	0.20	0.12	0.18	0.26	0.47	0.08	0.23
2	300	Base Pool Heating	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.02	0.06	0.00



**APPENDIX D**

2	400	Base Water Heating	0.06	0.19	0.54	0.09	0.01	0.18	0.48	0.71	0.37	0.37
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**Applicability Factor**

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	100	Base Cooking	0%	0%	68%	21%	0%	50%	73%	5%	42%	20%
1	102	High-Efficiency Convection Oven	0%	0%	68%	11%	0%	50%	73%	5%	42%	20%
1	103	Efficient Infrared Griddle	0%	0%	68%	21%	0%	50%	73%	5%	42%	5%
1	104	Infrared Fryer	0%	0%	34%	11%	0%	25%	37%	3%	21%	3%
1	105	Power Burner Oven	0%	0%	34%	11%	0%	25%	37%	3%	21%	3%
1	106	Power Burner Fryer	0%	0%	34%	11%	0%	25%	37%	3%	21%	3%
1	107	Infrared Conveyor Oven	0%	0%	68%	21%	0%	50%	73%	5%	42%	5%
1	200	Base Heating	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
1	202	Insulation (ceiling)	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
1	203	Insulation (wall)	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
1	206	Duct Repair and Sealing	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
1	207	Duct Insulation	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
1	209	Insulation of Pipes	23%	61%	68%	94%	86%	59%	87%	96%	65%	80%
1	212	Boiler Tune-Up	22%	0%	0%	0%	0%	39%	57%	37%	65%	70%
1	216	Clock / Programmable Thermostat	23%	60%	68%	94%	86%	20%	29%	59%	20%	20%
1	218	Installation of Energy Management Systems (EMS)	22%	0%	0%	0%	0%	39%	57%	37%	65%	70%
1	222	Installation of Air Side Heat Recovery Systems	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
1	227	High Efficiency Gas Furnace	20%	60%	65%	90%	85%	55%	80%	90%	60%	75%

APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	228	Stack Heat Exchanger	23%	62%	68%	94%	89%	55%	80%	90%	60%	75%
1	300	Base Pool Heating	0%	0%	0%	0%	0%	13%	23%	3%	44%	0%
1	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	13%	23%	3%	44%	0%
1	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	13%	23%	3%	44%	0%
1	400	Base Water Heating	50%	50%	65%	50%	75%	50%	50%	50%	50%	50%
1	401	Hot Water (SHW) Pipe Insulation	50%	50%	64%	50%	70%	50%	50%	50%	50%	50%
1	402	High-Efficiency Water Heater (gas)	50%	50%	64%	50%	50%	50%	50%	50%	50%	50%
1	403	Water Heater Tank Blanket/Insulation	47%	44%	70%	22%	46%	53%	54%	53%	64%	34%
1	404	Tankless Water Heater	34%	20%	64%	36%	37%	26%	22%	27%	46%	25%
2	100	Base Cooking	0%	0%	75%	30%	0%	60%	75%	15%	50%	30%
2	102	High-Efficiency Convection Oven	0%	0%	34%	11%	0%	25%	37%	3%	21%	3%
2	103	Efficient Infrared Griddle	0%	0%	68%	21%	0%	50%	73%	5%	42%	5%
2	104	Infrared Fryer	0%	0%	34%	11%	0%	25%	37%	3%	21%	3%
2	105	Power Burner Oven	0%	0%	34%	11%	0%	25%	37%	3%	21%	3%
2	106	Power Burner Fryer	0%	0%	34%	11%	0%	25%	37%	3%	21%	3%
2	107	Infrared Conveyer Oven	0%	0%	68%	21%	0%	50%	73%	5%	42%	5%
2	200	Base Heating	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
2	202	Insulation (ceiling)	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
2	203	Insulation (wall)	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
2	206	Duct Repair and Sealing	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
2	207	Duct Insulation	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
2	209	Insulation of Pipes	23%	61%	68%	94%	86%	39%	58%	78%	33%	45%
2	212	Boiler Tune-Up	22%	0%	0%	0%	0%	20%	20%	20%	20%	20%
2	216	Clock / Programmable Thermostat	23%	60%	68%	94%	86%	20%	29%	59%	20%	11%
2	218	Installation of Energy Management Systems (EMS)	22%	0%	0%	0%	0%	39%	57%	37%	65%	70%
2	222	Installation of Air Side Heat Recovery Systems	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
2	227	High Efficiency Gas Furnace	23%	50%	50%	50%	50%	20%	29%	50%	15%	11%
2	228	Stack Heat Exchanger	23%	62%	68%	94%	89%	59%	87%	96%	65%	80%
2	300	Base Pool Heating	0%	0%	0%	0%	0%	13%	23%	3%	44%	0%
2	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	13%	23%	3%	44%	0%
2	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	13%	23%	3%	44%	0%
2	400	Base Water Heating	50%	50%	65%	50%	75%	50%	50%	50%	50%	50%
2	401	Hot Water (SHW) Pipe Insulation	47%	44%	70%	22%	46%	53%	54%	53%	64%	34%
2	402	High-Efficiency Water Heater (gas)	34%	20%	64%	36%	37%	26%	22%	27%	46%	25%
2	403	Water Heater Tank Blanket/Insulation	47%	44%	70%	22%	46%	53%	54%	53%	64%	34%
2	404	Tankless Water Heater	34%	20%	64%	36%	37%	26%	22%	27%	46%	25%

APPENDIX D

EUI Adjustment Factor

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	100	Base Cooking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	102	High-Efficiency Convection Oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	103	Efficient Infrared Griddle	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	104	Infrared Fryer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	105	Power Burner Oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	106	Power Burner Fryer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	107	Infrared Conveyor Oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	200	Base Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	202	Insulation (ceiling)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	203	Insulation (wall)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	206	Duct Repair and Sealing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	207	Duct Insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	209	Insulation of Pipes	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	212	Boiler Tune-Up	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	216	Clock / Programmable Thermostat	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	218	Installation of Energy Management Systems (EMS)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	222	Installation of Air Side Heat Recovery Systems	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	227	High Efficiency Gas Furnace	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	228	Stack Heat Exchanger	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	300	Base Pool Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	301	Installation of Solar Pool/Spa Heating Systems	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	302	Installation of Swimming Pool / Spa Covers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	400	Base Water Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	401	Hot Water (SHW) Pipe Insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	402	High-Efficiency Water Heater (gas)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	403	Water Heater Tank Blanket/Insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	404	Tankless Water Heater	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	100	Base Cooking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	102	High-Efficiency Convection Oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	103	Efficient Infrared Griddle	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	104	Infrared Fryer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	105	Power Burner Oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	106	Power Burner Fryer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	107	Infrared Conveyor Oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	200	Base Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	202	Insulation (ceiling)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	203	Insulation (wall)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	206	Duct Repair and Sealing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	207	Duct Insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	209	Insulation of Pipes	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	212	Boiler Tune-Up	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

**APPENDIX D**

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
2	216	Clock / Programmable Thermostat	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	218	Installation of Energy Management Systems (EMS)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	222	Installation of Air Side Heat Recovery Systems	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	227	High Efficiency Gas Furnace	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	228	Stack Heat Exchanger	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	300	Base Pool Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	301	Installation of Solar Pool/Spa Heating Systems	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	302	Installation of Swimming Pool / Spa Covers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	400	Base Water Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	401	Hot Water (SHW) Pipe Insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	402	High-Efficiency Water Heater (gas)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	403	Water Heater Tank Blanket/Insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	404	Tankless Water Heater	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

APPENDIX D

Energy Savings

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	100	Base Cooking	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1	102	High-Efficiency Convection Oven	0%	0%	12%	9%	0%	14%	5%	7%	6%	0%
1	103	Efficient Infrared Griddle	0%	0%	14%	3%	0%	3%	4%	3%	3%	0%
1	104	Infrared Fryer	0%	0%	30%	3%	0%	15%	15%	15%	15%	0%
1	105	Power Burner Oven	0%	0%	8%	4%	0%	4%	4%	4%	4%	0%
1	106	Power Burner Fryer	0%	0%	8%	4%	0%	4%	4%	4%	4%	0%
1	107	Infrared Conveyor Oven	0%	0%	30%	3%	0%	5%	15%	15%	5%	0%
1	200	Base Heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	37%	25%	15%	6%	1%	15%	15%	15%	30%	6%
1	202	Insulation (ceiling)	5%	17%	6%	11%	31%	11%	10%	10%	10%	10%
1	203	Insulation (wall)	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
1	206	Duct Repair and Sealing	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
1	207	Duct Insulation	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
1	209	Insulation of Pipes	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
1	212	Boiler Tune-Up	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
1	216	Clock / Programmable Thermostat	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
1	218	Installation of Energy Management Systems (EMS)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
1	222	Installation of Air Side Heat Recovery Systems	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
1	227	High Efficiency Gas Furnace	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
1	228	Stack Heat Exchanger	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
1	300	Base Pool Heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

# APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	16%	16%	16%	16%	16%
1	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	35%	35%	35%	35%	35%
1	400	Base Water Heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1	401	Hot Water (SHW) Pipe Insulation	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
1	402	High-Efficiency Water Heater (gas)	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
1	403	Water Heater Tank Blanket/Insulation	15%	15%	5%	10%	15%	10%	5%	5%	5%	10%
1	404	Tankless Water Heater	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
2	100	Base Cooking	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	102	High-Efficiency Convection Oven	0%	0%	6%	7%	0%	14%	5%	7%	6%	0%
2	103	Efficient Infrared Griddle	0%	0%	7%	1%	0%	3%	4%	3%	3%	0%
2	104	Infrared Fryer	0%	0%	15%	1%	0%	15%	15%	15%	15%	0%
2	105	Power Burner Oven	0%	0%	4%	2%	0%	4%	4%	4%	4%	0%
2	106	Power Burner Fryer	0%	0%	4%	2%	0%	4%	4%	4%	4%	0%
2	107	Infrared Conveyer Oven	0%	0%	15%	1%	0%	5%	15%	15%	5%	0%
2	200	Base Heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	20%	10%	3%	6%	1%	6%	6%	6%	6%	6%
2	202	Insulation (ceiling)	5%	8%	6%	5%	15%	5%	3%	3%	3%	10%
2	203	Insulation (wall)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
2	206	Duct Repair and Sealing	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2	207	Duct Insulation	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2	209	Insulation of Pipes	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2	212	Boiler Tune-Up	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%



**APPENDIX D**

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
2	216	Clock / Programmable Thermostat	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2	218	Installation of Energy Management Systems (EMS)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
2	222	Installation of Air Side Heat Recovery Systems	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
2	227	High Efficiency Gas Furnace	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
2	228	Stack Heat Exchanger	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
2	300	Base Pool Heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	16%	16%	16%	16%	16%
2	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	35%	35%	35%	35%	35%
2	400	Base Water Heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	401	Hot Water (SHW) Pipe Insulation	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
2	402	High-Efficiency Water Heater (gas)	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
2	403	Water Heater Tank Blanket/Insulation	12%	12%	5%	8%	15%	8%	5%	5%	5%	8%
2	404	Tankless Water Heater	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%

**Incomplete Factor**

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	100	Base Cooking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	102	High-Efficiency Convection Oven	90%	90%	85%	90%	90%	90%	90%	90%	90%	90%
1	103	Efficient Infrared Griddle	80%	30%	80%	80%	80%	80%	80%	80%	80%	80%
1	104	Infrared Fryer	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
1	105	Power Burner Oven	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%

APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	106	Power Burner Fryer	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
1	107	Infrared Conveyor Oven	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
1	200	Base Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	98%	100%	100%	100%	100%	99%	99%	99%	98%	99%
1	202	Insulation (ceiling)	13%	75%	56%	85%	34%	45%	19%	22%	62%	14%
1	203	Insulation (wall)	84%	72%	93%	85%	45%	48%	19%	22%	100%	64%
1	206	Duct Repair and Sealing	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
1	207	Duct Insulation	59%	85%	57%	72%	62%	72%	74%	70%	79%	83%
1	209	Insulation of Pipes	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
1	212	Boiler Tune-Up	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
1	216	Clock / Programmable Thermostat	49%	79%	50%	78%	38%	49%	49%	49%	34%	42%
1	218	Installation of Energy Management Systems (EMS)	53%	79%	100%	80%	78%	10%	23%	75%	57%	17%
1	222	Installation of Air Side Heat Recovery Systems	90%	90%	78%	76%	69%	58%	90%	90%	50%	50%
1	227	High Efficiency Gas Furnace	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
1	228	Stack Heat Exchanger	84%	85%	86%	87%	84%	84%	81%	79%	85%	84%
1	300	Base Pool Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	100%	100%	100%	100%	97%
1	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	29%	25%	50%	80%	63%
1	400	Base Water Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	401	Hot Water (SHW) Pipe Insulation	50%	73%	75%	70%	76%	25%	2%	33%	49%	59%
1	402	High-Efficiency Water Heater (gas)	47%	57%	54%	69%	54%	100%	100%	96%	97%	87%
1	403	Water Heater Tank Blanket/Insulation	89%	76%	86%	100%	100%	100%	50%	50%	98%	40%
1	404	Tankless Water Heater	100%	100%	100%	100%	100%	100%	100%	92%	100%	100%

APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
2	100	Base Cooking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	102	High-Efficiency Convection Oven	90%	90%	85%	90%	90%	90%	90%	90%	90%	90%
2	103	Efficient Infrared Griddle	80%	30%	80%	80%	80%	80%	80%	80%	80%	80%
2	104	Infrared Fryer	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
2	105	Power Burner Oven	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
2	106	Power Burner Fryer	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
2	107	Infrared Conveyor Oven	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
2	200	Base Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	98%	100%	100%	100%	100%	99%	99%	99%	98%	99%
2	202	Insulation (ceiling)	13%	75%	56%	34%	34%	45%	19%	22%	62%	14%
2	203	Insulation (wall)	84%	72%	93%	45%	45%	48%	19%	22%	100%	64%
2	206	Duct Repair and Sealing	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
2	207	Duct Insulation	59%	85%	57%	62%	62%	72%	74%	70%	79%	83%
2	209	Insulation of Pipes	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
2	212	Boiler Tune-Up	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
2	216	Clock / Programmable Thermostat	49%	79%	50%	38%	38%	49%	49%	49%	34%	42%
2	218	Installation of Energy Management Systems (EMS)	53%	79%	100%	78%	78%	10%	23%	75%	57%	17%
2	222	Installation of Air Side Heat Recovery Systems	80%	80%	78%	69%	69%	58%	80%	80%	50%	50%
2	227	High Efficiency Gas Furnace	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
2	228	Stack Heat Exchanger	84%	85%	86%	84%	84%	84%	81%	79%	85%	84%
2	300	Base Pool Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	100%	100%	100%	100%	97%
2	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	29%	25%	50%	80%	63%

# APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
2	400	Base Water Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	401	Hot Water (SHW) Pipe Insulation	50%	73%	75%	70%	76%	25%	2%	33%	49%	59%
2	402	High-Efficiency Water Heater (gas)	47%	57%	54%	69%	54%	100%	100%	96%	97%	87%
2	403	Water Heater Tank Blanket/Insulation	89%	76%	86%	100%	100%	100%	50%	50%	98%	40%
2	404	Tankless Water Heater	100%	100%	100%	100%	100%	100%	100%	92%	100%	100%

## Technology Saturation

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	100	Base Cooking	0.0097	0.0024	0.0560	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
1	102	High-Efficiency Convection Oven	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
1	103	Efficient Infrared Griddle	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
1	104	Infrared Fryer	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
1	105	Power Burner Oven	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
1	106	Power Burner Fryer	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
1	107	Infrared Conveyor Oven	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
1	200	Base Heating	0.0148	0.0154	0.0407	0.0169	0.0124	0.0602	0.0228	0.0200	0.0149	0.0253
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	0.0877	0.0284	0.0460	0.0409	0.0171	0.0242	0.0625	0.0201	0.0945	0.0284
1	202	Insulation (ceiling)	0.6637	0.9148	0.9618	0.9819	0.9254	0.9527	0.6021	0.8728	0.4307	0.9001
1	203	Insulation (wall)	0.6637	0.9148	0.9618	0.9819	0.9254	0.9527	0.6021	0.8728	0.4307	0.9001
1	206	Duct Repair and Sealing	0.0453	0.0311	0.0793	0.0332	0.0153	0.0170	0.0145	0.0142	0.0315	0.0313
1	207	Duct Insulation	0.0453	0.0311	0.0793	0.0332	0.0153	0.0170	0.0145	0.0142	0.0315	0.0313
1	209	Insulation of Pipes	0.0371	0.0507	0.0781	0.0584	0.0278	0.0294	0.0108	0.0433	0.0244	0.0585
1	212	Boiler Tune-Up	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	216	Clock / Programmable Thermostat	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
1	218	Installation of Energy Management Systems (EMS)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	222	Installation of Air Side Heat Recovery Systems	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
1	227	High Efficiency Gas Furnace	0.0148	0.0154	0.0407	0.0169	0.0124	0.0602	0.0228	0.0200	0.0149	0.0253
1	228	Stack Heat Exchanger	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	300	Base Pool Heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0243	0.0192	0.0041	0.0158	0.3062
1	301	Installation of Solar Pool/Spa Heating Systems	0.0000	0.0000	0.0000	0.0000	0.0000	0.0168	0.0109	0.0013	0.0040	0.1605
1	302	Installation of Swimming Pool / Spa Covers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0243	0.0192	0.0041	0.0158	0.3062
1	400	Base Water Heating	0.0046	0.0145	0.0200	0.0068	0.0009	0.0204	0.0362	0.0318	0.0279	0.0273
1	401	Hot Water (SHW) Pipe Insulation	0.0010	0.0059	0.0064	0.0023	0.0004	0.0038	0.0063	0.0023	0.0086	0.0023
1	402	High-Efficiency Water Heater (gas)	0.0046	0.0145	0.0200	0.0068	0.0009	0.0204	0.0362	0.0318	0.0279	0.0273
1	403	Water Heater Tank Blanket/Insulation	0.0001	0.0006	0.0006	0.0002	0.0000	0.0004	0.0006	0.0008	0.0009	0.0002
1	404	Tankless Water Heater	0.0046	0.0145	0.0200	0.0068	0.0009	0.0204	0.0362	0.0318	0.0279	0.0273
2	100	Base Cooking	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
2	102	High-Efficiency Convection Oven	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
2	103	Efficient Infrared Griddle	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
2	104	Infrared Fryer	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
2	105	Power Burner Oven	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
2	106	Power Burner Fryer	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
2	107	Infrared Conveyor Oven	0.0097	0.0024	0.0550	0.0149	0.0001	0.0069	0.0039	0.0026	0.0031	0.0290
2	200	Base Heating	0.0148	0.0154	0.0407	0.0169	0.0124	0.0602	0.0228	0.0200	0.0149	0.0253
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	0.0877	0.0284	0.0460	0.0409	0.0171	0.0242	0.0625	0.0201	0.0945	0.0284
2	202	Insulation (ceiling)	0.6637	0.9148	0.9618	0.9819	0.9254	0.9527	0.6021	0.8728	0.4307	0.9001
2	203	Insulation (wall)	0.6637	0.9148	0.9618	0.9819	0.9254	0.9527	0.6021	0.8728	0.4307	0.9001
2	206	Duct Repair and Sealing	0.0453	0.0311	0.0793	0.0332	0.0153	0.0170	0.0145	0.0142	0.0315	0.0313
2	207	Duct Insulation	0.0453	0.0311	0.0793	0.0332	0.0153	0.0170	0.0145	0.0142	0.0315	0.0313
2	209	Insulation of Pipes	0.0371	0.0507	0.0781	0.0584	0.0278	0.0294	0.0108	0.0433	0.0244	0.0585

**APPENDIX D**

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
2	212	Boiler Tune-Up	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	216	Clock / Programmable Thermostat	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
2	218	Installation of Energy Management Systems (EMS)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	222	Installation of Air Side Heat Recovery Systems	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
2	227	High Efficiency Gas Furnace	0.0148	0.0154	0.0407	0.0169	0.0124	0.0602	0.0228	0.0200	0.0149	0.0253
2	228	Stack Heat Exchanger	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	300	Base Pool Heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0243	0.0192	0.0041	0.0158	0.3062
2	301	Installation of Solar Pool/Spa Heating Systems	0.0000	0.0000	0.0000	0.0000	0.0000	0.0168	0.0109	0.0013	0.0040	0.1605
2	302	Installation of Swimming Pool / Spa Covers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0243	0.0192	0.0041	0.0158	0.3062
2	400	Base Water Heating	0.0046	0.0145	0.0260	0.0068	0.0009	0.0204	0.0362	0.0318	0.0279	0.0273
2	401	Hot Water (SHW) Pipe Insulation	0.0010	0.0059	0.0064	0.0023	0.0004	0.0038	0.0063	0.0023	0.0086	0.0023
2	402	High-Efficiency Water Heater (gas)	0.0046	0.0145	0.0200	0.0068	0.0009	0.0204	0.0362	0.0318	0.0279	0.0273
2	403	Water Heater Tank Blanket/Insulation	0.0001	0.0006	0.0006	0.0002	0.0000	0.0004	0.0006	0.0008	0.0009	0.0002
2	404	Tankless Water Heater	0.0046	0.0145	0.0200	0.0068	0.0009	0.0204	0.0362	0.0318	0.0279	0.0273

**Feasibility Factor**

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	100	Base Cooking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	102	High-Efficiency Convection Oven	100%	75%	90%	75%	75%	75%	75%	75%	75%	75%
1	103	Efficient Infrared Griddle	100%	75%	90%	75%	75%	75%	75%	75%	75%	75%
1	104	Infrared Fryer	100%	75%	90%	75%	75%	75%	75%	75%	75%	75%
1	105	Power Burner Oven	100%	75%	90%	75%	75%	75%	75%	75%	75%	75%

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Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	106	Power Burner Fryer	100%	75%	90%	75%	75%	75%	75%	75%	75%	75%
1	107	Infrared Conveyor Oven	100%	75%	90%	75%	75%	75%	75%	75%	75%	75%
1	200	Base Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	202	Insulation (ceiling)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	203	Insulation (wall)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	206	Duct Repair and Sealing	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	207	Duct Insulation	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
1	209	Insulation of Pipes	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	212	Boiler Tune-Up	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	216	Clock / Programmable Thermostat	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	218	Installation of Energy Management Systems (EMS)	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
1	222	Installation of Air Side Heat Recovery Systems	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	227	High Efficiency Gas Furnace	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
1	228	Stack Heat Exchanger	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
1	300	Base Pool Heating	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%
1	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%
1	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	90%	90%	90%	90%	90%
1	400	Base Water Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1	401	Hot Water (SHW) Pipe Insulation	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
1	402	High-Efficiency Water Heater (gas)	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%

# APPENDIX D

Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
1	403	Water Heater Tank Blanket/Insulation	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
1	404	Tankless Water Heater	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
2	100	Base Cooking	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	102	High-Efficiency Convection Oven	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
2	103	Efficient Infrared Griddle	100%	60%	80%	60%	60%	60%	60%	60%	60%	60%
2	104	Infrared Fryer	100%	60%	80%	60%	60%	60%	60%	60%	60%	60%
2	105	Power Burner Oven	100%	60%	80%	60%	60%	60%	60%	60%	60%	60%
2	106	Power Burner Fryer	100%	60%	80%	60%	60%	60%	60%	60%	60%	60%
2	107	Infrared Conveyor Oven	100%	60%	80%	60%	60%	60%	60%	60%	60%	60%
2	200	Base Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	202	Insulation (ceiling)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	203	Insulation (wall)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	206	Duct Repair and Sealing	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	207	Duct Insulation	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
2	209	Insulation of Pipes	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	212	Boiler Tune-Up	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	216	Clock / Programmable Thermostat	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	218	Installation of Energy Management Systems (EMS)	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
2	222	Installation of Air Side Heat Recovery Systems	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	227	High Efficiency Gas Furnace	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
2	228	Stack Heat Exchanger	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%



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Seg	Measure #	Measure Description	Office	Retail	Restaurant	Grocery	Warehouse	School	College	Hospital	Lodging	Other
2	300	Base Pool Heating	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%
2	301	Installation of Solar Pool/Spa Heating Systems	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%
2	302	Installation of Swimming Pool / Spa Covers	0%	0%	0%	0%	0%	90%	90%	90%	90%	90%
2	400	Base Water Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	401	Hot Water (SHW) Pipe Insulation	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
2	402	High-Efficiency Water Heater (gas)	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
2	403	Water Heater Tank Blanket/Insulation	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
2	404	Tankless Water Heater	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	200	Base Heating	Office	10,017,219	0	0	0%	N/A	\$-HVAC	N/A	N/A	N/A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Office	8,195,344	1,821,875	1,821,875	18%	\$0.060	\$0.069	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	Office	8,185,319	10,025	1,831,900	18%	\$0.153	\$0.176	HVAC	Level A	Level A
1	228	Stack Heat Exchanger	Office	8,020,422	164,897	1,996,797	20%	\$0.116	\$0.134	HVAC	Level A	Level A
1	206	Duct Repair and Sealing	Office	8,000,066	20,356	2,017,153	20%	\$0.218	\$0.251	HVAC	Level A	Level A

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Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	212	Boiler Tune-Up	Office	7,961,099	38,966	2,056,120	21%	\$0.451	\$0.519	HVAC	Level C	Level C
1	209	Insulation of Pipes	Office	7,940,893	20,206	2,076,325	21%	\$0.455	\$0.524	HVAC	Level C	Level C
1	227	High Efficiency Gas Furnace	Office	6,903,997	1,036,896	3,113,222	31%	\$0.336	\$0.387	HVAC	Level B	Level B
1	207	Duct Insulation	Office	6,883,634	20,363	3,133,585	31%	\$0.647	\$0.744	HVAC	Level C	Level D
1	203	Insulation (wall)	Office	6,285,585	598,049	3,731,634	37%	\$1.260	\$1.449	HVAC	Level E	Level E
1	218	Installation of Energy Management Systems (EMS)	Office	6,035,923	249,662	3,981,295	40%	\$2.157	\$2.481	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Office	5,556,405	479,518	4,460,814	45%	\$3.985	\$4.563	HVAC	Level E	Level E
1	202	Insulation (ceiling)	Office	5,536,388	20,016	4,480,830	45%	\$5.164	\$5.938	HVAC	Level E	Level E
1	400	Base Water Heating	Office	7,315,690	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	Office	6,435,996	879,694	879,694	12%	\$0.061	\$0.070	Water Heat	Level A	Level A
1	401	Hot Water (SHW) Pipe Insulation	Office	6,362,054	73,942	953,636	13%	\$0.248	\$0.285	Water Heat	Level A	Level A
1	404	Tankless Water Heater	Office	6,318,752	43,302	996,938	14%	\$0.385	\$0.442	Water Heat	Level B	Level B
1	402	High-Efficiency Water Heater (gas)	Office	5,504,196	814,556	1,811,494	25%	\$0.400	\$0.459	Water Heat	Level B	Level C
1	200	Base Heating	Dry Goods Retail	9,448,482	0	0	0%	N/A	\$-	HVAC	N/A	N/A

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Dry Goods Retail	8,269,194	1,179,288	1,179,288	12%	\$0.044	\$0.051	HVAC	Level A	Level A
1	206	Duct Repair and Sealing	Dry Goods Retail	8,248,206	20,988	1,200,276	13%	\$0.209	\$0.241	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	Dry Goods Retail	8,232,434	15,772	1,216,048	13%	\$0.219	\$0.252	HVAC	Level A	Level A
1	207	Duct Insulation	Dry Goods Retail	8,197,382	35,053	1,251,100	13%	\$0.538	\$0.619	HVAC	Level C	Level C
1	227	High Efficiency Gas Furnace	Dry Goods Retail	7,000,870	1,196,511	2,447,611	26%	\$0.489	\$0.563	HVAC	Level C	Level C
1	228	Stack Heat Exchanger	Dry Goods Retail	6,858,224	142,646	2,590,258	27%	\$0.626	\$0.720	HVAC	Level C	Level D
1	209	Insulation of Pipes	Dry Goods Retail	6,841,105	17,119	2,607,377	28%	\$1.041	\$1.197	HVAC	Level E	Level E
1	203	Insulation (wall)	Dry Goods Retail	6,318,027	523,078	3,130,455	33%	\$2.455	\$2.823	HVAC	Level E	Level E
1	202	Insulation (ceiling)	Dry Goods Retail	5,897,402	420,625	3,551,080	38%	\$2.841	\$3.267	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Dry Goods Retail	5,722,793	174,610	3,725,689	39%	\$5.873	\$6.754	HVAC	Level E	Level E
1	400	Base Water Heating	Dry Goods Retail	12,268,008	0	0	0%	N/A	\$	Water Heat	N/A	N/A

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	403	Water Heater Tank Blanket/Insulation	Dry Goods Retail	11,062,944	1,205,064	1,205,064	10%	\$0.116	\$0.133	Water Heat	Level A	Level A
1	404	Tankless Water Heater	Dry Goods Retail	11,017,810	45,134	1,250,198	10%	\$0.371	\$0.427	Water Heat	Level B	Level B
1	402	High-Efficiency Water Heater (gas)	Dry Goods Retail	9,336,777	1,681,033	2,931,231	24%	\$0.396	\$0.455	Water Heat	Level B	Level C
1	401	Hot Water (SHW) Pipe Insulation	Dry Goods Retail	9,181,340	155,437	3,086,668	25%	\$0.558	\$0.642	Water Heat	Level C	Level C
1	100	Base Cooking	Restaurant	26,904,505	0	0	0%	N/A	\$-	Cooking	N/A	N/A
1	104	Infrared Fryer	Restaurant	23,813,349	3,091,156	3,091,156	11%	\$0.127	\$0.146	Cooking	Level A	Level A
1	103	Efficient Infrared Griddle	Restaurant	21,343,817	2,469,533	5,560,688	21%	\$0.224	\$0.258	Cooking	Level A	Level A
1	107	Infrared Conveyer Oven	Restaurant	15,996,861	5,346,956	10,907,645	41%	\$0.528	\$0.608	Cooking	Level C	Level C
1	106	Power Burner Fryer	Restaurant	15,528,660	468,201	11,375,845	42%	\$1.001	\$1.151	Cooking	Level E	Level E
1	102	High-Efficiency Convection Oven	Restaurant	14,086,583	1,442,076	12,817,922	48%	\$1.410	\$1.621	Cooking	Level E	Level E
1	105	Power Burner Oven	Restaurant	13,674,293	412,290	13,230,212	49%	\$2.840	\$3.266	Cooking	Level E	Level E
1	200	Base Heating	Restaurant	2,211,769	0	0	0%	N/A	\$-	HVAC	N/A	N/A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Restaurant	2,045,887	165,883	165,883	8%	\$0.102	\$0.117	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	Restaurant	2,043,310	2,576	168,459	8%	\$0.176	\$0.203	HVAC	Level A	Level A
1	206	Duct Repair and Sealing	Restaurant	2,038,124	5,186	173,645	8%	\$0.432	\$0.497	HVAC	Level B	Level C

APPENDIX D

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	227	High Efficiency Gas Furnace	Restaurant	1,745,992	292,132	465,777	21%	\$1,040	\$1,196	HVAC	Level E	Level E
1	209	Insulation of Pipes	Restaurant	1,741,561	4,431	470,209	21%	\$1,259	\$1,448	HVAC	Level E	Level E
1	207	Duct Insulation	Restaurant	1,736,572	4,989	475,198	21%	\$1,291	\$1,485	HVAC	Level E	Level E
1	228	Stack Heat Exchanger	Restaurant	1,700,789	35,783	510,980	23%	\$2,028	\$2,332	HVAC	Level E	Level E
1	203	Insulation (wall)	Restaurant	1,540,210	160,579	671,560	30%	\$2,167	\$2,493	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Restaurant	1,503,361	36,849	708,409	32%	\$4,389	\$5,047	HVAC	Level E	Level E
1	202	Insulation (ceiling)	Restaurant	1,475,787	27,573	735,982	33%	\$6,729	\$7,739	HVAC	Level E	Level E
1	400	Base Water Heating	Restaurant	7,986,194	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	Restaurant	7,632,652	353,542	353,542	4%	\$0,140	\$0,161	Water Heat	Level A	Level A
1	404	Tankless Water Heater	Restaurant	7,557,468	75,184	428,725	5%	\$0,175	\$0,201	Water Heat	Level A	Level A
1	402	High-Efficiency Water Heater (gas)	Restaurant	6,475,288	1,082,181	1,510,906	19%	\$0,186	\$0,214	Water Heat	Level A	Level A
1	401	Hot Water (SHW) Pipe Insulation	Restaurant	6,367,798	107,490	1,618,396	20%	\$0,205	\$0,236	Water Heat	Level A	Level A
1	100	Base Cooking	Grocery	3,337,901	0	0	0%	N/A	\$-	Cooking	N/A	N/A
1	103	Efficient Infrared Griddle	Grocery	3,277,456	60,445	60,445	2%	\$0,663	\$0,763	Cooking	Level D	Level D
1	102	High-Efficiency Convection Oven	Grocery	3,176,999	100,457	160,902	5%	\$0,780	\$0,898	Cooking	Level D	Level D
1	106	Power Burner Fryer	Grocery	3,136,069	40,930	201,832	6%	\$0,829	\$0,953	Cooking	Level D	Level D
1	105	Power Burner Oven	Grocery	3,095,666	40,403	242,235	7%	\$2,098	\$2,412	Cooking	Level E	Level E

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Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	104	Infrared Fryer	Grocery	3,067,637	28,029	270,264	8%	\$1.016	\$1.168	Cooking	Level E	Level E
1	107	Infrared Conveyer Oven	Grocery	3,005,330	62,307	332,571	10%	\$3.281	\$3.773	Cooking	Level E	Level E
1	200	Base Heating	Grocery	4,418,213	0	0	0%	N/A	\$-	HVAC	N/A	N/A
1	216	Clock/Programmable Thermostat	Grocery	4,409,547	8,666	8,666	0%	\$0.117	\$0.134	HVAC	Level A	Level A
1	206	Duct Repair and Sealing	Grocery	4,398,356	11,192	19,858	0%	\$0.120	\$0.138	HVAC	Level A	Level A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Grocery	4,258,618	139,738	159,595	4%	\$0.154	\$0.177	HVAC	Level A	Level A
1	207	Duct Insulation	Grocery	4,243,306	15,312	174,907	4%	\$0.317	\$0.365	HVAC	Level B	Level B
1	227	High Efficiency Gas Furnace	Grocery	3,630,368	612,938	787,845	18%	\$0.297	\$0.342	HVAC	Level A	Level B
1	209	Insulation of Pipes.	Grocery	3,621,154	9,214	797,059	18%	\$0.649	\$0.746	HVAC	Level C	Level D
1	228	Stack Heat Exchanger	Grocery	3,545,708	75,446	872,506	20%	\$1.097	\$1.261	HVAC	Level E	Level E
1	203	Insulation (wall)	Grocery	3,234,921	310,786	1,183,292	27%	\$1.494	\$1.718	HVAC	Level E	Level E
1	202	Insulation (ceiling)	Grocery	3,077,243	157,679	1,340,971	30%	\$2.623	\$3.016	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Grocery	3,024,772	52,471	1,393,441	32%	\$3.130	\$3.600	HVAC	Level E	Level E
1	400	Base Water Heating	Grocery	1,078,795	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	Grocery	1,032,926	45,869	45,869	4%	\$0.152	\$0.175	Water Heat	Level A	Level A
1	404	Tankless Water Heater	Grocery	1,025,427	7,499	53,369	5%	\$0.349	\$0.402	Water Heat	Level B	Level B

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	402	High-Efficiency Water Heater (gas)	Grocery	842,624	182,803	236,171	22%	\$0.386	\$0.444	Water Heat	Level B	Level B
1	401	Hot Water (SHW) Pipe Insulation	Grocery	829,326	13,298	249,469	23%	\$0.458	\$0.527	Water Heat	Level C	Level C
1	200	Base Heating	Warehouse	19,052,818	0	0	0%	N/A	\$-	HVAC	N/A	N/A
1	206	Duct Repair and Sealing	Warehouse	19,004,461	48,357	48,357	0%	\$0.094	\$0.108	HVAC	Level A	Level A
1	228	Stack Heat Exchanger	Warehouse	18,621,608	382,853	431,210	2%	\$0.162	\$0.186	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	Warehouse	18,604,250	17,358	448,568	2%	\$0.203	\$0.233	HVAC	Level A	Level A
1	207	Duct Insulation	Warehouse	18,545,857	58,393	506,961	3%	\$0.245	\$0.282	HVAC	Level A	Level A
1	227	High Efficiency Gas Furnace	Warehouse	15,871,703	2,674,154	3,181,115	17%	\$0.364	\$0.418	HVAC	Level B	Level B
1	209	Insulation of Pipes	Warehouse	15,832,723	38,980	3,220,095	17%	\$0.517	\$0.594	HVAC	Level C	Level C
1	202	Insulation (ceiling)	Warehouse	14,795,966	1,036,757	4,256,852	22%	\$1.091	\$1.255	HVAC	Level E	Level E
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Warehouse	14,721,986	73,980	4,330,832	23%	\$0.892	\$1.026	HVAC	Level D	Level E
1	203	Insulation (wall)	Warehouse	13,984,813	737,173	5,068,005	27%	\$2.278	\$2.620	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Warehouse	13,753,486	231,327	5,299,332	28%	\$4.972	\$5.717	HVAC	Level E	Level E
1	400	Base Water Heating	Warehouse	1,062,369	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	Warehouse	969,573	92,796	92,796	9%	\$0.215	\$0.247	Water Heat	Level A	Level A

APPENDIX D

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	404	Tankless Water Heater	Warehouse	964,826	4,747	97,543	9%	\$0.546	\$0.628	Water Heat	Level C	Level C
1	402	High-Efficiency Water Heater (gas)	Warehouse	871,760	93,066	190,609	18%	\$0.577	\$0.663	Water Heat	Level C	Level D
1	401	Hot Water (SHW) Pipe Insulation	Warehouse	857,782	13,978	204,587	19%	\$0.928	\$1.067	Water Heat	Level D	Level E
1	100	Base Cooking	School	180,975	0	0	0%	N/A	\$	Cooking	N/A	N/A
1	104	Infrared Fryer	School	172,579	8,396	8,396	5%	\$1.839	\$2.114	Cooking	Level E	Level E
1	102	High-Efficiency Convection Oven	School	155,945	16,634	25,030	14%	\$5.140	\$5.911	Cooking	Level E	Level E
1	103	Efficient Infrared Griddle	School	153,121	2,824	27,854	15%	\$7.697	\$8.851	Cooking	Level E	Level E
1	106	Power Burner Fryer	School	151,148	1,973	29,826	16%	\$9.323	\$10.722	Cooking	Level E	Level E
1	107	Infrared Conveyor Oven	School	146,022	5,127	34,953	19%	\$21.619	\$24.862	Cooking	Level E	Level E
1	105	Power Burner Oven	School	144,140	1,881	36,835	20%	\$24.426	\$28.090	Cooking	Level E	Level E
1	200	Base Heating	School	1,267,332	0	0	0%	N/A	\$	HVAC	N/A	N/A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	School	1,172,930	94,403	94,403	7%	\$0.042	\$0.048	HVAC	Level A	Level A
1	206	Duct Repair and Sealing	School	1,169,953	2,977	97,380	8%	\$0.072	\$0.083	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	School	1,169,466	487	97,866	8%	\$0.138	\$0.158	HVAC	Level A	Level A
1	207	Duct Insulation	School	1,165,244	4,222	102,089	8%	\$0.184	\$0.212	HVAC	Level A	Level A
1	228	Stack Heat Exchanger	School	1,143,297	21,947	124,035	10%	\$0.309	\$0.356	HVAC	Level B	Level B
1	209	Insulation of Pipes	School	1,140,387	2,910	126,946	10%	\$0.323	\$0.372	HVAC	Level B	Level B



**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	212	Boiler Tune-Up	School	1,136,541	3,845	130,791	10%	\$1.199	\$1.379	HVAC	Level E	Level E
1	227	High Efficiency Gas Furnace	School	976,149	160,393	291,184	23%	\$1.232	\$1.417	HVAC	Level E	Level E
1	203	Insulation (wall)	School	923,995	52,154	343,337	27%	\$1.518	\$1.746	HVAC	Level E	Level E
1	218	Installation of Energy Management Systems (EMS)	School	919,141	4,854	348,191	27%	\$1.803	\$2.073	HVAC	Level E	Level E
1	202	Insulation (ceiling)	School	894,876	24,265	372,456	29%	\$2.730	\$3.139	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	School	875,475	19,402	391,857	31%	\$3.235	\$3.720	HVAC	Level E	Level E
1	300	Base Pool Heating	School	275,440	0	0	0%	N/A	\$-	Appliances	N/A	N/A
1	302	Installation of Swimming Pool/Spa Covers	School	241,959	33,482	33,482	12%	\$0.023	\$0.026	Appliances	Level A	Level A
1	301	Installation of Solar Pool/Spa Heating Systems	School	203,729	38,229	71,711	26%	\$1.881	\$2.164	Appliances	Level E	Level E
1	400	Base Water Heating	School	1,080,665	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	School	970,949	109,716	109,716	10%	\$0.123	\$0.141	Water Heat	Level A	Level A
1	401	Hot Water (SHW) Pipe Insulation	School	965,338	5,611	115,327	11%	\$0.318	\$0.366	Water Heat	Level B	Level B
1	404	Tankless Water Heater	School	960,313	5,025	120,351	11%	\$0.562	\$0.646	Water Heat	Level C	Level C
1	402	High-Efficiency Water Heater (gas)	School	732,882	227,431	347,783	32%	\$0.671	\$0.771	Water Heat	Level D	Level D
1	100	Base Cooking	University	132,928	0	0	0%	N/A	\$-	Cooking	N/A	N/A

APPENDIX D

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	104	Infrared Fryer	University	126,762	6,167	6,167	5%	\$0.919	\$1.057	Cooking	Level D	Level E
1	103	Efficient Infrared Griddle	University	123,695	3,067	9,234	7%	\$2.603	\$2.993	Cooking	Level E	Level E
1	107	Infrared Conveyor Oven	University	110,980	12,715	21,948	17%	\$3.202	\$3.682	Cooking	Level E	Level E
1	106	Power Burner Fryer	University	109,550	1,430	23,378	18%	\$4.724	\$5.433	Cooking	Level E	Level E
1	102	High-Efficiency Convection Oven	University	105,859	3,691	27,069	20%	\$8.403	\$9.663	Cooking	Level E	Level E
1	105	Power Burner Oven	University	104,495	1,364	28,433	21%	\$12.374	\$14.230	Cooking	Level E	Level E
1	200	Base Heating	University	1,165,651	0	0	0%	N/A	\$	HVAC	N/A	N/A
1	206	Duct Repair and Sealing	University	1,162,693	2,959	2,959	0%	\$0.040	\$0.046	HVAC	Level A	Level A
1	228	Stack Heat Exchanger	University	1,142,000	20,693	23,651	2%	\$0.048	\$0.055	HVAC	Level A	Level A
1	209	Insulation of Pipes	University	1,139,086	2,915	26,566	2%	\$0.076	\$0.088	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	University	1,138,616	470	27,035	2%	\$0.091	\$0.104	HVAC	Level A	Level A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	University	1,053,947	84,669	111,705	10%	\$0.077	\$0.089	HVAC	Level A	Level A
1	207	Duct Insulation	University	1,050,037	3,910	115,614	10%	\$0.112	\$0.129	HVAC	Level A	Level A
1	212	Boiler Tune-Up	University	1,046,496	3,541	119,155	10%	\$0.198	\$0.228	HVAC	Level A	Level A
1	227	High Efficiency Gas Furnace	University	900,437	146,059	265,214	23%	\$0.325	\$0.374	HVAC	Level B	Level B
1	203	Insulation (wall)	University	880,237	20,200	285,415	24%	\$0.625	\$0.719	HVAC	Level C	Level D

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	218	Installation of Energy Management Systems (EMS)	University	869,216	11,021	296,435	25%	\$1,234	\$1,420	HVAC	Level E	Level E
1	202	Insulation (ceiling)	University	860,328	8,888	305,324	26%	\$1,266	\$1,456	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	University	842,064	18,264	323,587	28%	\$2,311	\$2,658	HVAC	Level E	Level E
1	300	Base Pool Heating	University	164,970	0	0	0%	N/A	\$-	Appliances	N/A	N/A
1	302	Installation of Swimming Pool/Spa Covers	University	147,354	17,615	17,615	11%	\$0.022	\$0.025	Appliances	Level A	Level A
1	301	Installation of Solar Pool/Spa Heating Systems	University	124,072	23,282	40,897	25%	\$1,513	\$1,740	Appliances	Level E	Level E
1	400	Base Water Heating	University	1,258,674	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	University	1,225,300	33,374	33,374	3%	\$0.151	\$0.174	Water Heat	Level A	Level A
1	401	Hot Water (SHW) Pipe Insulation	University	1,224,732	568	33,943	3%	\$0.184	\$0.211	Water Heat	Level A	Level A
1	404	Tankless Water Heater	University	1,219,230	5,502	39,445	3%	\$0.344	\$0.395	Water Heat	Level B	Level B
1	402	High-Efficiency Water Heater (gas)	University	930,479	288,751	328,195	26%	\$0.410	\$0.472	Water Heat	Level B	Level C
1	100	Base Cooking	Hospital & Health Care	171,062	0	0	0%	N/A	\$-	Cooking	N/A	N/A
1	104	Infrared Fryer	Hospital & Health Care	163,126	7,936	7,936	5%	\$0.230	\$0.264	Cooking	Level A	Level A

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	107	Infrared Conveyor Oven	Hospital & Health Care	146,358	16,768	24,704	14%	\$0.781	\$0.898	Cooking	Level D	Level D
1	103	Efficient Infrared Griddle	Hospital & Health Care	143,707	2,650	27,354	16%	\$0.969	\$1.114	Cooking	Level D	Level E
1	106	Power Burner Fryer	Hospital & Health Care	141,856	1,851	29,206	17%	\$1.174	\$1.350	Cooking	Level E	Level E
1	102	High-Efficiency Convection Oven	Hospital & Health Care	135,285	6,571	35,776	21%	\$1.488	\$1.711	Cooking	Level E	Level E
1	105	Power Burner Oven	Hospital & Health Care	133,542	1,743	37,519	22%	\$3.115	\$3.582	Cooking	Level E	Level E
1	200	Base Heating	Hospital & Health Care	16,171,714	0	0	0%	N/A	\$-	HVAC	N/A	N/A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Hospital & Health Care	14,966,060	1,205,654	1,205,654	7%	\$0.013	\$0.015	HVAC	Level A	Level A
1	206	Duct Repair and Sealing	Hospital & Health Care	14,928,075	37,985	1,243,639	8%	\$0.023	\$0.027	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	Hospital & Health Care	14,916,815	11,260	1,254,900	8%	\$0.053	\$0.061	HVAC	Level A	Level A
1	207	Duct Insulation	Hospital & Health Care	14,864,069	52,746	1,307,646	8%	\$0.060	\$0.068	HVAC	Level A	Level A
1	228	Stack Heat Exchanger	Hospital & Health Care	14,603,928	260,141	1,567,786	10%	\$0.064	\$0.073	HVAC	Level A	Level A

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	227	High Efficiency Gas Furnace	Hospital & Health Care	12,541,909	2,062,019	3,629,805	22%	\$0.156	\$0.180	HVAC	Level A	Level A
1	209	Insulation of Pipes	Hospital & Health Care	12,510,148	31,761	3,661,567	23%	\$0.213	\$0.245	HVAC	Level A	Level A
1	212	Boiler Tune-Up	Hospital & Health Care	12,485,648	24,500	3,686,067	23%	\$0.283	\$0.326	HVAC	Level A	Level B
1	203	Insulation (wall)	Hospital & Health Care	12,166,790	318,857	4,004,924	25%	\$0.503	\$0.578	HVAC	Level C	Level C
1	218	Installation of Energy Management Systems (EMS)	Hospital & Health Care	11,897,312	269,478	4,274,402	26%	\$0.720	\$0.829	HVAC	Level D	Level D
1	202	Insulation (ceiling)	Hospital & Health Care	11,758,332	138,980	4,413,383	27%	\$1.027	\$1.181	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Hospital & Health Care	11,533,865	224,467	4,637,849	29%	\$1.292	\$1.486	HVAC	Level E	Level E
1	300	Base Pool Heating	Hospital & Health Care	27,080	0	0	0%	N/A	\$-	Appliances	N/A	N/A
1	302	Installation of Swimming Pool/Spa Covers	Hospital & Health Care	21,910	5,170	5,170	19%	\$0.025	\$0.028	Appliances	Level A	Level A
1	301	Installation of Solar Pool/Spa Heating Systems	Hospital & Health Care	18,448	3,462	8,632	32%	\$0.945	\$1.087	Appliances	Level D	Level E
1	400	Base Water Heating	Hospital & Health Care	12,674,507	0	0	0%	N/A	\$-	Water Heat	N/A	N/A

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	401	Hot Water (SHW) Pipe Insulation	Hospital & Health Care	12,579,909	94,598	94,598	1%	\$0.045	\$0.052	Water Heat	Level A	Level A
1	403	Water Heater Tank Blanket/Insulation	Hospital & Health Care	12,256,344	323,564	418,162	3%	\$0.131	\$0.151	Water Heat	Level A	Level A
1	404	Tankless Water Heater	Hospital & Health Care	12,194,345	61,999	480,162	4%	\$0.206	\$0.237	Water Heat	Level A	Level A
1	402	High-Efficiency Water Heater (gas)	Hospital & Health Care	9,390,385	2,803,960	3,284,122	26%	\$0.245	\$0.282	Water Heat	Level A	Level A
1	100	Base Cooking	Hotel	516,278	0	0	0%	N/A	\$-	Cooking	N/A	N/A
1	104	Infrared Fryer	Hotel	492,327	23,951	23,951	5%	\$0.230	\$0.264	Cooking	Level A	Level A
1	103	Efficient Infrared Griddle	Hotel	483,411	8,915	32,866	6%	\$0.889	\$1.000	Cooking	Level D	Level D
1	106	Power Burner Fryer	Hotel	477,183	6,228	39,094	8%	\$1.053	\$1.211	Cooking	Level E	Level E
1	102	High-Efficiency Convection Oven	Hotel	457,940	19,244	58,338	11%	\$1.559	\$1.793	Cooking	Level E	Level E
1	107	Infrared Conveyor Oven	Hotel	442,407	15,533	73,871	14%	\$2.545	\$2.926	Cooking	Level E	Level E
1	105	Power Burner Oven	Hotel	436,707	5,700	79,571	15%	\$2.875	\$3.306	Cooking	Level E	Level E
1	200	Base Heating	Hotel	566,361	0	0	0%	N/A	\$-	HVAC	N/A	N/A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Hotel	482,904	83,456	83,456	15%	\$0.189	\$0.217	HVAC	Level A	Level A
1	206	Duct Repair and Sealing	Hotel	481,679	1,226	84,682	15%	\$0.336	\$0.387	HVAC	Level B	Level B
1	216	Clock/Programmable Thermostat	Hotel	481,554	125	84,807	15%	\$0.347	\$0.399	HVAC	Level B	Level B

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	228	Stack Heat Exchanger	Hotel	472,775	8,779	93,586	17%	\$0.360	\$0.414	HVAC	Level B	Level B
1	209	Insulation of Pipes	Hotel	471,579	1,196	94,782	17%	\$0.676	\$0.777	HVAC	Level D	Level D
1	227	High Efficiency Gas Furnace	Hotel	406,087	65,492	160,274	28%	\$0.761	\$0.875	HVAC	Level D	Level D
1	207	Duct Insulation	Hotel	404,474	1,613	161,886	29%	\$1.024	\$1.178	HVAC	Level E	Level E
1	212	Boiler Tune-Up	Hotel	402,423	2,051	163,938	29%	\$1.582	\$1.820	HVAC	Level E	Level E
1	203	Insulation (wall)	Hotel	362,181	40,242	204,180	36%	\$1.931	\$2.221	HVAC	Level E	Level E
1	202	Insulation (ceiling)	Hotel	350,464	11,717	215,897	38%	\$3.679	\$4.231	HVAC	Level E	Level E
1	218	Installation of Energy Management Systems (EMS)	Hotel	334,750	15,713	231,610	41%	\$5.198	\$5.977	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Hotel	329,092	5,658	237,269	42%	\$8.812	\$10.134	HVAC	Level E	Level E
1	300	Base Pool Heating	Hotel	553,305	0	0	0%	N/A	\$-	Appliances	N/A	N/A
1	302	Installation of Swimming Pool/Spa Covers	Hotel	403,377	149,928	149,928	27%	\$0.028	\$0.032	Appliances	Level A	Level A
1	301	Installation of Solar Pool/Spa Heating Systems	Hotel	339,643	63,734	213,661	39%	\$0.835	\$0.960	Appliances	Level D	Level D
1	400	Base Water Heating	Hotel	2,085,120	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	Hotel	1,960,554	124,565	124,565	6%	\$0.273	\$0.314	Water Heat	Level A	Level B
1	404	Tankless Water Heater	Hotel	1,942,675	17,880	142,445	7%	\$0.356	\$0.409	Water Heat	Level B	Level B

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Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	402	High-Efficiency Water Heater (gas)	Hotel	1,493,508	449,167	591,612	28%	\$0.423	\$0.487	Water Heat	Level B	Level C
1	401	Hot Water (SHW) Pipe Insulation	Hotel	1,476,786	16,722	608,333	29%	\$0.447	\$0.514	Water Heat	Level B	Level C
1	200	Base Heating	Miscellaneous	5,845,921	0	0	0%	N/A	\$	HVAC	N/A	N/A
1	206	Duct Repair and Sealing	Miscellaneous	5,831,084	14,837	14,837	0%	\$0.098	\$0.112	HVAC	Level A	Level A
1	216	Clock/Programmable Thermostat	Miscellaneous	5,829,556	1,527	16,365	0%	\$0.101	\$0.117	HVAC	Level A	Level A
1	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Miscellaneous	5,645,061	184,495	200,860	3%	\$0.092	\$0.106	HVAC	Level A	Level A
1	228	Stack Heat Exchanger	Miscellaneous	5,533,449	111,612	312,472	5%	\$0.152	\$0.174	HVAC	Level A	Level A
1	207	Duct Insulation	Miscellaneous	5,510,297	23,151	335,624	6%	\$0.264	\$0.304	HVAC	Level A	Level B
1	227	High Efficiency Gas Furnace	Miscellaneous	4,733,459	776,839	1,112,462	19%	\$0.392	\$0.450	HVAC	Level B	Level C
1	209	Insulation of Pipes	Miscellaneous	4,721,490	11,969	1,124,431	19%	\$0.571	\$0.657	HVAC	Level C	Level D
1	212	Boiler Tune-Up	Miscellaneous	4,700,674	20,816	1,145,247	20%	\$0.723	\$0.831	HVAC	Level D	Level D
1	203	Insulation (wall)	Miscellaneous	4,377,619	323,055	1,468,302	25%	\$1.132	\$1.302	HVAC	Level E	Level E
1	218	Installation of Energy Management Systems (EMS)	Miscellaneous	4,324,405	53,214	1,521,515	26%	\$1.408	\$1.619	HVAC	Level E	Level E
1	202	Insulation (ceiling)	Miscellaneous	4,290,184	34,221	1,555,736	27%	\$2.162	\$2.486	HVAC	Level E	Level E
1	222	Installation of Air Side Heat Recovery Systems	Miscellaneous	4,230,823	59,362	1,615,098	28%	\$2.431	\$2.796	HVAC	Level E	Level E



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Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
1	400	Base Water Heating	Miscellaneous	5,843,445	0	0	0%	N/A	N/A	Water Heat	N/A	N/A
1	403	Water Heater Tank Blanket/Insulation	Miscellaneous	5,682,501	160,944	160,944	3%	\$0.036	\$0.041	Water Heat	Level A	Level A
1	401	Hot Water (SHW) Pipe Insulation	Miscellaneous	5,606,386	76,115	237,059	4%	\$0.092	\$0.105	Water Heat	Level A	Level A
1	404	Tankless Water Heater	Miscellaneous	5,578,752	27,634	264,693	5%	\$0.349	\$0.401	Water Heat	Level B	Level B
1	402	High-Efficiency Water Heater (gas)	Miscellaneous	4,389,524	1,189,228	1,453,921	25%	\$0.403	\$0.463	Water Heat	Level B	Level C
2	200	Base Heating	Office	139,967	0	0	0%	N/A	\$-	HVAC	N/A	N/A
2	228	Stack Heat Exchanger	Office	137,589	2,379	2,379	2%	\$0.101	\$0.116	HVAC	Level A	Level A
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Office	124,051	13,538	15,917	11%	\$0.109	\$0.125	HVAC	Level A	Level A
2	206	Duct Repair and Sealing	Office	123,983	68	15,985	11%	\$0.373	\$0.429	HVAC	Level B	Level B
2	216	Clock/Programmable Thermostat	Office	123,945	38	16,023	11%	\$0.373	\$0.429	HVAC	Level B	Level B
2	227	High Efficiency Gas Furnace	Office	111,151	12,793	28,816	21%	\$0.440	\$0.506	HVAC	Level B	Level C
2	209	Insulation of Pipes	Office	111,011	140	28,956	21%	\$0.840	\$0.966	HVAC	Level D	Level D
2	212	Boiler Tune-Up	Office	110,742	270	29,226	21%	\$0.763	\$0.878	HVAC	Level D	Level D
2	207	Duct Insulation	Office	110,671	71	29,297	21%	\$1.034	\$1.190	HVAC	Level E	Level E
2	203	Insulation (wall)	Office	106,558	4,113	33,410	24%	\$2.146	\$2.467	HVAC	Level E	Level E

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Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	218	Installation of Energy Management Systems (EMS)	Office	103,623	2,934	36,344	26%	\$2.223	\$2.556	HVAC	Level E	Level E
2	202	Insulation (ceiling)	Office	103,299	325	36,669	26%	\$3.711	\$4.267	HVAC	Level E	Level E
2	222	Installation of Air Side Heat Recovery Systems	Office	97,743	5,556	42,225	30%	\$3.993	\$4.592	HVAC	Level E	Level E
2	400	Base Water Heating	Office	102,752	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	Office	92,902	9,851	9,851	10%	\$0.061	\$0.071	Water Heat	Level A	Level A
2	401	Hot Water (SHW) Pipe Insulation	Office	92,461	441	10,292	10%	\$0.341	\$0.392	Water Heat	Level B	Level B
2	404	Tankless Water Heater	Office	91,957	503	10,795	11%	\$0.438	\$0.504	Water Heat	Level B	Level C
2	402	High-Efficiency Water Heater (gas)	Office	85,693	6,264	17,059	17%	\$0.468	\$0.538	Water Heat	Level C	Level C
2	200	Base Heating	Dry Goods Retail	171,306	0	0	0%	N/A	\$-	HVAC	N/A	N/A
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Dry Goods Retail	162,569	8,737	8,737	5%	\$0.104	\$0.119	HVAC	Level A	Level A
2	206	Duct Repair and Sealing	Dry Goods Retail	162,536	33	8,770	5%	\$0.365	\$0.420	HVAC	Level B	Level B
2	216	Clock/Programmable Thermostat	Dry Goods Retail	162,458	78	8,847	5%	\$0.532	\$0.612	HVAC	Level C	Level C

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Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	228	Stack Heat Exchanger	Dry Goods Retail	159,680	2,778	11,626	7%	\$0.520	\$0.598	HVAC	Level C	Level C
2	227	High Efficiency Gas Furnace	Dry Goods Retail	146,395	13,284	24,910	15%	\$0.666	\$0.766	HVAC	Level D	Level D
2	207	Duct Insulation	Dry Goods Retail	146,345	50	24,960	15%	\$1.006	\$1.156	HVAC	Level E	Level E
2	209	Insulation of Pipes	Dry Goods Retail	146,164	181	25,141	15%	\$1.630	\$1.875	HVAC	Level E	Level E
2	203	Insulation (wall)	Dry Goods Retail	144,414	1,750	26,892	16%	\$4.133	\$4.753	HVAC	Level E	Level E
2	202	Insulation (ceiling)	Dry Goods Retail	142,981	1,433	28,324	17%	\$4.676	\$5.377	HVAC	Level E	Level E
2	222	Installation of Air Side Heat Recovery Systems	Dry Goods Retail	140,130	2,851	31,176	18%	\$5.390	\$6.199	HVAC	Level E	Level E
2	400	Base Water Heating	Dry Goods Retail	222,425	0	0	0%	N/A	\$	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	Dry Goods Retail	205,076	17,348	17,348	8%	\$0.117	\$0.135	Water Heat	Level A	Level A
2	404	Tankless Water Heater	Dry Goods Retail	204,407	669	18,018	8%	\$0.428	\$0.492	Water Heat	Level B	Level C
2	402	High-Efficiency Water Heater (gas)	Dry Goods Retail	194,465	9,942	27,960	13%	\$0.466	\$0.536	Water Heat	Level C	Level C
2	401	Hot Water (SHW) Pipe Insulation	Dry Goods Retail	193,209	1,257	29,216	13%	\$0.685	\$0.788	Water Heat	Level D	Level D

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2	100	Base Cooking	Restaurant	534,453	0	0	0%	N/A	\$	Cooking	N/A	N/A
2	104	Infrared Fryer	Restaurant	510,315	24,138	24,138	5%	\$0.263	\$0.302	Cooking	Level A	Level B
2	103	Efficient Infrared Griddle	Restaurant	489,153	21,162	45,300	8%	\$0.422	\$0.485	Cooking	Level B	Level C
2	107	Infrared Conveyor Oven	Restaurant	440,202	48,950	94,251	18%	\$0.930	\$1.070	Cooking	Level D	Level E
2	106	Power Burner Fryer	Restaurant	434,681	5,521	99,772	19%	\$1.368	\$1.573	Cooking	Level E	Level E
2	102	High-Efficiency Convection Oven	Restaurant	426,514	8,167	107,939	20%	\$2.019	\$2.322	Cooking	Level E	Level E
2	105	Power Burner Oven	Restaurant	421,165	5,350	113,288	21%	\$3.528	\$4.057	Cooking	Level E	Level E
2	200	Base Heating	Restaurant	40,100	0	0	0%	N/A	\$	HVAC	N/A	N/A
2	216	Clock/Programmable Thermostat	Restaurant	40,088	13	13	0%	\$0.431	\$0.496	HVAC	Level B	Level C
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Restaurant	39,530	558	570	1%	\$0.527	\$0.606	HVAC	Level C	Level C
2	206	Duct Repair and Sealing	Restaurant	39,523	7	578	1%	\$0.766	\$0.880	HVAC	Level D	Level D
2	227	High Efficiency Gas Furnace	Restaurant	36,543	2,980	3,558	9%	\$1.422	\$1.635	HVAC	Level E	Level E
2	228	Stack Heat Exchanger	Restaurant	35,911	632	4,190	10%	\$1.855	\$2.134	HVAC	Level E	Level E
2	209	Insulation of Pipes	Restaurant	35,866	45	4,235	11%	\$2.046	\$2.353	HVAC	Level E	Level E
2	207	Duct Insulation	Restaurant	35,858	7	4,242	11%	\$2.088	\$2.401	HVAC	Level E	Level E
2	203	Insulation (wall)	Restaurant	35,367	491	4,733	12%	\$3.617	\$4.160	HVAC	Level E	Level E
2	222	Installation of Air Side Heat Recovery Systems	Restaurant	34,739	627	5,361	13%	\$4.346	\$4.997	HVAC	Level E	Level E

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2	202	Insulation (ceiling)	Restaurant	34,553	186	5,547	14%	\$5.064	\$5.824	HVAC	Level E	Level E
2	400	Base Water Heating	Restaurant	144,793	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank	Restaurant	138,384	6,410	6,410	4%	\$0.112	\$0.129	Water Heat	Level A	Level A
2	404	Blanket/Insulation	Restaurant	137,293	1,090	7,500	5%	\$0.206	\$0.237	Water Heat	Level A	Level A
2	402	Tankless Water Heater	Restaurant	121,962	15,331	22,831	16%	\$0.224	\$0.258	Water Heat	Level A	Level A
2	401	High-Efficiency Water Heater (gas)	Restaurant	120,981	981	23,812	16%	\$0.279	\$0.320	Water Heat	Level A	Level B
2	100	Hot Water (SHW) Pipe Insulation	Restaurant	86,368	0	0	0%	N/A	\$-	Cooking	N/A	N/A
2	102	Base Cooking	Grocery	84,832	1,536	1,536	2%	\$0.987	\$1.135	Cooking	Level D	Level E
2	106	High-Efficiency Convection Oven	Grocery	84,546	286	1,822	2%	\$1.718	\$1.975	Cooking	Level E	Level E
2	103	Power Burner Fryer	Grocery	84,261	285	2,107	2%	\$2.041	\$2.347	Cooking	Level E	Level E
2	104	Efficient Infrared Griddle	Grocery	84,119	142	2,249	3%	\$2.908	\$3.345	Cooking	Level E	Level E
2	105	Infrared Fryer	Grocery	83,835	284	2,533	3%	\$4.328	\$4.977	Cooking	Level E	Level E
2	107	Power Burner Oven	Grocery	83,517	318	2,851	3%	\$9.338	\$10.739	Cooking	Level E	Level E
2	200	Infrared Conveyor Oven	Grocery	80,104	0	0	0%	N/A	\$-	HVAC	N/A	N/A
2	201	Base Heating	Grocery	77,559	2,545	2,545	3%	\$0.147	\$0.169	HVAC	Level A	Level A
2	206	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Grocery	77,549	10	2,555	3%	\$0.234	\$0.269	HVAC	Level A	Level A
2	206	Duct Repair and Sealing	Grocery	77,549	10	2,555	3%	\$0.234	\$0.269	HVAC	Level A	Level A

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2	216	Clock/Programmable Thermostat	Grocery	77,511	38	2,593	3%	\$0.319	\$0.367	HVAC	Level B	Level B
2	227	High Efficiency Gas Furnace	Grocery	73,257	4,253	6,847	9%	\$0.431	\$0.496	HVAC	Level B	Level C
2	207	Duct Insulation	Grocery	73,243	14	6,861	9%	\$0.613	\$0.705	HVAC	Level C	Level D
2	209	Insulation of Pipes	Grocery	73,151	92	6,953	9%	\$1.074	\$1.235	HVAC	Level E	Level E
2	228	Stack Heat Exchanger	Grocery	71,872	1,279	8,232	10%	\$1.045	\$1.202	HVAC	Level E	Level E
2	203	Insulation (wall)	Grocery	71,212	660	8,892	11%	\$2.615	\$3.007	HVAC	Level E	Level E
2	222	Installation of Air Side Heat Recovery Systems	Grocery	70,312	900	9,792	12%	\$3.079	\$3.541	HVAC	Level E	Level E
2	202	Insulation (ceiling)	Grocery	69,992	320	10,112	13%	\$4.776	\$5.493	HVAC	Level E	Level E
2	400	Base Water Heating	Grocery	19,559	0	0	0%	N/A	\$	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	Grocery	18,894	665	665	3%	\$0.152	\$0.175	Water Heat	Level A	Level A
2	404	Tankless Water Heater	Grocery	18,784	110	775	4%	\$0.408	\$0.470	Water Heat	Level B	Level C
2	402	High-Efficiency Water Heater (gas)	Grocery	16,871	1,913	2,688	14%	\$0.457	\$0.526	Water Heat	Level C	Level C
2	401	Hot Water (SHW) Pipe Insulation	Grocery	16,818	53	2,741	14%	\$0.566	\$0.673	Water Heat	Level C	Level D
2	200	Base Heating	Warehouse	345,438	0	0	0%	N/A	\$	HVAC	N/A	N/A
2	206	Duct Repair and Sealing	Warehouse	345,389	49	49	0%	\$0.178	\$0.204	HVAC	Level A	Level A
2	228	Stack Heat Exchanger	Warehouse	339,549	5,840	5,889	2%	\$0.172	\$0.198	HVAC	Level A	Level A

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2	227	High Efficiency Gas Furnace	Warehouse	319,855	19,694	25,583	7%	\$0.527	\$0.606	HVAC	Level C	Level C
2	207	Duct Insulation	Warehouse	319,799	56	25,639	7%	\$0.475	\$0.546	HVAC	Level C	Level C
2	216	Clock/Programmable Thermostat	Warehouse	319,724	74	25,713	7%	\$0.567	\$0.652	HVAC	Level C	Level D
2	209	Insulation of Pipes	Warehouse	319,335	390	26,103	8%	\$0.857	\$0.986	HVAC	Level D	Level D
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Warehouse	317,738	1,597	27,700	8%	\$0.716	\$0.824	HVAC	Level D	Level D
2	202	Insulation (ceiling)	Warehouse	315,735	2,002	29,702	9%	\$2.209	\$2.540	HVAC	Level E	Level E
2	203	Insulation (wall)	Warehouse	314,063	1,672	31,374	9%	\$3.943	\$4.535	HVAC	Level E	Level E
2	222	Installation of Air Side Heat Recovery Systems	Warehouse	310,230	3,833	35,207	10%	\$5.059	\$5.818	HVAC	Level E	Level E
2	400	Base Water Heating	Warehouse	19,261	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	Warehouse	17,579	1,682	1,682	9%	\$0.172	\$0.198	Water Heat	Level A	Level A
2	404	Tankless Water Heater	Warehouse	17,510	69	1,751	9%	\$0.644	\$0.740	Water Heat	Level C	Level D
2	402	High-Efficiency Water Heater (gas)	Warehouse	16,543	967	2,718	14%	\$0.696	\$0.800	Water Heat	Level D	Level D
2	401	Hot Water (SHW) Pipe Insulation	Warehouse	16,466	77	2,796	15%	\$1.249	\$1.437	Water Heat	Level E	Level E
2	100	Base Cooking	School	3,960	0	0	0%	N/A	\$-	Cooking	N/A	N/A
2	104	Infrared Fryer	School	3,838	122	122	3%	\$1.839	\$2.114	Cooking	Level E	Level E

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2	102	High-Efficiency Convection Oven	School	3,675	163	284	7%	\$5.057	\$5.816	Cooking	Level E	Level E
2	103	Efficient Infrared Griddle	School	3,631	44	328	8%	\$7.145	\$8.217	Cooking	Level E	Level E
2	106	Power Burner Fryer	School	3,600	31	359	9%	\$8.602	\$9.892	Cooking	Level E	Level E
2	107	Infrared Conveyer Oven	School	3,519	81	440	11%	\$19.859	\$22.838	Cooking	Level E	Level E
2	105	Power Burner Oven	School	3,489	30	470	12%	\$22.175	\$25.501	Cooking	Level E	Level E
2	200	Base Heating	School	22,978	0	0	0%	N/A	\$	HVAC	N/A	N/A
2	206	Duct Repair and Sealing	School	22,973	5	5	0%	\$0.126	\$0.145	HVAC	Level A	Level A
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	School	22,289	684	689	3%	\$0.100	\$0.115	HVAC	Level A	Level A
2	228	Stack Heat Exchanger	School	21,912	377	1,066	5%	\$0.311	\$0.358	HVAC	Level B	Level B
2	216	Clock/Programmable Thermostat	School	21,909	2	1,068	5%	\$0.353	\$0.405	HVAC	Level B	Level B
2	207	Duct Insulation	School	21,903	7	1,075	5%	\$0.327	\$0.376	HVAC	Level B	Level B
2	209	Insulation of Pipes	School	21,884	18	1,093	5%	\$0.564	\$0.649	HVAC	Level C	Level C
2	227	High Efficiency Gas Furnace	School	21,126	758	1,851	8%	\$1.697	\$1.951	HVAC	Level E	Level E
2	218	Installation of Energy Management Systems (EMS)	School	21,051	75	1,927	8%	\$1.813	\$2.085	HVAC	Level E	Level E
2	203	Insulation (wall)	School	20,870	181	2,108	9%	\$2.603	\$2.993	HVAC	Level E	Level E



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2	222	Installation of Air Side Heat Recovery Systems	School	20,538	332	2,439	11%	\$3.189	\$3.668	HVAC	Level E	Level E
2	202	Insulation (ceiling)	School	20,457	81	2,520	11%	\$4.855	\$5.583	HVAC	Level E	Level E
2	300	Base Pool Heating	School	774	0	0	0%	N/A	\$-	Appliances	N/A	N/A
2	302	Installation of Swimming Pool/Spa Covers	School	680	94	94	12%	\$0.130	\$0.149	Appliances	Level A	Level A
2	301	Installation of Solar Pool/Spa Heating Systems	School	573	107	202	26%	\$12.037	\$13.843	Appliances	Level E	Level E
2	400	Base Water Heating	School	19,593	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	School	18,002	1,591	1,591	8%	\$0.123	\$0.142	Water Heat	Level A	Level A
2	401	Hot Water (SHW) Pipe Insulation	School	17,953	49	1,640	8%	\$0.440	\$0.507	Water Heat	Level B	Level C
2	404	Tankless Water Heater	School	17,878	75	1,715	9%	\$0.646	\$0.743	Water Heat	Level C	Level D
2	402	High-Efficiency Water Heater (gas)	School	16,116	1,762	3,478	18%	\$0.769	\$0.884	Water Heat	Level D	Level D
2	100	Base Cooking	University	2,460	0	0	0%	N/A	\$-	Cooking	N/A	N/A
2	104	Infrared Fryer	University	2,370	89	89	4%	\$0.919	\$1.057	Cooking	Level D	Level E
2	103	Efficient Infrared Griddle	University	2,325	45	134	5%	\$2.576	\$2.962	Cooking	Level E	Level E
2	107	Infrared Conveyor Oven	University	2,138	187	322	13%	\$3.151	\$3.624	Cooking	Level E	Level E
2	106	Power Burner Fryer	University	2,116	22	343	14%	\$4.538	\$5.218	Cooking	Level E	Level E
2	102	High-Efficiency Convection Oven	University	2,079	38	381	15%	\$8.049	\$9.256	Cooking	Level E	Level E

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2	105	Power Burner Oven	University	2,058	21	402	16%	\$11.660	\$13.409	Cooking	Level E	Level E
2	200	Base Heating	University	21,136	0	0	0%	N/A	\$	HVAC	N/A	N/A
2	228	Stack Heat Exchanger	University	20,791	345	345	2%	\$0.050	\$0.057	HVAC	Level A	Level A
2	206	Duct Repair and Sealing	University	20,788	3	348	2%	\$0.076	\$0.088	HVAC	Level A	Level A
2	209	Insulation of Pipes	University	20,770	17	366	2%	\$0.140	\$0.161	HVAC	Level A	Level A
2	207	Duct Insulation	University	20,766	4	370	2%	\$0.190	\$0.218	HVAC	Level A	Level A
2	216	Clock/Programmable Thermostat	University	20,764	2	372	2%	\$0.239	\$0.275	HVAC	Level A	Level A
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	University	20,147	617	989	5%	\$0.184	\$0.212	HVAC	Level A	Level A
2	212	Boiler Tune-Up	University	20,135	12	1,001	5%	\$0.315	\$0.362	HVAC	Level B	Level B
2	227	High Efficiency Gas Furnace	University	19,437	698	1,699	8%	\$0.448	\$0.516	HVAC	Level B	Level C
2	203	Insulation (wall)	University	19,391	46	1,745	8%	\$1.110	\$1.277	HVAC	Level E	Level E
2	218	Installation of Energy Management Systems (EMS)	University	19,225	166	1,910	9%	\$1.282	\$1.475	HVAC	Level E	Level E
2	222	Installation of Air Side Heat Recovery Systems	University	18,950	275	2,185	10%	\$2.302	\$2.647	HVAC	Level E	Level E
2	202	Insulation (ceiling)	University	18,938	13	2,198	10%	\$3.591	\$4.129	HVAC	Level E	Level E
2	300	Base Pool Heating	University	987	0	0	0%	N/A	\$	Appliances	N/A	N/A

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	302	Installation of Swimming Pool/Spa Covers	University	882	105	105	11%	\$0.060	\$0.069	Appliances	Level A	Level A
2	301	Installation of Solar Pool/Spa Heating Systems	University	743	139	245	25%	\$4.548	\$5.230	Appliances	Level E	Level E
2	400	Base Water Heating	University	22,822	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	University	22,217	605	605	3%	\$0.121	\$0.139	Water Heat	Level A	Level A
2	401	Hot Water (SHW) Pipe Insulation	University	22,212	5	610	3%	\$0.261	\$0.300	Water Heat	Level A	Level B
2	404	Tankless Water Heater	University	22,132	80	690	3%	\$0.405	\$0.466	Water Heat	Level B	Level C
2	402	High-Efficiency Water Heater (gas)	University	20,249	1,883	2,573	11%	\$0.482	\$0.554	Water Heat	Level C	Level C
2	100	Base Cooking	Hospital & Health Care	9,057	0	0	0%	N/A	\$-	Cooking	N/A	N/A
2	104	Infrared Fryer	Hospital & Health Care	8,942	115	115	1%	\$0.230	\$0.264	Cooking	Level A	Level A
2	107	Infrared Conveyer Oven	Hospital & Health Care	8,690	252	367	4%	\$0.754	\$0.868	Cooking	Level D	Level D
2	103	Efficient Infrared Griddle	Hospital & Health Care	8,647	43	410	5%	\$0.864	\$0.994	Cooking	Level D	Level D
2	106	Power Burner Fryer	Hospital & Health Care	8,616	31	441	5%	\$1.033	\$1.188	Cooking	Level E	Level E
2	102	High-Efficiency Convection Oven	Hospital & Health Care	8,542	75	515	6%	\$1.297	\$1.492	Cooking	Level E	Level E

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	105	Power Burner Oven	Hospital & Health Care	8,511	30	546	6%	\$2.612	\$3.004	Cooking	Level E	Level E
2	200	Base Heating	Hospital & Health Care	293,193	0	0	0%	N/A	\$-	HVAC	N/A	N/A
2	206	Duct Repair and Sealing	Hospital & Health Care	293,155	38	38	0%	\$0.041	\$0.047	HVAC	Level A	Level A
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Hospital & Health Care	284,418	8,737	8,775	3%	\$0.032	\$0.037	HVAC	Level A	Level A
2	228	Stack Heat Exchanger	Hospital & Health Care	279,886	4,532	13,307	5%	\$0.063	\$0.073	HVAC	Level A	Level A
2	207	Duct Insulation	Hospital & Health Care	279,835	51	13,358	5%	\$0.106	\$0.121	HVAC	Level A	Level A
2	216	Clock/Programmable Thermostat	Hospital & Health Care	279,782	53	13,411	5%	\$0.136	\$0.156	HVAC	Level A	Level A
2	227	High Efficiency Gas Furnace	Hospital & Health Care	264,775	15,008	28,419	10%	\$0.216	\$0.249	HVAC	Level A	Level A
2	209	Insulation of Pipes	Hospital & Health Care	264,505	269	28,688	10%	\$0.338	\$0.388	HVAC	Level B	Level B
2	212	Boiler Tune-Up	Hospital & Health Care	264,367	138	28,826	10%	\$0.408	\$0.469	HVAC	Level B	Level C
2	218	Installation of Energy Management Systems (EMS)	Hospital & Health Care	260,300	4,067	32,893	11%	\$0.746	\$0.858	HVAC	Level D	Level D

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	203	Insulation (wall)	Hospital & Health Care	259,668	632	33,525	11%	\$0.921	\$1.059	HVAC	Level D	Level E
2	222	Installation of Air Side Heat Recovery Systems	Hospital & Health Care	256,329	3,339	36,864	13%	\$1.302	\$1.498	HVAC	Level E	Level E
2	202	Insulation (ceiling)	Hospital & Health Care	256,153	176	37,040	13%	\$2.929	\$3.368	HVAC	Level E	Level E
2	300	Base Pool Heating	Hospital & Health Care	282	0	0	0%	N/A	\$-	Appliances	N/A	N/A
2	302	Installation of Swimming Pool/Spa Covers	Hospital & Health Care	229	54	54	19%	\$0.038	\$0.044	Appliances	Level A	Level A
2	301	Installation of Solar Pool/Spa Heating Systems	Hospital & Health Care	192	36	90	32%	\$1.630	\$1.875	Appliances	Level E	Level E
2	400	Base Water Heating	Hospital & Health Care	229,789	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	401	Hot Water (SHW) Pipe Insulation	Hospital & Health Care	228,989	799	799	0%	\$0.064	\$0.074	Water Heat	Level A	Level A
2	403	Water Heater Tank Blanket/Insulation	Hospital & Health Care	223,100	5,890	6,689	3%	\$0.105	\$0.121	Water Heat	Level A	Level A
2	404	Tankless Water Heater	Hospital & Health Care	222,198	901	7,590	3%	\$0.242	\$0.279	Water Heat	Level A	Level A
2	402	High-Efficiency Water Heater (gas)	Hospital & Health Care	199,907	22,291	29,882	13%	\$0.288	\$0.331	Water Heat	Level A	Level B
2	100	Base Cooking	Hotel	11,029	0	0	0%	N/A	\$-	Cooking	N/A	N/A
2	104	Infrared Fryer	Hotel	10,682	347	347	3%	\$0.230	\$0.264	Cooking	Level A	Level A

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	103	Efficient Infrared Griddle	Hotel	10,550	131	479	4%	\$0.856	\$0.984	Cooking	Level D	Level D
2	106	Power Burner Fryer	Hotel	10,458	92	571	5%	\$1.031	\$1.185	Cooking	Level E	Level E
2	102	High-Efficiency Convection Oven	Hotel	10,265	193	764	7%	\$1.520	\$1.748	Cooking	Level E	Level E
2	107	Infrared Conveyor Oven	Hotel	10,029	236	1,000	9%	\$2.425	\$2.789	Cooking	Level E	Level E
2	105	Power Burner Oven	Hotel	9,941	88	1,088	10%	\$2.709	\$3.116	Cooking	Level E	Level E
2	200	Base Heating	Hotel	10,268	0	0	0%	N/A	\$-	HVAC	N/A	N/A
2	228	Stack Heat Exchanger	Hotel	10,093	176	176	2%	\$0.316	\$0.364	HVAC	Level B	Level B
2	206	Duct Repair and Sealing	Hotel	10,091	2	178	2%	\$0.552	\$0.635	HVAC	Level C	Level C
2	216	Clock/Programmable Thermostat	Hotel	10,090	1	178	2%	\$0.795	\$0.915	HVAC	Level D	Level D
2	227	High Efficiency Gas Furnace	Hotel	9,851	240	418	4%	\$0.943	\$1.084	HVAC	Level D	Level E
2	209	Insulation of Pipes	Hotel	9,844	6	424	4%	\$1.084	\$1.246	HVAC	Level E	Level E
2	207	Duct Insulation	Hotel	9,841	3	427	4%	\$1.404	\$1.614	HVAC	Level E	Level E
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Hotel	9,553	288	715	7%	\$0.948	\$1.090	HVAC	Level D	Level E
2	212	Boiler Tune-Up	Hotel	9,546	7	723	7%	\$2.040	\$2.346	HVAC	Level E	Level E
2	203	Insulation (wall)	Hotel	9,399	146	869	8%	\$2.845	\$3.272	HVAC	Level E	Level E
2	218	Installation of Energy Management Systems (EMS)	Hotel	9,108	291	1,160	11%	\$4.385	\$5.043	HVAC	Level E	Level E

APPENDIX D

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	222	Installation of Air Side Heat Recovery Systems	Hotel	8,996	112	1,272	12%	\$7.485	\$8.608	HVAC	Level E	Level E
2	202	Insulation (ceiling)	Hotel	8,970	26	1,298	13%	\$8.823	\$10.146	HVAC	Level E	Level E
2	300	Base Pool Heating	Hotel	5,496	0	0	0%	N/A	\$-	Appliances	N/A	N/A
2	302	Installation of Swimming Pool/Spa Covers	Hotel	4,007	1,489	1,489	27%	\$0.045	\$0.052	Appliances	Level A	Level A
2	301	Installation of Solar Pool/Spa Heating Systems	Hotel	3,374	633	2,122	39%	\$1.511	\$1.738	Appliances	Level E	Level E
2	400	Base Water Heating	Hotel	37,804	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	Hotel	35,545	2,258	2,258	6%	\$0.219	\$0.252	Water Heat	Level A	Level A
2	404	Tankless Water Heater	Hotel	35,286	259	2,518	7%	\$0.420	\$0.483	Water Heat	Level B	Level C
2	402	High-Efficiency Water Heater (gas)	Hotel	29,344	5,942	8,459	22%	\$0.498	\$0.572	Water Heat	Level C	Level C
2	401	Hot Water (SHW) Pipe Insulation	Hotel	29,158	187	8,646	23%	\$0.583	\$0.671	Water Heat	Level C	Level D
2	200	Base Heating	Miscellaneous	105,990	0	0	0%	N/A	\$-	HVAC	N/A	N/A
2	201	High Efficiency Windows (Multiple Glazed, Low Emissivity)	Miscellaneous	102,635	3,354	3,354	3%	\$0.088	\$0.101	HVAC	Level A	Level A
2	228	Stack Heat Exchanger	Miscellaneous	100,900	1,735	5,090	5%	\$0.169	\$0.194	HVAC	Level A	Level A
2	206	Duct Repair and Sealing	Miscellaneous	100,884	16	5,106	5%	\$0.194	\$0.223	HVAC	Level A	Level A
2	216	Clock/Programmable Thermostat	Miscellaneous	100,880	3	5,109	5%	\$0.281	\$0.323	HVAC	Level A	Level B

**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	207	Duct Insulation	Miscellaneous	100,854	26	5,135	5%	\$0.481	\$0.553	HVAC	Level C	Level C
2	227	High Efficiency Gas Furnace	Miscellaneous	99,485	1,369	6,504	6%	\$0.567	\$0.652	HVAC	Level C	Level D
2	209	Insulation of Pipes	Miscellaneous	99,415	71	6,575	6%	\$0.908	\$1.044	HVAC	Level D	Level E
2	212	Boiler Tune-Up	Miscellaneous	99,352	62	6,637	6%	\$1.045	\$1.202	HVAC	Level E	Level E
2	218	Installation of Energy Management Systems (EMS)	Miscellaneous	98,529	823	7,460	7%	\$1.423	\$1.636	HVAC	Level E	Level E
2	202	Insulation (ceiling)	Miscellaneous	98,345	184	7,645	7%	\$1.738	\$1.999	HVAC	Level E	Level E
2	203	Insulation (wall)	Miscellaneous	97,535	810	8,455	8%	\$1.985	\$2.259	HVAC	Level E	Level E
2	222	Installation of Air Side Heat Recovery Systems	Miscellaneous	96,550	985	9,440	9%	\$2.471	\$2.842	HVAC	Level E	Level E
2	400	Base Water Heating	Miscellaneous	105,945	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	Miscellaneous	103,640	2,305	2,305	2%	\$0.036	\$0.042	Water Heat	Level A	Level A
2	401	Hot Water (SHW) Pipe Insulation	Miscellaneous	103,220	420	2,725	3%	\$0.129	\$0.148	Water Heat	Level A	Level A
2	404	Tankless Water Heater	Miscellaneous	102,813	407	3,132	3%	\$0.405	\$0.466	Water Heat	Level B	Level C
2	402	High-Efficiency Water Heater (gas)	Miscellaneous	94,229	8,584	11,716	11%	\$0.489	\$0.540	Water Heat	Level C	Level C
2	400	Base Water Heating	Miscellaneous	105,945	0	0	0%	N/A	\$-	Water Heat	N/A	N/A
2	403	Water Heater Tank Blanket/Insulation	Miscellaneous	103,027	2,918	2,918	3%	\$0.036	\$0.041	Water Heat	Level A	Level A



**APPENDIX D**

Sgmt	Measure Number	Measure	Building Type	Total Therms	Therms Savings	Total Energy Savings Therms	Percent Therms Savings	Marginal Energy Cost \$/Therm Technical Potential	Marginal Energy Cost \$/Therm Achievable Potential	End Use Groups	Technical Potential Cost Group	Achievable Potential Cost Group
2	401	Hot Water (SHW) Pipe Insulation	Miscellaneous	102,610	417	3,335	3%	\$0.138	\$0.159	Water Heat	Level A	Level A
2	404	Tankless Water Heater	Miscellaneous	102,104	506	3,841	4%	\$0.345	\$0.397	Water Heat	Level B	Level B
2	402	High-Efficiency Water Heater (gas)	Miscellaneous	91,375	10,729	14,570	14%	\$0.399	\$0.459	Water Heat	Level B	Level C



# E

## INDUSTRIAL ELECTRIC RESULTS AND INPUTS

	1999 Open Access Consumption Total (MWh)	Measure Life (Years)	% Industrial Load	% End Use Savings	First Year Savings (MWh)	Measure Cost \$/kWh Saved	Total Cost (\$)	Simple Payback @ \$0.05/kWh	Cumm. Savings (kWh)	Gross Cost of Saved Energy (\$/kWh)
<b>Total Load</b>	1,571,020	15.9	10.3%	N/A	161,575	\$0.186	\$30,123,781	3.7	2,565,203	\$0.012
<b>E.1.1 Uncoded</b>	171,553	-	-	-	-	-	-	-	-	-
HVAC	179,248	15.0	1.3%	11.3%	20,165	\$0.450	\$9,074,414	9.0	302,480	\$0.030
Indirect Boiler	15,182	-	-	-	-	-	-	-	-	-
Lighting	156,980	10.0	1.2%	12.4%	19,418	\$0.250	\$4,854,575	5.0	194,183	\$0.025
Other - Not Reported	128,713	-	-	-	-	-	-	-	-	-
Process Electro Chemical	17,651	-	-	-	-	-	-	-	-	-
Process Heat	132,084	-	-	-	-	-	-	-	-	-
Process Other	9,354	-	-	-	-	-	-	-	-	-
Motors Technical Potential	654,866	17.3	6.7%	16.2%	105,801	\$0.130	\$13,766,273	2.6	1,825,688	\$0.008
• Motors Potential w/o Compressed Air O&M	NA	20.0	5.7%	13.7%	89,671	\$0.148	\$13,282,369	3.0	1,793,428	\$0.007
• Compressed Air O&M	NA	2.0	1.0%	2.5%	16,130	\$0.030	\$483,904	0.6	32,260	\$0.015
Refrigeration/Process Cooling	105,388	15.0	1.0%	15.4%	16,190	\$0.150	\$2,428,519	3.0	242,852	\$0.010



**F**

**INDUSTRIAL GAS RESULTS AND INPUTS**

	1999 Consumption Total	Measure Life (Years)	% Industrial Load	% End Use Savings	First Year Annual (therms)	Measure Cost \$/therm Saved	Total Cost (\$)	Simple Payback @ \$0.67/therm	Cumm. Savings (therms)	Gross Cost of Saved Energy (\$/therms)
<b>Total Sales</b>	<b>47,890,199</b>	<b>14.8</b>	<b>9.3%</b>	<b>-</b>	<b>4,446,617</b>	<b>-</b>	<b>\$8,044,845</b>	<b>-</b>	<b>66,014,080</b>	<b>\$0.12187</b>
<b>Uncoded</b>										
Miscoded	5,316,313	-	-	-	-	-	-	-	-	-
HVAC	1,904,499	-	-	-	-	-	-	-	-	-
Process Boiler	5,981,028	15	1.4%	11.2%	667,332	\$5.48	\$3,656,979	8.2	10,009,980	\$0.37
Process Boiler	15,554,164		7.9%	24.3%	3,779,285	\$1.16	\$4,387,865	1.7	56,004,101	\$0.08
Process Boiler										
Process Boiler										
Process Boiler (Upgrade/Controls/Ht Recov)	N/A	15	2.2%	6.7%	1,038,582	\$1.52	\$1,578,645	2.3	15,578,732	\$0.10
Process Boiler O&M	N/A	5	1.4%	4.4%	685,176	\$0.41	\$280,922	0.6	3,425,879	\$0.08
Steam Distribution Systems	N/A	18	4.3%	13.2%	2,055,527	\$1.23	\$2,528,298	1.8	36,999,490	\$0.07
• Other - Not Reported	3,209,210	-	-	-	-	-	-	-	-	-
• Process Heat	15,738,121	-	-	-	-	-	-	-	-	-
• Process Other	186,864	-	-	-	-	-	-	-	-	-

**Appendix B-  
Detail on Electric  
Portfolio Screening Model**

**Appendix B.**  
**Detail on Electric Portfolio Screening Model**

## **Contents**

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- **Portfolio Development**
- **Screening Model Logic**
- **Assumptions**

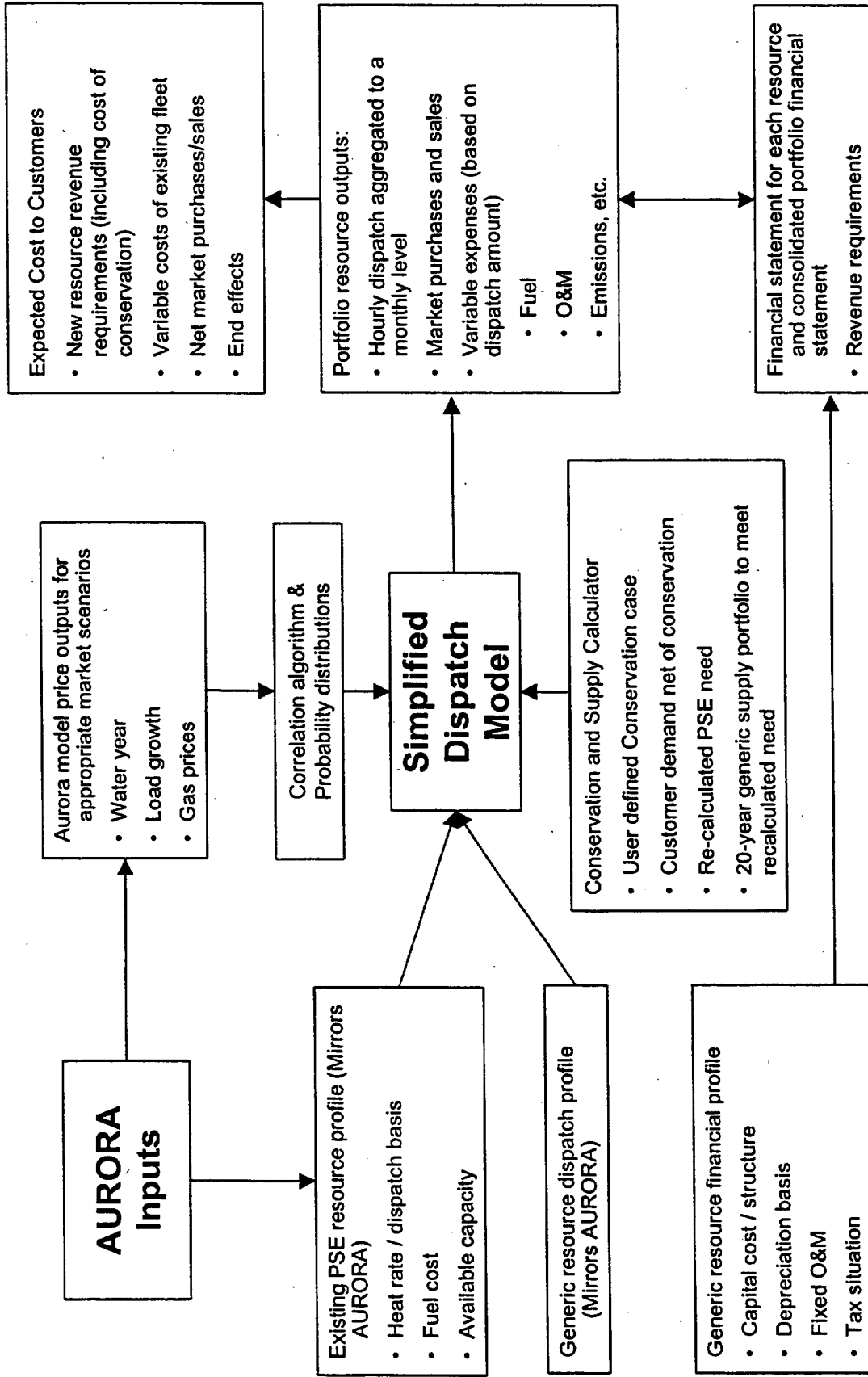


## Portfolio Construction Assumptions and Considerations

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- In the 04/30/03 LCP, the supply resource portfolios were constructed “by hand” using 25 MW increments, the supply resource portfolios are now automatically constructed to exactly match the need according to the following rules:
  - 10% of PSE’s demand will be met with renewable resources by 2013 and maintained thereafter (goal from the 04/30/03 LCP)
  - If there is no need in the months May thru August, then need from the remaining months will be met with Shaped CCGT MW
  - When need arises in the summer months, it will be met with a mix of thermal resources, 50% CCGT, and 50% coal
- Wind resources are added in a staggered fashion throughout the 10-year planning horizon and no wind is installed until 2005
- Whenever a CCGT resource is added (either full or shaped), an additional 13.5% of the CCGT capacity is added in the form of Duct Firing
  - PSE needs more capacity than energy
  - Duct Firing is significantly cheaper than SCGT
- Shaped CCGT rules:
  - PSE takes power from September to May
  - PSE would incur ~75% of the capital cost on a monthly market price weighted basis
  - Only the CCGT (not the Duct Firing) is jointly owned
- SCGT Capacity is sold forward as follows:
  - PSE has rights to the capacity from Nov to April
  - 100% of the fixed costs plus return are recovered for the 6-month capacity sale from May to October

# Integrated LCP Screening Tool Modeling Process Flow Chart



## Integrated LCP Portfolio Screening Tool - Overview

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The Integrated Portfolio Screening Tool is composed of three main parts:

- Conservation Load Impact and Supply Resource Calculator
  - Formerly the Portfolio Tester, now is integrated into the Screening Model calculations
  - The zero conservation total demand forecast is adjusted by the amount of conservation assumed in a conservation case and is used to re-calculate the PSE need for both energy and capacity
  - Supply resources are added automatically subject to user-defined rules to meet the remaining need
- Dispatch Model Calculation
  - Dispatches PSE fleet and potential new supply resources against hourly power prices from Aurora for WA/OR region
  - Utilizes the same inputs to Aurora for plant profiles and net demand
  - Output from dispatch model includes MWh for the PSE fleet and an assumed portfolio of new resources and their associated variable (or incremental) costs (fuel, O&M, etc.)
- Financial Summary and Expected Cost to Customer Calculation
  - MWhs produced and variable cost data from the dispatch model is used in conjunction with fixed cost assumptions to derive a 'bottom up' revenue requirement for each new resource being considered
  - A financial summary is generated for each new resource technology that includes an regulated income statement and an approximation of regulatory asset base
  - Financial data from each new resource is then consolidated
  - The comparative incremental cost (or going forward cost) to customers for a particular resource portfolio is developed by combining the variable cost of dispatch from the existing dispatchable PSE fleet, the variable emission cost from the existing PSE fleet, the cost of market purchases, and the revenue from market sales with the revenue requirements (including conservation expense) from the new resource portfolio over a 20 year period
  - The NPV of the 20 year strip of "forward" costs to customers is then calculated at the pre-tax WACC
  - The NPV of the Expected Cost to Customers are for comparative purposes only

## Detailed View of the Conservation Impact and Supply Resource Calculation Process – Input Data

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- Conservation load impact data in total MWh form as follows:
  - Eight residential bundles: Appliances, HVAC, Lighting, and Water heating for both new construction and existing construction
  - Eight commercial bundles: Appliances, HVAC, Lighting, and Water heating for both new construction and existing construction
  - One Industrial bundle
- The MWh of conservation were further broken down into price points, four for the residential and commercial bundles and one for industrial totaling 65 individual unique conservation bundle/price points
- The duration of benefit of each of the 65 conservation bundle/price points
- Weighted 8760 load shapes for the 17 bundles (8 residential, 8 commercial, and 1 industrial)
  - The load shapes were normalized such that the total annual MWh conservation impact could be multiplied by each hours value to yield the hourly conservation impact
  - The load shapes provided were based on shapes originally developed by NPPC

## Detailed View of the Conservation Impact and Supply Resource Calculation Process – Total Demand Adjustment and Supply Resource Calculation

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- Conservation cases are user defined by selecting a mix of the 65 unique bundle/price points
- The MWh associated with the selected bundle/price points are rolled up to the bundle level and grossed up by 6.5% for line losses
- Each of the 17 bundles has an associated hourly load shape that has been normalized to allow the rolled up bundle annual MWh to be directly spread to hourly before they are consolidated into a total hourly conservation impact
  - The base load shapes provided were developed from the load shapes defined by NPPC
  - The load shapes are for a 2004 base year and are adjusted for the proper annual start date for the years 2005-2023
- The 20-year total hourly conservation impact is then subtracted from the 20-year no-conservation total demand forecast to develop the conservation adjusted total demand forecast
- The conservation adjusted hourly total demand forecast is rolled up to a monthly aMW level and used to recalculate the PSE energy need
- The capacity value of conservation is assumed to be the average of the maximum hour of conservation in December, January, and February and is used to adjust the capacity need
  - Assumes that the highest hour of conservation savings is coincident with the peak hour of load
- Supply portfolios are constructed based recalculated capacity and energy need

## Detailed View of the Conservation Impact and Supply Resource Calculation Process – Dispatch and Financial Impact of Conservation

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- The 20-year total hourly conservation impact is subtracted net demand associated with the 20-year no-conservation total demand forecast
  - This process is mathematically equivalent to the treatment of the must-run resources (wind, NUG's, etc.) and the hydro resources
  - The net demand is the total demand minus current PSE contracts
- The calculated supply portfolios are dispatched against the June AURORA price forecast, hourly spot market purchase and sales are based on the total hourly dispatch of the PSE fleet (current and future generic) and the hourly conservation adjusted net demand
- The cost of the conservation bundles/price points assumed in the case flow directly to revenue requirement and are calculated as follows:
  - The cost of each conservation bundle/price point is spread over the respective useful life of the bundle/price point
  - For bundle/price points where the useful life is less than 20 years, we assume a 100% "re-up" rate for as many times as necessary to fill the 20 year period
  - There is no escalation of cost of bundle/price points when spread over the useful life or when re-upped
  - The total cost of the bundle/price points are reduced by 10% to reflect the environmental benefit of foregoing fossil supply additions through conservation
  - The total cost of conservation flows to revenue requirement with no return component
- End effects are dealt with in a similar fashion as the end effects of supply resources
  - A market benefit of the residual conservation from year 2024-2050 is calculated by subtracting the total cost of conservation from the market value of the conserved MWhs
  - This value is discounted back to year 1 and raises or lowers the revenue requirement based on the attractiveness of the conservation case

## Net Demand Development

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- Monthly demand and resource summaries extracted from Aurora for the forecast period are used to develop Net Demand
- The monthly Net Demand is derived by taking the total demand and subtracting contract purchases/(sales)
- The monthly Net Demand is converted to hourly Net Demand through the following process:
  - AURORA adjusts the base load shape for the proper day on which 1/1/xxxx falls for the 20-year analysis period
  - Factors are developed based on this 20-year hourly load shape
  - These factors for each hour are then applied to the monthly Net Demand to create 8760 Net Demand profiles for the 20-year forecast period

## Dispatchable Resources

- The dispatchable plants are:
  - PSE owned: Fredonia 1&2, Fredonia 3&4, Frederickson 1&2, Whitehorn 2&3, Colstrip 1&2, Colstrip 3&4 and Encogen (dispatchable)
  - NUG's: March Point 1&2 (dispatchable), Sumas, and Tenaska
  - New resources: CCGT (including structured deals), SCGT, and coal
- There are two primary data inputs to the dispatch logic from the dispatchable plants:
  - Dispatch Basis: This is the marginal cost of dispatch and is sum of variable O&M, fuel cost (calculated by running a "burner tip" \$/MMBtu fuel cost through the plants heat rate to arrive at \$/MWh), and any other incremental costs (e.g. emissions, transmission, etc.)
  - Dispatchable Capacity: The dispatchable capacity adjusts the net capacity for an asset by a forced outage rate applied evenly over all periods, and an planned outage rate applied when the outage is expected

Plant	Net Capacity (MW)	Heat Rate (Btu/KWh)	Forced Outage Rate (%)	VOM (\$/MWh)	Fuel Cost (Note/\$/MMBtu)	Planned Outage Period (Approx.)
Fredonia 1&2	202.1	11,569	16.87	2.12	Sumas + trans.	1 week in May
Fredonia 3&4	108.0	10,540	5.00	2.12	Sumas + trans.	1 week in May
Frederickson 1&2	141.0	12,450	14.26	2.12	Sumas + trans.	1 week in April
Whitehorn 2&3	134.4	11,987	13.23	2.12	Sumas + trans.	1 week in April
Colstrip 1&2	298.6	10,889	10.38	Inc. in fuel	0.45	2 weeks in May
Colstrip 3&4	359.9	10,695	8.29	Inc. in fuel	0.60	2 weeks in June
Encogen - Disp.	120.0	9,032	1.97	Inc. in fuel	Sumas + trans.	Inc. in FOR
March Point 1 - Disp.	0.0	8,500	0.20	Inc. in fuel	Sumas	Inc. in FOR
March Point 2 - Disp.	13.0	12,000	0.20	Inc. in fuel	Sumas	Inc. in FOR
Sumas	133.0	8,200	1.80	Inc. in fuel	Sumas	Inc. in FOR
Tenaska	245.0	8,700	0.30	Inc. in fuel	Sumas	Inc. in FOR
CCGT - Generic	NA	6,856	5.00	2.00	Sumas	1 week
SCGT - Generic	NA	10,817	3.60	2.00	Sumas	1 week
Coal - Generic	NA	8,922	7.00	2.00	0.73	2 weeks/yr



## Must Run and Renewable Resources

- The must run plants are:
  - PSE Owned: All hydro plants, and Encogen MR
  - NUG's: March Point 1&2 MR
  - New resources: Wind
- The Must Run plants have only have Dispatchable Capacity as input to the dispatch logic
  - The must run portions of Encogen and March Point calculate the Dispatchable Capacity is the same fashion as the dispatchable portions of those plants
  - The wind units have their nominal capacity adjusted for monthly availability based on seasonal variations in wind patterns (the proxy is currently for wind located in the Basin & Range region of OR and ID)
  - The hydro unit Dispatchable Capacity is based on the monthly availability for the average water year in the 40-year hydro data set from NWPP and the hourly dispatch shape for a 2003 base year in Aurora
    - ✓ The hourly shape adjusts the monthly average is a similar fashion as the Net Demand

Plant	Net Capacity (MW)	Heat Rate (Btu/KWh)	Forced Outage Rate (%)	VOM (\$/MWh)	Fuel Cost (Note\$/MMBtu)	Planned Outage Period (Approx.)
Encogen - MR	51.0	9,830	1.97	Inc. in fuel	Sumas + trans.	Inc. in FOR
March Point 1 - MR	85.0	8,500	0.20	Inc. in fuel	Sumas	Inc. in FOR
March Point 2 - MR	50.0	8,500	0.20	Inc. in fuel	Sumas	Inc. in FOR
Wind	NA	NA	72%	1.00	NA	NA

Source: 2002 Rate Case with some updates

## Must Run and Renewable Resources Continued

Month	Basin & Range	Cascades & Inland	Northern California	Northwest coast	Rockies & Plains	Southern California
January	119%	103%	22%	119%	161%	68%
February	139%	90%	28%	157%	157%	66%
March	107%	107%	69%	107%	102%	97%
April	105%	107%	113%	86%	84%	128%
May	94%	121%	181%	84%	77%	175%
June	71%	107%	188%	84%	73%	133%
July	56%	111%	210%	101%	35%	147%
August	61%	107%	185%	54%	42%	95%
September	72%	94%	96%	66%	52%	87%
October	74%	73%	65%	80%	100%	82%
November	159%	85%	24%	140%	130%	65%
December	143%	96%	18%	121%	188%	57%
FOR	72%	70%	69%	70%	64%	69%

- We are currently using the Cascade & Inland profile in the calculations
- Appears to be where the most promising near term projects are located

## Emissions Assumptions

Emission rate (T/GWh)	SO2	NOX	CO2	Source
Fredonia 1&2	-	0.00002	582.00	PSE
Frederickson 1&2	0.00080	0.03900	582.00	NPPC Generic
Fredonia 3&4	0.00080	0.03900	582.00	PSE
Whitehorn 2&3	0.000003	0.00002	582.00	PSE
Colstrip 1&2	2.27613	2.09048	1,119.24	EPA
Colstrip 3&4	0.50220	2.19521	1,097.69	EPA
Encogen (Dispatchable)	0.00200	0.03900	411.00	NPPC Generic
March Point 1&2 (Dispatchable)	0.00200	0.03900	411.00	NPPC Generic
Sumas	0.00200	0.03900	411.00	NPPC Generic
Tenaska	0.00200	0.03900	411.00	NPPC Generic
CCGT (Generic)	0.00200	0.03900	411.00	NPPC Generic
SCGT (Generic)	0.00080	0.05523	582.00	NPPC Generic
Coal (Generic)	0.38200	0.35000	1,012.00	NPPC Generic
Escalation	2.50%	-	-	
Base Cost/Ton	200.00	-	-	

## Dispatch Logic

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- The hourly dispatch of the PSE fleet and the new resources considered in the planning portfolio is done on a month by month basis (this is due to size constraints within Excel)
- The dispatch logic is as follows:
  - For each hour, the Dispatch Basis for each dispatchable plant is compared to the market price for that hour, if the Dispatch Basis is less than the market price, then the plant generates its Dispatchable Capacity for that hour, else, it does not dispatch that hour
  - The total generation from the dispatchable plants is summed for each hour
  - The total generation from the must run plants is added to the total generation from the dispatchable plants
  - The grand total of plant generation (dispatchable and must run) is compared to the Net Demand for each hour, if the amount generated is less than the Net Demand, then that amount represents a market purchase, if the amount generated is greater than Net Demand, then that amount represents a market sale
  - For every hour where there is a market sale or purchase, the market price at that hour is used to calculate the financial impact of the purchase or sale
- The major simplification from the dispatch logic in Aurora is that there is no provision for unit minimum run times, ramp rates, minimum dispatch levels, etc.

## End Effects for Supply Resources in the Screening Model

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- The issue of end effects arises because we have a 20 year evaluation period with for assets with a 30 year life, this is compounded by the fact that our portfolio planning horizon allows asset additions to occur through year 10, effectively creating a 40 year horizon for asset life
- To deal with years 21-40 in the analysis, we use the following methodology:
  - Forecast the free cash flows (100% equity basis) from the assets for years 21 to 40
  - NPV the free cash flows to year 20 at the after-tax WACC
  - Compare the NPV at year 20 to the remaining book value at year 20
  - NPV the difference to year one at the after tax WACC
  - Subtract the year one value from the Total Cost to Customer
- The free cash flow are estimated using the following assumptions:
  - Revenue: The revenue from year 17-20 is averaged and escalated at 2.5%
  - Fuel and VOM: The fuel and VOM from year 17-20 is averaged and escalated at 2.5%
  - Capacity Factor: The capacity factor from year 17-20 is averaged and held constant for year 21-40
  - FOM: The FOM continues to be escalated as in years 1-20
  - Property Tax: The property tax is trended down from year 17-20 (follows the trend down in rate base)
  - Insurance: The insurance is trended down from year 17-20 (follows the trend down in rate base)
  - Depreciation: The tax depreciation is run out normally for all assets past year 20
- The impact of the end effects are relatively small in comparison to the Total Cost to Customer, on the order of 2-5% of the total depending on portfolio mix and planning level

## Financial Summary and Revenue Requirement Calculation - Assumptions and Methodologies

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- Dates used for analysis period
  - Planning horizon for resource acquisition is 20 years beginning Jan. 1, 2004
  - Model assumes 'financial close' date of 12/31/xxxx as for all generic resources
  - Analysis period is 20 years
  
- Expense / Capital escalation rates
  - Both fixed and variable O&M currently assume a 2 ½% annual escalation factor
  - Both periodic and acquisition capex assume a 2 ½% annual escalation factor
    - ✓ Methodology – The model assumes two kinds of additional capex: 'incremental capex' and 'acquisition capex.' 'Incremental capex' are capital expenditures (plant) acquired on an annual basis using a \$/Kwh valuation. The current model assumes that 'incremental capex' is funded through available cash rather than by debt. Alternatively, the model assumes that 'acquisition capex', or capital expenditures related to acquiring new generation MW during the 10 year planning horizon, are financed using the debt to equity ratio supplied by PSE (60% debt to 40% equity).

### ▪ Capital Costs (New Acquisition Capex in \$/kw)

	All in Cost (\$/kw)
CCGT	\$710
SCGT	\$441
Coal	\$1,500
Wind	\$1,003
Duct Fired	\$150
Shaped CCGT	\$526

## Financial Summary and Revenue Requirement Calculation - Assumptions and Methodologies - continued

- O&M Costs (Table below outlining Fixed rates in \$/kW-yr and Variable O&M rates in \$/MWh)

	CCGT	SCGT	Coal	Wind	Duct Fired	Shaped CCGT
<b>Fixed Expenses (\$/kW-year)</b>						
FOM	11.00	3.00	20.00	26.10	-	8.14
Gas Transport	15.55	15.74	-	-	15.55	11.51
Electric Transmission	14.88	-	29.76	14.88	2.48	11.02
<b>Total</b>	<b>41.43</b>	<b>18.74</b>	<b>49.76</b>	<b>40.98</b>	<b>18.03</b>	<b>30.67</b>
<b>Variable Expenses (\$/MWh)</b>						
VOM	2.00	2.00	2.00	1.00	2.00	2.00
Fuel Basis Differential	1.24	1.29	-	-	1.00	1.24
<b>Total</b>	<b>3.24</b>	<b>3.29</b>	<b>2.00</b>	<b>1.00</b>	<b>3.00</b>	<b>3.24</b>

- Finance and Regulatory assumptions
  - Cost of equity and debt (used for both the WACC and debt amortization calculations) – 11.0% and 7.24% respectively
  - Pre / After Tax WACC – 8.95% and 7.61% respectively
  - Conversion Factor (gross-up factor used in revenue requirement calculation) – 62.02%
    - ✓ Roughly equivalent to (1- Federal tax rate and miscellaneous regulatory fees)

- Heat Rate and Forced Outage Rates

	CCGT	SCGT	Coal	Wind	Duct Fired	Shaped CCGT
Heat Rates	6,856	10,817	8,922	70%	9,100	6,856
Forced Outage Rates	5%	3.6%	7%	70%	0%	5%

## Financial Summary and Revenue Requirement Calculation - Calculation Detail

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The revenue requirement for a specified portfolio utilizes a 'bottom-up' approach where total fixed and variable costs are used to back solve for the appropriate revenue stream that would yield an operating income stream sufficient to provide a desired regulated rate of return. The following discussion outlines how individual components of fixed and variable expenses are calculated:

- Variable Costs – Fuel and Variable O&M
  - Fuel expense is calculated by multiplying the calculated number of MWh dispatched or generated each month, times the heat rate of the plant times the appropriate fuel curve (i.e. gas or coal)
  - Variable O&M is calculated by taking the appropriate VOM factor (as provided by PSE and illustrated on the previous slide), applying the VOM escalation percentage adjusted for time, and multiplying the resulting inflation adjusted VOM factor (in \$/Kwh) times the number of Kwh produced for the selected technology
- Fixed Costs – Fixed O&M
  - The FOM Factor provided by PSE should include all categories of fixed costs associated with the various technologies under consideration
  - The fixed cost calculation is similar to that of Variable O&M in that the FOM factor (quoted in \$/Kw) provided by PSE is inflation adjusted using the escalation factor illustrated on the previous slide and multiplied times the plant capacity (rather than the number of Kwh produced)
- Depreciation - Book and Tax
  - Book – Modeled value assumes 30 year recovery on all capital additions (Wind 20 years)
  - Tax – The portfolio model contains flexibility to select from 5, 10, 15 and 20 year MACRS (half-year convention)
    - ✓ The current test cases utilize 5 year MACRS for 'green' resources, 15 year MACRS for simple and combined cycle gas and 20 year MACRS for coal fired resources.



## Financial Summary and Revenue Requirement Calculation - Calculation Detail - continued

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- Debt Service – Interest
  - The interest is calculated as a function of Rate Base
  - The long-term capital structure assumes 52.57% debt
  - The interest rate is assumed to be 7.4%
  
- Tax – Current and Deferred
  - Current taxes are computed on taxable income calculated using tax depreciation rates previously discussed
  - Differences between book and tax depreciation are the only items considered to generate book/tax differences that give rise to deferred taxes.
  - Currently, the model assumes a 35% effective marginal rate

## Financial Summary and Revenue Requirement Calculation - Expected Cost to Customer

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- Expected Cost to Customer is the point at which various alternative portfolios will be measured
- Expected Cost to Customer in the portfolio model is calculated as follows:
  - The comparative incremental cost to customers for a particular resource portfolio is developed by combining:
    - ✓ The variable cost of dispatch from the existing dispatchable PSE fleet
    - ✓ The variable emission cost from the existing PSE fleet
    - ✓ The cost of market purchases
    - ✓ The revenue from market sales
    - ✓ The revenue requirements from the new resource portfolio over a 20 year period including the variable expense associated with market sales and the costs associated with conservation
  - The NPV of the 20 year strip of incremental costs to customers is then calculated at the pre-tax WACC
  - The NPV of the Expected Cost to Customers are for comparative purposes only